

South Coast Corridor Multi Modal Study  
Appraisal of SoCoMMS Strategy  
Prepared for  
**Government Office for the South East**  
August 2002

**Halcrow Group Limited**

In association with:

Accent

Chris Blandford Associates

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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](http://www.halcrow.com)

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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](http://www.halcrow.com)

# South Coast Corridor Multi Modal Study Appraisal of SoCoMMS Strategy

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# 1 Introduction

# 1 Introduction

## 1.1 *What is SoCoMMS*

1.1.1 The South Coast Corridor Multi Modal Study is one a number of studies being undertaken on behalf of the Government to review transport provision in this country. This study forms one of the second tranche of multi-modal studies proposed by the transport White Paper, 'A New Deal for Trunk Roads in England' (DETR, July 1998) and builds on the work already undertaken within the

- M27 Integrated Transport Study;
- A27, Worthing – Lancing Integrated Transport Study; and
- the Access to Hastings Multi-Modal Study.

## 1.2 *Study Area*

1.2.1 The SoCoMMS study is investigating the congestion, safety and environmental problems related to transport along the south coast between Southampton (Hampshire) and Thanet (Kent). As such, the south coast transport corridor is well defined between Southampton and Brighton being hemmed in to the north and south by the South Downs and the sea respectively. To the east of Brighton the transport corridor passes through the South Downs and crosses the Pevensey Levels to Hastings. To the east of Hastings the rail based transport system passes inland to Ashford and then on to Ramsgate and Margate via both Dover and Canterbury. Similarly, the road network in this area splits at Brenzett with the A259, A20 and A256 route following the coast through Folkestone and Dover while the A2070, A28 route passes through Ashford and Canterbury.

1.2.2 In addition, the study has defined an area of influence which reflects that

- the alternative travel routes for longer distance movements are via London for rail and via the M25 for road based trips;
- there are major land use influences (current and proposed), particularly to the west at Dibden Bay and to the north at Winchester, Gatwick, Bluewater and Tunbridge Wells;
- the main access route to areas such as Bournemouth and the Isle of Wight is through the study area; and
- there are other locations for which transport measures might influence travel on the south coast (for example rail improvements at Gatwick airport).

### 1.3

#### 1.3.1

#### ***Purpose of This Report***

The purpose of this report is to appraise the proposed strategy using the methodology set out in the Guidance on the Methodology for Multi Modal Studies (GOMMMS). The second chapter explains the different parts of the Appraisal process. This report will be looking in detail at the first part which is the Appraisal Summary Table. Chapter Three appraises the effects of the proposed strategy on the Human Environment. Chapter Four presents the impacts on the Physical Environment. In Chapter Five the affect of the strategy on safety will be appraised. Chapter Six looks at the strategies impact on Economy and Chapter Seven will look at Accessibility while Chapter Eight will discuss the impact of the strategy on Integration. In Chapter 9 the strategy is assessed against local and regional objectives. Chapter 10 appraises the impact of the strategy on identified problems. Chapter 11 presents the supporting analyses and appraise the strategy in relation to: distribution and equity; affordability and financial sustainability and practicality and public acceptability. Chapter 12 presents the Appraisal Summary Table which summarises the impact of the SoCoMMS strategy on the five transport objectives outlined by the Central Government.

## **2 The GOMMMS Appraisal Method**

## 2

# The GOMMMS Appraisal Method

### 2.1.1

The appraisal of the SoCoMMS transport strategy 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”.

### 2.1.2

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**.*

### **3 Human Environment**

## 3 Human Environment

### 3.1 *Noise*

3.1.1 The appraisal of the SoCoMMS Strategy has been carried out following the 'Methodology for Strategies' for the Noise sub-objective given in Volume 2, Chapter 7 of GOMMMS.

#### *Methodology*

3.1.2 The EMME/2 traffic model produced for SoCoMMS is a link-based model which is more spatially detailed than that which GOMMMS envisages is available at the strategy testing stage. Therefore some adaptations to the GOMMMS methodology were required, although these have not affected the form of the appraisal. The appraisal method involves two stages. The principles of the method are outlined initially below, followed by explanations of the methodologies for road traffic and railway noise.

3.1.3 **Stage 1** – For each model link, the differences in average noise emission between the Strategy under consideration and both the Present and Future Do Minimum are determined based on simplified calculation procedures.

3.1.4 **Stage 2** – The changes in noise emission levels and the zonal population density are in part used to determine the change in Estimated Population Annoyed by noise in each model zone. This is determined by:

- Initially, each link is divided into parts depending on the ratio of coverage of the link crossing several zones.
- The length of each model link is multiplied by the width of the impact corridor to determine the area of noise impact.
- The areas are multiplied by the zonal population density to give the estimated population exposed for each link.
- For each area an annoyance response function (change in % pop. annoyed/dB) is applied to the population exposed according to the change in noise emission. This gives the change in population annoyed for that link.
- The coverage of zones by each link is then determined as a percentage and this percentage is then multiplied by the population affected in each zone.

- The change in Estimated Population Annoyed (EPA) is then summed for each model zone and the overall changes are determined across the study area.

### 3.1.5

**Road traffic noise** – The noise indicator used to represent average road noise emissions for each link is the Basic Noise Level determined according to *Calculation of Road Traffic Noise*, Department of Transport, 1988. This is the  $L_{A10\ 18\text{-hour}}$  index in dB at 10 m from the road-side. The calculation is based on traffic flow in terms of the 24-hour AADT, derived from the peak hour flow from the traffic model. Strictly speaking, the calculation should be based on the 18-hour AAWT. However, the factor to convert between AADT and 18-hour AAWT is generally around 0.96 and therefore the difference between the two measures is not significant in terms of the resulting noise levels. The traffic speed is taken directly from the model. The percentage of HGVs is a default value for each road type (motorway, trunk A, other A and B roads). The noise impact corridor is taken to be a band 50 m wide on each side of each road link. Where a strategy includes a new link not present in the Do Minimum scenario, an ambient level of 55 dB  $L_{A10\ 18\text{-hour}}$  is taken for the Do Minimum. The annoyance response function is based on Table 4.2 in GOMMMS as follows:

Noise emission level dB $L_{A10\ 18\text{-hour}}$	Annoyance Response Function %/dB
Greater than or equal to 65 dB	3
Between 55 and 64 dB	2
Less than 55 dB	0

### 3.1.6

**Railway traffic noise** – The noise indicator used to represent average rail noise emission for each link is the index equivalent to the Basic Noise Level for road traffic and is determined according to *Calculation of Railway Noise*, Department of Transport, 1995. This is the  $L_{Aeq\ 18\text{-hour}}$  index in dB calculated at 25 m from the near-side railhead and corrected to a distance of 10 m. The calculation is based on a 1-hour traffic flow. It is assumed for the appraisal that the same flow would apply over each hour between 06:00 and 00:00 hours. The model provides the average train speed for each train type on each link. This is used to calculate the  $L_{Aeq}$  for each train type on each link. These values are combined to give the total  $L_{Aeq}$  for each link. The noise impact corridor is taken to be a band 50m wide on each side of each railway link. Where a strategy includes a new link not present in the Do Minimum scenario, an ambient level of 55 dB  $L_{Aeq\ 18\text{-hour}}$  is taken for the

Do Minimum. The annoyance response function is based on Table 4.2 in GOMMMS as follows:

<b>Noise emission level</b> <b>dB L<sub>Aeq</sub> 18-hour</b>	<b>Annoyance Response Function</b> <b>%/dB</b>
Greater than or equal to 65 dB	2
Between 55 and 64 dB	1
Less than 55 dB	0

3.1.7

**Presentation of results** – To complement the worksheets and AST the results of the noise appraisal are also analysed using GIS as seen in Appendix A. These illustrate whether the Estimated Population Annoyed increases or decreases for each district, and the magnitude of these changes.

*Appraisal of the SoCoMMS Strategy*

3.1.8

The results of the appraisal for the SoCoMMS Strategy are summarised in Table 3.1 (worksheet 4.2).

**Table 3.1 : SoCoMMS Strategy : Worksheet 4.2 : Environment : Noise**

<b>Number of zones...</b>	<b>With Option compared with the Present Do Minimum (current situation)</b>	<b>With Option compared with Future Do Minimum</b>
...with increased Estimated Population Annoyed 'losers'	455	193
...with reduced Estimated Population Annoyed 'winners'	61	322
...with no change in Estimated Population Annoyed	28	29
<b>Total Change in Estimated Population Annoyed</b>	<b>+10028</b>	<b>+1226</b>

3.1.9

Compared with the Future Do Minimum, this Strategy shows that a much larger proportion of zones would experience benefits than disbenefits, and there would be an overall increase in Estimated Population Annoyed of +1226. This is largely associated with the implementation of road improvements that are spread across

the whole of the study area. The benefits from rail improvements are more localised within certain zones of the region.

3.1.10 Compared with the Present Do Minimum (current situation), this Strategy shows clear disbenefits in both the number of zones that are ‘losers’ and in the total change in Estimated Population Annoyed. This is, as would be expected, due to traffic growth between the present and future scenarios and the noise increases associated with the various transport service and infrastructure improvements. The noise disbenefits of the strategy are spread across most of the study area. The summary of its noise impact compared with the Future Do Minimum is as follows:

3.1.11 SoCoMMS Strategy – Overall noise disbenefits as net EPA increase of 1226 and 322 zones that win compared with 193 that lose. Table 2.2 contains AST entries for the SoCoMMS Final Strategy.

**Table 3.2 : AST entries for the SoCoMMS Strategy**

<b>Qualitative Comment</b>	<b>Quantitative Column</b>	<b>Overall Assessment</b>
In 15 <sup>th</sup> year: 193 zones ‘losers’ 322 zones ‘winners’ Indicates benefits are spread across the region	Change in estimated population annoyed in longer term (15 <sup>th</sup> year) with Strategy compared with present Do Minimum: +10028	Change in estimated population annoyed in longer term (15 <sup>th</sup> year) with Strategy compared with future Do Minimum: +1226

3.2 ***Local Air Quality and Greenhouse Gases***

3.2.1 The appraisal procedure takes full account of the New Approach to Appraisal and the specific guidance prepared for the multi-modal studies (GOMMMS). Within GOMMMS, the relevant environmental sub-objectives are:

- **Air Quality:** to reduce the effects of traffic on local air quality; and
- **Greenhouse Gases:** to cut the level of emissions of several greenhouse gases, especially carbon dioxide to help tackle climate change.

*Methodology*

3.2.2 In GOMMMS, the approach to assessing local air quality is based on either: the change in properties exposed to air quality in 2004 (for particulate matter, using

PM<sub>10</sub>) and in 2005 (for Nitrogen Dioxide), or on identifying total emissions in the study area (for the same pollutants). At the strategy test stage, the total emissions approach is used.

- 3.2.3 Changes in total emissions can be used as a surrogate or proxy for micro scale air quality impacts. Generally reductions in total emissions in an area are likely to result in improved air quality, although to what extent will not be clear from an understanding of emissions alone. A reduction in total emissions may not in all cases lead to a reduction in the population's exposure to air pollution, as emissions of air pollutants can undergo physical and chemical transformation in the atmosphere. An understanding of changes in air quality against air quality standards at specific receptor sites (and the effects on population) can only be accurately determined where specific link traffic flows and speeds are available, as in the GOMMMS method for Plans.
- 3.2.4 For greenhouse gases, the total emissions method is used for both the strategy and plan stage, and is essentially the same method as for local air quality.
- 3.2.5 Emissions to air from the SoCoMMS strategy is assessed using the procedures for strategy testing outlined in section 4.4.18-4.4.31 (Oxides of Nitrogen and PM<sub>10</sub>), and section 4.5 (Carbon Dioxide) of the GOMMMS manual. The GOMMMS strategy test method estimates total emissions on the basis of vehicle kilometres, vehicle speed and vehicle fleet-emission factors for the assessment year. Results are reported as changes over the base case ("present year do-minimum" of 2000), and the situation in the future without the strategy ("future year do-minimum" of 2016). Differences are calculated for each area, and the total summed.
- 3.2.6 The GOMMMS methodology is implemented using bespoke software developed by Halcrow, as briefly outlined below. Two emissions models "ROADEMS" and "RAILEMS" were developed to work with output from the EMME2 road and rail models respectively. Both models calculate annual emissions of Oxides of Nitrogen, particulates (PM<sub>10</sub>) and Carbon Dioxide, from road and rail mobile sources for each transport link included in EMME2. The separate outputs from the two emissions models are processed in a third model ("DISTEMS") to derive total annual emissions for each pollutant on a zone by zone basis for the SoCoMMS area. These emissions values are then further processed to derive GOMMMS worksheet statistics and AST values. The basic model structure is illustrated in **Figure AQ1** (Appendix A).

3.2.7 Model results are also analysed using GIS to indicate relative changes in population exposure to emissions in very simple terms, i.e. a negative change (indicating decrease in exposure to emissions) or positive change (indicating an increase in exposure to emissions), between each strategy and the do-minimum case in 2016. Changes are shown in relation to transport zones (544 zones in total are considered in the SoCoMMS study area) and Air Quality Management Area (AQMA) status. AQMA are designated areas where there are particular air quality problems, as identified by local authorities 'reviews and assessments of their local air quality' under the system of local air quality management (LAQM) through the Environment Act 1995.

3.2.8 The graphical output of this GIS analysis is given in **Figure AQ2** (changes in relation to emissions of Oxides of Nitrogen) and **Figure AQ3** (changes in relation to emissions of PM<sub>10</sub>). Figures are in Appendix A.

3.2.9 The reader should consider the information conveyed in these figures together with the results reported below and not in isolation. In line with GOMMMS, the information shown on the figures does not indicate the magnitude of any changes in emissions but only those zones where any changes are predicted.

#### *Deviation from GOMMMS*

3.2.10 The method adopted for deriving statistics for Nitrogen Dioxide (as indicated by Oxides of Nitrogen) has deviated slightly from that shown in Worksheet 4.4 (Local Air Quality) in the GOMMMS manual. This relates to the way in which the comparisons between the "with Option" case with the "Do-minimum - present" and "Do-minimum - future" cases are calculated. The method used matches that outlined in GOMMMS for PM<sub>10</sub>. For Nitrogen Dioxide, results are calculated by subtracting the Index for the With Option case from the Index for "Do-minimum - present", or "Do-minimum - future" case. The resulting value may be positive or negative or zero. A positive value indicates a worsening with regard to pollutant emission, a negative value indicates an improvement with regard to emissions, and zero indicates no-change in emissions with the strategy in place. This approach has been agreed previously.

3.2.11 To assist the reader, additional figures are provided showing the results in a different way. These include a 'filter', such that only locations with noticeable changes are shown. **Figure AQ4 and AQ5** (Appendix A) show these results for Oxides of Nitrogen and PM<sub>10</sub>.

### *Data sources and assumptions*

- 3.2.12 SoCoMMS EMME2 model output for roads and rail are used as inputs the SoCoMMS emissions model. For road emissions, codes for 'A' and 'B' nodes for each road link, road type code, average hour flow, speed and road link length are input. For rail emissions, codes for 'T' and 'J' nodes for each rail link, train type code, headway and rail link length are input.
- 3.2.13 In calculating road emissions the percentage heavy-duty vehicles (HDV = lorries, buses and coaches over 3.5 tonnes) are assumed equivalent to heavy goods vehicles (HGV = lorries over 3.5 tonnes only). There are four different link types included in SoCoMMS EMME2 (road) model. Percentages of HDV traffic applicable for the whole of the SoCoMMS area are: 11% for Motorways (EMME2 road type 41), 9% for Trunk Roads (EMME2 road type 42), 8% for 'A' roads (EMME2 road type 43), and 5% for 'B' roads (EMME2 road type 44).
- 3.2.14 For the road traffic emissions calculation it is necessary to derive Annual Average Daily Traffic (AADT) flows from average hour flows forecast by the EMME2 (road) model output. The following factors are applied: 14.7 for Motorways, 14.2 for Trunk Roads, 13.8 for 'A' roads, and 13.6 for 'B' roads.
- 3.2.15 Emissions algorithms for light duty vehicles (LDV = cars and goods vehicles under 3.5 tonnes) and HDV road traffic are derived from values in lookup tables given under Volume 11, Section 3, Part 1 of the Design Manual for Roads and Bridges (March 2000 amendment).
- 3.2.16 To determine annual road emissions, emissions calculated for AADT are factored by 365 (days).
- 3.2.17 To calculate emissions from rail sources it is necessary to assume an average number of rail motive power (diesel) units per class of locomotive/train type for routes in the SoCoMMS area. The assumptions are: 1 locomotive per front hauled train, 2 power cars per IC125 and DMU (excluding Class 205, where 1 power car is assumed), and 4 power cars per Virgin Voyager. For simplicity, emissions from power generating stations supplying third rail or overhead (electric) traction are omitted for the strategy tests (as previously agreed).
- 3.2.18 In the calculation of annual emissions from rail sources, trains services are assumed to operate for 18-hours per day over 363 days.

- 3.2.19 Emission factors for rail motive power (diesel) units are taken from the UK Emission Factor Database.
- 3.2.20 In determining the GOMMMS 'Emissions Estimate' values for PM<sub>10</sub> and "NO<sub>2</sub>" (Nitrogen Dioxide as approximated by Oxides of Nitrogen emissions) for each strategy, TEMPRO population statistics corresponding to each transport zone in the SoCoMMS study area are used to determine population density (i.e. head of population per square kilometre). Population estimates are for the years 2000 and 2016.
- 3.2.21 SoCoMMS transport zones are as indicated by GIS mapping.
- 3.2.22 Pre-strategy local air quality problems are indicated by Air Quality Management Area (AQMA) status. Designated status has been determined for each transport zone from a survey of all local authorities in the SoCoMMS study area. Designation is shown zone by zone, rather than by local authority. For the SoCoMMS study, as a worst-case assumption no differentiation is made of zones with AQMA designation where this may be exclusively for Nitrogen Dioxide or exclusively for PM<sub>10</sub>.

*Results of the Strategy Tests – Local Air Quality*

- 3.2.23 Details of the results are shown in Worksheet 4.4 (Table AQ1a and AQ1b). Table AQ1a (Appendix A) shows the zone by zone results, and Table AQ1b (below) summarises the net effect of the strategy. For emissions over the SoCoMMS study area as a whole, the strategy would result in net reductions in emissions of Oxides of Nitrogen and PM<sub>10</sub> in 2016. This is indicated in Tables AQ1a and AQ1b by negative "Emissions Estimate" values. The Emissions Estimate is a crude indicator of population exposure to the pollutants Nitrogen Dioxide and PM<sub>10</sub>.
- 3.2.24 Emissions of Oxides of Nitrogen and PM<sub>10</sub> are lower in the "Future Do-minimum" (2016) than in the "Present Do-Minimum" (2000), where 58,801 tonnes of Oxides of Nitrogen and 1,795 tonnes of PM<sub>10</sub> in 2000 reduce to 27,997 tonnes and 592 tonnes respectively by 2016. These reductions are in line with the UK Air Quality Strategy, which predicts year on year reductions in vehicle emissions until about 2015 when the trend is expected plateau due to the effects of continual traffic growth cancelling out improvements in emissions from individual vehicles.

Table A Q1b: Worksheet 4.4 Environment: Local Air Quality – Strategy Level

**Option name:** Test 'Final' Strategy  
**Year:** 2016

Number of Zones = ...	With 'Final' strategy Compared to Present Do-Minimum (2000)		With 'Final' Strategy Compared to Future Do-Minimum (2016)	
	"NO2"	PM10	"NO2"	"PM10"
... with positive "losers"	28	4	64	67
... with negative "winners"	481	505	445	442
... with no-change	35	35	35	35
"Emissions estimate" value	-25002987	-1106512	-3113286	-33257

3.2.25 Compared to the Present Do-Minimum, the strategy has a net benefit (93% of zones are "winners"). There are 35 zones with no-change. Thirteen of these zones indicate no change, as they have no residential population (including major shopping centres and transport interchanges). Compared to the Future Do-Minimum, the strategy has a net benefit (80% are winners).

3.2.26 The GIS reveals more about distribution of changes over the SoCoMMS, particularly in relation to areas with AQMA status. As shown in Figures AQ2 and AQ3, the strategy results in some increased emissions of local air pollutants within local authority AQMA designations. Increases are confined to a small number of transport zones: 1111, 1201, and 1409, and three local authorities: Sevenoaks, Medway and Maidstone (as shown in Table AQ2a). Analysis of these increases (against the Future Do-Minimum) shows them all to be very small (i.e. negligible) - generally less than 1 tonne in the case of both pollutants (as shown in Table AQ2b). None of the AQMAs fall within the main study area, only within the transport zone of influence.

Strategy test	Number of Zones with designated AQMA Experiencing Increase in Emissions of Nox	Number of Zones with Designated AQMA Experiencing Increase in Emissions of PM10	Zones Experiencing Increase in Emissions of NOx	Zones Experiencing Increase in Emissions of PM10	Local authority District containing zone Containing AQMA designation experiencing increase in NOx emissions	Local authority District containing Zone Containing AQMA designation Experiencing Increase in PM10 emissions
Final	3	2	1201, 1111, 1409	1111, 1409	Sevenoaks, Medway, Maidstone	Medway, Maidstone

*Table A Q2a: SoCoMMS transport zones with designated A QMA where increases in emissions of local air pollutants are expected with strategy (2016)*

- Notes: a) A total of 25 zones (out of 544 considered) contain AQMA designated. These are located outside of the main SoCoMMS study area within the transport zone of influence
- b) An indicated increase in emissions does not necessarily indicate an air quality problem
- c) All zones indicated have resident population

Zone	Oxides of Nitrogen		Strategy		Zone	PM10		Strategy	
	Present Do-Minimum	Future Do-Minimum	'Final'			Present Do-Minimum	Future Do-Minimum	'Final'	
	Actual	Actual	Actual	Increase		Actual	Actual	Actual	Increase
1105	85	35	-	-	1105	3	1	-	-
1109	76	31	-	-	1109	3	1	-	-
1111	110	54	54	<	1111	3	1	1	<
1201	939	336	336	<	1201	26	7	-	-
1405	55	25	-	-	1405	2	1	-	-
1409	341	152	153	1	1409	9	3	3	<

**Table A Q2b: Increases in emissions (with strategies) for transport zones with designated A QMA**

Notes: All emissions are shown in tonnes

Indicated 'Increase' in emissions = with strategy test 'Actual' – Future Do-Minimum 'Actual'

Total emissions of Oxides of Nitrogen in Future Do-Minimum for all 544 zones = 27,997 tonnes

Total emissions of PM10 in Future Do-Minimum for all 544 zones = 592 tonnes

3.2.27 Figure AQ4 and AQ5 show the results just for zones with noticeable changes in emissions. Noticeable is defined for SoCoMMS as emission changes in a zone over 5% compared to the future do-minimum, and the zone being populated. After these criteria are applied, the results are overlaid on maps of existing air quality problems (based on AQMA). This clearly shows a large reduction in the number of zones affected by the strategy.

3.2.28 Overall, no zones with AQMA are worsened by the strategy (for both Nitrogen Dioxide and PM<sub>10</sub>). Two zones with AQMA are potentially improved by the strategy for Nitrogen Dioxide. In any event, all AQMA are outside of the study area. Zones with noticeable increases in emissions are primarily along the main routes east-west, and are all in areas without current AQMA.

*Results of the Strategy Tests – Greenhouse Gases*

3.2.29 Overall emissions of Greenhouse Gases are indicated by percentage change in Carbon Dioxide emissions over the do-minimum, as shown in worksheet 4.5 (Table AQ3a). Zones with relatively large emissions of Greenhouse Gases reflect the major transport corridors and intersections. A change of less than 100%

represents a net reduction in Carbon Dioxide; conversely a change of greater than 100% represents a net increase. Table AQ3b gives an analysis of the results.

3.2.30

Implementation of the strategy would result in a net increase in Carbon Dioxide of around 10% over that predicted for the Present Do-Minimum. A net increase is predicted for the majority of zones. Implementation of the strategy in would result in a net reduction in Carbon Dioxide of 2% below that predicted for the Future Do-Minimum. A net reduction is predicted for the majority of zones.

Strategy Test	Number of Zones with decrease in Emissions (compared to Future Do-Minimum)	Number of Zones with Increase in Emissions (compared to Future Do-Minimum)	Number of zones with no change (compared to Future Do-Minimum)	Emission in 2016 (tonnes)	Percentage of Future Do-Minimum	Difference With strategy (tonnes)	Percentage change
'Final'	446	69	29	6,581,752	98%	- 137,742	-2%

*Final A Q3b: Analysis of Worksheet 4.5 results for Greenhouse Gases*

- Notes: a) Total Carbon Dioxide emissions for Present Do-Minimum (all 544 zones) = 5,965,292 tonnes  
 b) Total Carbon Dioxide emissions for Future Do-Minimum (all 544 zones) = 6,719,494 tonnes

## **4 Impact on the Physical Environment**

## 4 Impact on the Physical Environment

### 4.1 *Introduction*

4.1.1 The assessment methodology has followed the assessment approach as set out in GOMMMS. The full GOMMMS assessment worksheets have been completed for each scheme.

4.1.2 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. Summary sheets have been completed for each identified part.

### 4.2 *Landscape*

4.2.1 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*

#### 4.2.2 **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.

4.2.3 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

4.2.4

#### **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.

4.2.5

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

4.2.6

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

4.2.7

#### **Step C** – Impact Assessment

- (3) Identify the potential impacts of the ‘plan stage’;

- direct and indirect landscape impacts and effects; and
- positive or adverse effects.
- (3) Complete the Landscape ‘Worksheet’ (GOMMMS) and confirm Summary Assessment Score, together with qualitative comments. Use GOMMMS Scoring:
  - (3) Very large negative impact;
  - (3) Large negative impact;
  - (3) Moderate negative impact;
  - (3) Slight negative impact;
  - (e) Neutral impact;
  - (3) Slight positive impact; and
  - (3) Moderate positive impact.
- (3) Complete the Landscape section in the Appraisal Summary Table:
  - Qualitative Impact;
  - Quantitative Impact; and
  - Assessment Score.

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

4.2.9 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.

4.2.10 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*

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

<b>LANDSCAPE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Totton to Hythe Railway	The scheme will have no direct impacts on the landscape assuming the existing railway width and alignment is retained and the line is currently used for freight.	Neutral
M27 between J3 and J4	The widening scheme, although within existing highway boundaries, is likely to have some detrimental impacts on landcover and landscape pattern particularly.	Slight Negative
Eastleigh Chord	The short section of new railway line is unlikely to have any significant detrimental impacts on the landscape. Any existing scrub lost could be substitutable by new planting.	Neutral
Fareham Dualled Section of Railway Line	The railway track dualling is likely to have some detrimental impacts on woodland and valleyside landform particularly, although the visual impact will be mostly contained due to the fairly enclosed character of the landscape. (Assumed dualling design will be chosen to minimise loss of woodland, otherwise negative some may increase to moderate).	Slight Negative
Chichester Fishbourne Roundabout	There will be a direct impact on landscape of medium importance at a local level. There is an opportunity to minimise the landscape impact by new hedgerows, treebelts and high quality design of structures.	Slight Negative
Chichester A27/A286 Roundabout	There will be a direct impact on landscape of low value at a local level. There is an opportunity to reduce the landscape impact of the flyover by high quality design of structures and treebelt planting.	Slight Negative
Chichester A27/A259 Roundabout	There will be a direct impact on landscape of low value at a local level. There is an opportunity to reduce the visual impact of the grade separated junction (assumed to involve flyover) by new tree belts/hedgerows and high quality design of structures. (An underpass instead could potentially reduce the impact to neutral if accompanied by significant replacement planting).	Slight Negative
Chichester Portfield Junction Closure (Oving Road)	There will be little impact on the landscape which is typical urban fringe.	Neutral
Chichester A27/Junction with B2145 Wyke road	The removal of the roundabout will have little impact on landscape	Neutral
Chichester A27/Wetshampnett	There will be a direct impact on landscape of low value at a local level. There is an	Slight Negative

<b>LANDSCAPE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Roundabout	opportunity to reduce the visual impact of the enlarged roundabout and flyover by new treebelts, hedges and woodland planting on disturbed land.	
Fontwell A27/A29 (Eastergate) Roundabout	A grade separation with flyover is likely to have a slight detrimental impact on landscape.	Slight Negative
Fontwell A27/A29 (Slindon) Roundabout	A grade separated junction with flyover is likely to have detrimental impacts on landcover, landscape pattern and tranquillity. (An underpass may have an equivalent impact particularly due to possible effects on landcover).	Moderate Negative
Arundel Bypass	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
Littlehampton Wick Railway Station	Due to strong urban fringe character around the location for the new station enclosed by a variety of bulk land uses, it is unlikely to have a detrimental impact on the landscape overall and there may be opportunities for enhancement with high quality built development and landscape design of station surrounds.	Neutral
Worthing A27 Tunnel	New cuttings associated with tunnel entrances around Durrington and North Lancing will have some detrimental impact on landscape pattern and landcover. More information on extent of necessary cutting, position of tunnel portals is needed to fully assess impact. A more northerly route for the tunnel through the Downs is likely to result in a higher negative score.	Slight Negative
Lewes Southerham Roundabout	The junction improvements may have some adverse impact on landform, and views from higher land within the South Downs AONB and on the landscape setting of Lewes. Impact is difficult to fully determine without more information on the type/extent of junction improvements.	Slight Negative
Lewes Beddingham Flyover	The Flyover is likely to have a particularly adverse visual impact on the open landscape of the South Downs AONB and on the setting of Beddingham even taking account of route online.	Large Negative
Selmeston Bypass	Although single carriageway the bypass will have detrimental impacts on landscape patterns, tranquillity, cultural landscape and landcover.	Moderate Negative

<b>LANDSCAPE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Wilmington Bypass	The scheme is likely to have a detrimental impact on landscape pattern and landscape particularly albeit some sections are online or in close proximity to existing road/rail routes.	Moderate Negative
Eastbourne Railway Station	The scheme is expected to have only a very localised slight detrimental impact on pasture landcover and existing hedgerows (which could be mitigated for), and visual impact must be seen in the context of the existing urban development.	Neutral
Bexhill St Leonards West Marina Railway Station	Given the location of strong urban character and taking into account possible mitigation measures, the scheme is unlikely to have a detrimental impact on the landscape.	Neutral
Hastings-Bexhill Link Road	There will be detrimental impacts on landscape pattern, particularly valley side landform and valley form and on landcover.	Large Negative
Dover A2 at Upton Wood	Online dualling with a slight detrimental impact on landscape pattern, landcover and tranquillity.	Slight Negative
Park and Ride Sites	These proposals are at concept stage therefore specific sites have not as yet been identified	Not applicable

4.2.12 The scheme will have a neutral-slight negative impact on the majority of the study area. However, large negative impacts on the landscape have been identified on certain parts of the study area, including Arundel, Lewes, and Hastings.

4.2.13 The landscape pattern and landcover between Junctions 3 and 4 of the M27 in Southampton would be damaged (slight negative impact) by improvements to the M27. There will be a slight direct negative impact on landscape around the A27 through Chichester (between Fishbourne and Westhampnett roundabouts) and Fontwell caused by junction improvements (moderate negative impact in the case of the Fontwell/Slindon Roundabout (A27/A29)). There will be a detrimental (large negative) impact on the setting of Arundel which is close to the boundary with the Sussex Downs AONB. There will be a slight negative impact on landscape pattern and landcover associated with tunnel entrances around the A27 to the north of Worthing. The proposed flyover at Beddingham will have a large negative impact on the landscape. Between Selveston and Wilmington there will be a moderate negative impact on the landscape. There will be a large negative impact on the landscape between Bexhill and Hastings along the route of the proposed link road. There will be a slight negative impact on the landscape around Upton Wood at Dover caused by dualling of the A2.

4.2.14 **The overall assessment is Large Negative Impact.**

### 4.3

#### ***Townscape***

#### 4.3.1

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.

#### 4.3.2

#### **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).

#### 4.3.3

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

#### 4.3.4

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

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

4.3.5

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

4.3.6

#### **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

4.3.7

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.

4.3.8

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.

4.3.9

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

<b>TOWNSCAPE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Totton to Hythe Railway	The railway line would enable people to move more freely around the area, thus increasing the opportunities for human interaction	Moderate Positive
M27 between J3 and J4	The M27 will become more dominant in the townscape.	Slight Negative
Eastleigh Chord	The impacts will mainly affect the industrial area through which the railway line would run.	Slight Negative
Fareham Dualled Section of Railway Line	There will be little effect on the rural appearance of the area, or on the isolated farm buildings	Neutral
Chichester Fishbourne Roundabout	Local appearance could change with some landtake from either a flyover or underpass, and potential views of the scheme from the wider townscape if a flyover were proposed	Slight Negative
Chichester A27/A286 Roundabout	The dwellings close to the existing road and roundabout could be affected.	Slight Negative
Chichester A27/A259 Roundabout	There will be effects on some farm buildings in the locality.	Slight Negative
Chichester A27/Junction with B2145 Wyke road	The removal of the roundabout will have a beneficial impact on townscape	Slight Positive
Chichester Portfield Junction Closure (Oving Road)	No impacts have been identified.	Neutral
Chichester A27/Westhampnett Roundabout	The area is currently congested and junction improvements would serve to increase human interaction in the area.	Slight Positive
Fontwell A27/A29 (Eastergate) Roundabout	No impacts have been identified.	Neutral
Fontwell A27/A29 (Slindon) Roundabout	There is likely to be an adverse impact on Slindon Park	Slight Negative
Arundel Bypass	The scheme would have a moderate beneficial impact on Arundel town centre where the nationally important features of the townscape are situated. There	Neutral

<b>TOWNSCAPE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
	will, however, be a slight-moderate adverse impact on the area through which the proposed road would run (eg Tortington and south Arundel).	
Littlehampton Wick Railway Station	The scheme will enable greater human interaction within the area.	Slight Positive
Worthing A27 Tunnel	The existing A27 would be relieved of traffic, thus improving the townscape and potential for human interaction in the area, which is mainly residential, together with a retail park.	Slight Positive
Lewes Southerham Roundabout	There would be some potential local impacts on residential and employment areas near to the junction.	Slight Negative
Lewes Beddingham Flyover	There are scattered buildings in the area, together with the village of Beddingham, which will have their townscape adversely affected.	Moderate Negative
Selmeston Bypass	The scheme will have benefits for the settlements within the area, such as Selmeston and some scattered farms.	Moderate Positive
Wilmington Bypass	There will be benefits for the settlements within the area, such as Selmeston and Wilmington.	Slight Positive
Eastbourne Railway Station	There may be some visual impact due to the scale, appearance and elevation of the station. There may also be some loss of open space and impact on the recreational function of the area.	Slight Negative
Bexhill St Leonards West Marina Railway Station	Due to the position of the railway station on the embankment, there may be a visual impact on the recreational function of the beach and some of the houses in the area.	Slight Negative
Hastings-Bexhill Link Road	Any road widening is likely to have a significant impact on the character of Bexhill, and the houses fronting the road in particular.	Large Negative
Dover A2 at Upton Wood	Temple Farm is likely to be slightly adversely affected by the scheme.	Slight Negative

<b>TOWNSCAPE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Park and Ride Sites	These proposals are at concept stage therefore specific sites have not as yet been identified	Not applicable

4.3.10 The scheme will have a neutral-slight negative impact on the majority of the study area, with a number of areas experiencing a beneficial impact. However, a large negative impact has been identified in Hastings.

4.3.11 There will be a moderate benefit on one area, and a negative impact on two areas, of townscape in Southampton caused by improvements to the M27 between junctions 3 and 4 and improvements to rail links between Totton and Hythe. There will be a negative impact on areas of townscape in Chichester caused by improvements to roundabouts. One area of Chichester (around Westhampnett roundabout), however, will experience an improvement in townscape. There will be a slight negative impact on Slindon Park in Fontwell caused by improvements to the roundabout. There will be a slight positive impact on the townscapes of Littlehampton (due to a new station at Wick) and Worthing (due to the tunnel). There will be a slight-moderate negative impact on the townscape between Lewes and Selmeaton caused by improvements to the Southerham roundabout and to the A27, but a positive impact on Wilmington caused by the removal of traffic from the A27 which runs close by. Eastbourne and Bexhill will experience a slight negative impact caused by the proposed new railway stations. The Bexhill-Hastings Link Road will have a large negative impact on the local townscape and there will be a slight negative impact on the townscape near Upton Wood in Dover caused by improvements to the A2 at this point.

4.3.12 **The overall assessment is Large Negative Impact.**

#### 4.4 *Heritage*

4.4.1 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).

##### 4.4.2 **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).

#### 4.4.3

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

#### 4.4.4

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

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

#### 4.4.5

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

4.4.6 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.

4.4.7 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.

4.4.8 **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*

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

<b>HERITAGE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Totton to Hythe Railway	The scheme may directly impact on features associated with the history of the railway line. The scheme may impact upon the setting of three listed buildings, one Conservation Area in Hythe, and	Slight Negative

<b>HERITAGE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
	one local park and garden. The scheme may impact upon currently unidentified archaeological deposits.	
M27 between J3 and J4	The scheme may directly impact upon one Grade II listed building. The scheme may potentially affect the setting of; one Grade II*; and four Grade II listed buildings. The scheme may affect currently unrecorded archaeological deposits within the road corridor.	Slight Negative
Eastleigh Chord	The scheme will directly impact upon a number of potentially significant built heritage assets. The scheme also has the potential to impact upon currently unidentified buried archaeological remains.	Slight Negative
Fareham Dualled Section of Railway Line	The scheme may directly impact upon two Grade II listed complexes, a regionally significant historic landscape, and five locally significant archaeological sites. The scheme may also directly impact upon currently unidentified archaeological deposits. The scheme may negatively affect the setting of the three Grade II Listed building complexes and one Grade II listed church.	Moderate Negative
Chichester Fishbourne Roundabout	The scheme may affect the setting of three listed buildings. The scheme will not directly impact on any heritage assets identified during this assessment. However the scheme may impact upon currently unidentified assets.	Slight Negative
Chichester A27/A286 Roundabout	The scheme may impact upon medieval / post medieval deposits connected with Chichester or Stockbridge. The scheme also has the potential to impact upon currently unidentified assets.	Slight Negative
Chichester A27/A259 Roundabout	The scheme may impact upon potentially significant prehistoric deposits connected with the pre-roman history of Chichester. The scheme may also impact upon a number of currently unidentified heritage assets.	Slight Negative

<b>HERITAGE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Chichester A27/Junction with B2145 Wyke road	The scheme will have no impact on the historical environment	Neutral
Chichester Portfield Junction Closure (Oving Road)	The scheme may adversely affect the setting of a number of listed buildings. The scheme will directly impact upon no identified heritage assets. The scheme may directly impact upon currently unidentified heritage assets.	Slight Negative
Chichester A27/Westhampnett Roundabout	No identified assets will be directly affected by the scheme. The scheme has the potential to impact upon currently unidentified assets.	Neutral
Fontwell A27/A29 (Eastergate) Roundabout	The scheme will directly impact upon no known heritage assets. The scheme may have a slight impact upon the setting of Slindon Park.	Neutral
Fontwell A27/A29 (Slindon) Roundabout	There is likely to be an adverse impact on Slindon Park	Slight Negative
Arundel Bypass	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
Littlehampton Wick Railway Station	The scheme will directly impact upon no known heritage assets. The scheme has the potential to impact upon currently unidentified assets.	Neutral
Worthing A27 Tunnel	The beneficial effects of the reduction in overland traffic on historic resources along the scheme's length, seemingly balance out the potentially negative impacts on areas of historic parkland, areas of historic landscape and possible historic buildings. The scheme has	Neutral

<b>HERITAGE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
	the potential to impact upon currently unidentified assets.	
Lewes Southerham Roundabout	The scheme is likely to affect assets from a range of periods.	Slight Negative
Lewes Beddingham Flyover	The proposed scheme may have a slight affect the visual setting of at least three SAMs. The scheme may affect a range of archaeological / palaeo-environmental remains sealed in or below the alluvial deposits of the valley floor.	Slight Negative
Selmeston Bypass	The scheme will directly impact upon and sever the historic landscape of the study area as well as affecting the setting of Firfe park and may also affect the setting of Charlston Museum The scheme may potentially impact upon currently unidentified assets from a range of periods	Moderate Negative
Wilmington Bypass	The scheme will directly impact on and sever the historic landscape of the study area. The scheme may impact on the setting and amenity value of Wilmington, Wootton Manor and Berwick. The scheme may have a beneficial impact upon the amenity value of Wilmington Green. The scheme may also impact upon a number of currently unidentified.	Moderate Negative
Eastbourne Railway Station	The scheme has the potential to impact upon currently unidentified assets.	Neutral
Bexhill St Leonards West Marina Railway Station	The lack of heritage information and information about the scheme restricts the accuracy of the assessment.	Neutral
Hastings-Bexhill Link Road	The proposed scheme will probably affect the setting of three Grade II listed buildings and a number of archaeological sites. The scheme may directly impact upon a range of archaeological sites. The scheme will sever and severely compromise the relatively cohesive and intact historic landscape between Bexhill and Hastings. The scheme may impact	Moderate Negative

<b>HERITAGE</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
	upon currently unidentified archaeological and palaeo-environmental deposits.	
Dover A2 at Upton Wood	The scheme may directly impact on an area of Ancient Woodland, two regionally significant archaeological sites and one locally significant archaeological site. The scheme may have an impact on the setting of four Grade II listed buildings. The scheme also has potential to impact upon currently unidentified heritage assets.	Slight Negative
Park and Ride Sites	These proposals are at concept stage therefore specific sites have not as yet been identified	Not applicable

4.4.10 The scheme will have a neutral-slight negative impact on the majority of the study area. However, a large negative impact on the historic environment has been identified in Arundel.

4.4.11 There will be slight negative impacts on the historical resource between Junctions 3 and 4 of the M27 and around the Eastleigh Chord in Southampton. The scheme may impact on historical areas in Fareham along the route of the proposed railway line dualling. Historical assets along the A27 through Chichester (between Fishbourne and the A27/A259 roundabout near Portfield) will be adversely affected. There will be a beneficial effect on the amenity value of Arundel, but large negative impacts on the town's setting caused by the proposed bypass. There will be a slight-moderate negative impact on historical features and their settings between Lewes and Wilmington. The Bexhill-Hastings Link Road will have a moderate negative impact on the historical resource along its route. Historical features around Upton Wood in Dover will experience a slight negative impact caused by the dualling of the A2.

4.4.12 **The overall assessment is Large Negative Impact.**

#### 4.5 ***Biodiversity***

4.5.1 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.

4.5.2

**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)

4.5.3

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

4.5.4

**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:

4.5.5

**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*

4.5.6

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

<b>BIODIVERSITY</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Totton to Hythe Railway	The railway line runs through two SSSIs (Lower Test Valley and Dibden Bay). The existing railway line is being used.	Minor Adverse
M27 between J3 and J4	There are no designated sites near the proposed scheme. There may be possible local nature conservation impacts.	Neutral
Eastleigh Chord	No nature conservation or earth heritage designated sites near the proposed new section of the railway line. There will be potential local nature conservation impacts.	Neutral
Fareham Dualled Section of Railway Line	There is likely to be some loss of ancient semi-natural woodland and the ecology of a good quality chalk river (River Meon).	Minor Adverse
Chichester Fishbourne Roundabout	The construction works and polluted runoff from the road could damage the integrity of this site and impair its function as a buffer for the Chichester Harbour SSSI.	Minor Adverse
Chichester A27/A286 Roundabout	The junction improvement could have an adverse impact on the Chichester Canal SNCI at the construction stage, due to accelerated erosion and silt entering the watercourse. This would require mitigation	Minor Adverse
Chichester A27/A259 Roundabout	An impact on the hydrogeology of the Chichester Canal Pits and Legthorne Meadow SNCI could have a minor impact on their integrity.	Minor Adverse
Chichester Portfield Junction Closure (Oving Road)	The roundabout is in close proximity to the Legthorne Meadow SNCI.	Minor Adverse

<b>BIODIVERSITY</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Chichester A27/Junction with B2145 Wyke road	The removal of the roundabout will have a slight beneficial impact on the SNCI. However construction work may have a slight negative impact unless satisfactory mitigation measures are put in place	Neutral
Chichester A27/Westhampnett Roundabout	There are no designated sites near the proposal. There could be some local nature conservation impacts.	Neutral
Fontwell A27/A29 (Eastergate) Roundabout	The junction improvement is likely to have a minor impact on the locally important Fontwell Park Racecourse SNCI during the construction stage.	Minor Adverse
Fontwell A27/A29 (Slindon) Roundabout	There will be further incremental loss of ancient woodland (Slindon Bottom SNCI) and there is likely to be some disturbance.	Minor Adverse
Arundel Bypass	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
Littlehampton Wick Railway Station	There are no designated sites of nature conservation importance in proximity to the site. There may be some local nature conservation impacts.	Neutral
Worthing A27 Tunnel	The proposal may cause some disturbance to an area of nationally scarce calcareous grassland (Offington Cemetery SNCI).	Minor Adverse
Lewes Southerham Roundabout	The Lewes Railway Land SNCI and Lewes Brooks SSSI are in close proximity to the roundabout. More details are needed of the extent of the junction improvements to confirm the level of impact.	Minor Adverse
Lewes Beddingham Flyover	The construction of the roundabout and possible landtake could have a minor adverse impact on Beddingham Grazing Marsh SNCI.	Minor Adverse

<b>BIODIVERSITY</b>		
<b>Scheme</b>	<b>Impact</b>	<b>Score</b>
Selmeaton Bypass	The Firle Escarpment SSSI and Tilton Wood SNCI are far enough from the proposed road as not to be affected.	Neutral
Wilmington Bypass	The two SSSIs (Milton Gate Marsh and Arlington Reservoir) and the Monkyn Pyn SNCI all support a breeding bird community.	Minor Adverse
Eastbourne Railway Station	The scheme will not have an impact on any county level or nationally designated nature conservation and earth heritage sites. There may be some local nature conservation impacts.	Neutral
Bexhill St Leonards West Marina Railway Station	The train station would increase human movement in the area, which could adversely affect the sites of nature conservation value (South Saxons SNCI, Bulverhythe Shingle Beach and Cliffs SNCI and the proposed Pebsham, Country Park).	Minor Adverse
Hastings-Bexhill Link Road	The route is in the vicinity of the Coombe Haven SSSI with resultant risk of runoff into the SSSI. The route also runs through a SNCI.	Serious Adverse
Dover A2 at Upton Wood	The area contains a number of designations containing a range of species and habitat, some of which is nationally rare (eg Shepherdswell SNCI, Caens Wood ancient woodland).	Significant Adverse
Park and Ride Sites	These proposals are at concept stage therefore specific sites have not as yet been identified	Not applicable

4.5.7 The scheme will have a neutral-slight negative impact on the majority of the study area. However, a serious adverse impact on biodiversity has been identified along the route of the proposed Hastings-Bexhill Link Road.

4.5.8 There will be a minor adverse impact on two SSSIs and two SNCIs between Totton and Hythe to the east of Southampton due to the re-opening of the railway line. There will be a minor adverse impact on areas of biodiversity caused by the proposed dualling of the railway line in Fareham. In Chichester, there will be a

slight adverse impact on areas of biodiversity (between Fishbourne roundabout and Portfield). At Fontwell, there will be a minor adverse impact on biodiversity caused by improvements to the A27/A29 (Eastergate and Slindon) roundabouts. The Arundel bypass will have a neutral effect as traffic will be taken away from an SNCI, although road construction may have adverse impacts. A SSSI in Lewes near the Lewes Southerham roundabout will be slightly adversely affected by junction improvements and the proposed Beddingham flyover. The Wilmington Bypass will have a similar impact on areas of biodiversity. The proposed Bexhill-Hastings Link Road will have a serious adverse impact on an SSSI and negative impacts on an SNCI. Proposed improvements to the A2 at Upton Wood in Dover will have a significant adverse impact on a number of nature conservation designations.

4.5.9

**The overall assessment is Serious Adverse Impact.**

4.6

#### ***Water***

4.6.1

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;

4.6.2 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.

#### ***Application of MMEA Method – development and refinement***

4.6.3 For the SoCoMMS study, scoring and weighting systems developed for the SWARMMS study were adopted. In addition we have allowed for a greater commentary on the impact of individual schemes. For example, for the groundwater environment there is now readily available information on the extent and distribution Source Protection Zones (SPZs) from the Environment Agency (EA) web site. This information was not so readily available during the development and use of the method for the SWARMMS appraisal.

4.6.4 Scoping - The nature of the strategy is that transport infrastructure developments comprise relatively well defined measures (for example road and rail route schemes). As such that there is no transport “corridor” to be assessed per se, but an accumulation of individual measures. Within SoCoMMS there are limited numbers of infrastructure schemes, with road schemes predominantly focussed on the M27/A27. The strategy also excludes new airport or port developments (with the exception of some undefined access improvements) so no consideration of these modes is needed. Essentially the transport modes are limited to road and rail.

4.6.5 Objectives, Targets and Indicators - The MMEA defines these with respect to both the groundwater and surface water environment which are then used to form the basis of the MMEA “worksheets”.

4.6.6 For the groundwater environment, the indicators used are Groundwater Protection Zones (GPZs- mapped nationally) and SPZs, where these are traversed by the route or route corridor, with the magnitude of impact represented by intersected length. The MMEA method indicates the use of SPZs only on local scale assessments, however given the (now) ready availability of this data, we have included qualitative comment on the potential impact on these indicators although we have not shown the worksheets or scoring for this indicator.

- 4.6.7 For the surface water environment a combination of Chemical GQA, Biological GQA and RE class designations are used by the MMEA as indicators of river quality, with the number of “river crossings” being introduced as a measure of the magnitude of the occurrence (presence). The SWARMMS appraisal also introduced the concept of adjacent river length as a measure of magnitude, also adopted here.
- 4.6.8 Intakes for Public Water Supply are used as an indicator for local scale assessment only and have not been included in this appraisal.
- 4.6.9 Flood plains traversed by the routes form the final indicator applied to the water environment.
- 4.6.10 Data Assembly – The identification of different transportation modes is carried out in this part of the MMEA. It is recognised that different modes of transport have different impacts on the water environment (eg road and rail) and that upgraded routes may have positive impacts (ie benefits) arising from the opportunity to upgrade (for example) drainage measures to modern standards. In undertaking this assessment, and in recognition of its strategic nature we have chosen to separate road and rail modes only and not to use other distinguishing criteria. Strictly speaking, under MMEA, a strategic assessment need not include then scoring process as described in Section 8 of the methodology. However given the relatively detailed scheme descriptions available, it was deemed appropriate to undertake scoring. This is further described below. Qualitative comment on the potential positive impact of new or upgraded developments (post mitigation) is also provided and is used to determine the ultimate textural assessment for both the core strategy.
- 4.6.11 Assessment Methodology - This appraisal has been based upon the use of the assessment tables (worksheets) described in Section 8 of the MMEA. Chemical GQA only is used for water quality evaluation (other data was less readily available) and is used with both groundwater vulnerability classification and floodplain “intrusion” to provide a worksheet for each of the new infrastructure routes described in the developed strategy.
- 4.6.12 The scoring and weighting system used is as devised for SWARMMS, based on an initial qualitative assessment of the potential level of impact of each component. This is shown below:

<b>Indicator</b>	<b>Division</b>	<b>Weighting Factor</b>	<b>Scoring method</b>
Groundwater Vulnerability Class	Major Aquifer	10	Weighting factor multiplied by traverse length
	Minor Aquifer	6	
	Non Aquifer	0	
Rivers-Chemical GQA	Very Good	10	The quality weighting factor is multiplied by the number of river crossings and added to the weighting factor multiplied by the adjacent length (in kilometres)
	Good	8	
	Fairly Good	6	
	Fair	4	
	Poor	2	
	Bad	1	
Floodplain	Crossing	5	The weighting factor is multiplied by the length of flood plain traversed.
	Parallel/adjacent	2	

4.6.13 Allocation of a weighting factor to each indicator, particularly for water quality and groundwater vulnerability, essentially provides an estimate of the importance of the attribute - similar in principle to the “importance criteria” used in GOMMS based assessments. So, for example, weighting based on existing water quality reflects greater risks attached to high quality rivers (such as the loss of valuable fisheries) although it is essentially a qualitative allocation of relative importance of the attribute.

4.6.14 From initial evaluation it was concluded that heavy weighting should also be provided to major aquifers, which could represent a regionally significant strategic resource. Indeed much of the south east is covered by Chalk, which provides the most important groundwater resource in the country as well as regionally.

4.6.15 The introduction of adjacent length to the surface water quality assessment reflects possible concerns over drainage to an adjacent surface water (this may be river, lake, pond, canal etc). Any surface water parallel to the route within a distance 500m is considered – although clearly this should be down slope from the route for this weighting to apply.

4.6.16 Not all transport routes actually cross the flood plain, many (particularly railways) may follow the flood plain and potentially impact upon it for many kilometers.

Greater weight is given to those routes that wholly cross the flood plain as these may have significant effect on flood routings and cause up stream damming. However, some impact from routes parallel to the flood plain may also be expected, particularly if flood plain area is lost or flood flow routes altered. Equal weighting is given to those areas of tidal flood plain and those where the flood plain relates to freshwater.

4.6.17 In addition to the weighting factors, an adjustment for “transport mode” is also made. Presently this adjustment is based on factoring final scores in each worksheet by five for road developments and by two for rail. It is envisaged that airports would be factorised by one, but this has not been applied here. These modal adjustments are intended to reflect the different scale of impacts as described in the MMEA. No modal adjustment is made for flood plains as any development on flood plains may have an impact

4.6.18 Textural Assessment - For the evaluated strategy, worksheet scores were totalled. Scores for each assessed component of the water environment (ie groundwater; river quality; flood plains) are not in any way compatible and as such each component must therefore be considered individually in any comparison between strategies or combinations of schemes within strategies.

4.6.19 The ultimate textural assessment also recognises that mitigation measures applied to upgraded routes may have positive impacts over the existing situation (ie benefits) arising from the opportunity to modernise (for example) drainage measures. This is also reflected in the Appraisal Summary Table for the water environment

4.6.20 Following the consideration of available mitigation measures, each individual component, may ultimately be considered with respect to the potential to cause harm (eg significant; no change; potential for enhancement).

### ***Data Sources***

4.6.21 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
<b>Groundwater</b> - Groundwater Vulnerability Zones	Groundwater vulnerability maps published by HMSO at 1:100,000 scale (available as hard copy and digitally)
<b>Rivers</b> - 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
<b>Floodplains</b>	Further details (local assessment only) from Section 105 maps from Flood Defence sections of regional office of EA

4.6.22 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.

4.6.23 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.

***Appraisal /Assessment Limitations***

4.6.24 The key elements of the core strategy for SoCoMMS are based on a number of policy themes:

- Reducing the need to travel;
- Providing better integration for public transport;
- Promoting the use of public transport to/from main urban areas;
- Provide more opportunities for rails travel;

- Provide enhancements to assist freight movement;
- Provide new road/rail infrastructure;
- Local road safety and other measures;
- Improve access to airports and ports.

4.6.25 With respect to the water environment, quantitative assessment at a strategic level is focussed solely on proposed infrastructural developments. No attempt has been made to assess the affect on the water environment of the following:

- Changes in traffic volumes;
- Changes in traffic control systems or traffic management;
- Movement of freight from road to rail or other freight management schemes.

4.6.26 These may have an influence on potential accident and spillage rates and also potential pollutant loadings on road carriageways. In addition no attempt has been made to assess the effect of developments which have a relatively small and undefined footprint, for example new railway stations or revisions to existing stations, park and ride schemes or cycleway developments. During more detailed planning these may require assessment (with respect to water) at a more local scale

4.6.27 This appraisal also takes no account of any increases in population (temporary or otherwise) with respect to the increased pressure on water resources in the region arising from improved access.

### ***Groundwater***

4.6.28 The 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.

4.6.29 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.

4.6.30 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

4.6.31 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.

4.6.32 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***

4.6.33 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.

4.6.34 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.

4.6.35 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;

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

4.6.37 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.

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

### ***SoCoMMS Strategy***

4.6.39 With the SoCoMMS strategy as proposed it is not possible to use the MMEA scores to assess the relative impact between strategies and with the limited use of the MMEA methodology to date there is no benchmark that allows us to determine the scale of overall impact on the water environment. However the MMEA scores do show quantitatively the relative impact on the water environment of the individual scheme components of the SoCoMMS strategy. Further comment on the scale and importance of these impacts is warranted. This is provided below with respect to each component of the water environment.

4.6.40 Groundwater - The most significant impacts identified arise from:

- Brighton Area LRT
- Southampton – Portsmouth LRT
- Worthing Tunnel
- Bexhill- Hastings Link Road

4.6.41 The high scoring totals for the LRT routes result primarily from the length of the routes which lie over major aquifers (the entire length for Brighton LRT) and the combined length of major and minor aquifer overlain by the Southampton to Portsmouth LRT. Significant parts of the Brighton LRT (Brighton – Falmer and Brighton – Patcham) also traverse SPZs including the most sensitive inner zones (Zones 1 and 2). No such SPZs are crossed by the Southampton- Portsmouth LRT.

4.6.42 The High scoring totals for the Worthing proposals ( assuming one tunnel) and Bexhill- Hastings link again relate to traversed length of major and minor aquifer (respectively). For the Worthing tunnel, 60 % of the total route lies over SPZs, with 34% (of the total) over the most sensitive Zone 1.

4.6.43 Despite lower scores, some of the other schemes also cross SPZs, the most significant of these are :

- Dover – Lyddon (entire route within Zone III and Zone II)
- Lewes- Beddingham (junctions lie over SPZs)

- 4.6.44 The rail routes largely avoid SPZs.
- 4.6.45 For all these developments there is the potential for significant impacts on the groundwater environment unless mitigation measures are applied. The most significant impact relates to the Tunnel at Worthing. Whereas developments at the surface may be subject to a range of mitigation measures (see below) which can significantly reduce (or even negate) impacts on groundwater, tunnelling through a major aquifer (let alone passing through SPZ's) may lead to significant impact on the groundwater environment, with limitations on the available mitigation measures (particularly during construction). Given the value of groundwater as a resource and the overall shortage of water resources in the south east, the impact of such a scheme on the water environment is likely to be a considerable constraint on its development.
- 4.6.46 Surface Water Quality - the most significant impacts identified arise from:
- Bexhill- Hastings Link Road
  - A27 Lewes to Beddingham Schemes
  - Southampton – Portsmouth Light Rail
- 4.6.47 The impacts arise from the number of river crossings and the potential impact that these may have on the surface water, both with respect to drainage and with respect to impacts during construction. Both the road schemes include new alignments that will require new river crossing with the associated impact. The light rail follows an existing route – perhaps providing an opportunity to enhance existing drainage to modern standards.
- 4.6.48 It should be noted that as a significant number of the schemes occur on the chalk (where there is little surface water), in general terms the overall impact on surface water is relatively limited.
- 4.6.49 Flood Plain Intrusion - the most significant impacts arise from:
- Bexhill- Hastings Link Road
  - Southampton – Portsmouth Light Rail
  - Arundel south by-pass
- 4.6.50 Crossing of tidal flood plains contributes significantly to the potential impacts, although the LRT crosses a number of rivers known to be flood sensitive. The

crossing of any flood plain, particularly the need for new bridges may have significant impacts on flood routing. Much of this must be addressed at a local level in conjunction with route designers. Local adjustments to routes for avoiding aggravating flood problems cannot be ruled out.

### ***Potential Mitigation and Strategic Balance***

4.6.51

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.

4.6.52

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).

4.6.53

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

4.6.54

Within the SoCoMMS strategy the balance of new alignments/routes and existing transport routes is approximately as follows:

	<b>New Alignment</b>	<b>Existing Transport Routing</b>
<b>Road</b>	22.5km (47%)	25km (53%)
<b>Rail</b>	1.5km (8%)	17.5 km (92%)
<b>Light Rail</b>	nil	68 km (100%)

(All distances approximate)

4.6.55 This suggests that the significant majority of schemes are based on existing transport routes and that any impacts identified through the assessment process may have already occurred in establishing these existing routes. Additionally, this suggests that by improvements to mitigation (for example through improved drainage) for these existing routes, that potential benefits may be accrued. It should be noted however that here is more or less a balance with respect to road schemes and these are recognised as having a greater overall impact on the water environment. These factors need to be considered within the overall textural assessment (see below).

#### ***Summary and Textural Assessment***

4.6.56 The core strategy proposes a series of schemes which must be considered both on an individual basis and in the light of potential cumulative impacts from the implementation of the entire strategy. The impacts must also be considered with respect to the availability of mitigation measures that could be applied locally and also take into account the cumulative effect of potential benefits arising from mitigation (through for example improvements to drainage on upgraded existing routes).

4.6.57 The final assessment must also consider the present status of the water environment and its sensitivity to change. This is particularly important both with respect to groundwater resources – which are under particular pressure in the south east and with respect to flooding – which has caused significant problems within the region.

4.6.58 On the basis of the individual schemes, the proposed tunnel at Worthing, which passes not only through a major aquifer but also through a number of inner SPZs, must be considered as having major regional impact. The difficulties involved in applying appropriate mitigation enhance this view. For other schemes (at grade),

which traverse major aquifers or SPZs, mitigation measures may be available (such as “sealed” drainage) to reduce impact.

4.6.59 On a local scale both environmental benefits (arising from upgrades) and negative impacts (eg from new routes) will occur. The overall balance between new schemes and upgrades of existing schemes would tend to suggest that (excluding the Worthing tunnel) there may be an overall net benefit if mitigation applied to existing routes leads to local enhancements. On this basis, (again excluding the tunnel) and on a strategic basis it may be considered that there will be low to insignificant environmental impacts arising from this strategy.

4.6.60 However the impact of the Worthing tunnel, with the associated limitations on mitigation, is such that the core strategy as it stands must be considered as having a significant impact (ie a significant potential to cause harm) on the water environment.

#### 4.7 ***Journey Ambience***

4.7.1 The methodology used for the assessment of impacts on journey ambience has been based on the Guidance on the Methodology for Multi-modal Studies (GOMMMS) 2000. The methodology applied for strategies is based on a corridor assessment rather than at specific locations. Therefore assessment has not been made of each particular scheme e.g highway / rail scheme.

4.7.2 Journey Ambience can be influenced by 3 factors, ‘Traveller Care’, ‘Travellers’ Views’ and ‘Travellers Stress’. ‘Traveller Care’ comprises of 4 sub-factors, cleanliness, facilities, information and environment and ‘Traveller Stress’ comprises of 3 sub-factors, frustration, fear of potential accidents and route uncertainty.

4.7.3 A number of assumptions have been made for the assessment which are as follows:

- It is assumed that ‘Traveller Care’ relates to public transport improvements to rolling stock, new coaches/buses, new facilities (at stations and on the vehicles themselves), and better information at stations. Emphasis is on vehicle attributes therefore provision of new stations per se have not been included as a benefit in terms of ‘Traveller Care’. Improvements to stations and bus stops should be assessed under the Passenger Interchange sub-objective.

- It has been assumed that there will be no change to ‘Travellers’ Views’ as the details of the schemes that would be required to assess this aspect are unavailable at this stage.
- It has been assumed under ‘Traveller Stress’ that travellers’ frustration and fear of accidents will be reduced if there are new /improved roads within the strategy, as these roads will be designed to higher quality.
- It is also assumed that traveller’s frustration and fear of accidents will not change due to changes in traffic flow/congestion as the effects of traffic flow and reduced journey times are assessed under other sub-objectives, such as Transport Economic Efficiency, Reliability and Accidents sub-objectives. However reduced access time to stations has been included as a factor reducing travellers’ frustration.

#### 4.7.4

The assessment uses the GOMMMS Worksheet 4.15 and a simple 3 point scale – better, neutral or worse. The overall assessment score uses the following guidelines:

- The overall assessment is likely to be neutral if the assessment is neutral for all or most of the sub-factors, or improvements on some sub-factors are generally balanced by deterioration on others;
- If the change in impact across the sub-factors is, on balance for the better, the assessment is likely to be beneficial, and, conversely, it is likely to be adverse if there is an overall change for the worse;
- The overall assessment is likely to be slight (beneficial or adverse) where the numbers of travellers affected is low (less than 500 a day, say);
- The overall assessment is likely to be large (beneficial or adverse) where the numbers of travellers affected is high (more than 10,000 a day say);
- The overall assessment is likely to be moderate (beneficial or adverse) in all other cases.

4.7.5 Since the study area for SoCoMMS is large, the numbers of people likely to be affected are beyond 10,000, therefore the application of the above scoring for the overall assessment is more difficult.

4.7.6 In general the results of the assessment show and it would be expected that, any strategy that improved public transport would improve ‘Traveller Care’ and any strategy which improved conditions on the roads, through traffic management, good road layout and geometry, lighting etc. would reduce traveller stress. The Worksheets 4.15 have been completed for the do-minimum and the SoCoMMS strategy and they show that overall assessment score for the SoCoMMS strategy is ‘beneficial’

4.7.7 **Base/Do-Minimum** may improve journey ambience through road improvements, and other congestion and safety improvements, which will reduce travellers’ stress, assuming new roads will be designed to better standards. Station improvements and local transport plan public transport initiatives will also improve ‘Traveller Care’ slightly and are likely to improve journey ambience. Therefore the do-minimum situation represents an improvement in journey ambience with the overall assessment being ‘beneficial’.

4.7.8 **SoCoMMS Strategy** At this stage we are unable to assess each scheme (e.g road, rail etc) in detail, but look at the general measures under the strategy and provide a commentary based on the level of information currently available. The measures included in the SoCoMMS strategy, such as reducing travel demand (e.g persuasive measures to reduce certain types of car trip), highway improvements, reduction in freight movements on the road, and public transport improvements are all likely to reduce ‘frustration’ on the roads and therefore significantly reduce ‘Traveller Stress’. The ‘Fear of potential accidents’ is also likely to be reduced by measures such as making the best use of road space, highway improvements, local road safety/ ‘hotspot’ measures and strategic road safety initiatives, thereby reducing ‘Traveller Stress’ further. In addition, ‘Traveller Stress’ is likely to be reduced, because of improved accessibility to information and information systems, which reduce ‘Route uncertainty’.

**Worksheet 4.15**

**Environment: Journey Ambience**

**SoCoMMS Strategy**

Factor	Sub-factor	Better	Neutral	Worse
		✓ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Factor	Sub-factor	Better	Neutral	Worse
Traveller Care	Cleanliness			
	Facilities	✓ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Information	✓ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Environment	✓ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Travellers' Views	-	<input type="checkbox"/>	✓ <input type="checkbox"/>	<input type="checkbox"/>
Traveller Stress	Frustration	✓ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fear of potential accidents	✓ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Route uncertainty	✓ <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.7.9

'Traveller Care' is significantly improved under the strategy, by the improvements to public transport, including improved facilities at stations, improved rolling stock, improved public transport access to stations and Quality Bus Partnerships. These reductions in 'Traveller Stress', and improvements to 'Traveller Care', result in a beneficial impact on 'Journey Ambience'. **The overall assessment for the Core Strategy is 'Large Beneficial'.**

4.8

#### ***Physical Fitness***

4.8.1

The GOMMMS 2000 methodology for assessment physical fitness is mainly applied at plan level and is difficult to apply at strategy level. At plan level, a threshold is set of 30 minutes, which is the minimum length of activity for which health benefits occur. There are four levels of benefit that can be considered:

- For new walk and cycle trips where journey times are below this threshold, there will be some minor health benefits;
- For new walk and cycle trips where journey times are above this threshold, there will be significant health benefits;
- For existing walk and cycle trips, where the journey time remains above the threshold, health benefits will be largely unchanged; and

- For existing walk and cycle trips, where the journey time falls below the threshold, there will be minor reductions in health benefits.

4.8.2 For the purposes of this assessment, where there are no details of the schemes involved, the community facilities, catchment areas or the changes in journey times for pedestrians and cyclist, it would not be possible to complete the suggested Worksheet 4.14. Therefore a qualitative comment has been made using professional judgement, for each strategy below.

4.8.3 **Base/Do-Minimum** mainly consists of road schemes, which can change journey times for pedestrians and cyclists by creating or reducing severance. This might have the effect of changing the number of walkers or changing journey times of walkers or cyclists to above or below the 30minute threshold. Since the details of the schemes are unknown it is difficult to establish if the effect will be improve physical fitness or reduce physical fitness at this stage, therefore the effect of the do-minimum is unclear.

#### SoCoMMS Strategy

4.8.4 Measures included in the strategy such as provision of increased facilities for local journeys to be made by walking or cycling and enhanced walk and cycle access to public transport interchanges are likely to increase the number of people walking and cycling thereby providing benefits to 'Physical Fitness'. However, enhanced walking and cycling routes could have a negative effect on 'Physical Fitness' if for example journey times of existing cyclists are reduced to less than the 30 minute threshold. This would need to be looked at in greater detail, which is not feasible at this stage, since locations of specific measures are unknown.

4.8.5 The highway schemes included in this Strategy may change journey times by creating or reducing severance. For example if the number of walkers is reduced due to increased severance then physical fitness will decline. However, increased severance can also improve fitness if the numbers of walkers and cyclists remains unchanged and there is increase in journey time above the 30 minute threshold, and vice versa for a reduction in severance. The effect of these highway schemes is therefore unclear at this stage of assessment. Other measures included in the strategy such as rail improvements, better public transport, efficient freight movement and reducing travel demand also have an unknown effect on physical fitness at this level of assessment.

- 4.8.6 Although as mentioned above it unclear as to the changes in the numbers of cyclists and pedestrians that will occur due to the strategy, it is assumed that with the improvements that are suggested in the strategy, cycling and walking will increase and that there will be a modal shift.
- 4.8.7 Qualitative Impacts: Measures to improve cycling and walking facilities are likely to bring about an increase in walking and cycling and therefore improve physical fitness. However at a strategic level it is unclear what changes in the number of cyclists and pedestrians will occur.
- 4.8.8 The overall assessment of the measures included in SoCoMMS Strategy is 'Beneficial Impact'.

## **5 Safety**

## 5 Safety

### 5.1 *Introduction*

5.1.1 The Safety objective identified within GOMMMS is concerned with reducing the loss of life, injuries and damage to property resulting from transport accidents and crime. Two sub-objectives are considered, namely;

- Accidents; and
- Security.

### 5.2 *Accidents*

#### *Methodology*

5.2.1 The SoCoMMS Strategy has been compared against the do minimum situation with regard to predicted accident numbers and associated costs.

5.2.2 The revised version of the COBA computer program – COBA11 - has been used as the method of appraisal for assessing the road accident issues. Prior to the revisions to the COBA users manual (DMRB Volume 13), reference has been made to the 'Interim Guidance Notes', HETA Division, March 2001.

5.2.3 Within the revised program, the Present Value and Price Base Years have been updated from 1994 to 1998. The discount rate remains at 6%. Compared with the earlier COBA10 program version, accident rates, severity splits and costs have been revised in accordance with the latest data.

5.2.4 Accident values are now expressed in 1998 prices and accident rates and severity splits now change over time, in order to be consistent with observed trends and likely policy developments. These are forecast to follow the existing downward trend until 2010 in accordance with the Governments Casualty Reduction Targets. Accident rates are then assumed to continue to fall until 2030.

5.2.5 In the following COBA11 accident analysis, a scheme opening year of 2008 has been assumed, with a last scheme year of 2037, giving a standard 30 year assessment period. For all routes default accident rates were applied.

5.2.6 In the network definition stage, the defaults used are for a Non Built-up Trunk (INB) network classification. Equivalent national average traffic proportions have also been assumed, with a standard seasonality index of 1.10.

5.2.7 In carrying out the accident data analysis, combined link-and-junction accident rates (COM) were used.

5.2.8 Link traffic flow information for the do minimum scenario and SoCoMMS Strategy options were obtained direct from the EMME/2 strategic traffic model. These flows were for a 2016 forecast year.

5.2.9 Within the EMME/2 model, however, the flows produced were for Annual Average Hourly Traffic (AAHT). These were converted to an ‘average day’ matrix by the application of factors contingent upon the classification of road type. The factors used are set out below:

<b>Road Classification</b>	<b>Factor</b>
<i>Motorway</i>	14.7
<i>A Road (Trunk)</i>	14.2
<i>A Road (Other)</i>	13.8
<i>B Road</i>	13.6

5.2.10 The basic unit for traffic flow calculations used within the COBA program is therefore the Annual Average Daily Traffic flow (AADT). This is required for every link in the defined network for each year of the evaluation period.

5.2.11 Default low and high growth assumptions were applied to traffic, economic and fuel costs over the 30 year evaluation period. The default annual discount rate of 6% has also been assumed.

*Summary Results*

5.2.12 The COBA11 results for the SoCoMMS Strategy are shown in Table 5.1. A large element of the accident benefits can be attributed to the forecast reduction in traffic demand with the SoCoMMS Strategy vis-à-vis the do minimum.

**Table 5.1 Results of COBA11 Accident Assessments : Net Present Benefits**

Strategy	Reduction in Accident Numbers & Cost Savings				
	No of Accidents	Casualties			Accident Cost Saving
		Fatal	Serious	Slight	
<b>SoCoMMS Strategy</b>					
	9,741	226	1,638	13,525	<b>£298.3m</b>

Note: 1. All Costs are in 1998 prices, discounted to 1998.  
2. Assumes Mid growth

5.2.13 The package of road improvements in the SoCoMMS Strategy, coupled with reduced growth in travel demand, result in a forecast reduction in accidents of approximately 9,750 over the 30 year evaluation period, compared to the Do Minimum scenario. The number of fatal casualties are estimated to fall by approximately 230, while the overall Net Present Value is in the region of £300M. Accident values are expressed in 1998 prices, discounted to 1998.

5.3 **Security**

5.3.1 GOMMMS indicates that the safety objective is also concerned with improving the personal security of travellers and their property. The security of public transport passengers increases with the provision of surveillance, design features that reduce the opportunities for attackers to surprise travellers and facilities for making emergency calls.

5.3.2 The GOMMMS methodology for assessment of security is mainly applied at a project level therefore, as suggested in GOMMMS, this approach has been adapted for assessment at the strategy level. The following paragraphs reprise some of the key information in GOMMMS that has been used.

5.3.3 For public transport passengers, the DTLR Mobility Unit has produced best practice guidelines for railway stations and public transport operators (Mobility Unit, 1998). This raises a number of key security issues and gives guidance on design and management practises. These are broad ranging and a key sub-set have been used as security indicators, as set out below.

Security Indicator	Poor	Moderate	High
Site perimeters, entrances and exits	Unmarked or poorly marked site perimeters, exits	Attention to boundary and exit marking	Clearly marked site perimeters/exits
Formal surveillance	No CCTV system in place	CCTV system in place but number not optimal	Effective CCTV system in place
Lighting and visibility	Poor design which hinders camera view. Poor or no lighting in passenger areas at night	Camera view not too problematic. Lighting in passenger areas at some but not all times when facility open	Good design for camera view. Lighting to daylight standard in passenger areas when facility open.
Emergency Call	No or poor provision of emergency phones, help points and public telephones	Basic provision of emergency phones, help points and public telephones	Good provision of emergency phones, help points, public telephones.

#### 5.3.4

The SoCoMMS Strategy measures include improvements to security at railway stations through the installation of CCTV, access controls and the refurbishment, and redevelopment of station buildings and facilities. These measures are outlined in more detail below:

- CCTV provision is to cover stations, car parks, cycle storage, taxi ranks and bus stops at all stations
- Upgraded and new automated ticket barriers to provide controlled access to all large and medium stations
- BTP agreement, high quality and recordable for court evidence, 24 hour monitoring
- Secure Station Accreditation
- Refurbishment of footbridges and subways with improved materials, lighting, security, and mirrors.

- Refurbishment, replacement and provision of waiting rooms or shelters with improved security and lighting.
- Help points on every platform linked to central control on 24 hour basis

5.3.5

The assessment uses the GOMMMS Worksheet 5.1 as a basis for considering the overall impact of the strategy.

**Worksheet 5.1: Assessment of Security Sub-objective : SoCoMMS Strategy**

Security Indicator	Relative Importance	Base/Do-Minimum	SoCoMMS Strategy
Site perimeters, entrances and exits	Medium	Moderate	High
Formal Surveillance	High	Moderate	High
Lighting and Visibility	High	Moderate	High
Emergency Call	High	Moderate	High

5.3.6

For each indicator the strategy brings about an improvement and a shift to the right of the table of indicators, therefore according to GOMMMS criteria the strategy is beneficial compared to the Do-minimum. These improvements will effect over 100,000 thousand travellers in the study area. The SoCoMMS strategy measures also include similar improvements for bus stations and therefore fulfils the same assessment criteria. **The overall assessment in relation to Personal Security for the SoCoMMS strategy is “large beneficial”.**

5.3.7

Qualitative Comments: 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.

## **6 Economy**

## 6 Economy

### 6.1 *Introduction*

6.1.1 The Economy objective identified within GOMMMS is concerned with improving the economic efficiency of transport and the efficiency of economic activities, with the key aim of supporting sustainable economic activity and returning good value for money. Three sub objectives are considered, namely;

- the economic efficiency of the transport system
- reliability
- the wider economic impacts

### 6.2 *Transport Economic Efficiency*

6.2.1 Assessment of the achievement of the transport economic efficiency sub-objective is made by conducting a 'transport' cost/benefit analysis (CBA). The results of a CBA may be accumulated into a single measure of economic worth in a number of different ways. However, GOMMMS suggests that for multi-modal studies, such measures are likely to obscure several distinctly different impacts. In order to avoid this, and to ensure that assessors are presented with appropriate information when considering the overall impacts of options, the results of the CBA should be presented broken down into its component effects on users, public sector transport providers, private sector providers, and other government impacts.

6.2.2 The uni-modal software used by the DETR for the appraisal of road schemes (COBA and URECA) have a limited role to play in the multi-modal studies. While they have been developed in recent years to deal with variable trip matrices, they cannot handle benefits to modes other than road, except to the extent that public transport vehicles are affected by conditions on the road system.

6.2.3 The methodology to be employed so that the CBAs may be conducted on a comparable basis across the multi-modal studies involves use of standard software prepared by the DETR.

6.2.4 The software is known as TUBA – Transport Users Benefits Assessment. It estimates user benefits for all modes of transport (including public as well as private), private sector provider revenues and government indirect tax revenues.

The TUBA software is to be used for the CBAs in all the multi-modal studies. The first full release of TUBA (version 1.2a March 2001) has been used for this study.

6.2.5 The results of the CBA are presented in the Transport Economic Efficiency (TEE) table, the purpose of which is to summarise and present the results of a transport cost benefit analysis including all the necessary elements. The TEE table is of the form presented in GOMMMS as Table 6.2.1.

6.2.6 It can be seen that the strategy performs well in economic terms and hence represents good value for money. Each significant individual element or package within the strategy also achieves a positive NPV, indicating that each item contributes towards the viability of the whole program. Table 6.2.2 summarises the performance of each package within the strategy. It should be noted that the benefits from the strategy as a whole exceed the sum of these individual components, as many synergies exist between schemes.

6.2.7	Overall Assessment	<b>User Benefits: NPV</b>	<b>£1715M</b>
		<b>Private Providers NPV</b>	<b>£-129M</b>
		<b>Public Providers NPV</b>	<b>£1964M</b>
		<b>Other Government NPV</b>	<b>-£1688M</b>
		<b>Strategy NPV</b>	<b>£1862M</b>
		<b>Strategy B:C ratio</b>	<b>2.8</b>

**Table 6.2.1: Transport Economic Efficiency (TEE) £M : Worksheet 6.1: Strategy**

<b>Impact</b>	<b>TOTAL</b>	<b>Present Value:1998 prices discounted to 1998 values</b>			
<b>User benefits</b>					
<b>Personal travel</b>					
		Private	Goods (road)	Bus & Rail	
Travel time	3791	2642	504	644	
Vehicle operating costs	766	613	152	0	
User charges	-2841	-2721	-120	0	
Construction/Maintenance Delays	0	0	0	0	
NET IMPACT	1715	(1)	534	536	644
<b>Private Sector Provider Impacts</b>					
		Private	Goods (road)	Rail	
Revenue	0	0	0	0	
Operating costs	-129	(a)	0	0	-129
Investment costs	-76	(b)	0	0	-76
Grant/subsidy	76	0	0	0	76
NET IMPACTS	-129	(3)	0	0	-129
<b>Public Sector Provider Impacts</b>					
		Private	Goods (road)	Rail	
Revenue	2796	2681	114	0	
Operating costs	-225	(c)	-225	0	0
Investment costs	-607	(d)	-394	0	-213
NET IMPACTS	1964	(4)	2062	114	-213
<b>Other Government Impacts</b>					
		Private	Goods (road)	Rail	
Grant/subsidy payments	-76	(e)	0	0	-76
Indirect tax revenues	-1612		-967	-645	0
NET IMPACTS	-1688	(5)	-967	-645	-76
<b>TOTAL</b>					
Net Present Value, NPV	1862	(6)=(1)+(3)+(4)+(5)			
Present Value of Costs, PVC	-1036	(7)=(a)+(b)+(c)+(d)			
Present Value of Cost to Government	1888	(8)=(4)+(e)			
Benefit/Cost Ratio, BCR	2.797	(9)=((6)-(7))/-(-7)			
Value/Cost to Govt Ratio, VCGR	-0.99	(10)=(6)/-(8)			

**Table 6.2.2 – Summary of Package Performance**

<b>Package</b>	<b>NPV - £m</b>	<b>B:C ratio</b>	<b>Notes</b>
HIGHWAYS			
Major Schemes			
Arundel By-pass	33.5	3.5	
Worthing By-pass	265.0	2.3	
Beddingham	22.7	12.7	
Selmeston	10.6	1.5	
Wilmington	31.6	1.6	
Hastings Link Road	26.5	2.7	
<b>Total Highways Package</b>	<b>1635</b>	<b>3.6</b>	Includes various other packages and schemes, demand management and wider synergies
PUBLIC TRANSPORT			
Bus Strategy	5	1.1	Total bus measures
Rail Strategy - operations	185	2.2	Train service measures
Rail Strategy - stations	19	1.3	New and enhanced
Brighton LRT	17	1.1	Opens 2020
<b>Total Strategy</b>	<b>1862</b>	<b>2.8</b>	

6.3

***Reliability***

6.3.1

This sub- objective according to GOMMMs summarises the strategies impact on the objective to improve journey time reliability for transport users by road and rail.

*Methodology for Assessing Reliability for Roads*

6.3.2

Following the guidance as set out in GOMMMS the stress- based approach was used to determine the degree to which the proposals of the SoCoMMS strategy affect the reliability of roads within the study area. The change of reliability between the *Do Minimum* and the proposed strategy is thus reflected by the change in ‘stress’ for a particular section of road. Reliability in this case is a reflection of congestion, itself a function of traffic flow and road capacity.

6.3.3 Volume over capacity ratios were used as a measure of ‘stress’ with 75% to 125% being the constrained ranges within which reliability improvements or decline would be measured. Following the GOMMMS recommendation, therefore, any stress value less than 75% or greater than 125% were given values of 75% or 125% as appropriate. It is nevertheless recognised that such an aggregation is arbitrary and only serves to focus on the benefits to already problematic roads, which may conceal more widespread benefits resulting from the strategy. This focus on roads with existing high stress levels can be seen in parallel with the statement in GOMMMS that “*modest improvements for large volumes of traffic may be more highly rated than those providing large improvements for small volumes*”, with congestion and stress being a function of volume and road capacity.

6.3.4 The difference between the percentage stress for the *Do Minimum* and that of the *Do Something* gives a score that, when multiplied by the Annual Average Daily Traffic Flow, provides the assessment for that link. However, whereas the recommendation makes specific reference to the assessment of new routes with relation to their ‘old’ counterparts, the methodology employed caters equally for new proposed routes. This is not made very clear in the recommendations.

6.3.5 It is accepted within the GOMMMS appraisal process that the impact assessment method can only provide a very broad indication of impact of a proposal on reliability or reliability benefits and that it is therefore inappropriate to present the results as numeric calculations. Following its guidelines, similar textual scores were used to define the reliability impacts of the strategy. This final assessment was made on the basis of the overall impact score (i.e. Difference in Stress \* AADT flows). The terminology used is:

- Large Beneficial and Large Adverse
- Moderately Beneficial and Moderately Adverse
- Slightly Beneficial and Slightly Adverse
- Neutral

6.3.6 The results of the assessment can be seen in Table 6.3.1. Overall, it can be said that the SoCoMMS strategy is slightly beneficial in terms of its impact on the road network (although taking into account the points made in 6.3.3). Of course, since assessing impacts on the basis of the number of links is somewhat spurious, the

results have also been presented as total link length for each category. This way, beneficial impacts outweigh adverse ones by approximately five to one in total.

Table 6.3.1: Reliability assessment from the SoCoMMS strategy

<b>Type of Impact</b>	<b>Number of Links</b>	<b>Total Link Length (km)</b>
Large Adverse	0	0
Moderately Adverse	6	13
Slightly Adverse	47	126
Neutral	4122	12805
Slightly Beneficial	245	556
Moderately Beneficial	21	54
Large Beneficial	2	5

6.3.7

The strategy has also been assessed in relation to the benefits that occur within the study area only. This is presented in table form in Table 6.3.2 and graphically in Figure 6.1 which clearly show the relative reliability benefits of the SoCoMMS strategy for roads within the study area.

6.3.8

Table 6.3.2: Reliability assessment from the SoCoMMS strategy in the study area

<b>Type of Impact</b>	<b>Number of Links</b>	<b>Total Link Length (km)</b>
Large Adverse	0	0
Moderately Adverse	3	7
Slightly Adverse	13	35
Neutral	703	1480
Slightly Beneficial	76	134
Moderately Beneficial	5	8
Large Beneficial	0	0

### *Reliability for Rail*

- 6.3.9 At a strategy level there is insufficient information available to undertake the methodology set out in GOMMMS. However it is possible to set out a broad indication of the impact the strategy will have on reliability.
- 6.3.10 Delays and cancellations can be commonplace for those who use the trains regularly along the south coast. Reasons for unreliable services include poor rolling stock, the general conditions of the railways and lack of integration between services (e.g. not holding connections).
- 6.3.11 The Strategy proposes improvements to rail infrastructure, rolling stock and service enhancements that will improve reliability of the network. Proposed infrastructure enhancements are as follows:
- Improved signalling;
  - Eastleigh Chord;
  - Additional platforms at Eastbourne, Fareham and Havant;
  - Double tracking between Ashford and Hastings – with a view to providing higher speed corridors; and
  - Double tracking between Fareham and Botley – with a view to providing higher speed corridor services.
- 6.3.12 Rolling stock enhancements include:
- Replacement, installation and upgrading of rolling stock to improve reliability and safety;
  - Provision of service planning information
  - New rolling stock to included security cameras, accessibility regulations compliance, through gangways and layouts which minimise dwell times at stations
- 6.3.13 It is the consultants opinion that these improvements will have a Moderate Beneficial Impact on the reliability of rail passengers.
- 6.3.14 Qualitative Comments: **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.**

6.3.15 Assessment: **Moderate Beneficial Impact**

6.4 ***Wider Economic Impacts.***

6.4.1 This section seeks to identify the wider economic impacts resulting from the implementation of the SoCoMMS Strategy on the corridor as a whole. The assessment seeks to build on the approach outlined in the GOMMMS framework, as well as ongoing research into the impact of improved accessibility on local economic activity. The assessment also makes reference to the ongoing research<sup>1</sup> by Steer Davies and Gleave (SDG) for the DfT concerning the link between new transport infrastructure and economic development.

6.4.2 It should be noted that that the results of the economic evaluation (cba), reported above, provide a close guide to the wider benefits from the strategy. Whilst these consist largely of travel time and operating cost changes, such benefits act within the economic system to increase the general level of welfare (utility) within the region. For instance a travel time saving to a business traveller increases the potential for additional economic activity or, at the margin, allows previously constrained activities to take place. A key issue in assessing the wider economic benefits is to identify **where** such changes occur and to relate this to local regeneration and development priorities. Accessibility measures are used in this respect.

6.4.3 In the following sections the recent performance of the regional economy in the South Coast corridor is assessed. This is followed by a description of the estimated changes in accessibility to the area following the implementation of the SoCoMMS Strategy and finally, the impact it is likely to have on the regional economy is assessed. A more detailed account of the accessibility analysis is given in Chapter 7.

#### *Economic Background*

6.4.4 The SoCoMMS corridor is characterised by a region of diverse economic fortunes, with some areas which are economically successful and expanding, whilst others (mainly the coastal towns) exhibit high levels of urban deprivation and economic decline. This is reflected in a range of economic and social indicators which provide an illustration of this relative economic decline. Some headlines include:

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<sup>1</sup> Guidance on the Economic Impact Report, Stage 1 Report December 2001, DTLR

- In the UK context, GDP per head in the South East Region as a whole is higher than any other region outside London. It stood at £15,098 in 1999.
- The South East region contributes 15.8% to National GDP, second only behind London.
- The relative success of the South East economy hides real deficiencies:
  - Variations in GDP per head, employment rate and educational attainment
  - Increasing development and congestion are affecting its future growth potential
  - People in the South East travel further than in any other region (8000 miles pa compared to 6000 miles for England).
- The South East has the most heavily used roads outside London (4800 vpd/km compared to 3700 for England).
- In terms of track capacity, less than 10% of the rail network in the South East is operating at 90% of capacity or more.
- Significant improvements to many radial routes between the corridor and London are already underway (e.g. the Channel Tunnel Rail Link; Govia's rail franchise plans) . Others remain to be addressed, such as the A21 north of Hastings. However these lie outside the direct scope of this study.

#### 6.4.5

It is generally accepted that there is a mismatch between supply and demand of transport infrastructure in the SoCoMMS region. The concern is that this will spill over into the performance of the economy and future growth will be constrained. Currently infrastructure in the SoCoMMS corridor is focussed on links with the capital and does not favour cross country links. Improving accessibility within the SoCoMMS corridor is therefore of prime importance.

6.4.6 The CBA indicates the large magnitude of economic benefits generated by the strategy. The extent to which these could have a wider impact is indicated by accessibility analysis.

*Accessibility Analysis*

6.4.7 As part of the strategic modelling an Accessibility Model has been developed which estimates changes in transport accessibility resulting from the implementation of the SoCoMMS Strategy. This is measured in terms of how many jobs are considered to be within 45 minutes travel time. Furthermore, accessibility is calculated by the use of deterrence functions which weight the importance of jobs by location. This means that a higher weight is placed on local jobs, and less weight on jobs which have a higher travel time.

6.4.8 Figures 1 to 12 in Appendix C summarise the results of the accessibility analysis as it affects regional economic performance. Further details of the accessibility analysis are given in Chapter 7.

6.4.9 The accessibility analysis illustrates the significant improvements conferred by the strategy, in particular, in addressing those aspects of accessibility that are poor in the Do-Minimum scenario.

6.4.10 Access to people and jobs are significantly improved by the strategy. Moreover, the eastern part of the study area, characterised by poor public transport accessibility, gains significantly from the proposed rail and bus enhancements. The central part of the region, characterised by poor highway accessibility, also gains significantly from the proposed road enhancements.

6.4.11 PAERS benefit considerably from the proposals. For example, Hastings is shown to benefit from improved public and private access to population and employment (see Hastings LAP). They will benefit further from the proposed bus schemes which, due to their local nature, are not fully captured by the strategic model. The bus measures will also have a significant impact on social exclusion, which is particularly sensitive to bus improvements.

6.4.12 It should be noted that the Romney Marsh area shows relatively little improvement in road accessibility. This reflects an important aspect of the strategy, in which enhancements in this area are limited to rail and road safety schemes. Development of major highway improvements will generate large volumes of

additional traffic, not only in this area but further west on the corridor. This will confer few benefits and negate the other planned local improvements. Rail, which is significantly enhanced between Ashford and Hastings, is designed to be the mode of first choice for longer distance traffic.

6.4.13

In conclusion, significant improvements in accessibility are generated by the strategy. These indicate the distribution of the economic benefits already quantified. All major urban areas, including the PAERs, are likely to benefit significantly from the strategy.

#### *Regeneration Impact*

6.4.14

The advice in GOMMMS concerning the wider economic impact of schemes states that in cases where the main impact of an option being appraised may be to assist the economic regeneration of specific areas, consideration should be given as to whether:

- the option is significantly beneficial for designated regeneration areas; and
- there are significant developments within or adjacent to the regeneration areas which are likely to be dependent upon the option being implemented.

6.4.15

For the first statement to be true, the option would have to satisfy two criteria:

- It should serve an area with recognised regeneration status (such as Assisted Area, Single Regeneration Budget, European Structural Fund) such that either:
  - a new road or a new or enhanced public transport facility would pass through the regeneration area and there is, or will be, a junction(s) or a station(s) within that area;
  - or the key development site within the area has direct access (by road or, for public transport facilities, on foot) onto the new road or public transport facility; and
- the option is consistent with the achievement of the local regeneration objectives, as outlined in evidence from the relevant Government Office

6.4.16

For the second statement to be true in addition to the above criteria being met, particular development sites must have been identified where there is a high probability that one of the following is the case as well:

- the Highways Agency or local highway authority would object to the development if the option was not implemented; or
- planning permission would be conditional on the implementation of the option; or
- investors would not come forward or proceed beyond feasibility in the absence of the option.

The analysis has shown that the first condition is met by the strategy. PAERs and other areas where economic development is a priority benefit from both new infrastructure and an increase in accessibility, the second condition is more difficult to assess in a strategy study, as it requires a more detailed analysis. However, a clear theme of the public consultation was a need for transport improvements to support regional business.

6.4.17

It is evident that the improvement in accessibility to SoCoMMS corridor resulting from the SoCoMMS Strategy is likely to be significant. Poor accessibility has been identified as a significant factor either in the poor performance of parts of the region or as a threat to continued prosperity. The extent to which these accessibility improvements are converted into wider economic benefits depends on the extent to which the various public and private stakeholders exploit these opportunities (eg: by making accessible land available for development). This strategy provides stakeholders with opportunities to realise wider benefits. The extent to which such benefits can be claimed now depends on the collaborative actions of others.

6.4.18

Hastings can be singled out as a Priority Area for Regeneration that benefits particularly from this strategy. The rail enhancements reinforce the alignment upon which the Hastings Five-Part Plan places particular emphasis (Ore-Bexhill) The Link Road will also both relieve congestion and create new development opportunities.

## **7 Accessibility**

# 7 Accessibility

## 7.1 *Introduction*

7.1.1 Accessibility is one of the Government's five main criteria for transport. Specifically, the accessibility objective seeks to improve access to facilities for those without a car, and to reduce community severance. In the Appraisal Summary Table (AST), accessibility is divided into three sub-objectives, namely:

- Option Values – to *increase* 'option values';
- Severance – to *reduce* community severance.; and
- Access to the transport system – the objective being to improve access to the transport system.

This section provides further details of the accessibility results reported above.

## 7.2 *Option Values*

7.2.1 Before considering appraisal of the effects that the SoCoMMS strategy has on option values, it is useful to distil some of the definitions and underlying principles of option values from GOMMMS.

7.2.2 One of the definitions for accessibility is the measurement of the value that people place on having public transport facilities available but which they do not use under normal circumstances, and may indeed never use. The value that people place on such public transport facilities being available as an option is the 'option value'. Expressed in a more categorical way as the choice of last resort, the definition would become the 'existence value'. Option Values were included in OPRAF (now within the SRA) appraisal guidelines for seeking support for passenger rail services, but for a multi-modal study apply to all forms of transport measures that substantially change the availability of transport within the study area.

7.2.3 In essence, the idea of option values encompasses several situations. For example, residents in a town that lies on the route of a re-opened railway line may value having the option to use the service even if they do not specifically intend to do so on a regular basis. Another example would be that of a person whose regular mode of transport is their car, who may value the existence of a bus route that they could use if the car is out of action.

7.2.4 Considering the examples given, GOMMMS notes in particular that option values are associated with unexpected uses of the transport system that are not generally built into transport models, and thus do not necessarily appear in benefits these analyses generate – this is why they appear separately in the appraisal.

7.2.5 Methodologies exist to evaluate option values in monetary terms, and indeed GOMMMS cites several situations where such figures have been calculated. As such, the guidance suggests that these should be calculated when possible. However, when assessing a transport strategy, it is not practical or feasible to do such analyses.

7.2.6 The guidance thus suggests that a procedure based on qualitative analyses should be used for strategy analyses. The procedure is shown in the table below.

**GOMMMS’ Qualitative procedure for assessing option values**

<b>Community population</b>	<b>Service Withdrawn</b>	<b>Service Added</b>
>2000	Strong adverse	Strong beneficial
500-1999	Moderate adverse	Moderate beneficial
1-499	Slight adverse	Slight beneficial
0	Neutral	Neutral

**Note:** Where more than one community is involved, the total number of residents should be added together. The Total should be ‘net’ with negative values attached to communities where a service is lost.

7.2.7 The technique used in the appraisal is essentially based on that outlined in the GOMMMS qualitative procedure. However, due regard has to be paid to the size of the SoCoMMS study area. For instance, GOMMMS suggests that starting a new rail service that benefits more than 2,000 people has a strong beneficial effect in that local area. However, in terms of the SoCoMMS study area, which has a population many times that, this would be insignificant. As the strategy proposes a number of schemes that will improve option values, the methodology used is to firstly assess each scheme individually and then to determine the combined effect of the different schemes to obtain an overall strategy appraisal “score”. As such, in determining the strategy appraisal ‘score’ for the whole study area, the appraisal has taken into account the relative effect across the study area as a whole.

- 7.2.8 Proposals outlined in the strategy that effect option values include: the opening of five new railway stations; provision of an LRT between Fareham and Southampton; and provision of an LRT network within Brighton.
- 7.2.9 Six new railway stations are proposed. Each new station serves a settlement of >2000 population and thus has a strong beneficial local effect on option values.
- 7.2.10 Provision of the LRT's between Fareham and Southampton and within Brighton will serve settlements of >2000 at each of the LRT stations.
- 7.2.11 The introduction of Park and Ride at Patcham, Falmer, Totten, Swanwick and north of Portsmouth will improve option values of not only those within the settlements but those in the surrounding areas who would be able to use the Park and Ride. It is difficult to ascertain the numbers, however it can be assumed this is an added beneficial effect.
- 7.2.12 Combined the schemes will improve options values for over 150,000 people. Details of the option values appraisal for the SoCoMMS Strategy are set out in the table below.

**SoCoMMS Strategy – Option Value Appraisal**

<b>Strategy Element</b>	<b>Local Area Appraisal</b>
Five new stations in study area	Strong beneficial
LRT systems	Strong beneficial
<b>Summary</b>	<b>Study Area Appraisal</b>
Assumption of up to five new rail stations provides strong beneficial effects at the local level for each station, as does the introduction of the LRT stations. The combined effect will provide overall study area wide opportunities,.	Strong beneficial

7.3 ***Access to the transport system***

7.3.1 As GOMMMS states, “*the most important determinant of access to the transport system is the availability of a vehicle for private use*”. As such, it is essential for people without a car to have access to some form of public transport. The methodology below serves

to show what impact the SoCoMMS strategy will have on the access to public transport, in this case access to new rail stations.

7.3.2 The SoCoMMS strategy makes recommendations for a number of new stations on the rail network of the area. These new stations will provide new access points into the transport system for their surrounding areas and it is desirable to measure the extent of their impacts on accessibility. The proposed new rail stations are at:

- **St Leonards Marina** – between St Leonards Warrior Square and Bexhill
- **Glyne Gap** – between St Leonards Warrior Square and Bexhill
- **Stone Cross** – between Pevensey & Westham and Hampden Park
- **Shoreham Airport Parkway** – between Shoreham-by-Sea and Lancing
- **Littlehampton Parkway** – between Angmering and Ford
- **Eastleigh MDA** – between Hedge End and Eastleigh

7.3.3 To appraise the benefits that the strategy will provide in relation to increasing accessibility to the transport system GOMMMS suggests that the “access to transport” index should be used. The ‘access to the transport system’ index is calculated using the following equation:

$$A = (1 - (\sum PNCA_i) / \sum P_i) \times 100$$

7.3.4 Where A is the access to transport system index for the study area;  $PNCA_i$  is the resident population of zone  $i$  who have access to a car; and where  $P_i$  is the total resident population of zone  $i$ . The percentage change between the *Do Minimum* and the *Do Something* provides an overall assessment score. As such, the assessment becomes  $(A^1 - A^0) / A^0$  where  $A^0$  and  $A^1$  are the do minimum and the do something indices, respectively.

7.3.5 The scoring scale for impacts associated with the strategy is given under recommendation from GOMMMS and is detailed in Table 7.3.1:

**Table 7.3.1: Textual derivation of overall assessment score (GOMMMS)**

Proportionate Change in access index, $(A1 - A0)/A0$	Textual Score
+ 21% or greater	Large beneficial
+6% to +20%	Moderate beneficial
+2% to +5%	Slight beneficial
-1% to +1%	Neutral
-2% to -5%	Slight adverse
-6% to -20%	Moderate adverse
-21% or greater	Large adverse

7.3.6 Table 7.3.1 qualifies the access to the transport system as a textual score. This score, highlights the interaction that exists between two key variables, namely access to a private car and proximity to a public transport service.

7.3.7 Due to the size of the SoCoMMS study area, the ‘access to transport appraisal’ focuses only on those areas that will experience significant change in accessibility. This is consistent with other studies (e.g. SWARMMS). The methodology used is that which is described in GOMMMS for projects, but then is aggregated to give a result for the overall strategy.

7.3.8 Given the configuration of the SoCoMMS strategy, it was felt necessary to modify the GOMMMS methodology to a strategy level. The distance of the catchment areas on which this appraisal is based has been increased from the recommended 250 metres to 1 kilometre, under the assumption that people would generally be more willing to travel further to access a rail services (e.g. rather than bus). Supporting this assumption, the *Urban Design Compendium* (English Partnerships, 2000) suggests that a new railway station will be viable in cases where there are enough people within a 1km radius (i.e. a 12/13 minute walk).

7.3.9 A ‘footprint’ or ‘catchment’ of 1km radius was defined around each new proposed station. The population of each band was calculated as an area proportion of population in the underlying wards and aggregated to provide the total population ( $P_i$ ) within each station boundary area.

7.3.10

As mentioned, the GOMMMS methodology requires the population who does not have access to a car to be factored into the calculation. Census data was used to calculate the percentage population for each ward that does not have access to a car. Table 7.3.2 details the proportion of residents in the station footprint according to their underlying wards. It also shows the number of residents within these areas that do not have access to a car, and are thus currently secluded to an extent from the transport system.

7.3.11

In the *Do Minimum* scenario, it is assumed that the only people who have access to the transport system are those who have access to a car. The value of  $PN_{Ai}$  is therefore simply the number of people within the study area who do not have access to a car. Table 7.3.3 shows the calculation of the *Do Minimum* access to transport index for each station in the SoCoMMS:

**Table 7.3.2. Population statistics for 1km buffers around new stations**

New Station	Within Ward Name	Population	% no car	Pop with no car
Eastleigh MDA	West End North	1293	18	233
Littlehampton Parkway	Littlehampton Wick Ward	3470	30	1041
	Littlehampton Ham Ward	1542	47	725
	Middleton-on-sea Ward	15	23	3
	Arundel Ward	71	23	16
Shoreham Airport Parkway	Barnham Ward	2	17	0
	Buckingham Ward	483	11	53
	Marine Ward	1449	16	232
	Mash Barn Ward	119	31	37
	St Nicolas Ward	4733	30	1420
Stone Cross	St Mary's Ward	845	43	363
	Southlands Ward	538	36	194
	Langney Ward	3948	34	1342
Glyne Gap	Pevensey & Westham Ward	450	24	108
	West St Leonards Ward	2133	23	491

New Station	Within Ward Name	Population	% no car	Pop with no car
	St Michael's Ward	482	26	125
St Leonards Marina	West St Leonards Ward	1121	23	258
	Maze Hill Ward	3299	38	1254
	Central St Leonards Ward	437	57	249
	Gensing Ward	6	44	3
TOTAL				8147

**Table 7.3.3: The 'access to the transport system indicator' - *Do Minimum* Scenario**

<i>Station</i>	<i>P<sub>i</sub></i>	<i>PNCA<sub>i</sub></i>	<i>Access Index</i>
<i>St Leonards Marina</i>	3100	1763	43
<i>Glyne Gap</i>	1999	616	69
<i>Stone Cross</i>	2948	1450	51
<i>Shoreham Airport Parkway</i>	5868	2299	61
<i>Littlehampton Parkway</i>	3314	1786	46
<i>Eastleigh MDA</i>	1060	233	78
<i>Overall Strategy</i>	<b><math>\Sigma P_i = 18289</math></b>	<b><math>\Sigma PNCA_i = 8147</math></b>	<b>55.5</b>

7.3.12 Table 7.3.3 shows the *Do Minimum* has an overall 'access to the transport system' index of 55.5.

7.3.13 Under the SoCoMMS strategy, everyone living within the catchment areas of the stations would have access to the transport system. Therefore, in each case A=100 within these targeted areas. In determining the overall assessment score, a

comparison needs to be made between the *Do Minimum* and *Do Something* scenarios and this comparison is based upon the equation  $(A^1 - A^0)/A^0$  where  $A^0$  and  $A^1$  are the do minimum and the do something indices, respectively.

7.3.14

This overall assessment shows that a **large beneficial** effect should be attributed to the strategies proposal of introducing new stations as shown in Table 7.3.4:

**Table 7.3.4: Overall Assessments**

<i>A1</i>	<i>A0</i>	<i>Percentage Change</i>	<i>Assessment Score</i>
55.5	100	44.5	Large Beneficial

7.4

7.4.1

***Severance***

GOMMMS suggests that severance is concerned primarily with those using non-motorised modes, particularly pedestrians. Severance is therefore classified according to level of hindrance to pedestrian movement as follows:

- None                      Little or no hindrance to pedestrian movement.
- Slight                    All people wishing to make pedestrian movements will be able to do so, but there will probably be some hindrance to movement.
- Moderate                Some people, particularly children and old people are likely to be dissuaded from making journeys on foot. For others, pedestrian journeys will be longer or less attractive.
- Severe                    People are likely to be deterred from making pedestrian journeys to an extent sufficient to induce a reorganisation of their activities. In some cases, this could lead to a change in the location of centres of activity to a permanent loss of access to certain facilities for a particular community. Those who do make journeys on foot will experience considerable hindrance.

7.4.2 The guidance provided by GOMMMS is for use at the project level. It is worth noting the methodology here because it forms the basis on which an assessment of strategies can also be based.

7.4.3 Assessment is based on a comparison of a change in severance between a do minimum and a do something scenario. Firstly, the levels of severance for both the do minimum and do something cases must be determined. Subsequently, change in severance must be estimated by comparing the do minimum and do something scenarios using Table 7.4.1.

**Table 7.4.1 Assessment of change in severance**

	<b>Do Something Severance Scoring</b>			
<b>Do Minimum Severance Scoring</b>	None	Slight	Moderate	Severe
None	None	Slight negative	Moderate negative	Large negative
Slight	Slight positive	None	Slight negative	Moderate negative
Moderate	Moderate positive	Slight positive	None	Slight negative
Severe	Large positive	Moderate positive	Slight positive	None

7.4.4 Finally an estimate of the numbers of people affected (either actually or potentially) should be noted.

7.4.5 An overall assessment of each option is based on the following guidelines (in each case the assessment is beneficial if severance is reduced and adverse if severance is increased):

- Overall assessment is **neutral** if increases in severance are broadly balanced by relief of severance;
- Overall assessment is likely to be **slight** where change in severance is slight or the total numbers of people affected across all levels of severance is low;
- Overall assessment is likely to be **large** where change in severance is large, and affects a moderate or high number of people, or, the total numbers of people affected across all levels of severance is high; and
- Overall assessment is **moderate** in all other cases.

*Methodology - Appraisal of a strategy*

7.4.6 GOMMMS gives relatively little guidance on the appraisal of strategies, albeit that it recognises that the above methodology assumes a level of detail which may not be appropriate for the appraisal of strategies. GOMMMS therefore recommends that the methods be adapted to suit the level of detail that is available. Suggested adaptations include:

- Focusing on the parts of the network where change in severance is likely;
- Assessment based less on the indicators suggested in DMRB and more on expert judgement; and
- Assessment of numbers of people affected based on the catchment areas method applied at a relatively coarse geographical scale.

7.4.7 The GOMMMS methodology has been used as a basis in appraising the SoCoMMS strategy. The steps described in the methodology above have been followed, although assessments have been simplified where appropriate. As recommended, attention has been focused on those parts of the network where significant change in severance is likely. A single assessment has been made for each component part of the strategy and the results of this aggregated to produce an overall assessment for each strategy. The following paragraphs describe the methodology used.

7.4.8 Firstly, those schemes incorporated within the strategy that are likely to result in changes in severance were identified. For each, a brief outline of the intended scheme was obtained. Secondly census data was used to estimate the population that may be affected by the improvements. It is important to note that population data from the 1991 census is only available at ward level; therefore the numbers presented can only give a broad indication of the numbers of people affected. When the Strategy Development Plans have been completed a more detailed appraisal will take place of the numbers of those affected by a change in severance.

*Appraisal of the SoCoMMS Strategy*

7.4.9 Initially all of the infrastructure schemes were looked at to identify those schemes where changes in severance would occur. These schemes included the following highway improvements:

- Infrastructure improvements at Chichester

- Provision of an Arundel Bypass
- Improvements at Worthing and Lancing
- Provision of Selmeston Bypass
- Provision of Wilmington Bypass
- Provision of a link road at Hastings
- Provision of A2 Lyddon – Dover

7.4.10

The following rail infrastructure improvements were also considered:

- Willingdon chord – subsequently dropped as a firm commitment.
- Eastleigh chord – scheduled for around 2020.

7.4.11

Of the above schemes five were seen to have an affect on severance, these are set out in Table 7.4.2.

**Table 7.4.2 : Schemes that will affect severance**

<b>Scheme</b>	<b>Notes</b>
Arundel Bypass	Will provide traffic and environmental improvements within the urban area
Chichester – online improvements	The redesign of the junctions will assist cyclists and pedestrians
Selmeston Bypass	Will reduce accidents at this location and provide for cyclists, will take traffic out of the village
Wilmington Bypass	Will reduce accidents at this locations and provide for cyclists and will take traffic out of the built up area
Worthing Bypass	Will provide traffic and environmental improvements within the urban area
Hastings Link Road	A new link road that will relieve pressure on the A259

7.4.12

All of the above schemes are in areas, which were mentioned in the “Problems and Issues” report as particularly suffering from severance.

7.4.13 For each of the schemes listed above a do minimum and a do something level of severance was estimated and a change in severance subsequently determined using the method described in GOMMMS.

7.4.14 Table 7.4.3 indicates the severance assessments for the do minimum (existing situation) and the do something scenarios. The change in severance is derived from a comparison of these levels. Where number of people affected is recorded, this is an estimate based on 1991 census data.

**Table 7.4.3: Severance Assessments**

<b>Scheme</b>	<b>Do minimum</b>	<b>Do something</b>	<b>Change</b>	<b>People in ward</b>
Arundel Bypass	Severe	Slight	Moderate positive	3,500
Chichester	Severe	Moderate	Slight positive	3,817
Selmeston Bypass	Slight	None	Slight positive	1,721
Wilmington Bypass	Slight	None	Slight positive	5,356
Worthing	Severe	Moderate	Slight positive	7,673
Hastings Link Road	Moderate	Moderate	None	
<b>Overall assessment = Slight beneficial</b>				

7.4.15 The SoCoMMS Strategy provides relief from existing severance for those in Arundel, Chichester, Wilmington, Worthing and Selmeston.

7.4.16 GOMMMS states that the overall assessment for a plan should be large in cases where more than 1,000 people are affected, slight where around 200 people are affected and moderate in all other cases. The overall assessment should be neutral if increases in severance are broadly balanced by relief in severance.

7.4.17 Given that the SoCoMMS Strategy could offer relief to approximately 22,000 people, the guidance, when interpreted literally, suggests that the effect should be recorded as large. However given the size of the study area it is considered appropriate that the overall assessment be recorded as **slight beneficial**.

## **8 Integration**

## 8 Integration

### 8.1 *Introduction*

8.1.1 The integration objective identified within GOMMMS determines to what extent the strategy reflects the Government’s integrated transport policy. More specifically this means integration with other transport modes; land used planning so that transport and planning work together to support more sustainable travel, and integration with policies for education, social exclusion, and health as well as other transport related policies. Three sub objectives are considered, namely

- Transport Interchange
- Land Use Policy; and
- Other Government Policies

### 8.2 *Transport interchange (Passengers)*

8.2.1 Improving interchange has been identified by the Government as a key factor in achieving a fully integrated transport system. The aim of this assessment is to identify in broad terms the extent to which particular indicators would change and the number of passengers affected following the implementation of the strategy.

8.2.2 All benefits relating to travel time changes and interchange penalties have been valued and included within the Economic Efficiency of the transport system sub objective.

8.2.3 The passenger interchange indicators are identified within GOMMMS and are set out below. These indicators enable a general assessment to be made of the impacts the strategy has on the passenger interchange facilities.

Passenger Indicator	Poor Standard	Moderate Standard	High Standard
Waiting Environment	Old, uninviting, uncomfortable, non – existent or poorly – lit waiting room.	Some comfortable waiting rooms, but improvement or upgrades still needed.	New, inviting and comfortable well–lit waiting room.
Levels of Facilities	Terminal old and needing upgrate. No or very poor buffet. No other facilities.	Some good facilities but others needing replacement or upgrade.	Modern terminal, good buffet and/or other facilities available.

<b>Passenger Indicator</b>	<b>Poor Standard</b>	<b>Moderate Standard</b>	<b>High Standard</b>
Level of Information	No announcements, partial timetables, absence of automatic displays or information office.	Full timetables and announcements, no automatic displays of information office. Information level could be improved.	Frequent announcements, full timetables, automatic displays, information office.
Visible staff presence	No visible staff presence for most of the time the terminal is open.	Staff presence visible at some times terminal is open.	Staff presence visible at all times terminal is open.
Physical linkage for next stage of journey	Physical linkage impossible without use of more than one bridge or subway. Need to change to a physically separate terminal.	Physical linkage with use of a single bridge or subway. No need to change to a physically separate terminal.	Physical linkage possible without use of a bridge, subway or changing to a physically separate terminal.
Reliability of connection	Timetable largely uncoordinated. High risk of missing connections.	Some timetable co-ordination but still a moderate risk of missing connections.	Timetable co-ordinated or guaranteed either within or between modes to minimise risk of missing connections.

#### 8.2.4

The SoCoMMS Strategy measures include improvements to 128 current stations and the introduction of 5 new rail interchanges. Those measures that are relevant to the interchange indicators are outlined below:

#### **Waiting Environment**

- Refurbishment, replacement and provision of waiting rooms or shelters with improved glazing, heating and lighting

#### **Level of Facilities**

- New or refurbished buildings concourse and ticket hall with improved glazing and heating and lighting where necessary
- Refurbishment of public and staff toilets and provision of disabled toilet at all large and medium sized stations.
- Refurbishment of footbridges to provide shelter, improved material, mirrors, stairways and ramps

- Refurbishment and extension of platform canopies to provide cover between buildings, subways and footbridges
- Provision of good quality catering, retail and leisure facilities in partnership with private investors and operators

#### **Level of Information**

- Minimum customer information systems (CIS) at all stations
- Local and long line announcements
- Real time information on departures and arrivals
- Local display of train departures
- Meet minimum standards for disabled

#### **Reliability of connection**

- Improved connections and coordination of the timetable

Other measures that will improve interchanges but are not included in the GOMMMS indicators are:

- Improvements to access for all including: tactile paving to assist blind and partially sighted persons; additional access facilities for mobility impaired; provisions of lifts and escalators and staff training in disability awareness.
- Additional points of access for vehicles, cycles and pedestrians
- Improved accessibility for bus users
- Provision of additional facilities for bicycle storage at stations
- Provision of expanded and new car parking facilities
- Improved ticketing facilities with new ticket windows, new and improved ticket vending machines

- Credit card and smartcard compatible ticket machines at all large and medium stations and almost all small stations
- Improvement and standardisation of ticket office facilities at all stations

8.2.5 The SoCoMMS Strategy also includes new Park and Ride interchanges associated with the Light Rail Transit systems as well as improvements to bus stations and shelters.

8.2.6 GOMMMS requires the completion of relevant Worksheets, based on the indicators outlined above, to support the qualitative statements made in the appraisal process. As it is not within the confines of this study to undertake a detailed audit of the 128 stations that are recommended for improvements the GOMMMS methodology has been slightly modified to make best use of the information available. At this stage it is also difficult to assess the level of each indicator before the introduction of the strategy. Therefore the assessment is undertaken at a broad brush level.

8.2.7 **Do-minimum** - It is assumed that the TOC's will invest in facilities provided at certain stations however without wider investment in interchange facilities the majority of public transport users in the study area will experience a worsening of interchange conditions as the number of public transport users increase but the facilities are not updated or improved. Therefore it is assumed that in the Do-minimum the standard for all the indicators is moderate.

**Worksheet 8.8.1 : Integration – Passenger Interchange : SoCoMMS Strategy**

<b>Passenger Interchange Indicator</b>	<b>Do Minimum</b>	<b>SoCoMMS Strategy</b>
Waiting Environment	Moderate	High
Level of Facilities	Moderate	High
Level of Information	Moderate	High
Visible Staff Presence	Moderate	Moderate
Physical Linkage for next stage of journey	Moderate	Moderate
Connection time and risk of missing a connection	Moderate	Moderate

8.2.8 **SoCoMMS Strategy** – The improvements suggested in the SoCoMMS strategy will provide a shifting to the right of the indicator table in four of the categories. As outlined above the strategy also provides improvements to interchanges not

included in the indicators set out in GOMMMS. It also, essentially, includes measures that improve interchange between modes. These improvements will effect over 100,000 thousand travellers in the study area. The SoCoMMS strategy measures also include similar improvements for bus stations and therefore fulfils the same assessment criteria. **The overall assessment in relation to Passenger Interchange for the SoCoMMS strategy is “large beneficial”.**

8.2.9 Qualitative Comment: **The upgrading of existing interchanges, improved information and access for all travellers, introduction of new stations and Park and Ride measures contribute to providing an integrated transport system and a seamless journey.**

8.3 ***Land-use policy***

8.3.1 This sub-objective summarises the assessments made of the extent to which the strategy is integrated with land use proposals and policies and with proposals and policies concerning transport across all modes.

8.3.2 The SoCoMMS strategy were compared with policy at the national, regional and local levels. These policy sets included:

**At the National Level:** PPGs (Planning Policy Guidance Notes), The Urban and Rural White Papers,

**At the Regional Level:** Regional Planning Guidance (Regional Sustainable Development Framework for the South West of England.

**At the Local Level:** Local Transport Plans and Structure Plans. (Local Plans were considered too detailed to allow meaningful assessment of strategies at this stage).

8.3.3 In order to facilitate consistency across the strategy assessments, each of these sets of policy was first scoped, and the relevant policy issue recorded in an integration table. The strategy was then assessed against the recorded policy requirement, with a score of beneficial, neutral or adverse provided, depending on the extent of integration.

8.3.4 The strategies were scored against each policy with the scores then computed to arrive at a composite score for the policy set. These were then computed to arrive at a score for each level of policy including national, regional and local, as described above. These scores were recorded on the individual worksheets, which will feed into the AST.

*Current Situation*

8.3.5

The present situation in respect of planning policy and guidance is for closer integration in respect of land use and transport planning. Thus investment in transport infrastructure should occur parallel to development, and may be used as a mechanism to guide and direct development and regeneration. In respect of recently issued guidance such as PPG3 and PPG13, the emphasis is on accessibility by a range of modes, and reduced dependence on the private car. Thus measures to direct development towards highly accessible brown field locations, and to promote public transport, cycling and walking are integral to this approach. Along with direct investment in the necessary infrastructure, measures include: mechanisms to curb car usage such as congestion charging, high parking charges and workplace parking charges as well as bus and cycle priority lanes and High Occupancy Vehicle Lanes.

*General Comments on Assessment of SoCoMMS Strategy*

8.3.6

This strategy performs well against the National, Regional and Local Levels. In particular, the balance between parallel measures to change travel demand (such as those relating to land use planning), the improvement of public transport alternatives to the car, measures to curb car usage and support for the slow modes, results in a favourable score for this strategy across all levels of the appraisal.

**Worksheet 8.3 : Integration : Land Use Policies**

	<b>Land Use Policies or Proposals</b>
<b>Local</b>	Performs well against the LTP strategies & Structure Plans Overall Score - ✓ - Positive
<b>Regional</b>	Performs well against regional planning policy Overall Score - ✓ - Positive
<b>National</b>	Performs well against national guidance (PPG's) and the Urban and Rural White Papers Overall Score - ✓ - Positive

<b>Reference Sources:</b>	<b>At the National Level:</b> PPGs (Planning Policy Guidance Notes), The Urban and Rural White Papers, <b>At the Regional Level:</b> RPGs (Regional Planning Policy Guidance), and Regional Sustainable Development Framework <b>At the Local Level:</b> Local Transport Plans and Structure Plans. (Local Plans were considered too detailed to allow meaningful assessment of strategies at this stage).
<b>Assessment Score:</b>	✓ - Positive
<b>Qualitative Comments:</b>	Strong compliance with strategic principles set out at the national level as part of planning policy guidance, regional planning policy, Structure Plans and Local Transport Plans.

**AST entries : Land-use policy**

Performs well against national and regional guidance, as well as LTPs and Structure Plans.	<b>Positive</b>
--	-----------------

8.4

***Other Government policies.***

8.4.1

GOMMMS suggests that the impacts of the transport strategy on other Government policies should be considered, in order to assess the effect on overall policy integrations within Government. A review was carried out to identify whether the strategy either (a) contributes to the and is consistent with, (b) has no overall contribution or (c) is inconsistent with other Government policies beyond transport. Other government departments' policies reviewed included:

- The Cabinet Office;
- Department of Trade and Industry Objectives;
- Department for Culture Media and Sport – Commitment to Quality Tourism;
- Department for Education and Skills;
- Department for Work and Pensions;
- HM Treasury Objectives; and
- Department of Health.

8.4.2

The extent to which the strategy benefited or hindered the objectives or policies set out by the above departments was assessed and an individual score was given

for each. These scores were then computed to provide an overall score for the strategy.

*General Comments on Assessment of SoCoMMS Strategy*

8.4.3

The SoCoMMS Strategy appears to be consistent with other Government policies relating to access to employment opportunity; reducing road accidents; promoting urban regeneration and promoting slow modes.

**Worksheet 8.4 : Integration : Other Government Policies**

<b>Reference Sources:</b>	Cabinet Office – Social Exclusion objectives; D’TI objectives; DCMS – Planning and Accessibility: A Good Practice Guide; HM Treasury Objectives: Department of Health – Saving Lives: Our Healthier Nation; Department for Education and Skills – Employment Action Plan
<b>Assessment Score:</b>	✓ - Positive – generally supportive of other government policies
<b>Qualitative Comments:</b>	Consistent with other Government policies relating to access to employment opportunity, reducing road accidents, promoting urban regeneration and promoting slow modes.

8.4.4

In July 2000 the Government published the 10 Year Plan for Transport which, set down eight Public Service Agreement targets. These are outlined below:

- To reduce congestion on the inter-urban network and in large urban areas in England below current levels by 2010
- To increase rail use in Great Britain from 2000 levels by 50% by 2010
- To increase bus use in England from 2000 levels by 50% by 2010
- To double light rail use in England by 2010 from 2000 levels

- To cut journey times on London Underground services by increasing capacity and reducing delays
- To improve air quality by meeting the National Air Quality Strategy targets
- To reduce green house gas emissions by 12.5% from 1990 levels and move towards a 20% in carbon dioxide emissions by 2010
- To reduce the numbers of people killed or seriously injured in Great Britain in road accidents by 40% by 2010 and the number of children killed or seriously injured by 50% compared with the average for 1994-98.

#### 8.4.5

The outcomes of the multi-modal studies are a key contribution to meeting many of these targets. Although the time frame of SoCoMMS is longer than that of the 10 year plan, a qualitative appraisal can be undertaken in relation to how the strategy meets these objectives. As can be seen in Table 8.4.1, the strategy performs well against the applicable objectives. The strategy contributes towards these specific targets and must be supported by other local measures including development controls. The strategy has been assessed against the objectives with a score of positive (✓), neutral (□), and negative (✗)

**Table 8.4.1 Strategy Assessment against the Department for Transport’s Public Sector Agreement (PSA) Targets**

Objective	Impact of Strategy	Remarks
to reduce congestion	✓	With the introduction of demand management schemes and soft measures the strategy will reduce congestion in the urban areas. The road infrastructure improvement contribute to the reduction of congestion on the inter-urban network.
to increase rail use	✓	The introduction in improved service frequency, new rolling stock and investment in stations rail use along the south coast will bring about an increase passenger kilometres.
to increase bus use	✓	The introduction of improved service frequency, bus priority and investment in passenger waiting facilities will bring about an increase in bus use throughout the study area.
to double light rail use	✓	The introduction of light rail infrastructure in South Hampshire and Brighton will result in the increase of the number of passenger journeys in the study area
to cut journey times on the underground	☐	
to improve air quality	✓	The promotion of slow modes, the introduction of demand management schemes and improved public transport services will serve to improve the Air Quality of the study area as a whole
to reduce the number of people killed or seriously injured in Great Briatin in road accidents	✓	Investment in an improved road network will bring about a reduction in road accidents within the study area. Soft measures, which promote walking and cycling, travel awareness schemes and safer routes to schools will contribute to reducing the levels of pedestrian and cycling accidents in Great Britain
to reduce green house gases	✓	Demand management schemes, improved public transport and soft measure will contribute to the reduction in private vehicle road based trips and therefore a reduction in the level of green house gases

## **9 Assessment Against Local and Regional Objectives**

## 9

# Assessment Against Local and Regional Objectives

### 9.1

#### *Introduction*

#### 9.1.1

The five criteria or objectives as set out in the Appraisal Summary Table (AST) are environment, safety, economy, accessibility and integration. These objectives are very broad and as Central Governments criteria they may not fully reflect the specific regional circumstances of the South Coast Corridor. More specific regional objectives are set out in the Regional Planning Guidance. GOMMMS suggests that studies should reflect these strategic priorities and objectives for future land uses, and show how transport options can support them.

### 9.2

#### *Policy Objectives*

#### 9.2.1

The policy objectives that have been highlighted from consideration of the Regional Planning Guidance and Local Transport Plans are:

- to promote urban renaissance
- to promote rural development
- to minimise the need to travel
- to promote slow modes
- to improve Public Transport
- to improve freight (develop sustainable freight transport systems)
- to protect the environment
- to improve safety
- to promote the regional economy
- to improve accessibility (including social inclusion)

- 9.2.2 As suggested by GOMMMS the above policy objectives all lie within the framework provided by the Governments objectives as set out in the AST.
- 9.2.3 From the above policy objectives further sub-objectives have been highlighted as shown in Table 9.2. These sub-objectives, taken from local and regional plans, are in the consultants view the most relevant to the study.
- 9.2.4 The performance of the SoCoMMS strategy has been measured against the sub-objectives by defined indicators as seen in Table 1. These indicators were chosen as they were seen to be a balance of relevance and practicality.
- 9.2.5 Where it is sensible to do so the same indicators are used for assessing the performance against local and regional objectives as those used to measure impacts in the Assessment Summary Table. This mainly occurs with Environmental and Safety objectives. The strategy has also been assessed against the key policy objectives with a score of positive (✓), neutral (□), and negative (✗)
- 9.2.6 The strong performance of the strategy in the field of “urban renaissance” is of particular importance, as this is a key local policy issue amongst most regional, county and local authorities. The strategy supports this key policy area in a number of ways, including:
- Significant accessibility enhancements across the region;
  - Significant levels of infrastructure investment;
  - Strong sustainability ethos to support general improvement to the quality of the human environment;
  - Reinforcement of the position of regional hubs, which have been identified by the Regional Assembly as key to the development of the area;
  - Achieving balance between higher levels of mobility and conserving the natural assets which under-pin the regions attractiveness to locals, visitors and investors.

**Table 9.2 - Local and Regional Objectives Appraisal**

Objective	Sub- Objective	Impact of Strategy	Remarks
Promote Urban Renaissance	Promote development in Urban Areas	✓	Improved accessibility to urban areas by private car, road based public transport, rail and slow modes
	Invest in PAERs	✓	Investment in improved transport infrastructure and services in the PAERs of Southampton, Portsmouth, Hastings, the Sussex and East Kent coastal towns
	Improve quality of urban environment	✓	Improved walking and cycling in the urban environment and reducing congestion in the urban areas
	Renew urban infrastructure	✓	Reinforces existing settlement patterns and regional economic hubs
	Increase employment in region	✓	Improved accessibility throughout the study area to areas of employment
Promote Rural Development	Support sustainable communities	✓	Reinforces existing settlement patterns
	Improve access to social & economic activities	✓	Improved accessibility to employment and population
	Protect the rural character	✓	Transfer of trips from rural roads on to the A27 thereby reducing environmental and safety problems in the rural areas
	Encourage new economic activities in rural areas	<input type="checkbox"/>	
Minimise need to travel	Reduce dependency on cars	✓	A 3% reduction in the number of vehicle miles
	Encourage close proximity between development & PT	✓	Improved public transport accessibility in PAERs
Promote slow modes	Improve cycle facilities	✓	Investment in cycle facilities
	Improve pedestrian mobility	✓	Investment in pedestrian facilities
Improve Public Transport	Improve PT integration infrastructure	✓	The upgrading of existing interchanges, improved information and access for all travellers, introduction of new stations and Park and Ride measures contribute to providing an integrated transport system and a seamless journey.
	Improve Rail service	✓	Increased frequency and reliability in rail service along the South Coast, improved infrastructure ie stations
	Improve bus services	✓	Increased frequency and reliability in bus services along the South Coast, improved infrastructure ie stations and bus priority
	Improve PT support services (eg information)	✓	The upgrading of existing interchanges, improved information and access for all travellers, introduction of new stations and Park and Ride measures contribute to providing an integrated transport system and a seamless journey.
Improve Freight	Increase proportion of freight by rail or sea	<input type="checkbox"/>	The strategy promotes the use of freight by rail and sea.

Objective	Sub- Objective	Impact of Strategy	Remarks
(Develop sustainable freight transport systems)	Reduce impact of road freight	✓	The introduction of road infrastructure improvements will create a transfer of road freight away from roads that are environmentally sensitive
Protect the Environment	<p>promote transport modes &amp; projects with minimum environmental impact</p> <p>enhance air quality</p> <p>protect sensitive habitats</p> <p>enhance quality of urban environment</p> <p>constrain green field development</p> <p>preserve landscape</p>	<p>✓</p> <p>✓</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	<p>The strategy promotes slow modes which is a positive impact new infrastructure is introduced with minimum impact on the environment</p> <p>There is a positive impact on air quality throughout the study area</p> <p>Infrastructure improvements means that there is a transfer of vehicles from environmentally sensitive roads, however proposed infrastructure improvements do take place on sensitive habitats</p> <p>A neutral-slight negative impact on the majority of the study area with a number of areas experiencing a beneficial impact. However a slight negative impact has been identified in Hastings due to townscape benefits within parts of Bexhill and Hastings.</p> <p>The strategy is dependant on enforcement of current land use and development policies</p> <p>Infrastructure improvements means that there is a transfer of vehicles from environmentally sensitive roads, however proposed infrastructure improvements do affect the landscape</p>
Improve Safety	reduce transport related accidents	✓	There are significant accident savings associated with reduced highway demand and new highway infrastructure.
Promote the Regional Economy	<p>promote tourism</p> <p>increase regional prosperity</p> <p>broaden economic base</p> <p>promote local industries</p> <p>support growth of Ashford as regional centre</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	<p>Improved accessibility to areas of tourism via private and public transport</p> <p>The strategy NPV of £1841M indicates increased user benefits and therefore a positive economic impact on the regional prosperity</p> <p>Improved accessibility by private and public transport throughout the study area to areas of employment and markets</p> <p>Improved accessibility by private and public transport throughout the study area at local level</p> <p>Improved rail links to Hastings and the Kent Coast towns</p>
Improve Accessibility	<p>maintain level of service of strategic highway network</p> <p>improve access to air/sea ports</p> <p>rail congestion</p> <p>improve facilities for mobility impaired</p> <p>promote social inclusion</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	<p>Reduction in congestion compared to the future do minimum throughout the study area</p> <p>Improved accessibility by private and public transport throughout the study area</p> <p>New infrastructure will increase the capacity of the rail network</p> <p>All improvements will adhere to the guidelines set out for disabled access</p> <p>Investment in public transport services will improve accessibility for socially excluded groups</p>

## **10 Appraising the Impact on Problems**

## 10

# Appraising the Impact on Problems

### 10.1

#### ***Introduction***

#### 10.1.1

The third part of the GOMMMs appraisal process involves an assessment of the degree to which the identified problems would be ameliorated by the strategies put forward, compared to the situation if there was not positive policy intervention.

#### 10.1.2

The Problems and Issues report provides a summary of the range of transport issues and problems that currently exist for all modes in the study area. This report has been used as a basis to identify those problems and issues against which the strategies should be appraised in this part of GOMMMs.

### 10.2

#### ***Identified Problems***

#### 10.2.1

The principle problems that emerged from the Problems and Issues Report are summarised by mode in Table 10.1. Each identified issue has been analysed. The following paragraphs introduce the approach that has been used to appraise the impact the SoCoMMS strategy has on each issue.

#### 10.2.2

**Congestion** - One of the main issues that was highlighted in the problems and issues report was that of congestion on the roads. An appraisal took place into the changes in congestion throughout the study due to the introduction of the SoCoMMS strategy compared to the Do- Minimum. The strategy has a positive impact on the areas of congestion that are highlighted in the problems and issues report

#### 10.2.3

**Fear and Intimidation** – An issue that was stressed through out the consultation process was that of the fear and intimidation experienced by pedestrians and cyclists caused from traffic. A qualitative analysis has been undertaken to ascertain the changes that will occur due to the strategy. An integral part of the SoCoMMS strategy is the improvement of cycling and pedestrian networks and facilities both of which should reduce the fear and intimidation experienced by pedestrians and cyclists.

#### 10.2.4

**Noise and Air pollution** – The process used to analyse changes has already been described in detail chapter 3 of this report. The SoCoMMS strategy has a positive impact on the levels of noise and air pollution through out the study area in comparison to the Do- minimum.

- 10.2.5 Severance – The process used to analyse changes has already been described in chapter 3 of this report. Overall the strategy will bring about a reduction in severance, for pedestrians, cyclists and equestrians. The new roads that are proposed will divert traffic and make the existing roads easier for people to cross. The new roads that are proposed will not act as barriers to deter people from accessing facilities and therefore do not create severance. The strategy states that proposed infrastructure improvements to existing roads should take account of pedestrian and cycling facilities and equestrians.
- 10.2.6 Safety and Security – The SoCoMMS strategy will bring about significant accident savings associated with reduced highway demand and new highway infrastructure. 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 at these interchanges.
- 10.2.7 Crowding /Pathing Congestion – An integral part of the SoCoMMS strategy is the introduction of new rail infrastructure, the impact of these improvements will be that there will a reduction in pathing congestion and extra capacity to meet passenger demand.
- 10.2.8 Accessibility – GIS maps have been used to reflect the accessibility to the transport network and to areas of employment. This has been explained in more detail chapter 6 of this report. The SoCoMMS strategy improves accessibility throughout the study area both by road and rail.
- 10.2.9 Integration – The problems of integration as outlined in the Problem and Issues report do not lend themselves to a quantitative appraisal therefore qualitative comments has been used. The SoCoMMS strategy stresses the importance of *Integration* therefore proposals address improvements to interchanges for rail and bus and access to interchanges by foot and cycle. It also proposes the introduction of integration between timetables of rail and bus and suggests the use of integrated ticketing.

**Table 10.1 - Summary of Problems Analysis Within Appraisal Process**

<b>Mode</b>	<b>Road</b>	<b>Rail</b>	<b>Cycling &amp; Walking</b>	<b>Buses</b>
<b>Problems</b>				
Noise	✓			
Air Pollution	✓			
Congestion	✓			
Severance	✓	(✓)		
Fear & Intimidation			✓	
Safety & Security	✓	✓	✓	
Crowding		✓		
Pathing Congestion		✓		
Accessibility	✓	✓		✓
Integration	✓	✓	✓	✓

## **11 Supporting Analyses**

# 11 Supporting Analyses

## 11.1 *Introduction*

11.1.1 GOMMMS suggests that there are three additional groups of issues which are relevant to the appraisal of a strategy which come under the title of “Supporting Analyses”. These issues are:

- distribution and equity;
- affordability and financial sustainability and;
- practicality and public acceptability.

## 11.2 *The Distribution and Equity Supporting Analysis*

11.2.1 This supporting analysis is designed to show the distribution of the overall impacts summarised in the Assessment Summary Table, thereby enabling a judgement to be made about the fairness of the impacts across those affected by the strategy.

11.2.2 GOMMMS presents some ideas about how the distributional analysis should take place, and which of the sub objectives would be appropriate for this type of analysis. It suggests that noise, air quality and accidents can be assessed by geographical distribution and therefore a GIS tool such as Map Info would be a useful way of displaying the impacts. This has been undertaken for noise and air quality.

11.2.3 The geographical distribution of the noise impacts can be seen in chapter 3 figure 3.1, in this figure it can be noted that the noise disbenefits occur in the wards through which the A27 runs. This is as would be expected due to the noise increases associated with the various transport service and infrastructure improvements.

11.2.4 The geographical distribution of the impact of the SoCoMMS strategy on local air quality is presented in Appendix A figure AQ4 and AQ5. These figures show the result just for zones with noticeable changes in emissions. Noticeable is defined for SoCoMMS as emission changes in a zone over 5% compared to the future do-

minimum and the zone being populated. Noticeable increases in emissions are primarily along the main routes east-west which are all in areas without current Air Quality Management Areas status. It can be seen in these figures that the majority of wards are positively impacted by the study.

11.2.5 The distribution of costs, benefits and disbenefits to the different user groups may also be considered. It is suggested that these groups are broken down into personal travellers by mode (car, bus and coach, rail, walk/cycle, other) and freight (road, rail other). Transport system operators by mode should also be analysed. GOMMMS suggests that personal traveller benefits/disbenefits may be broken down by trip purpose. This is presented in a table format as shown in Table 1 in Appendix D.

11.2.6 Analysis of the accessibility to the transport network, on a spatial basis can provide useful information on the distribution and fairness of an option's impact in relation to social inclusion.

11.2.7 Using GIS, it is possible to represent the number of jobs that are accessible within a 45 minutes drive time as well as the number of jobs that are accessible within a 45 minute public transport journey. The relative equity of each of the transport schemes may then be measured by changes in:

- the total number of jobs accessible within the catchment of a 45 minute public transport journey
- the total number of jobs accessible within the catchment of a 45-minute drive.

11.2.8 This is presented in Appendix C.

### 11.3 ***The Affordability and Financial Sustainability Supporting Analysis***

11.3.1 GOMMMS suggests that steering groups should have regard to the financial performance of the strategies. The role of this analysis is to provide an overall assessment of the likely public and private expenditure required to ensure the provision of the strategy under consideration.

11.3.2 To aid this assessment GOMMMS suggests the use of an Affordability and Financial Sustainability table. This table summarises the financial impact on private

sector providers and on public sector providers as can be seen in Table 2 Appendix D.

*11.3.3* Table 2, sheet 1 summarises the total private sector investment, and the change in operator costs and operator revenue. A section of the table is broken down by the private sector organisations that contribute to the strategy e.g. rail operators. It also incorporates the contribution that the government will make via capital grants and subsidies.

*11.3.4* Sheet 2 represents the total public sector investment, and operator costs and operating revenue. A section of the table is broken down into the organisations/budgets that contribute to the strategy e.g. light rail.

*11.3.5* The key question for Financial Sustainability is the extent to which the strategies or plans are self-supporting from revenues. Where options would not be self-supporting, this raises the question of what grant or subsidy would be required to deliver the option.

*11.3.6* In assessing Affordability it will be necessary to take a view as to the likelihood of public funds being available for the strategy. However, the proposed demand management measures will make a significant contribution to the funding of the strategy. A net annual income from those of around £100m will be available by 2010. This will be sufficient to fund at least 75% of the various schemes (road and rail), assuming an average cost of capital of around 10%. Whilst significant levels of public and private funding will be required in the short-term, the strategy appears to be affordable in the long term, with a good potential for cost recovery.

*11.3.7* In order to provide overall consistency between studies, GOMMMS sets out default funding arrangements that should be assumed:

*11.3.8* Roads – public sector funding.

- Bus services – potentially commercially viable services should be considered as private operator funded schemes. For services seen to be commercially unviable then operating grants should be considered.
- Bus Infrastructure – funding for will come via the Local Transport Plans
- Light Rail – funding for Light Rail will come from Central Government

- Heavy Rail - potentially commercially viable services should be considered as private operator funded schemes. For services seen to be commercially viable then grants from the SRA should be considered.

Table 11.1 summarises the suggested funding sources for the various elements of the strategy.

**Table 11 – Suggested Funding Sources**

<b>Scheme Category</b>	<b>Delivery Agency</b>	<b>Initial Source of Finance</b>	<b>Long-term Funding</b>
Highway Schemes	Highways Agency	Government	75% demand management revenues; 25% government
Rail station enhancements	SRA	TOCs	TOCs
New Stations	SRA	SRA	50% local authority 50% SRA grant (RPP) or 100% developer finance
Rail rolling stock	TOC	TOC	SRA/TOC
Rail infrastructure	SRA	SRA	SRA/TOC
Bus services	Bus operators/quality partnerships	County Councils	County Councils & operator revenue
Bus infrastructure	Local authorities	Local authorities	Local authorities
Local Transport Initiatives	Local authorities	Local authorities	Local authorities
Demand management measures	Local authorities	Local authorities	Self funding
Light Rapid Transit	Local authorities	Government	Government grant with contribution from operating surplus

11.4  
11.4.1

***The Practicality and Public Acceptability Supporting Analysis***

GOMMMS has provided the following check list as an aid to assessing practicality:

- Feasibility – What is the likelihood of the decision being implemented? Issues such as land availability and purchase as well as the availability of funds would be considered. Is the strategy likely to gain consent in relation to technical and legal issues eg TWA
- Enforcement – Does the strategy require other, supporting enforcement measure to ensure that it is effective?
- Area of interest (“breadth” of the decision) – What is the scale of the strategy? What are the roles of the local authorities and other bodies whose activities are embraced by the strategy?
- Complexity (“depth” of the decision) – Does the strategy or plan involve numerous co-ordinated elements?
- Time-scale – What is the time scale for the implementation of the strategy and its effects?
- Phasing – What is the phasing of the strategy for example design and construction and how does this fit in with the phasing of the funding?
- Partitioning – Can the strategy be broken down into a series of simpler, discrete components? Does the strategy have the ability to be broken down into smaller manageable units?
- Complementarity – Are the proposals complementary or independent? Some measures will make a significant contribution only if undertaken in association with others.
- Conflicts – Do the measures conflict with others that have been or are likely to be made?
- Political nature of policies and proposals – How does the strategy relate to the way that political choices are made?

- 11.4.2 This checklist is represented in a table format in Appendix D Table 3.
- 11.4.3 GOMMMS suggests that Public Acceptability should be informed by the responses from the public consultation. The third round of workshops were partly structured around the above issues and have been used to gauge stakeholder's responses in relation to the impact of the strategies on their local area and in the wider context. The workshops were also designed to show the general level of public support and highlight what objections may occur.
- 11.4.4 Some of the major themes that emerged from the workshops were:
- general support for the basic principles;
  - the need for a better public transport network e.g wider coverage, type of services, accessibility;
  - the need for better integration of a cycling network;
  - the need for a better freight distribution network;
  - the need to minimise impacts of transport improvements on the environment;
  - opposition to the pricing proposals;
  - the need for commitment to funding and implementation.
- 11.4.5 Questionnaires handed out at the exhibitions and available through various local bodies were also used as a tool to measure the level of support for the strategy. However it is felt that this measure should be treated with some caution as there may have been an over-representation of areas from community action groups. Questionnaires response for supporting the strategy was some 59%, comprising of 33% for strong support and 26% for slight agreeance. 22% strongly disagreed and 10% slightly disagreed. The remaining 9% neither agreed or disagreed.
- 11.4.6 Qualified Surveys (telephone surveys amongst random samples) were conducted with residents along the South Coast corridor are a better representation of views

on the SoCoMMS strategy. The overall levels of support for the proposed strategy, 57% supporting it and 17% supporting it strongly. Only 7% opposed the strategy, including 3% who opposed it strongly.

11.5

***Distillation of the Appraisal Information***

11.5.1

The main points from the Supporting Analyses are summarised on a single table for each option as shown in Appendix D Table 4.

## **12 The Appraisal Summary Table**

## 12

# The Appraisal Summary Table (AST)

12.1

### *AST*

12.1.1

The Appraisal Summary Table presents the degree to which the strategy meets the Central Governments five objectives for transport. The table is the distillation of the appraisal that has been undertaken for the SoCoMMS strategy and provides a comprehensive summary of the impacts of the strategy.

12.1.2

The AST is presented below in Table 12.1.

**Table 12.1 Appraisal Summary Table**

Core Strategy			Problems	Present Value Cost To Government £510M
OBJECTIVE	SUB- OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE MEASURE	ASSESSMENT
ENVIRONMENT	Noise	In 15th year: 193 zones “losers”, 322 zones “winners”. The winners are largely associated with road infrastructure improvements and the losers are largely associated with increased rail services	Change in estimated population annoyed in 15 <sup>th</sup> year with Strategy compared with present Do-minimum: +10028	Change in estimated population annoyed in 15 <sup>th</sup> year with Strategy compared with future Do-minimum: +1226
	Local Air Quality	Overall, no zones with AQMA are worsened by the strategy (for both Nitrogen Dioxide and PM10). Two zones with AQMA are potentially improved by the strategy for Nitrogen Dioxide. However all AQMA are outside of the study area.	NO2: 445 zones “winners” NO2: 64 zones “losers” NO2: 35 zones no change PM10: 442 zones “winners” PM10: 67 zone no “losers” PM10: 35 zones “no change”	Emissions estimate NO2: -3,113,286  Emissions estimate PM10: - 33257
	Greenhouse Gases	A net reduction is predicted for the majority of zones		Reduction of 137,742 tonnes of CO2 for 2016 (-2%) against future do-minimum
	Landscape	Due to limited new road and rail infrastructure schemes the strategy will have a neutral-slight negative impact on the majority of the study area. However large negative impacts have been identified in certain parts of the study area including Arundel, Lewes, Selmeston and Hastings	Impact of Strategy on Resource: Slight-ve Medium-ve Large-ve National e.g. SSSI and National Park: - - 1 on AONB Regional e.g. Special Landscape Area and Area of Great Landscape Value: 1 on Ancient Woodland 1 on Ancient Woodland -	Large Negative Impact
	Townscape	The scheme will have a neutral-slight negative impact on the majority of the study area, with a number of areas experiencing a beneficial impact including parts of Chichester, Littlehampton Worthing and Wilmington. However, a large negative impact has been identified in Hastings.	Multiplicity of features do not lend themselves well to a matrix.	Moderate Negative Impact
	Heritage of Historic Resources	There will be a neutral-slight negative impact on the majority of the study area. However a large negative impact has been identified on the historic environment in Arundel.	Resource: Scheduled Ancient Monument: 1 Listed Building: 1 Historic Park and Gardens: 2 County and Local Archaeological Sites e.g. SMR and Local Plan Designation: 2 Conservation Area: 1	Large Negative Impact
	Biodiversity	There will be a neutral-slight negative impact on the majority of the study area. However, a serious adverse impact on biodiversity has been identified along the route of the proposed Hastings-Bexhill Link Road.	Impact Resource: Minor-ve Significant-ve Serious-ve National e.g. SSSI, NNR: 1 on SSSI: - 2 on SSSI: Regional e.g. CWS, SINC: 17 on SINC and 1 on Ancient Woodland: 1 on Ancient Woodland and 1 on SINC: Local Plan Designation: 2 on Woodland Protection Area: -	Large Negative Impact
	Water Environment	The balance of new schemes and upgrades suggests that on a regional scale the overall impact is generally low. However one scheme (the Worthing Tunnel), which passes through a regionally important groundwater resource with little scope for mitigation, has in itself a major impact and is sufficient (by accumulation of all local measures) to rate the impact of the core strategy as significant		Significant negative impact
	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 reduced highway demand and new highway infrastructure.	Savings: Fatal 226 Serious 1638 Slight 13,525	PVB 298.3
	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	Revenue generated from demand management schemes substantially exceeds the public sector and investment costs		User Benefits: NPV £1409M Private Providers NPV £-129M Public Providers NPV £2192M Other Government NPV £1637M
	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			Beneficial
ACCESSIBILITY	Option Values	New rail stations provide strong beneficial effects at the local level for each station as does the introduction of two Light Rail Transit systems. The combined effect will provide overall area wide opportunities within the study area.		Large Beneficial Impact
	Severance	Provides relief from existing severance for those in Arundel, Chichester, Wilmington, Worthing and Selmeston		Slight positive impact
	Access to the Transport System	Positive impacts are associated with the introduction of new stations 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 stations and Park and Ride measures 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

