13. Projections of the potential traffic impacts of soft factors and associated costs

13.1 Introduction

The preceding chapters have drawn on available evidence and detailed comment from experts in the field on each of the individual soft factors. Now, we seek to apply that evidence and information to answer two important questions:

- By how much could soft factors affect future levels or growth rates of traffic, if they were applied more intensively and on a larger scale than at present?
- How much do soft factors cost, and what value for money do they represent ?

In considering these questions, we have developed two scenarios.. The first scenario, which we call 'low intensity', is a projection of the present rate of expenditure and level of commitment, taking account of the important initiatives which already exist, and will no doubt continue, by the most committed local authorities, and of commercial initiatives being undertaken by companies. The second, which we call 'high intensity', is based on an expansion of activity, commitment and resources to a substantially higher level, which would still be consistent with practical and realistic experience, the current judgements of those working at local level in practical implementation, and feasible levels of expenditure, given the known constraints of staffing and funding generally. This scenario presupposes commitment at both local level and national level, but does allow for a degree of variation according to local circumstances.

Both scenarios are based on what we judge could be achieved by a realistic level of commitment to a programme building up over a ten year period. However, this should not be interpreted as a 'forecast for 2014', because no allowance is made for other things that will have changed by then (demography, income, economic growth, road user charging, revision and rolling forward of the Ten Year Plan, etc) and also because the effects of soft factor initiatives will certainly be influenced by other policies.

At this stage, we recognise the potential importance of induced traffic, but temporarily take this out of analysis. We do not adjust the behavioural responses in either direction, neither allowing for erosion due to induced traffic, nor enhancement of soft factor effects due to the measures to prevent induced traffic such as pricing or reallocation of road capacity. As outlined in Chapter 1, this position may be interpreted as an assumption that 'locking-in' measures are introduced at just sufficient intensity to maintain the changes brought about by soft measures, but not more.

We do not define this level in precise policy terms, but discuss it further in the next chapter. However, we note that there is now considerable empirical evidence on the scale and properties of induced traffic and suppressed traffic, arising from experience from changes in road capacity and its allocation, pricing, etc.. Consequently, this evidence base should enable the identification of quantitative estimates of the scale of implementing such measures that would be required to meet our assumption. This estimate cannot be made using the DfT's National Transport Model in its current stage of development. However, in the following chapter, we discuss some issues of analysis and method, arising from this project, which might help to move forward in solving this problem. It remains to be demonstrated how easily current modelling frameworks can be adapted to allow for soft factors, but, in any case, decisions can still be supported by a combination of formal modelling, other statistical and qualitative analysis, and judgement based on practical experience.

We do not, at this stage, make a quantitative adjustment for the effect of synergy between soft factors, or between soft and hard factors, but we do make adjustments in order to avoid double counting, especially in the case where car trips removed as a result of one soft initiative, are then not available to be removed by another initiative. This adjustment is discussed in section 13.3, and these issues are also discussed qualitatively in chapter 14.

The approach we take in the rest of this chapter is, first, to develop a range of estimates of future impact for each individual soft factor, and then to apply these, in combination, to base traffic data. We take actual traffic data for 2000 as the base, rather than forecast data for some future year, and therefore the results do not distinguish between 'traffic reductions' and 'reducing the rate of traffic growth to a level than it would otherwise have been without the initiative'[1]. This corresponds with the approach taken by other studies, as reviewed in chapter 2. Thus, the results may perhaps be interpreted as estimating what difference would exist now, if we had proceeded vigorously on this path for the previous decade or so. A judgement can then be made about future trajectories, bearing in mind that traffic growth in the more congested areas has already slowed or in some cases halted, and in these circumstances, the issue of induced traffic becomes crucial.

Finally, we bring together the data from earlier chapters on the cost-impact relationship for the different soft factors, and use this to make some inferences about value for money.

The process of estimating future impacts requires reasoned justification of many assumptions, and detailed arithmetic calculations. In all cases, these have been based on the direct and cautious judgement of the authors, rather than using behavioural or other assumptions deriving from a formal theory, or constraints imposed by the structure of an existing model. Sufficient detail is reported to enable the professionally interested reader to follow and, if desired, check the calculations and consider the impacts of alternative assumptions or methods as may seem better supported as experience develops. Those wishing to omit this rather dense narrative will find a summary of the important points arising from the calculations, and their conclusions, in the final section of the chapter.

[1] This distinction can only be made with a forecasting process in which soft measures are themselves endogenous within a forecasting model provided with behavioural mechanisms fully allowing for their impact, which does not currently exist.

13.2 Projections of impact for individual soft factors

This section considers what might be the impact of each individual soft factor, following about ten years of implementation. There are two dimensions to this, which we term 'coverage' and 'effectiveness'. 'Coverage' is the proportion of the population which might be affected in some way by the soft factor concerned, while 'effectiveness' is the amount by which car travel could be reduced within the affected population. The product of 'coverage' x 'effectiveness' we term 'impact'. Usually, impact is expressed as a reduction in car trips. Wherever possible, we use information enabling us to express impact in terms of car mileage, but this is not always the case, and this introduces a potential bias (often, but not always, an underestimate) of the impact, recognised in chapters 1 and 2, and discussed further in chapter 14.

We quote a lower and an upper value for coverage, and the same for effectiveness. Both of these dimensions are affected by the conditions of implementation: coverage partly reflects, for example, how many different local authorities are likely to implement such initiatives, while effectiveness is partly a function of the resources and design quality of the initiatives. Thus taken together, these two figures broadly define our low intensity and high intensity scenarios respectively. It is important to note that the difference between the two scenarios is a measure of two different sets of policies, and should not be interpreted as a 'range of uncertainty' deriving from statistical error bands, as is done for those forecasting models based on formal econometric estimation. Such uncertainty, of course, exists, but would apply to both scenarios[2].

In most cases, estimates of impact are expressed as a percentage reduction in trips or mileage for a specific journey purpose (for example, reduction in car trips to work). However, some soft factors affect more than one type of journey, and for these, the estimate of impact is a percentage reduction across all, or all relevant, journey purposes. Thus, the figures quoted for different soft factors are not immediately comparable at this stage, until brought together and applied to data reflecting the size of the different traffic segments.

The estimates of coverage and effectiveness are based as much as possible on evidence from the case studies, supplemented by data from the literature review. In particular, the case study interviews included questions on the possible future scale of implementation of each soft initiative. Where the case studies gave little indication of possible future coverage and effectiveness, we have still suggested a potential for future impact, based on judgement of plausibility or credibility, informed, where possible, by collateral evidence. We make it clear where we have had to resort to this approach.

For some soft factors, there is case study or other evidence suggesting greater coverage or effectiveness in urban areas than in non-urban areas. Where soft measures

[2] Uncertainty ranges are not estimated, for reasons rather similar to those which have prevented those responsible for the National Transport Model and its predecessors from making such estimates, namely that the statistical properties of a model, or a calculation procedure, which has been derived from a deliberative synthesis of many different sources and judgements, cannot be treated as a textbook case of a complete model estimated from a single coherent data set.

have a differential impact by journey purpose, there are likely also to be consequential differences by time of day. These are taken into account as appropriate.

In some cases, we have drawn on the National Travel Survey to provide a basis for current travel habits. As mentioned in Chapter 1, throughout the report, we have aimed to draw on the 1999/2001 results, to provide standardisation, although it has occasionally been necessary to use results from 1998/2000, or 2002, as these were not readily available from the 1999/2001 report.

The following sections look at each individual soft factor in turn.

13.2.1 Workplace travel plans

In estimating the impact of workplace travel plans on future car travel demand, we assume:

- The impact is concentrated in the peak period, and mainly on the journey to and from work. (There could also be impacts on business, patient, shopper, student, tourist and other visitor travel, but these have been excluded as there is not enough data to comment).
- **Coverage.** There is an upper level to the proportion of the workforce that can be readily engaged in travel plans. This is *currently* determined principally by the proportion of employees who work for public sector organisations and large companies, although the level might be increased by policies which create incentives for smaller organisations to adopt travel plans. Conservatively, we assume that the proportion of the workforce that can be readily engaged is lower in non-urban areas than in urban areas (since employment may be more dispersed and there may be fewer large employers). This is consistent with findings from our case studies. Table 13.1 sets out our projections of what proportion of the workforce might be covered by travel plans in different types of area, over the next ten years. Estimates are based on what is being achieved in the case study areas now, and what case study interviewees felt could be achieved in future, as reported in section 3.14.1. These estimates are also conservative because most interviewees' estimates of future coverage were coloured by an assumption of little change in resources, and because experience of working with clusters of SMEs is only just starting to develop.
- **Effectiveness.** In section 3.10.1 we saw that most travel plans achieve cuts in car use of 0-35%, with a few best practice plans achieving cuts of over 40% and some delivering no reduction at all. Data from the case study areas suggests that, broadly:

  10% of travel plans achieve no change
  20% reduce car use by >0-10%
  35% reduce car use by >10-25%
  25% reduce car use by >25-35%
  10% reduce car use by over 35%.

  The average reduction (including poor-performing, middle-range and good-performing plans) was 18%. This is consistent with results from the literature, which highlight that even minimalist plans can be expected to have some impact (as described in section 3.2).

The scenarios are based on these data (table 13.1). For both the low intensity and high intensity scenarios, in urban and non-urban areas, we assume an average effectiveness of 18%. As with our reported data, this does not mean every travel plan achieving an 18% reduction in car use. Some plans will achieve more, and some less. Equally, it does not mean that all areas will achieve the same results. Some flagship towns – for example, compact cities with well-developed traffic restraint policies – may do very well, and others may do less well. Moreover, it assumes that, even under our high intensity scenario, a large number of employers may not be prepared to engage in travel planning at all (representing 50% of employees in urban areas and 80% in non urban areas).

Combining the assumptions in table 13.1, the reduction in car commuter trips would be 5% or 9% in urban areas, and 2% or 4% in non-urban areas.

Table 13.1: Coverage and effectiveness of workplace travel plans

	Coverage Percentage of workforce covered by travel plans after ten years	***Effectiveness*** Proportion of travel plans with:					***Impact*** Implied reduction in car commuting trips	
		no effect~	low effect ~	medium effect~	high effect ~	very high effect ~	Expressed as % of car trips to work in companies with travel plans	Expresse d as % of all car journeys to work in area
Urban areas	30 – 50%	0.1	0.2	0.35	0.25	0.1	18%	***5 or 9%***
Non-urban areas	10 – 20%	0.1	0.2	0.35	0.25	0.1	18%	***2 or 4%***

~ 'low' means a >0-10% cut in car commuting trips; 'medium' = >10-25% cut; 'high' = >25-35% cut; 'very high' = over 35% cut.

13.2.2 School travel plans

In estimating the impact of school travel plans on future car travel demand, we assume:

- The impact in the morning is entirely in the peak period. The impact in the afternoon is during the off-peak period. The entire impact is assumed to be on the journey to and from school (ignoring any potential synergy benefits with initiatives aiming to affect commuting journeys).
- **Coverage.** Evidence from the case studies suggests that in the next ten years a significant proportion of schools in all areas will have developed effective travel plans – say somewhere between 30% (a little higher than Merseyside's estimate for 2006) and 95% (close to the estimates made by Buckinghamshire and York for 2011). Coverage is likely to be similar in urban and non-urban areas (table 13.2). (It should be noted that these estimates are relatively conservative given the DfES/DfT jointly declared objective that all schools should have an active travel plan by the end of the decade).
- **Effectiveness.** The effectiveness of travel plans will vary between schools. As discussed in section 4.9.4, evidence from the case studies suggests, at current levels of engagement, typically 10-40% of engaged schools will not experience positive modal shift, 45-50% might be expected to achieve car use reductions of

between 0-20%, whilst 15-40% can be expected to achieve reductions of over 20%, with some schools achieving reductions of 50% or more. The proportion of high impact travel plans should increase with time, as the number of schools with fully developed travel work increases, and local authorities are able to provide more schools with measures such as safer infrastructure. Effectiveness in urban and non-urban areas is assumed to be similar (table 13.2).

Combining the assumptions in table 13.2, the reduction in car escort trips to and from school would be 4% or 20% over ten years. The effect is similar in urban and non-urban areas.

Table 13.2: Coverage and effectiveness of school travel plans

	Coverage Percentage of pupils covered by travel plans after ten years	***Effectiveness***			***Impact*** Implied reduction in car escort trips to / from school	
		Proportion of travel plans with no impact~	Proportion of travel plans with an average effect~	Proportion of high performing travel plans~	Expressed as % of car escort trips to / from schools with travel plans	Expressed as % of all car escort trips to/ from schools in area
Non-urban areas	30 – 95%	0.05 – 0.2*	0.2 – 0.5*	0.75 – 0.3*	13 or 21%	***4 or 20%***
Urban areas	30 – 95%	0.05 – 0.2	0.2 – 0.5	0.75 – 0.3	13 or 21%	***4 or 20%***

~ 'no impact' means a 0% cut in car escort trips to / from school; 'average effect' = 10% cut; 'high performing' = 25% cut.
* We adopt two scenarios for school travel plan effectiveness. The first is based on the 'average' current level of engagement, and assumes that 20% of plans have no impact on traffic, 50% have an average impact and 30% are high performers. The second scenario assumes that, as local authority work in this area increases, they will be able to engage with a much greater proportion of schools on an intensive basis. In this scenario, we assume that 5% of plans have no impact, 20% have an average impact and 75% have high impact. (It should be noted that this second scenario is equivalent to a scenario where the proportion of high performers is smaller, but there are some which achieve traffic reductions considerably in excess of 25%).

13.2.3 Personalised travel planning

In estimating the future impact of personalised travel planning, we assume:

- An equal effect on all journey purposes and at all times of day.
- **Coverage.** The Nottingham and Gloucester case studies suggest that it is feasible to develop large-scale personalised travel planning programmes, covering between 10,000 and 30,000 people per year (representing approximately 10 – 20% of the population in Gloucester each year, and 3 – 5% of the population in Greater Nottingham each year). In London, a programme covering more than ten times this number of people annually is being considered, which would reach about 2% of the population per year.
- In our high intensity scenario, we assume that personalised travel planning programmes could be developed to cover around one third of the urban population over a ten year period (i.e. about 3% per year) with each programme doing whatever reinforcement is necessary for sustained impact. Not all cities would

achieve the same level of coverage – some might do more, and some much less. We assume much lower coverage in non-urban areas (where the potential for purely information-based measures to stimulate modal shift is less), such that about 3% of the non-urban population is targeted over the same period (or 0.3% per year – only a tenth of that assumed for urban areas).

- In the low intensity scenario, we assume about half this level of implementation – that is, around 15% of the urban population and 1% of the non-urban population are targeted by personalised travel planning programmes over ten years.
- **Effectiveness.** In the high intensity scenario, personalised travel planning programmes cut car driver trips by an average of 15% in urban areas and 6% in non-urban areas. These figures are at the upper end of the range of reported results. In the low intensity scenario, we assume personalised travel planning programmes cut car driver trips by an average of 7% in urban areas and 2% in non-urban areas. These figures are at the lower end of the range of results reported in sections 5.2.2 and 5.7.1.

Using these assumptions, the reduction in car driver trips is 1% or 5% in urban areas and less than 1% in non-urban areas.

Table 13.3: Coverage and effectiveness of personalised travel planning, across all journey purposes

	Coverage Proportion of population targeted	***Effectiveness*** Reduction in car driver trips per person	***Impact*** Implied reduction in car driver trips
Urban areas	15 – 30%	7 – 15%	***1 or 5%***
Non-urban areas	1 – 3%	2 – 6%	***0.02 or 0.2%***

13.2.4 Public transport information and marketing

In estimating the future impact of public transport information and marketing, we assume:

- An equal effect on all journey purposes, and at all times of day.
- **Coverage.** We assume all areas increase public transport patronage by 0.7 – 2.5% per year as a result of information and marketing activity. However, their starting points are different, resulting in different final potential impacts. An annual increase of 0.7 - 2.5% is roughly half the patronage increase currently being achieved in Nottingham and Brighton, which case study information suggested was a reasonable proportion to attribute to information and marketing initiatives (as reported in sections 6.10.1). Our projection assumes that, on average, public transport quality is sufficient to enable such marketing to take place. This a reasonable assumption, given that our projected increases are applied to existing levels of public transport use (thus allowing for the fact that service provision varies dramatically in different parts of the country). An annual increase of 0.7 - 2.5% is equivalent to an increase in public transport patronage of 7 – 28% over ten years. It should be noted that these figures are approximately consistent (to a first order of magnitude) with the aspirations in the Ten Year Plan for growth in public transport demand, taking rail and bus together. However, it is not clear whether

the projections in the 10 Year Plan already implicitly made allowance for the growth that might be expected from marketing the public transport improvements it hoped to secure, or whether those projections were mainly based on anticipated service improvements (with or without conventional levels of marketing activity), such that intensive marketing might be expected to result in additional patronage increases.

- **Effectiveness.** Based on findings from the literature and the case studies (discussed in section 6.10.2), it is assumed that 30% of patronage increases may be attributed to former car users, made up of 19% former car drivers and 11% former car passengers (in line with average car occupancy levels).

Using these assumptions, information and marketing measures could reduce car driver mileage in London and other urban areas by 0.3% or 1.1% overall after ten years (with a higher figure in London and a lower figure in urban areas outside London). In non-urban areas, car driver mileage could be reduced by 0.1% or 0.3% after the same period.

Table 13.4: Effect of information and marketing measures on public transport use in urban and rural areas

	London	Urban areas, excluding London	Non-urban areas
Current local bus trips per person per year*	115	71	32
Coverage: Annual increase in local bus trips attributable to public transport information and marketing+	8.1 – 32.2	5.0 – 19.9	2.2 – 9.0
Effectiveness: proportion of public transport trips transferred from car as driver	0.19	0.19	0.19
Annual reduction in car driver trips per person~	1.5 – 6.1	0.9 – 3.8	0.4 – 1.7
Annual reduction in car driver km per person #	21.2 – 85.0	13.1 – 52.5	5.9 – 23.7
Current annual car driver km per person**	3312	5723	8040
Percentage reduction in car driver km++	0.6 or 2.6%	0.2 or 0.9%	***0.1 or 0.3%***
Overall percentage reduction in car driver km in London + urban areas##	***0.3 or 1.1%***		

* Current local bus trips per person are derived from National Travel Survey data for 1998-2000 (as more recent NTS breakdowns were not available). The figure for urban areas excluding London is estimated, based on a mid-figure between number of local bus stages per person in metropolitan built-up areas (98) and in urban areas with a population of 10,000 or more (44). The figure for rural areas is also estimated, based on mid-figure between number of local bus stages per person in settlements of 3000-10,000 people (34) and in rural areas with less than 3000 people (29).
\+ Annual increase in local bus trips = (current local bus trips per person per year) x (percentage increase in bus trips over ten years). Lower figure assumes 0.7% growth per annum; upper figure assumes 2.5% growth per annum.
~ Annual reduction in car driver trips per person = (annual increase in local bus trips per person) x 0.19
\# Annual reduction in car driver km per person = (annual reduction in car driver trips per person) x (average mileage of a car trip). Average mileage of a car trip is derived from National Travel Survey data and was 13.9 km in both 1999/01 and 2002.
** Current annual car driver km is derived from National Travel Survey data for 2002. It is 3312 km for London residents; estimated at 5723 km for urban areas (based on a mid-figure between the figure for metropolitan built up areas and the figure for settlements with a population of 10,000 or more); and estimated at 8040 km for non-urban areas (based on a mid-figure between the figure for settlements of 3000-10,000 and for rural areas with less than 3000 people).
++ Percentage reduction in car driver km = (annual reduction in car driver km per person) / (current annual car driver km per person)
\## Overall percentage reduction in car driver km in London + urban areas: assumes London population = 7.6 million and population of urban areas excluding London = 34.4 million.

13.2.5 Travel awareness campaigns

The effects of general travel awareness programmes are inherently difficult to quantify, and although our one travel awareness campaign case study had some monitoring data, it does not, on its own, provide a good basis for us to feel confident of our forecast of the impact of travel awareness programmes in general. There are also different types of travel awareness campaigns, ranging from those aimed at city level (or even wider areas)[3], and those which involve intensive intervention with a much smaller group of people, such as the BikeBus'ters experiment in Denmark. Our calculations below apply to the more general type of campaign, largely due to difficulties of estimating the impacts of the specialised kinds.

The evidence we have leads us cautiously to the following:

- **Coverage.** As reported in section 7.12, in York, somewhere between 3% and 12% of drivers have probably reduced their car travel as a result of the campaign. For reasons of caution in the absence of more data, we assume that travel awareness programmes of this type might in general impact on about half this proportion (that is, a lower figure of 1.5% or an upper figure of 6%), either because such programmes are not implemented everywhere, or because they are implemented at lower intensity.
- **Effectiveness.** We assume that the reduction in car use for those people who respond to travel awareness campaigns might be 5% (as a minimum that would be noticeable), through to 20% (as a maximum, perhaps equivalent to say, foregoing car use approximately one day a week.

Taken together, these assumptions suggest 'general' travel awareness campaigns could reduce car use by 0.1 or 1% overall. We do not attempt to distinguish between effects in urban and non-urban areas, and we do not include the potential impacts of more intensive types of campaigns.

Table 13.5: Impact of travel awareness campaigns

	Coverage Proportion of car users reacting to campaign	***Effectiveness*** Reduction in car use amongst those car users who change their behaviour	***Impact*** Implied reduction in car trips
All areas	1.5 – 6%	5 – 20%	0.1 or 1.2%

13.2.6 Car clubs

In estimating the future impact of car clubs, we assume:

- The impact is most likely to be to reduce car use for regular trips and those where alternatives are most readily available (that is, commuting, business, school escort). This is because car club membership enables people to drive for journeys which are heavily car-reliant, such as transporting a heavy load or escorting an elderly relative. This reduces the need to own a car and leads to other journeys to

[3] Such campaigns often define much smaller target groups than simply a 'whole city' or 'whole region' – for example, car drivers, aged 18-25. However, they are significantly different to those that, say, aim to work intensively with a group of a few hundred volunteers.

be made by non-car modes. Pricing regimes also discourage the use of car clubs vehicles for regular journeys such as commuting. Initially at least, the impact of car clubs is likely to be concentrated in urban areas, where alternatives are more readily available, although emerging information from rural pilots suggests that car clubs may rapidly become viable and impact in these areas too.

- **Coverage**. If organisational hurdles can be overcome, already-established car clubs could become self-financing and could grow at a more rapid rate than at present. Growth will also come from more clubs being established, in cities where they are not currently operating. More clubs, and membership growth within these clubs, would result in non-linear (though not necessarily exponential) growth in car club membership.
- For our lower scenario we took the case in which 5 urban car clubs were set up per year for the next decade, each growing at 75 members per year for the first five years, and 150 members per year thereafter (in line with current growth rates in Bristol, Edinburgh and Europe). Our upper scenario takes the case in which 10 clubs are set up each year, growing at a similar rate. These assumptions seem relatively conservative since, as discussed in section 8.8, the Carplus website reports that 7 clubs launched in 2003 and 12 have launched in 2004.
- In the long run (probably requiring more than ten years), we took the case where car clubs engage 10% of the adult population in both urban and non-urban areas. This is based on evidence from the literature about the potential size of the target market for car clubs.
- **Effectiveness**. Based on international studies (as reported in sections 8.4 and 8.9), we assume that the net effect of car club membership is to reduce average car mileage of all members by about a third. This allows for the fact that some car club members will make much larger cuts in their car use, while others (especially former non-car owners) may make little change or even increase their car use.

With these assumptions, car clubs could cut urban car mileage by 0.03% or 0.06% over a decade. These low figures are because of the comparatively small number of people affected. However, in the longer term, European evidence suggests that the target market could be about 10% of the population, and if this were the case, car mileage could be cut by 3%.

Table 13.6: Effect of car clubs on car mileage

		Coverage Car club members as proportion of population	***Impact*** Reduction in car mileage
Within next ten years	Urban areas over 100,000 people	0.1 – 0.2%*	0.03 or 0.06%
	Smaller urban and non-urban areas	0~	0
Longer-term	Urban areas	10%	3%
	Smaller urban and non-urban areas	10%~	3%

* Lower figure based on 26,000 car club members within 10 years. This could be achieved by 5 urban car clubs being set up per year for the next decade, each growing at 75 members per year for the first five years, and 150 members per year thereafter. Upper figure based on 10 car clubs being set up per year, at similar growth rates.
~ assuming that large scale car club development is concentrated mainly in larger urban areas in next ten years, but that over a longer timescale car clubs are developed in all areas

13.2.7 Car sharing

It is difficult to judge the overall effect of car sharing, because our case studies and most of the other data we have obtained relate only to commuter car sharing schemes. Car sharing might also be important for business trips and certain types of leisure trip, but we have not been able to include this in our assessment due to absence of data. This makes our estimate of the effect of car sharing conservative.

There are successful commuter car sharing schemes in both urban and rural areas. There may be particular potential for car sharing to reduce single-occupancy commuting in rural areas and small towns, where there may be less potential for other soft interventions (workplace travel plans and public transport information and marketing) to influence car commuting.

In estimating the future impact of car sharing, we therefore used the following assumptions:

- **Coverage.** We assume that an additional 1 – 10% of urban and rural car commuters might begin active car sharing within ten years. (By this, we mean being registered with, and a regular user of, a car sharing scheme, or car sharing informally on a regular basis as a result of car sharing promotion work.) The lower figure is based on linear growth projections for the Buckinghamshire scheme indicating the proportion of potential car driving commuters that might be affected in about 10 years; the upper figure is based on projections for the Milton Keynes area indicating the proportion of potential car driving commuters that might be affected in about 10 years. (These projections are described in section 9.12.1). Compared to present car commuting patterns, this amount of increase in car sharing would be fairly modest. If an extra 10% of car commuters began car sharing, this would mean that, for every 100 people commuting by car, an extra 5-6 commuters would start travelling as a car passenger (depending on levels of car occupancy amongst sharers). This would increase the number of commuters travelling as a car passenger from 18 per 100 (the current number according to 1999/01 National Travel Survey data) to 23 or 24 per 100.
- No account is taken of the potential contribution of car sharing for journey purposes other than commuting.
- **Effectiveness.** We assume an average car occupancy of 2 – 2.5 in each car-sharing vehicle. The lower figure, equivalent to driver plus one passenger, is the minimum possible, whereas some car-sharing schemes specifically encourage three or more people per car. For comparison, 1999/01 National Travel Survey data suggests an average car occupancy of 2.4 amongst commuters who already car share.
- We assume the journey to work distance for car sharers is 1 – 1.5 times the average journey distance for people driving alone. This is based on indications from the case studies that car sharing appeals more to people who have further to travel.
- Commuter car sharing in urban areas may be developed as part of workplace travel programmes, or as a substitute for them, and, therefore, there may be some potential for double counting in urban areas with extensive workplace travel plan programmes. We deal with this issue in section 13.3.

With these assumptions, car sharing could cut car commuting vehicle trips by 0.6% or 7%, and car commuting vehicle mileage by 0.6% or 11%, over a decade.

Table 13.7: Effect of car sharing on car trips and car mileage

	Coverage	***Effectiveness***		***Impact***	
	Proportion of car commuters who begin car sharing#	Average car occupancy in car-sharing vehicles	Average journey distance to work for car sharers, relative to average for all car trips to work	Expressed as percentage reduction in vehicle trips driven to work	Expressed as percentage reduction in vehicle mileage driven to work
Urban	1 – 10%	2 – 2.5	1 – 1.5	0.6 or 7%*	**0.6 or 11%**
Non-urban	1 – 10%	2 – 2.5	1 – 1.5	0.6 or 7%	**0.6 or 11%**

Expressed as proportion of all commuters travelling by car
* At present, 1999/2001 National Travel Survey data indicates that 82 cars are used for every 100 people travelling to work by car. Of these 100 people, 69 drive alone, 13 are drivers with at least one passenger, and 18 are passengers. If 10% of car commuters (who formerly drove alone) were to begin car sharing, with an average car occupancy of 2.5, the number of cars would fall from 82 to 76, a 7% drop.

13.2.8 Teleworking

In estimating the future impact of teleworking, we assume:

- The entire impact is concentrated on the peak period, and on the journey to work. The effect is the same in urban and rural areas.
- **Coverage.** As reported in section 10.3, about 64% of the workforce is employed in occupations which currently have significant levels of teleworking (with particularly high levels in managerial, professional and technical occupations), although there is some degree of telework in all occupational groups. At present, at least 7% of the workforce teleworks some of the time, and if growth continues at current rates, around 30% of the workforce might be teleworking in a decade.While not all of those in suitable occupations are likely to be engaged in teleworking in ten years time, there are a number of trends which would support continued growth at current rates. These include the growth in the proportion of the workforce employed in 'naturally' high teleworking occupations; the growth in incidence of teleworking within those jobs most suitable for it; the development of new techniques which apply telecommunications even to those tasks previously thought unsuitable; the development of cheaper and more appropriate telecommunications technologies; and changes in attitudes to working at home as it becomes more widespread. Therefore, for the high intensity scenario, we take the case in which 30% of the workforce are engaged in teleworking to some extent (consistent with linear growth at current rates). For the low intensity scenario, we take the case in which teleworking grows more slowly than the current rate, such that 20% are engaged in teleworking to some extent within ten years.
- **Effectiveness.** For the high intensity scenario, we take the case in which 30% of the workforce are engaged in teleworking to some extent (consistent with linear growth at current rates), and working at home an average of 3 days per week.

Three days per week is is in line with the higher estimate of location-independent tasks identified in one study of a local authority workforce, current teleworking behaviour at BT, and current levels of teleworking as reported by NOP (see section 10.4). This average would certainly include some relatively intensive teleworkers, and some that are less intensive. Although we are not able to make a definite forecast for this distribution, a check on credibility is given by a possible example, such as:

70% of the workforce not teleworking at all
10% teleworking for a minority of their work, say 1-2 days per week
10% teleworking for a substantial part of their work, say 3 days per week
10% mostly working at home but with regular workplace days, or entirely home-based but with occasional meetings (say 4-5 home-based days per week).

In the low intensity scenario, we assume that teleworkers are, on average, based at home 1.5 days per week, being the lower estimate of current practice, derived from 2001 Labour Force Survey results about teleworking.

- Teleworkers' journey-to-work distance and car mode share are assumed to be similar to the national average. (This is a conservative estimate, since the literature suggests that current teleworkers typically undertake longer than average commute journeys and are more likely to be car drivers. However, as telework spreads, these tendencies may diminish, and so we have not included them here).
- We make no allowance for new car trips generated by other household members using the car left at home on telework days, or for new car trips undertaken by the teleworker. These effects are often mentioned as a particular concern for teleworking, but in fact they are merely one example of the general issue of induced traffic which we deal with in chapter 14. Evidence from the literature, as discussed in section 10.2, suggests such effects are small (and may themselves be offset by other behaviour changes such as household members adopting contracted action spaces).
- Some of the benefit of teleworking might be achieved through measures introduced as part of workplace travel plans, but a reasonable proportion might be expected to happen independently of travel plans. Nevertheless, there is some risk of double counting. We deal with this issue in section 13.3.

With these assumptions, teleworking could reduce car commuter trips by 3% or 12% in ten years.

Table 13.8: Effect of teleworking on car commuter trips

Coverage: Proportion of workforce teleworking	20 – 30%
Increase in proportion of workforce teleworking since 2003	10 – 20%
Effectiveness: Overall proportion of teleworkers' time working at home	30 – 60%
Impact: Percentage reduction in car commuter trips	**3 – 12%**

13.2.9 Teleconferencing

In estimating the future impact of teleconferencing, we assume:

- The entire impact is concentrated on business trips.
- ***Coverage.*** Between 25% and 60% of companies may have readily available teleconferencing facilities in the next 10 years, and start using it as part of mainstream company practice.

- ***Effectiveness***. Companies which use teleconferencing facilities reduce their business travel by between 10 and 30%.

These figures are derived from the literature and our case study, as discussed in section 11.11.

With these assumptions, we tentatively suggest that teleconferencing might reduce car business trips by 2.5% or 18% in ten years.

13.2.10 Home shopping

In estimating the future impact of home shopping, we make the following assumptions:
- **Coverage**. The home shopping literature review suggests that home delivery has the greatest potential impact on car use in the grocery sector. This accounts for 40% of personal shopping mileage by car, according to the 1998-2000 National Travel Survey.
- Estimates of the likely take-up of grocery home delivery suggest it could account for around 5 – 15% of UK grocery sales by value within about ten years, as discussed in section 12.4.1.
- **Effectiveness.** Amongst those utilising home delivery services, vehicle mileage saved per shopping load is of the order of 70% or more, as discussed in section 12.5.

This suggests home shopping could reduce vehicle mileage for shopping by 1% or 4% in ten years.

Our case study also suggests that expansion of the Royal Mail / Post Office collection points trial, (as described in section 12.6), could reduce car mileage for personal business trips. In estimating the future impact of rolling this out nationally, we assume:
- **Coverage.** In the Nottingham trial, local collection points for missed deliveries were being used twice by each household over a year, with the potential for as many as 28 uses per year, as involvement increases. Assuming an average household size of 2.3, this would be equivalent to between 0.9 and 12.2 occasions per person per year. The average person makes 105 trips for personal business in a year (including 44 as a car driver) according to the 1999/2001 National Travel Survey. We therefore assume that if rolled out nationally, the local collection points trial could affect 2% of personal business trips, or potentially up to 28% if the scheme was exploited to the full, and that the impact would fall equally on trips made by car and by non-car means.
- **Effectiveness.** In the Nottingham trial, for trips to collect goods which were unsuccessfully delivered to the home, data-supported assumptions are that perhaps 15% trips would have been made anyway (for other reasons), 30% were no longer made by car, and the average distance of remaining car trips halved. This implies that, on average overall, there was a 72% reduction in the car distance travelled to collected undelivered goods.

This suggests national roll-out of local collection points for missed deliveries from Royal Mail could cut car mileage on personal business by about 1.5% (although there is the potential for the impact to be considerably higher, up to about 20%).

Finally, there is some information suggesting that public sector investment in delivery facilities (i.e. secure drop-off points) could also reduce light goods vehicle delivery traffic by home shopping operators. As discussed in section 12.7, work by several commentators has suggested that the use of dedicated delivery facilities could reduce home shopping delivery vehicle traffic by 30-50% or more, compared to some current arrangements where retailers promise to deliver to customers within specified time slots. We have not included this in our calculation, given problems with identifying the volume of relevant delivery traffic that could be affected. However, we note that the effects could be significant.

13.3 Summary of impacts

Table 13.9 summarises the impact estimates derived above, according to area type and journey purpose.

Table 13.9: Summary of impacts of different types of soft factor~

Journey purpose	**Soft factor**	**Impact***	
		Non-urban	**Urban**
Journey to work	Workplace travel plans	2 or 4%	5 or 9%
	Car sharing	0.6 or 11%	0.6 or 11%
	Teleworking	3 or 12%	3 or 12%
Combined impact of workplace travel plans, car sharing and teleworking, allowing for double counting		*5 or 24%*	*8 or 26%*
Journey to school	School travel plans	4 or 20%	4 or 20%
Business journeys	Tele-conferencing	2.5 or 18%	2.5 or 18%
Shopping trips	Home shopping for groceries	1 or 4%	1 or 4%
Personal business trips	Local collection points	1.5%	1.5%
Multiple journey purposes	Personalised travel planning	<1%	1 or 3%
	Public transport information and marketing	0.1 or 0.3%	0.3 or 1.1%
	Travel awareness campaigns	0.1 or 1%	0.1 or 1%
	Car clubs		0.03% - 0.06% (up to 3% long term)

* Impact is expressed as a percentage reduction in car mileage for the relevant journey purposes for car clubs, car sharing, home shopping for groceries and local collection points. For all other measures, the impact is expressed as a percentage reduction in car *trips* for the relevant journey purposes, and we suggest that these figures are also applied to car mileage, as there is no information from either the literature or the case studies that would enable the reliable calculation of different figures for mileage.
~ Note that for soft factors which affect multiple journey purposes, the impact is expressed relative to all car travel. For soft factors which affect only one journey purpose, it is expressed relative to car travel for that purpose.

For most soft factors, we have insufficient information to give different estimates according to area type. The exceptions are workplace travel plans, personalised travel planning, public transport information and marketing, and car clubs: for these the non-urban estimates are mostly lower because of the generally poorer quality of public transport there.

In most cases, the impact is expressed as a percentage reduction in car *trips.* However, there are a few exceptions, where we had information that enabled an estimate of the impact on car *mileage.* On the whole, car mileage data is more useful. Where it is lacking, we assume that mileage is reduced by the same proportion as trips. As mentioned above, this may introduce a bias, usually but not always an underestimate, especially important where the combined effects of soft measures (and other policies) are such as to encourage a greater proportion of local travel, as well as a shift in mode.

Some soft factors are assumed to only affect one type of trip: for example school travel plans are assumed to only affect car use for the journey to school. (This is a simplification, since mode change for one journey purpose may well have second-order effects, particularly for linked trips.) Other soft factors affect trips for a variety of purposes. Equally, some trip purposes can be affected by more than one soft factor.

In section 13.4, we combine the impact of several soft factors to derive journey change factors for different trip purposes. Before doing this, we were keen to make adjustments to avoid the possibility of double counting. By double counting, we mean the incorrect assumption that several soft factors acting together will each reduce car travel by an independent percentage, when in fact the target market of people willing or receptive to respond to each of them overlaps. For most trip purposes, this is not likely to be an issue. For example, home shopping affects a fairly small proportion of car mileage for shopping trips, and so it is plausible that any impact from personalised travel planning, public transport information and marketing, travel awareness campaigns or car clubs would simply be additive.

However, the journey to work can be influenced by six or possibly seven soft factors, of which three (workplace travel plans, car sharing and teleworking) could each have a substantial impact. Here, there does seem to be some risk of double counting. We therefore make the following adjustments:

- We assume that car sharing will largely be developed as part of workplace travel programmes, or as a substitute for them. Arbitrarily, we assume around two-thirds of the impact of workplace travel plans will come from measures other than car sharing in the high intensity scenario. This would make the combined impact of workplace travel plans and car sharing schemes 3 or 14% in non-urban areas and 6 or 17% in urban areas.
- We assume that the growth in teleworking will be uniformly spread across public and private sector bodies, and across small and large organisations, but that in organisations which have a travel plan, half of the impact of teleworking will 'overlap' with the travel plan. Thus in non-urban areas, where we estimate 10 – 20% of the workforce may be covered by a travel plan, the net effect of teleworking will be to cut car commuting trips by 3 or 11%. In urban areas, where we estimate 30 – 50% of the workforce may be covered by a travel plan, the net effect of teleworking will be slightly less, cutting car commuting trips by 3 or 9%.

13.4 Applying the projections to national traffic data

The calculations above have produced a set of low figures corresponding with a low intensity scenario, and a set of higher figures for a high intensity scenario. The reviews and discussion indicate that useful calculation of the effects of soft measures must to some extent distinguish different contexts, not deal at very general national totals.

The Department for Transport forecasting model, the National Transport Model (NTM), operates at the level of individual trip-making for journeys by each mode of transport for each journey purpose, and freight traffic, travelling on a road network which distinguishes areas of the country, times of day, different types of road (motorway, trunk, etc) and different types of area (big cities, small towns, etc), but not specific roads in specific locations.

Ideally, the impact of soft measures would use the same classification system, but the research results only partly overlap with the model categories, and do so differently for the separate instruments. The main issues this presents for projection include the following:

- It is possible to distinguish impacts by journey purpose for some initiatives, namely workplace and school travel plans, teleconferencing and home shopping. In some cases, this also allows differentiation by time of day. In contrast, personalised travel planning, public transport information and marketing, travel awareness campaigns and car clubs are assumed to affect more than one journey purpose.
- It is possible to provide different estimates of impacts in different areas for workplace travel plans, personalised travel planning, public transport information and marketing and car clubs.
- Nearly all the measurements relate to changes in the volume of car use for a specific subset of traffic. We have no direct evidence from the case studies of the total traffic volumes represented by each subset, but this information is available in the NTM model, broken down in some detail by the areas and times it occurs.
- Policy impacts on behaviour within the NTM model are calculated at the level of the trip, driven mainly by generalised cost changes, distinguishing mode but not time of day, which is introduced at a later stage of the calculation. Soft measures are not fully defined by generalised cost, and in some cases hardly at all.

Therefore we proceeded as follows:

1. We defined a table of traffic data that was consistent with the dimensions of discrimination we are able to make from the research results, *and* the data used in NTM for the year 2000. (To some extent, this data also embodies some grossing up and adjustments performed by the Department's modelling process. This complication is ignored: we treated the tables as though they were real data).
2. We calculated the percentage changes to appropriate subsets of traffic that would be caused by different soft factors, at a level of intensity corresponding to the high intensity and low intensity scenarios built up over a notional ten year period.
3. We applied these percentage changes to the traffic table created in stage one.

As discussed above, we used an implicit assumption that just sufficient locking in is implemented to prevent induced traffic from eroding the impacts, but not more, and that there is no synergetic addition or subtraction to the figures other than those reported in sections 13.2 and 13.3.

13.4.1 The source National Transport Model data

The source data used for the first stage of our calculation is drawn from the National Transport Model and is for a base year of 2000. The tabulations available to us differentiated vehicle mileage by time of day, urban / non-urban roads and vehicle type (car, goods vehicles and public transport vehicles). Car mileage was further divided into six categories according to journey purpose: home-based work; home-based employers' business; non-home based work/employers' business; home-based essential other; home-based discretionary other; and non-home based discretionary other. While some of these categories clearly correspond to more familiar descriptions of journey purpose such as commuting and business travel, this categorisation was not very helpful for soft factors which affect journeys to school, shop and for personal business. We explain below how we have dealt with this.

The time of day data was simplified into two bands: 'peak weekday' traffic (traffic between 8-9am and 5-6pm Monday – Friday); and 'rest of week' traffic (all traffic outside peak weekday hours).

'Urban' traffic was defined as all traffic in urban areas with a population of over 10,000. 'Non-urban' traffic was defined as all traffic in areas with a population of 10,000 or less.

HGV and bus traffic was converted into passenger car units (pcus) using the standard factors applied by Department for Transport.

Table 13.10 summarises the source data.

Table 13.10: Year 2000 traffic data derived from National Transport Model

	Urban			Non-urban		
	All traffic	Peak weekday	Rest of week	All traffic	Peak weekday	Rest of week
Cars work	57.53	16.76	40.76	52.97	15.20	37.77
Cars business	20.16	3.01	17.15	32.98	5.67	27.31
Cars other	107.43	6.69	100.74	105.25	6.39	98.86
Cars total	185.11	26.46	158.65	191.20	27.26	163.93
Other traffic	53.79	6.03	47.76	79.77	8.96	70.81
Total	238.90	32.49	206.42	270.97	36.22	234.75

Units are billion pcu kilometres
'Peak weekday' = 8-9am and 5-6 pm Monday – Friday; 'rest of week' = all traffic outside peak weekday hours
'Cars work' = home-based work
'Cars business' = home-based employers' business + non-home based work / employers' business
'Cars other' = home-based essential other + home-based discretionary other + non-home based discretionary other
'Other traffic' = LGVs + rigid HGVs + articulated HGVs + PSVs, converted to pcus.

13.4.2 Journey change factors

For each of the journey purpose categories, 'work', 'business' and 'other', we derived two journey change factors, based on summation of the impacts of the relevant soft factors[4]. The lower journey change factor represents the case in which the coverage and effectiveness of each soft factor are the lower figures corresponding with the 'low intensity' scenario. The higher journey change factor represents the case in which coverage and effectiveness of each soft factor are of higher value, the 'high intensity' scenario.

We had difficulty in estimating the contribution of two soft factors, namely school travel plans and shopping home delivery / local collection points. This is because we did not know what proportion of 'cars other' mileage was for escort education, shopping or personal business. To enable calculations for these soft factors, we used an approximate breakdown based on 1999/2001 National Travel Survey data[5].

The journey change factors are derived from tables 13.11 and 13.12.

The final journey change factors used are as follows:

- **High intensity scenario**

'Cars work' journey change factor = 0.67 in urban areas; 0.75 in non-urban areas
'Cars business' journey change factor = 0.75 in urban areas; 0.81in non-urban areas
'Cars other' journey change factor = 0.92 in urban areas; 0.97 in non-urban areas.

- **Low intensity scenario**

'Cars work' journey change factor = 0.91 in urban areas; 0.95 in non-urban areas
'Cars business' journey change factor = 0.96 in urban areas; 0.97 in non-urban areas
'Cars other' journey change factor = 0.98 in urban areas; 0.99 in non-urban areas.

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[4] Our journey change factors are expressed as the proportion of traffic that remains after our projected reductions are applied. For example, a journey change factor of 0.66 implies that 66% of the car traffic would remain, if our projected traffic reductions from soft factor initiatives were realised.

[5] This approximation assumes that 'cars others' is broken down into: 2.2% escort education; 18.7% shopping; 10.0% personal business; 69.1% other. This approximation is based on National Travel Survey data about the breakdown of annual miles travelled by all modes (excluding travel for commuting and business). Ideally, we would have preferred to use a breakdown based on annual mileage travelled *by car* for different trip purposes, but this was not readily available. Given the size of the final volumes of potentially affected traffic, and the magnitude of potential traffic reductions that we were applying to these, it is our impression that using that alternative breakdown would not have had a significant effect on our final estimations.

Table 13.11: Journey change factors in a 'high intensity' scenario

		Non-urban areas	Urban areas
Cars work		Workplace travel plans, car sharing and teleworking together cut car travel to work by 24%; personalised travel planning cuts it by 0.2%; public transport information and marketing by 0.3%; travel awareness campaigns by 1%; car clubs by 0%. Total reduction of 25.5%	Workplace travel plans, car sharing and teleworking together cut car travel to work by 26%; personalised travel planning cuts it by 5%; public transport information and marketing by 1.1%; travel awareness campaigns by 1%; car clubs by 0.06%. Total reduction of 33.16%
Journey change factor		**0.75**	**0.67**
Cars business		Teleconferencing cuts business travel by 18%; personalised travel planning cuts it by 0.2%; public transport information and marketing by 0.3%; travel awareness campaigns by 1%; car clubs by 0%. Total reduction of 19.5%	Teleconferencing cuts business travel by 18%; personalised travel planning cuts it by 5%; public transport information and marketing by 1.1%; travel awareness campaigns by 1%; car clubs by 0.06%. Total reduction of 25.16%
Journey change factor		**0.81**	**0.75**
Cars other	'escort education = 2.2% of 'cars other' 'shopping' = 18.7% of 'cars other' 'personal business' = 10.0% of 'cars other'	Personalised travel planning cuts 'cars other' travel by 0.2%; public transport information and marketing cuts it by 0.3%; travel awareness campaigns by 1%; car clubs cut it by 0%; school travel plans cut the escort education portion of 'cars other' by 20%; home delivery cuts the shopping portion of 'cars other' by 4%; local collection points cut the personal business portion of 'cars other' by 1.5%. Total reduction of 2.84%	Personalised travel planning cuts 'cars other' travel by 5%; public transport information and marketing cuts it by 1.1%; travel awareness campaigns by 1%; car clubs by 0.06%; school travel plans cut the escort education portion of 'cars other' by 20%; home delivery cuts the shopping portion of 'cars other' by 4%; local collection points cut the personal business portion of 'cars other' by 1.5%. Total reduction of 8.50%
Journey change factor		**0.97**	**0.92**

Table 13.12: Journey change factors in a 'low intensity' scenario

		Non-urban areas	Urban areas
Cars work		Workplace travel plans, car sharing and teleworking together cut car travel to work by 5%; personalised travel planning cuts it by 0.02%; public transport information and marketing by 0.1%; travel awareness campaigns by 0.1%; car clubs by 0%. Total reduction of 5.22%	Workplace travel plans, car sharing and teleworking together cut car travel to work by 8%; personalised travel planning cuts it by 1%; public transport information and marketing by 0.3%; travel awareness campaigns by 0.1%; car clubs by 0.03%. Total reduction of 9.43%
Journey change factor		**0.95**	**0.91**
Cars business		Teleconferencing cuts business travel by 2.5%; personalised travel planning cuts it by 0.02%; public transport information and marketing by 0.1%; travel awareness campaigns by 0.1%; car clubs by 0%. Total reduction of 2.72%	Teleconferencing cuts business travel by 2.5%; personalised travel planning cuts it by 1%; public transport information and marketing by 0.3%; travel awareness campaigns by 0.1%; car clubs by 0.03%. Total reduction of 3.93%
Journey change factor		**0.97**	**0.96**
Cars other	'escort education = 2.2% of 'cars other' 'shopping' = 18.7% of 'cars other' 'personal business' = 10.0% of 'cars other'	Personalised travel planning cuts 'cars other' travel by 0.02%; public transport information and marketing cuts it by 0.1%; travel awareness campaigns by 0.1%; car clubs by 0%; school travel plans cut the escort education portion of 'cars other' by 4%; home delivery cuts the shopping portion of 'cars other' by 1%; local collection points cut the personal business portion of 'cars other' by 1.5%. Total reduction of 0.65%	Personalised travel planning cuts 'cars other' travel by 1%; public transport information and marketing cuts it by 0.3%; travel awareness campaigns by 0.1%; car clubs by 0.03%; school travel plans cut the escort education portion of 'cars other' by 4%; home delivery cuts the shopping portion of 'cars other' by 1%; local collection points cut the personal business portion of 'cars other' by 1.5%. Total reduction of 1.86%
Journey change factor		**0.99**	**0.98**

13.4.3 Combined impact of the soft factors on future traffic levels

The result of applying the journey change factors to the NTM data is as follows:

Under the 'high intensity' scenario, traffic in urban areas could be cut by 14% overall, and 21% at peak times. Traffic in non-urban areas could be cut by 8% overall, and 14% at peak times. Nationally (that is, across both urban and non-urban areas), traffic could be cut by 11% overall, and 17% at peak times.

Under the 'low intensity' scenario, traffic in urban areas could be cut by 3% overall, and 5% at peak times. Traffic in non-urban areas could be cut by 2% overall, and 3% at peak times. Nationally, traffic could be cut by 2-3% overall, and 4% at peak times.

These conclusions are summarised in table 13.13:

Table 13.13: Impacts of soft factors on future traffic levels

Impact on…	Low intensity scenario	High intensity scenario
National traffic	2%	11%
Peak-time national traffic	4%	17%
Off-peak national traffic	2%	10%
Urban traffic	3%	14%
Peak-time urban traffic	5%	21%
Off-peak urban traffic	3%	13%
Non-urban traffic	2%	8%
Peak-time non-urban traffic	3%	14%
Off-peak non-urban traffic	1%	7%

We emphasise again that these are projections of what *could* happen. Achieving these reductions in traffic (especially those in the 'high intensity' scenario) will depend on the priority and support accorded to soft factors, and the extent to which their benefits are locked in by other measures to control induced traffic.

Table 13.14 summarises the relative contribution made by the different soft factors to the overall traffic reduction figures. The biggest contributions come from measures targeted at the journey to work (workplace travel plans, teleworking and car sharing), personalised travel planning, and teleconferencing. This does not mean that the other measures are unimportant. In particular, school travel plans could have great significance by influencing attitudes to car use amongst children, which may be translated into greater awareness and behavioural change when they are adults. Car clubs are very unlikely to have a major impact on car use within the next ten years because they are relatively new, but, as noted earlier, in the longer term they could cut car use by as much as 3% and have the potential to become self financing.

Table 13.14: Contribution made by each soft factor to overall traffic reduction figures, national average
(with adjustment to avoid double-counting; columns are additive not multiplicative; no adjustments to allow for synergy of impact; assumption that there are 'just enough' supporting measures to lock in effects without enhancing them)

		High intensity scenario	Low intensity scenario
Measures targeting the journey to work, of which:		5.4%	1.4%
	Workplace travel plans	*1.2%*	*0.7%*
	Car sharing	*2.0%*	*0.1%*
	Teleworking	*2.2%*	*0.6%*
Personalised travel planning		1.9%	0.4%
Teleconferencing		1.9%	0.3%
Travel awareness		0.7%	0.1%
Public transport information and marketing		0.5%	0.1%
Home shopping		0.3%	0.08%
School travel plans		0.2%	0.04%
Local collection points		0.06%	0.06%
Car clubs		0.02%	0.01%
Total*		**11%**	**2.5%**

* Figures in this row may not match column totals, due to rounding

13.5 Relationship between impact, cost and value for money

Chapters 3 to 12 used case study data on current levels of spending and impact for each soft factor to derive a cost-impact ratio: that is, an estimate of the current cost per car kilometre taken off the road to the public sector. Table 13.15 presents a summary of that data. We emphasise that the figures it contains should be treated as indicative of orders of magnitude only. Making assessments about the relative effectiveness of the different soft measures, or of soft measures in different case study areas, will be sensitive to the various simplifications and assumptions made as listed in the calculations in chapters 3 – 12, and the figures are likely to vary in different local contexts. This means that we are *not* able to say that, for example, there is a general rule that workplace travel plans are 'cheaper' or 'more effective' than, say, car clubs. We can however say that the costs of workplace travel plans and car clubs are of a similar order of magnitude.

The figures given reflect experience to date. There are some logical reasons for expecting the relationship between costs and level of implementation to be non-linear. There may be economies of scale which reduce the unit costs of large initiatives; there may be learning and the development of better methods which increase the effectiveness of soft measures; and there may be diminishing returns especially as the achievable limits to behavioural change are approached. The first and second of these would lead to unit costs becoming lower as a programme of soft measures is built up, and the third would lead to the unit costs becoming higher. A sensible hypothesis might be that in the early stages of extensive soft factor implementation, unit costs will fall, and at later stages as saturation of effect is approached, they will increase. There are insufficient data and experience fully to check this hypothesis at present, but we comment on evidence and indications about this issue below.

We also note that the cost-impact ratios we have used are based on the reduction in car vehicle kilometres, as an indicator of congestion and environmental benefits. The costs quoted do not include any changes in personal expenditure by the individuals modifying their behaviour, or spending by the private sector (unless a direct grant or contract by the public sector). The figures also take no account of the social value of resulting changes in congestion, pollution, social inclusion, health improvement etc. The measures we have used are those without any discounting to allow for erosion of benefit due to induced traffic, in line with the general appraoch used in the study, and therefore their achievement does depend on whether supportive measures are implemented.

Table 13.15: Indicative public sector costs, in terms of pence/vehicle kilometre reduced, for soft factors

Factor	**Source**	**Indicative Cost*** pence/vehicle km reduced
Workplace travel plans--	Birmingham case study	0.1 – 0.3
	Bristol case study	0.6 – 1.6
	Buckinghamshire case study	0.7 – 1.5
	Cambridgeshire case study	0.4 – 0.9
	Merseyside case study	0.4 – 0.7
	Nottingham case study	0.6 – 2.0
	York case study	0.4 – 0.6
School travel plans	Buckinghamshire case study	1.4 – 2.6
	Merseyside case study	2.0 – 3.8
	York case study	5.3 – 9.9¬
Personalised travel planning	Gloucester case study (pilot)	3.3
	Bristol case study (Vivaldi phase 1)	3.4
	London proposed large-scale	1.2
	Nottingham proposed large-scale	0.7
Public transport information and marketing +	Brighton case study	4.4
	Nottingham case study	4.1
Travel awareness	York case study	0.2 – 2.7
Car clubs#	Edinburgh case study	4.8
	Bristol case study	5.1
Car-sharing	Buckinghamshire case study	3.3
	Milton Keynes case study	0.7
Teleworking	In all three cases, private sector investment is needed, but cost savings should outweigh investment costs. However, public sector intervention may be needed to stimulate developments and changes in business practice^.	
Tele-conferencing		
Home shopping		

* Use of decimal places (eg in 0.2p) should not be read as greater precision than 1p, 5p etc.. Capital costs have been annualised at 3.5%. No allowance has been made for induced traffic.

¬ York's school travel figures are high because they include a substantial amount of safer routes work, as well as the 'softer' elements of school travel plans. Such engineering work is often essential to school travel plans, but, in many authorities, it is partly borne by the road safety budget, not simply by the school travel plans budget.

-- Excludes spending by the private sector. We assume that private employers will only invest in travel plans if they see offsetting benefits, such as reduced parking requirements, improved staff recruitment and retention, obtaining commercially valuable planning permissions, etc. In some cases, employers have managed entirely to fund travel plans from car parking charges.

+ Costs include public investment only. Investment by commercial operators is assumed to be motivated, and therefore at least offset, by revenue generated by additional passengers. (However, net costs would be even less where revenue from additional passengers exceeds investment by the public transport operator).
# It is likely that car clubs will become cheaper, and eventually 'free', at the point when they become self-financing.
^ For telework, we estimated that the BT initiative had reduced travel at a cost of 1.2 pence per km, in terms of the costs to BT of facilitating teleworking. However, this calculation did not include offsetting savings. For example, BT estimate that telework has contributed to their office space savings worth £180 million per year.
For teleconferencing, one company reported that videoconferencing equipment paid for itself within the first week of each month in terms of reduced travel costs and staff time savings, and numerous other companies also reported financial savings from adopting teleconferencing. However, public sector promotion, advice and grants may be needed to encourage greater adoption of teleconferencing as mainstream practice, which are currently impossible to cost.
For home shopping, provision of services is largely occurring for commercial reasons anyway. However, public sector promotion of home shopping for groceries could help to increase take-up, and funding for local drop-off facilities could help to make freight operations more efficient. One 'back of the envelope' calculation suggested that, to achieve traffic reduction at a cost of 1.5 pence per kilometre, in a city of 200,000 people, it would be possible to justify spending at least £300,000 over 10 years.

On these assumptions, cost-impact ratios vary from about 0.1 pence to about 10 pence expenditure per vehicle kilometre reduced, with most figures tending to be at the lower end of this range. Those at the upper end of the range typically include some supporting hard measures implementation. The approximate average soft factors cost was 1.5 pence per vehicle kilometre saved.

Although the development of a full cost benefit analysis of the value for money represented by these figures is beyond the scope of the study, we can make use of other studies which calculate the congestion relief and other benefits which derive from a reduction in vehicle traffic in various conditions. There is a large literature on this subject, and naturally a range of different estimates are made, some of which have already been used in comparable applications of assessing the value for money of Department for Transport initiatives. For example, the evaluation of the school and workplace travel plan site specific advice programme (Potter et al 2003) used a value of 20.5 pence per mile, equivalent to 12.8 pence per kilometre, based on an update of figures from Samson et al 2001[6].

The most authoritative and complete figures available to date which are actually used for the purpose of assessing value for money in the allocation of public funds, are those agreed between the Strategic Rail Authority and the Department for Transport for use when assessing the benefit of shifting 'sensitive' lorry miles from road to rail. These figures, published by the Strategic Rail Authority (2003) include estimated values for congestion costs for a variety of different road conditions, and also values for accidents, noise, pollution, climate change, infrastructure costs, a quantitative estimate for other unquantified factors, and adjustments for taxation. The total value per lorry mile reduced was given as 51pence, and £1.74 on local roads in London and other conurbations. Over 85% of the net benefit per lorry mile reduced was accounted

[6] Samson et al's figures included some valuation of the effects of reducing accidents, local air pollution, noise and climate change, although the bulk of their figure (over 10p per kilometre) was based on congestion benefits.

for by the congestion element, the proposed environmental values being rather low in comparison (and based on less well established evidence).

The best established figures used, in practice, are those for congestion. These are shown in table 13.16.

Table 3.16 Values of road congestion benefits resulting from reduction of traffic.

	Congestion Benefits (pence per lorry mile)
Motorways	
High congestion	79.0
Medium congestion	37.0
Low congestion	6.3
London & Conurbations	
Trunk & principle	121.9
Other roads	135.5
Rural and Other Urban	
Trunk & principle	45.8
Other roads	10.6
Weighted Average	43.9

Source: SRA 2003

For the purpose of calculating congestion effects, standard PCU factors enable conversion from lorries to cars: these are currently assessed as 1 for light vans, 1.68 for HGV rigids, and 2.46 for HGV articulated vehicles. While the actual traffic mix will vary according to type of road and context, to a first approximation we can convert from lorry miles to car kilometres by dividing the figures in table 3.16 by 3.

This suggests that each car kilometre removed by soft measures brings an overall average benefit in reduced congestion of about 15 pence. This figure varies with location, ranging from about 45 pence in city streets, to over 3 pence in rural and other urban streets. These figures do not distinguish by time of day: since the benefits of reducing traffic are very sensitive to the level of congestion, the figures would be higher at peak periods. They would also be higher if other external benefits, such as environmental impacts, are included.

The implication of these figures, even taking account of their range of uncertainty, is that taking a proportion of traffic off the roads by soft measures appears to give robustly good value for money: the margin of estimated benefit over cost is large enough that even quite major errors in assumptions about costs and impacts (which, as discussed above, have themselves been on the conservative side) would still leave a positive net benefit.

However, we should caution that the estimated benefits are not necessarily robust to induced traffic. For the same reasons as pointed out by SACTRA (1994) in the case of road building, a small amount of induced traffic, in conditions of relatively high congestion, can have a disproportionately large effect in eroding the initial benefits.

The costs of achieving reductions of congestion by soft measures appear to be less than by other 'carrots' such as public transport infrastructure or service improvements (other than those brought about by low cost capacity reallocation such as bus priority measures). They are also typically very much less than the cost of seeking to achieve comparable reductions in congestion by increasing road capacity more than traffic growth. (Demand management by price, on the other hand, can, if desired, raise more money than it costs, so the comparison is different in nature). We caution that such comparisons would always need to take account of the extent and cost of the supportive measures necessary for success, and also that such policies are not entirely independent of each other. For example, public transport improvements and public transport marketing are often linked.

Further quantification of these considerations would go beyond the terms of reference of this study, but the orders of magnitude are such that this conclusion will be reasonably robust to more detailed analysis. Over the coming years, it should also be possible to estimate empirically the hypothesised relationships of changes in soft factor unit costs due to economies of scale, improvement of methods, and diminishing returns, for which there is qualitative and logical evidence but not yet clear quantitative evidence. At present, there is no evidence that unit costs have started to rise due to these effects, and indeed there are some indications that returns from soft factors are currently increasing due to the development of knowledge and skill in devising more effective methods of implementation, and economies of scale. We therefore speculate that we are currently still in the increasing returns part of the hypothesised curve, although further research would be needed to conclude this with certainty.

In summary, there is a prima facie case that expenditure on soft measures could represent very good value for money in terms of the absolute benefits obtained per pound spent. We have indications that the ratios of benefits:costs are in the order of 10:1 on average, and many times this in congested urban conditions. There is also a likelihood that comparisons with other methods of achieving similar objectives would also be very favourable for soft factors. Logically, at some stage, diminishing returns should set in, but there is no indication that this is imminent, or that it would erode benefits sufficently to offset the very positive margin of net benefit considered likely to occur within the time frame and policy range of this study.

13.6 Summary of findings on projections and costs

In this chapter, we have developed two scenarios for the possible future impact of soft factors, termed 'high intensity' and 'low intensity'. The high intensity scenario represents the conditions in which local and national policies support the widespread implementation of all soft factors, and lead to each individual soft factor having an effect at the high end of what experience suggests is realistically achievable in a period of approximately 10 years. In the low intensity scenario, implementation of soft factors is presumed to be less widespread over the next ten years, and their effect is presumed to be at the lower end of what is suggested by current experience.

The scenarios make no explicit adjustment for induced traffic or for particular synergy between soft and hard factors, or for positive reinforcement between individual soft factors. These issues have been mentioned in earlier chapters, and are discussed again in chapter 14.

Using evidence from the case studies and elsewhere, we derived estimates of future impact for each of the individual soft factors. Some allowance was made to avoid any possibility of double counting for the journey to work (the only journey purpose where the risk of this was considered significant), by reducing the combined impact of three soft factors which, in practice, are likely to interact closely. These were workplace travel plans, car sharing and teleworking.

We combined the impact estimates for the individual soft factors to produce journey change factors for work trips, business trips and other trips, differentiated by urban and non-urban areas. The journey change factors were applied to traffic data used for the National Transport Model, and suggested that (in the high intensity scenario), the reductions in car use brought about by soft factors could amount to something in the order of 14% of traffic in urban areas and 8% in non-urban areas. Impacts would be higher (21% and 14%, respectively) during peak periods.

The biggest contribution came from measures targeted at the journey to work (workplace travel plans, teleworking and car sharing), personalised travel planning, and teleconferencing, although there are clearly reasons why it is may also be considered important to invest in the other soft factors, in particular their effects over a longer timescale than the next ten years.

In terms of pence per vehicle km taken off the road, all soft factors had costs in the range from about 0.1 pence to about 10 pence. Most figures were at the lower end of this range, such that 1.5 pence per vehicle km taken off the road represents a reasonable average figure for soft factors. In terms of congestion relief, the ratios of benefits:costs were in the order of 10:1 on average, and many times this in congested urban conditions.

13.7 References

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