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Guidance on the methodology for multi-modal studies (Vol 1)

Contents

1 Introduction

1.1 Background to the Multi-Modal Studies

Purpose of the Guidance

1.1.1 "A New Deal for Trunk Roads in England", published by the Government in July 1998, proposed a series of studies to address problems on the strategic trunk road network not addressed in the Targeted Programme of Improvements being taken forward over the next seven years. Following consultation with Regional Planning Bodies, on 23 March 1999, the DETR announced the final programme of 27 studies and the timetable for taking these forward (listed in Appendix A). There will be two kinds of study:

- **Road-Based Studies** in which the focus would be on further consideration of solutions to particular problems on the road system; and
- **Multi-Modal Studies** in which consideration would be given to problems and solutions affecting all modes of travel.

1.1.2 This programme of studies will be taken forward by the Government Offices in partnership with Regional Planning Bodies. Thereafter it is anticipated that Multi-Modal studies would be instigated and led by Regional Planning Bodies. This Guidance offers advice on the technical conduct of these **Multi-Modal Studies** (the Studies). The Guidance will also be relevant to the conduct of many aspects of the Road-Based Studies.

The Aim of the Studies

1.1.3 **The aim** of the Multi-Modal Studies is to investigate problems on or with all modes of transport and to seek solutions to those problems. **The output** from the Studies will be a number of different options aimed at addressing the problems within the study area. Each option will consist of a transport plan, that is, a collection of quite specific and individual interventions. **Analysis** of options will need to be sufficiently detailed to ensure that robust decisions can be made. The **results** of the Studies will be used by the Regional Planning Bodies in developing and reviewing Regional Transport Strategies.

The Nature of the Studies

1.1.4 Multi-modal studies are intended to be investigations of **problems** on or with **all** modes of transport. The initial programme of Studies was identified in the course of the 1998 Roads Review to address specific problems on the trunk road network. In practice, it is expected that the Studies will major on problems on the road, rail and bus systems, including access to ports and airports. The Studies could also include analysis of problems of air transport, coastal shipping and inland waterways.

1.1.5 Transport problems within a study area will vary in severity and in terms of the number of people affected. The Studies are principally intended to address the most severe strategic transport problems rather than isolated local transport problems. For example, area-wide congestion which might be best addressed by an area-wide policy could be considered in a Multi-Modal Study, whereas an isolated safety problem which might be best tackled by a localised measure is not likely to be a suitable subject for a Multi-Modal Study. Collections of localised problems or apparently isolated problems, however, could be legitimate consideration for a Multi-Modal Study.

1.1.6 In setting the scale of problem to be addressed by the study, the Steering group should take into account:

- whether some kind of strategic and/or multi-modal approach to their solution seems appropriate; and
- whether including problems of a detailed nature in the scope of the Studies would over-burden the Studies and make them impractical in the desired timescale and within the budget likely to be available.

1.1.7 In seeking **solutions** to the problems to be addressed in the study, the contributions of all modes should be considered, including walking, cycling, air transport, shipping and pipelines, as well as roads, railways, buses and other forms of public transport. Solutions may also relate to non-transport policies, for example land-use, health and education. Although the genesis of the initial programme of Studies lies with problems on the trunk road network, the focus of the Studies will not primarily be on ways of providing additional road capacity. However, proposals for road improvements, whether through better management, widening or new alignments, are not ruled out and could be an output if such a solution were shown to be the most appropriate in the circumstances. Indeed, some schemes put on hold by the Roads Review have specifically been remitted for the Studies to consider in more detail.

1.1.8 The output from the Multi-Modal Studies will be a number of different options aimed at addressing the problems within the study area. These options will be in the form of **plans**, that is, a collection of quite specific and individual interventions. In some Studies, it may also be appropriate for over-arching **strategies** to be developed for the study areas, that is, general area-wide policies which could influence the use made of the transport system, such as land-use policies and policies for transport-using sectors, such as health and education.

Relationship with Regional Transport Strategies and Local Transport Plans

1.1.9 The results of the Studies will be used by Regional Planning Bodies in developing and reviewing Regional Transport Strategies. The Studies should work within the context provided by the spatial framework set out in Regional Planning Guidance and development plans, where they are up to date. The influence of the Studies on Local Transport Plans will, in principle, be through Regional Transport Strategies. In practice, however the timing of the preparation of LTPs in relation to the timing of the preparation of the RTSs may mean that the outputs of the Studies may also directly influence the development or amendment of LTPs.

General Procedures for Conducting the Studies

1.1.10 For the initial programme of studies being taken forward by DETR, the Government Offices will be in the lead. For each Study, the Government Office will establish a Steering Group drawn from the Regional Planning Bodies, the Regional Development Agencies, the Highways Agency, the Shadow Strategic Rail Authority, local environmental interests and other transport and business groups.

1.1.11 Terms of reference and consultants briefs for the Studies will be drawn up by the Government Offices in conjunction with the Steering Groups. Consultants will then be invited to tender for the Studies in accordance with the terms of reference, brief and this Guidance.

1.1.12 It may be appropriate, in those cases where there is particular uncertainty about the nature of the problems and therefore the kind of study required, for there to be a scoping stage. However, the normal approach will be that the terms of reference will be sufficiently detailed for a single tender to be awarded at the outset of the study.

1.1.13 This guidance is not intended to be overly prescriptive. Nevertheless, unless good reasons are articulated, it is expected that the Studies should follow the general process described in Chapter 2 and the more detailed advice on technical aspects set out in subsequent chapters. The specific requirements for individual studies should be set out in the consultants brief.

1.1.14 The Studies will vary in cost and timescale according to their complexity. While the general process adopted in the Studies is expected to be fairly similar, the technical methods may differ according to factors such as the scale of the study area, the nature of the problems to be addressed and solutions appraised, and the data and models already available.

The Need for Robustness

1.1.15 The options for solutions identified by the studies are unlikely to be in the form of fully-developed schemes ready for statutory procedures and implementation (other than where they involve schemes that have previously been worked up in detail). However, analysis of the options needs to be sufficiently detailed to ensure that robust decisions can be made. That is, there should be a high degree of confidence that a decision would not have been different if the analysis had been conducted at a greater level of detail and precision. The aim should be to carry out the Studies at a level of detail which is just sufficient to enable confident decisions to be taken about what initiatives to progress.

1.1.16 The work of the Studies will not be as detailed as would be required for the progression of specific schemes through the design stage and statutory procedures. However, a Study should identify impacts of different options with sufficient robustness to enable the decisions taken to proceed with a particular strategy or plan (on the basis of the Study) to be defended at public examination or inquiry (for example, at a public examination of regional guidance).

The Nature of the Guidance

1.1.17 This document provides an overview and guidance on the whole study process and more detailed guidance on some specific aspects of the Studies. The Guidance also provides a gateway to more detailed advice on individual aspects of the study, where appropriate advice is readily available elsewhere.

1.1.18 The Governments White Paper, *A New Deal for Transport*, announced a new approach to the appraisal of different solutions to transport problems. The new approach to appraisal includes the identification and assessment of problems, the identification of options for solving problems, and the appraisal of those options. First used during the Roads Review, the new approach has been adapted to provide the framework within which the Studies should be taken forward. The Guidance sets out that framework.

1.1.19 The guidance is not intended to be overly prescriptive. It concentrates on general principles in aspects such as general approach, modelling and data collection, and level of detail of analysis. In other respects, such as cost/benefit analysis and environmental appraisal, the DETR has some well-established and well-codified procedures and the Guidance is quite specific in these aspects.

1.1.20 The level of detail of the Guidance varies with both the existence of suitable detailed advice already documented and the degree of prescriptiveness required. The Guidance is more detailed in aspects where prescription is appropriate but where no suitable reference documentation exists.

The Guidances Target Audience

1.1.21 This document (Volume 1 of the Guidance) is intended for the following audiences:

- the Government Offices taking forward the immediate programme of Studies, their Steering Groups and organisations who will commission and steer Studies in the future;
- the consultants commissioned to undertake the Studies; and
- other participants in the Studies, such as the statutory bodies and interest groups.

Volume 2, which contains the more technical guidance, is aimed primarily at the consultants commissioned to undertake the Studies.

The Status and Currency of the Guidance

1.1.22 This version of the Guidance has been based largely on current best practice. Further versions may be produced to incorporate new advice arising out of either experience or new research and development.

1.2 Structure of the Guidance

1.2.1 The Guidance is split into two volumes. Volume 1 has a further five chapters following this introduction:

- Chapter 2 gives an overview of the whole study process;
- Chapter 3 deals with setting objectives and identifying problems;
- Chapter 4 sets out the range of policy instruments that could be considered as part of solutions in the Studies;
- Chapter 5 summarises the advice on modelling and sets out the key issues for the non-transport modeller; and
- Chapter 6 summarises the appraisal process, including the development of the New Approach to Appraisals Appraisal Summary Table for use in the Studies.

1.2.2 Volume two contains more detailed advice on:

- modelling; and
- appraisal against Central Governments objectives for transport.

1.2.3 Data needs and collection methods are discussed at appropriate points in each of the chapters.

2 The Overall Approach to the Studies

2.1 Introduction

2.1.1 In the last chapter, the distinction was drawn between:

- a transport **strategy**, that is, some general, perhaps area-wide, policies aimed at dealing with a number of problems; and
- a transport **plan**, that is, a collection of interventions to solve individual problems or close groups of problems.

2.1.2 In the case of the Multi-Modal Studies being undertaken by the Department, the expectation is that the options considered will **always** include a **plan** of specific interventions. In some Studies, it may also be appropriate for different over-arching strategies to be developed.

2.1.3 In all cases, however, the process of identifying options should be broadly similar and:

- be easily comprehensible, both to those commissioning, steering and undertaking the work; and where possible to a wider public;
- avoid leading to a particular outcome simply by virtue of the method or process adopted;
- enable a wide range of strategy or plan components and the synergy between combinations of components to be investigated in a cost-effective manner;
- enable a preferred strategy or plan to be developed which addresses the objectives and problems at which the strategy or plan is aimed; and
- provide a means by which the acceptability of the preferred strategy or plan to the public can be tested and taken into account.

2.1.4 Typically, a study of this nature should include:

- agreement on a set of objectives which the strategy or plan should seek to satisfy;
- analysis of present and future problems on, or relating to, the transport system;
- exploration of potential solutions for solving the problems and meeting the objectives;
- appraisal of options, seeking combinations which perform better as a whole than the sum of the individual components; and
- selection and phasing of the preferred strategy or plan, taking account of the views of the public and transport providers.

Alternative Ways of Undertaking Multi-Modal Studies

2.1.5 Few, if any, multi-modal transport studies will have been carried out in the past in precisely the same way; there will generally always be some differences between one study and the next, not least because computing power, modelling capability, and understanding about transport systems all increase as time passes. In recent years, two main approaches have found favour, which relate to the two kinds of study in paragraph 2.1.1 as follows:

- **transport strategies** may be generated through the so-called **top-down** approach which examines, at a broad scale, ways of achieving objectives through integration of strategy components; and

- **transport plans** may be developed through the so-called **bottom-up** approach in which particular attention is paid to the detailed analysis of problems and their solutions.

2.1.6 A key issue which should determine which approach should be followed, is whether or not the existing policy framework is being questioned at the outset. A New Deal for Transport sets out the national transport policy and regional planning guidance and development plans provide the spatial framework for the studies, so the bottom-up approach is most likely to be appropriate. However, particularly in some of the larger or more complex study areas, the large number of options and solutions which may need to be examined during the study may require a top-down approach. The modelling implications of this are discussed in Chapter 5. A prime requirement in these cases will be for a model which has a short turn-round time, thereby enabling many options to be appraised in an acceptable timeframe.

2.1.7 Involvement of the Public

It is important that the public should be engaged in the study process. It is for the individual Steering Groups, who understand the local circumstances and history best, to decide when and how to involve the public, on advice from their consultants if appropriate.

2.2 The Steps in the Process

2.2.1 Figure 2.1 is a general description of the process for establishing a transport strategy or plan

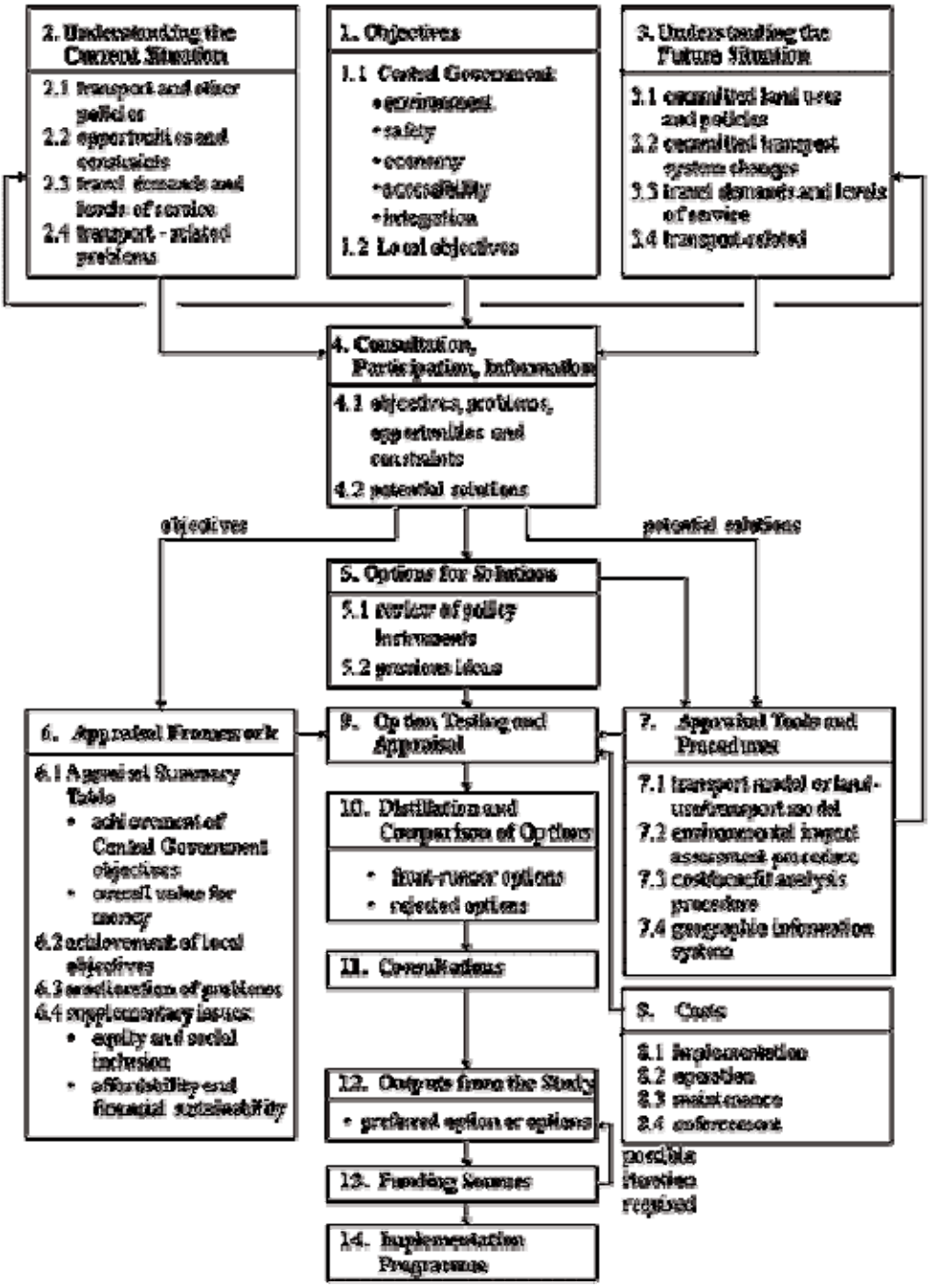

Figure 2.1 Study Approach

Step 1: Objectives

2.2.2 In A New Deal for Transport, the DETR has set out its five main criteria for transport, as follows (DETR, 1998a, on page 64):

- "*integration - ensuring that all decisions are taken in the context of our integrated transport policy;*
- *safety - to improve safety for all road users;*
- *economy - supporting sustainable economic activity in appropriate locations and getting good value for money;*

- *environmental impact - protecting the built and natural environment;*
- *accessibility - improving access to everyday facilities for those without a car and reducing community severance.".*

2.2.3 These criteria, which can be couched as objectives, should form the cornerstone of the Studies and are shown in Figure 2.1 as Step 1.1 - **Central Government objectives**. So, Step 1.1 is, in effect, complete for all Studies at the outset; the Governments five main objectives are a given starting point.

2.2.4 A number of factors may have triggered the need for a study. Annex D to A New Deal for Trunk Roads in England (DETR, 1998b) gives the problems on the trunk roads which led to the DETRs initial programme of studies being identified. However, in the longer term, studies will be initiated directly from the Regional Planning Guidance/Regional Transport Strategy process and will not relate to problems on a particular mode. Thus, the problems behind the study may be quite varied in nature. They may range, for example, from the possible redevelopment of a major site, to the need to regenerate the economy of a run-down area, to the need to control congestion, to the desire to enhance the attraction of an area as a recognised business or tourist centre. Whatever the initial stimulus for the study, it may give a sharper focus to the Studies if those initial thoughts and requirements are translated into a set of local or study-specific objectives which the study should aim to meet.

2.2.5 These **local, regional or study-specific objectives** should be framed in such a way so that they:

- all nest within the Governments five main objectives, with no local or regional objectives lying outside the framework provided by the Governments objectives; and
- avoid indications of preferred solutions.

2.2.6 Where quantified targets are stated, care should be taken not to introduce bias by inadvertently setting some targets which are easy to meet while others are very difficult, if not impossible, to achieve.

2.2.7 Study-specific objectives may also relate to the

- distribution and equity,
- affordability and financial sustainability, and
- practicality and public acceptability

of potential solutions. While these issues are not to be treated as objectives in the same way as the Governments five main objectives are, they do appear in the appraisal process, as explained in Chapter 6.

2.2.8 Chapter 3 discusses the development of a set of objectives for use in establishing a transport strategy or plan.

Step 2: Understanding the Current Situation

2.2.9 Step 2 is designed to contribute to developing an understanding of the **current** situation in the study area.

Step 2.1: Current Transport and Other Policies

2.2.10 Step 2.1 is concerned with developing an understanding of current transport policies and practice. Included in these policies would be those of the transport providers. Other areas of Government policy should also be taken into account, where they impact on the transport sector. Of particular importance are policies relating to land uses.

Step 2.2: Opportunities and Constraints

2.2.11 Step 2.2 is concerned with exploring the physical features of the study area. Examples of physical features which may exert special **constraints** on the shape of a transport strategy or plan include:

- sensitive areas of ecological or landscape or heritage importance;
- built-up areas;
- rivers and railway lines which are expensive to bridge;
- hilly terrain making infrastructure works expensive; and
- unusual existing patterns of development such as industry and commerce spread over wide areas outside the traditional urban centre.

2.2.12 There may also be institutional or legal constraints which are important to take into account. Examples of this kind of constraint could include:

- the provision of elements of the public transport system by private operators who will have their own commercial objectives; and
- the provision of private non-residential parking, although legislation to enable the use of this space to be controlled is planned.

The extent to which these institutional and legal constraints have a material bearing on the outcome of the Studies could depend on the extent to which the recommendations are developed jointly with the private suppliers of transport.

2.2.13 These are but a few of the kinds of feature which should be appreciated early in the strategy or plan development process. Of course, not all such features would necessarily be regarded as sacrosanct to the same extent nor necessarily as absolute constraints in every case. Nevertheless, an early appreciation of these issues will assist in identifying a strategy or plan which is more readily acceptable than one which ignores them.

2.2.14 Within this exploration, any **opportunities** for the improvements to the transport system and the way it is used should be noted. Examples of opportunities could include:

- ways of making better use of the existing infrastructure through either better management or some small but crucial addition to the infrastructure; and
- provision of new or improved transport infrastructure, such as reopening or reusing railway lines for light rail, bus-only links (including guided busways), cycle routes or a new road.

Step 2.3: Current Travel Demands and Levels of Service

2.2.15 For a full understanding of the study area and its transport system, it is essential to establish the levels of service offered by the current transport networks and the current demands for travel by those living in the area and its hinterland. The surveys necessary to collect this information often consume a substantial part of the resources allocated to the study. Best use should be made of

information collected previously and care should be taken to minimise the effort required to assemble new information.

2.2.16 A comprehensive picture of the demand for travel in the study area is usually required for the creation of a computer model of the transport system, which is desirable for the proper appraisal of the strategy and its components. For general advice on travel demand surveys, reference should be made to the Departments Design Manual for Roads and Bridges Volume 12 or to textbooks such as Richardson, *et al* 1995.

Step 2.4: Current Transport-Related Problems

2.2.17 The analysis of the current problems on the transport system is a crucial step. It brings into sharper focus the issues at which the study should be aimed. As will be explained in Chapter 3, there is little or no material difference, in concept, between a comprehensive set of quantified objectives and a comprehensive set of problems identified by relating conditions to thresholds.

2.2.18 Problems may be analysed at very broad or very specific levels. At the broad level, a problem may be identified where it is judged that an objective is not being met. For example, if an objective had been set to reduce emissions from transport to a specified level, and if emissions can be shown to be above that specified level, a problem of poor air quality can be said to exist. Thus, problems can de defined as unmet objectives.

2.2.19 Problems may be identified in a number of ways, including:

- by consulting people about their perceptions of the problems, both those that they encounter when travelling and those which result from other people travelling (see Step 4 below);
- through discussions with representatives of the regional and local authorities and the transport providers to gain an understanding of the transport and planning professionals perceptions of problems with the transport system (also see Step 4 below);
- by conducting audits of specific elements of the transport system in order to gain a deeper understanding of the roles performed and to analyse the extent to which the expected aims are not met; and
- by analysing outputs from the transport model in comparison with thresholds so as to enable the geographic display of the worst conditions on a consistent numerical basis across the study area.

2.2.20 The geographical display of problems can be very useful, in that it provides:

- those involved with the study, including the public, with a display of current problems on the transport system in a comprehensible, rather than abstract, form;
- the transport planner with a means of calibrating the methods used for forecasting future problems, by comparing the numerical analyses in the base year with peoples perceptions and adjusting the numerical analyses appropriately; and
- a direct stimulus to the development of solutions and the transport strategy or plan as a whole.

However, it is not always appropriate or possible to undertake such spatially detailed analyses.

2.2.21 Chapter 3 describes the different ways in which problems may be identified. It is crucial, however, that the **causes** of the problems are investigated before solutions are generated. It has often been argued in the past that focusing on problems as the stimulus for option development encourages a superficial approach whereby solutions are adopted which patch up the symptoms without addressing the real underlying causes. Analysis of causes avoids this pitfall.

2.2.22 Consistency between the approaches adopted in the different study areas will be essential in several key respects, notably forecasts of travel demand, in the methods of environmental impact assessment and cost/benefit analysis, and in the values of the economic parameters which are used in the cost/benefit analysis. As far as problems are concerned, however, it is considered that some degree of flexibility is desirable to ensure that solutions are developed which are most suited to local and regional objectives.

Step 3: Understanding the Future Situation

2.2.23 Step 3 broadly parallels Step 2 in that it is concerned with developing an understanding of problems, but in the future rather than the present.

Step 3.1: Future Committed Land-Uses and Policies

2.2.24 The interaction between transport and land use is a two-way relationship. On the one hand, future travel demands will be shaped by future land uses while, on the other hand, changes in the disposition of land uses will be influenced by changes in accessibility provided by the transport system.

2.2.25 The traditional transport planning approach has been to assume a particular land-use pattern for the future planning year as a starting point. In a similar manner, at the macro-level, the Studies should work within the framework set by regional planning guidance and development plans. However, at the micro-level, the Studies should examine the interaction of transport and planning decisions and may consider land-use planning based solutions. The modelling implications for this are discussed in Chapter 5 and Volume 2.

2.2.26 It is important to ensure that the approach to planning data forecasts is broadly consistent between the Studies. To ensure that this is achieved, forecasts of population, households and employment published by the DETR in the TEMPRO database should be used as a reference case. In cases where a land-use/transport interaction model is used, study-specific forecasts of planning data will be generated by the model. Forecasts should also be prepared using the TEMPRO data as a benchmark. The differences between the modelled forecasts and the TEMPRO data should be displayed and the implications of the differences explored and reported.

Step 3.2: Future Committed Transport System Changes

2.2.27 The assessment of a transport intervention includes a comparison of the situation without the intervention against the situation which would obtain with the intervention in place. The without-intervention scenario needs careful consideration and may be defined in one of the following two ways:

- a do-nothing case in which the current transport system is used unchanged;
- a do-minimum case in which only committed changes are made to the existing transport system.

These concepts are explained in more detail in the COBA Manual (Design Manual for Roads and Bridges, Volume 13).

2.2.28 The do-nothing scenario generally makes little sense as the datum against which the options are compared because it is very rare for there to be no changes at all to the present system in the pipeline.

2.2.29 The most usual basis for the assessment of options is the do-minimum in which only **committed** changes are added to the existing system. These committed changes, which may apply

to public transport and parking as well as roads and traffic management, should be limited to those schemes to which a genuine commitment has been made from which it would be difficult to withdraw. This includes projects for which tenders have been invited or let and projects to which Ministers have given a firm commitment (for example, road schemes in the Targeted Programme of Improvements). The do-minimum should also include minor changes which can be expected to be carried out as conditions deteriorate - signalisation of busy priority junctions, for example.

2.2.30 The do-minimum may also reflect trends in the provision of transport. For example, if an improved trend in the levels of service offered by public transport or an upward trend in the real cost of fares can be identified, there may be a case for extending these trends into the future do-minimum scenario. This philosophy is intended to answer the question: if no action is taken, what will be the situation on the transport system at some defined point in the future?

2.2.31 In order to achieve the desired degree of consistency on all the factors affecting the do-minimum forecasts, the Government Offices will need to agree, in liaison with DETR, the relevant forecasting assumptions.

Step 3.3: Future Travel Demands and Levels of Service

2.2.32 As well as considering changes in land uses and the transport system, the Studies will also need to consider the impacts of other trends, such as in GDP and taxation, especially of car purchase and fuel. Again, consistency between Studies will be important.

2.2.33 Travel demands will need to be forecast for some future years. A distinction needs to be made between the traditional approach and evolving approaches using dynamic modelling systems.

2.2.34 In the **traditional** approach, the travel forecasts are made using a transport model. In transport strategy or plan studies, it is usual to adopt a single planning year. Desirably, however, forecasts should be produced for other years, both before and after the main horizon year so that an appreciation can be gained as to how conditions and problems will change over time. Forecasts for intermediate years are also essential for working out the phasing of the various components of the preferred strategy or plan over the implementation period and for estimating streams of benefits for use in the cost/benefit analysis. In the **dynamic** approach, forecasts of land-use and travel demand are made at relatively small intervals throughout the planning period. The guidance in Chapter 5 should be followed.

Step 3.4: Future Transport-Related Problems

2.2.35 Having established future travel demands in the horizon year do-minimum case, future problems can be analysed. While audits of specific parts of the transport system are not appropriate in this context, the public, the regional and local transport and planning professionals, transport providers and other transport interests may all be consulted about their views on the forecast changes (see Step 4 below). It will also be useful to repeat the base year numerical analyses of problems conducted by comparing conditions with thresholds but using the forecast travel demands and levels of service for the do-minimum case.

Step 4: Consultation, Participation and Information

2.2.36 Local people, businesses, environmental interests, transport users and operators will need to be involved in the study process. Wide participation and consultation will be a key factor in gaining public support and acceptability for options put forward in the studies. So the Steering groups will need to establish early on in the study process a strategy for involving these groups.

2.2.37 The strategy should address **who** to involve. In particular, the strategy will need to address how to involve the following groups:

- regional partners (Regional Planning Conferences; Regional Assemblies, Regional Development Agencies, Regional Chambers);
- local authorities;
- transport providers (Highways Agency, highway authorities, Strategic Rail Authority, Railtrack, train operating companies, bus and coach operators, and car park operators);
- representatives of business (Regional Chambers of Commerce, CBI, Freight operators);
- transport users (rail passengers, disabled travellers, freight interests, motorists, cyclists and walkers);
- environmental interests (Transport 2000, CPRE, etc);
- Statutory Bodies (Countryside Agency, English Heritage, Environment Agency, English Nature)
- the general public of the study area; and
- the travelling public who would be a subset of the general public in the study area but who would also include people from outside the study area;

2.2.38 The strategy should also specify **when** to involve them, for example:

- prior to the start of the study so that views can be sought on the terms of reference;
- at the start of the study so that views can be sought on local and regional objectives;
- in the early stages so that current perceptions of problems on or with the transport system can be established;
- after the analysis of current transport problems so that the perceived problems can be used to validate and, if necessary, adjust the computational procedures used to identify problems;
- after the analysis of the future transport problems so that views can be sought on the relative importance of the different kinds of problem;
- at the start of the option development step so that views can be sought on the kind of solution which should be considered; and
- as part of the appraisal process (e.g. involvement of the statutory bodies in assessing the environmental aspects of particular options)
- after the options have been tested and appraised so that views of respondents can be taken into account when making a decision about the preferred transport strategy or plan.

2.2.39 The strategy should make clear from the outset the aims and limits of this involvement, so that suitable techniques can be identified and confusion as to the role of different groups can be avoided. In particular the strategy should distinguish between the following.

- **Information provision,** a one way process to keep those with an interest in the study informed. All information about the Studies should be made available, except where disclosure would not be in the public interest (as defined in the Code of Practice on Access to Government Information). In particular, Government Offices should ensure that the consultants brief, reports and papers prepared by the consultants for steering group members, notes of steering group meetings, and responses to

consultation and participation exercises are easily and routinely available. For clarification of what information should/should not be made available, advice should be sought from DETR.

- **Consultation,** where the views of the general public or sectional interests are sought at particular stages of the study and the results are input back into the study process. This need not involve lengthy consultation documents. Consultants should advise on the most appropriate techniques, e.g. the use of leaflets, exhibitions and questionnaires.

- **Participation,** either through the steering group or through other means by which the public and other interests have a direct influence on the outcome of the Studies.

2.2.40 Chapter 7 of the IHTs Guidelines on Developing Urban Transport Strategies (IHT, 1996) provides advice on the various techniques available for consulting the public. One feature of the proposed Studies which will require special attention is their size. Ways of consulting the public over the larger study areas in a cost-efficient manner will need some careful consideration and development by the steering groups and their consultants.

Step 5: Options for Solutions

2.2.41 Once objectives have been set, the situation in the study area has been examined, and problems have been identified, the next step is to start developing ideas for solutions. The following sources of ideas are likely to be available:

- the public, if consulted at the stage suggested in Figure 2.1, will have some ideas;

- ideas considered previously may be reviewed to check whether any of the proposals discarded in the past may now be worth reconsidering; and

- Chapter 4 of this Guidance reviews the significant policy instruments which may be of use in the Studies.

2.2.42 Chapter 4 sets out a wide range of policy instruments that may be relevant in the Studies covering both urban and inter-urban techniques. Generally, the Studies are likely to have more of an inter-urban emphasis, given their genesis in the Review of the Roads Programme. However, one of the major causes of motorway congestion is the use made of these roads by local traffic, diverting to avoid congestion on local roads caused by even more local traffic. If some of these very local car journeys could be transferred to cycle, foot or public transport, this could provide some relief of the motorway congestion. In addition, where inter-urban routes bypass or provide access into urban areas, then urban instruments may be used to complement inter-urban techniques.

2.2.43 Brainstorming sessions or workshops can be used as a means of developing options for testing. These approaches can generate ideas by cross-fertilisation between the participants different perspectives, though both have potential drawbacks:

- because of the limited time often allocated, the discussions may fail to address the issues in a thorough manner, giving rise to the danger that any conclusions reached may well be superficial; and

- the power of the personalities participating, and the energy and persuasiveness with which they are able and prepared to pursue their arguments, may result in a biased view emerging which is not truly representative of the balanced views of the group as a whole.

These difficulties may be reduced, but not necessarily eliminated, by allocating sufficient time for discussion and for the raporteurs to prepare their feedback to the plenary sessions, and by employing strong, well-briefed people to chair the workshops.

2.2.44 The steering group, on advice from their consultants, will play the key role in selecting options for detailed consideration in the studies. Chapter 4 provides the starting point. It provides a checklist of the range of policy instruments which are likely to be relevant to the studies, and indicates the types of objectives they can help contribute to. It also provides references to source documents which will provide more detail about the performance of the instruments more likely to be of use. At this stage of the study, outputs from the transport model and the problem analyses will be available, and may be used to undertake some broad brush analyses of the likely effects of the promising policy instruments in the context of the specific studies. By a combination of numerical analysis and rational argument, it is likely that the most promising set of policy instruments for any particular circumstance can be identified.

Step 6: Appraisal Framework

2.2.45 Before options can be appraised, an appraisal framework is required. This is discussed in detail in Chapter 6. The framework has four strands.

1. The Appraisal Summary Table. This analyses the degree to which the five Central Government objectives for transport (environment, safety, economy, accessibility and integration) would be achieved. It provides a comprehensive summary of the impacts of an option. Assessors should use the information provided in the AST (and, where necessary, its more detailed supporting documents) to make a judgement about the overall value-for-money of the option. Used in this way, the AST will help ensure that decisions on the value of options are consistent between study areas. Volume 2 gives detailed advice on the multi-modal AST.

2. An assessment of the degree to which the **local and regional objectives** would be achieved. This is likely to be of particular interest to the regional and local authorities and to local people, so is an important element of the appraisal process. Overlap between this appraisal strand and the previous one is to be expected.

3. An assessment of the extent to which the **problems** identified would be ameliorated by the option.

4. **Supporting analyses** of distribution and equity, affordability and financial sustainability, and practicality and public acceptability.

2.2.46 It is possible that the second and third of these appraisal strands may amount to much the same thing, although this will clearly depend on the nature of the local and regional objectives adopted and the form of the local problem analyses.

2.2.47 Chapter 6 and Volume 2 provide guidance on how each of these appraisals should be conducted. The use made of them is discussed under Step 10 below.

Step 7: Appraisal Tools and Procedures

2.2.48 While Step 6 is concerned with defining what **information** is required for the appraisal framework, Step 7 is concerned with establishing the **methods** (tools and procedures) by which the required information should be provided. The entries to the Appraisal Framework and, in particular to the Appraisal Summary Table, are **computed** under Step 9.

2.2.49 Four groups of tools or procedures are identified in Figure 2.1:

- a transport or a land-use/transport interaction model;
- an environmental impact assessment procedure;
- a cost/benefit analysis procedure; and

- a geographic information system.

Step 7.1: Transport Model or Land-Use/Transport Interaction Model

2.2.50 The consequences of a transport strategy or plan may be many and varied and considerable expenditure is often involved. It is important, therefore, that every effort is made to assess the likely consequences, to ascertain the extent to which objectives are met and problems solved, and to estimate the value for money of the strategy or plan. For these purposes, a computer model of the transport system is usually required which can project future demands and realistically represent the effects of all the components. Generally, given the nature of the Studies, multi-modal models will be required, as explained in Chapter 5 in this volume and in Chapter 2 in Volume 2.

2.2.51 This is a crucial step in any study of this nature. The creation of a transport model, along with the collection of the necessary data, is potentially costly and time-consuming. It is vital, therefore, that the scope for using existing models and data is carefully considered, and that new models and data are up to the task. Careful consideration should be given, before resources are committed to data collection and model building, to the nature of the options which it is likely to wish to test and the required level of detail of the analyses.

Step 7.2: Environmental Impact Assessment Procedure

2.2.52 An important part of the information required for the AST comes from environmental impact assessment and cost/benefit analysis. The AST enables the information from these two sources to be presented in a balanced and integrated manner. By adopting standard procedures for these two assessments and using common parameter values in the cost/benefit analysis, consistency across the Studies can be ensured, thereby facilitating any comparisons which Ministers may wish to make.

2.2.53 While guidance is readily available on the environmental assessment procedures for the appraisal of road schemes, guidance is less available for the appraisal of the impacts of other modes. Methods of strategic environmental assessment are also currently emerging which enable environmental impacts to be taken into account at the broad level at which some of the Studies may well be undertaken. It is clearly important that methods of environmental assessment are chosen which are appropriate to the scale of the study being undertaken, the nature of the area and the kind of solutions likely to be appraised. Chapter 6 and Volume 2 contain advice on these matters.

Step 7.3: Cost/Benefit Analysis Procedure

2.2.54 Cost/benefit analysis of multi-modal strategies or plans is complex. The uni-modal COBA and URECA software used by the DETR to appraise road schemes is not appropriate to the appraisal process to be applied in the studies. The DETR will be producing new standard software for this purpose. For more information contact HETA Division, DETR on 020-8890-6183.

2.2.55 Of particular importance in these calculations is the consistent and explicit treatment of flows of taxes, so that impacts on the Exchequer can be identified, and flows of fares, tolls and charges paid by travellers, and revenues received by transport operators, can be accounted for. These payments and receipts appear in the cost/benefit analysis as costs and benefits. Thus, the information required for the appraisal of the financial consequences on the Exchequer and the transport operators is automatically contained within a full cost/benefit analysis and can be identified separately.

2.2.56 Chapter 6 in Volume 2 contains advice on how the cost/benefit analysis should be undertaken and on the sources for the economic parameter values required for the calculations.

Step 7.4: Geographic Information System

2.2.57 Geographic Information Systems (GISs) are very powerful tools for the display of information on a geographical basis. Background information, such as designated areas, can be assembled in the GIS, along with detailed OS background mapping. Plots can then be output which overlay the elements of the strategy or plan on the background data. A database is usually associated with a GIS in order to store information relating to the appraisal of each of the options tested. From this source, information from the appraisal can be displayed geographically, either for options individually or as a means of making comparisons between options.

Step 8: Costs

2.2.58 Costs are as crucial to the appraisal process as benefits. Therefore, the Studies will need to include estimates of the costs of implementation, operation, maintenance and enforcement, to an appropriate level of accuracy to enable robust decision to be made. However, it would not be cost-effective to spend considerable funds designing something in detail, simply so that its cost could be determined with accuracy, only to find subsequently that it fails the appraisal criteria and is rejected. Once the initial appraisal results become available, it should then be possible to see where the cost estimates are particularly important to the choices which have to be made and for the robustness of the overall recommendations. Further effort may then be directed to refining those costs which have a special influence on the choices to be made.

2.2.59 Step 8 is concerned with establishing the **methods** by which costs should be estimated. The estimates themselves are derived as part of Step 9. Procedures need to be established for each of the various kinds of costs, along the following lines:

- **implementation costs** - unit costs for land, construction, vehicles, etc;
- **operating costs** - models of the costs of operating public transport and charging systems;
- **maintenance costs** - unit rates or simple models; and
- **enforcement costs** - unit rates or simple models.

Advice on the treatment of costs in the cost/benefit analysis is given in Chapter 6 in Volume 2.

Step 9: Option Testing and Appraisal

2.2.60 Using the appraisal framework, appraisal tools and procedures described in earlier steps, the work of testing and assessment of the options can begin. There are a number of different ways in which this step can be tackled; these are considered in Chapter 3 of Volume 2, and in IHT Guidelines, 1996.

Step 10: Distillation and Comparison of Options

2.2.61 It is conceivable that very large numbers of options could be tested and appraised in the course of a Study. On the face of it, the process of comparing a large number of options, for each of which there is a large amount of complex appraisal information, could present a considerable challenge.

2.2.62 In practice, it seems unlikely that a study would be undertaken in such a way that (a) a large number of options are tested and appraised, but (b) that no comparisons of the options are undertaken until the results from all the options are available. It seems more probable that a learning process would be adopted, whereby a small number of tests would be conducted, the

results compared, leading to the specification of another small group of tests, and so on. In other words, there may, in reality, be no need to devise a way of comparing a large number of options because, even though a large number may be appraised, only small numbers would be compared at any one time.

2.2.63 The process of strategy or plan appraisal may be viewed as the progressive distillation of the key features that:

- either distinguish one option from others;
- or contribute significantly to the overall value-for-money of an option.

Distilling the appraisal information down to these two essentials may well reduce significantly the amount of information which needs to be considered by the decision-maker and make the process of comparing options tractable. Advice on this process is given in Chapter 6.

Step 11: Consultations

2.2.64 A consultation exercise should be undertaken before the steering group reaches its conclusions.

Step 12: Outputs from the Study

2.2.65 Once consultants have reported on the appraisal of options and consultation is complete, the steering group may ask the consultants to express their views about the effectiveness of these options. In doing so, consultants should endeavour to maintain their objectivity. The Steering Group may then choose either to pass the consultants work straight to the Regional Planning Body, or to comment on the consultants findings and make recommendations on the attractiveness of specific options before reporting to the Regional Planning Body. If the steering group choose to comment on the consultants findings they should:

- make it clear that their views do not formally bind the organisations represented on the steering group to implementing preferred options;
- take realistic account of what resource may be available to implement particular options, for example by considering funding levels provided in previous years;
- indicate that the regional planning body will need to set the findings of the study in the context of regional priorities and affordability;
- take care that the options considered do not cause blight.

2.2.66 The outputs of the Studies are aimed primarily at the Regional Planning Body, who will use the results in drawing up their regional transport strategy. However, the regional transport strategy will be taken forward through a number of programmes, for example local transport plans and the Highways Agencys programmes. So Ministers, local authorities, transport providers and operators all have an interest and part to play in the decision-making process and delivery of options proposed in the Studies. Therefore, the outputs of the Studies should:

- be provided at a level of detail that enables the different players to contribute to the debate and make their decisions in a fully informed manner; and
- should set out the conclusions in a clear and logical manner without over-burdening the reader with information.

Step 13: Funding Sources

2.2.67 A crucial part of the appraisal framework described under Step 6 will be the assessment of affordability and financial sustainability. Thus, a view should be taken in the course of the Studies about the likely financial requirements of any solution proposed. Once conclusions and recommendations have been reached, it may be worth re-investigating the funding implications to ensure that the options proposed are feasible in this crucial respect.

Step 14: Implementation Programme

2.2.68 Although the preferred way forward will be identified outside of the study process, by the regional planning body, the Studies will need to have one eye on possible timing and planning of implementation of options. In broad terms, this will entail phasing the elements of the preferred strategy or plan in an appropriate order and to a feasible timetable.

2.2.69 A typical transport strategy or plan will involve a considerable amount of expenditure and a large number of concerted actions, spread out over a number of years. These need to be phased appropriately so that the transport system develops in the most effective manner. In determining the phasing of the component parts of a strategy or plan, it will be necessary to:

- decide **when** each component is required by analysing when the problems are likely to emerge at which the component is aimed;
- understand the relationships between the various components, taking account of which elements **must** come before or after others;
- take account of the lead times required to progress each component, taking account of planning procedures, and design and construction times;
- take account also of the capabilities of the transport providers to deliver schemes at the required times; and
- reconcile the ideal sequence of implementation with the likely flow of funding.

References

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3 Objectives and Problems

3.1 Introduction

3.1.1 In developing a transport strategy or plan it is essential to be clear as to what the strategy or plan is designed to achieve. The answer to this question can be expressed at varying levels of generality or detail, from broad statements of vision, through strategic objectives, to more specific objectives and lists of problems to be overcome.

3.1.2 Stated objectives serve several functions. They help to identify the problems to be overcome, both now and in the future. They provide guidance on the types of solution which might be appropriate and the locations in which they are needed. They act also as constraints, in clarifying what should be avoided in pursuing any particular solution. Finally, they provide the basis for appraisal of alternative solutions, and for monitoring progress in implementation.

3.1.3 Almost inevitably, it will not be possible to satisfy all of the objectives which are identified in this way. In principle, it would be helpful, not just to have a clear understanding of the overall objectives, but also to be able to specify their relative importance, so that conflicts can be readily resolved. However, priorities between objectives are a matter for political judgement which is exercised by the decision-maker on the basis of the appraisal information against each of the objectives.

3.1.4 This chapter deals with:

- the Governments objectives for transport;
- local and regional objectives;
- objectives and targets; and
- problems.

3.2 Objectives-led and Problem-orientated Approaches

3.2.1 There are, in practice, two different types of approach which can be adopted to identifying objectives and related problems. The first is the true objectives-led approach in which objectives of the kind described in Section 3.3 and 3.4 are first specified. These are then used to identify problems by assessing the extent to which current or predicted future conditions, in the absence of new policy measures, fail to meet the objectives.

3.2.2 The main drawback with this approach is that many members of the public are less familiar with the abstract concept of objectives (such as improving accessibility) than they are with concrete problems (such as the nearest medical facilities being 50 minutes away). It is to bridge this gulf that some integrated transport (or top-down) studies check the identified problems with the public.

3.2.3 The alternative approach is to start by defining types of problem, and to use data on current (or predicted future) conditions to identify when and where these problems occur. The objectives are implicit in the specified problems, and may never actually be stated. This approach has the merits of being easily understood. However, it is dependent on developing a full list of potential problems at the outset. If particular types of problem (like access to medical facilities) are not identified because the underlying objective (accessibility) has not been considered, the resulting strategy will be partial in its impact. It is thus important to check with the public (either directly, or through their representatives) that the full set of problems has been identified.

3.2.4 Neither of these approaches is necessarily preferable to the other. Both require checks to ensure that the problems identified are comprehensive. Once this has been done both methods follow the approach described in Chapter 2. The choice between them should be determined by whether the users of the study feel more at ease with the concepts of objectives or problems. For a more detailed discussion of these approaches, see Section 2.3 of the IHTs Guidelines on Developing Urban Transport Strategies.

3.3 The Governments Objectives for Transport

3.3.1 The Governments objectives which underpin A New Deal for Transport (DETR, 1998) are:

- to promote a strong economy and increase prosperity;
- to provide better protection for the environment; and
- to develop a more inclusive society.

3.3.2 In A New Deal for Transport, the DETR has set out its five main criteria for transport. These may be couched in terms of objectives, as follows:

- **environmental impact** - to protect the built and natural environment;
- **safety** - to improve safety;
- **economy** - to support sustainable economic activity and get good value for money;
- **accessibility** - to improve access to facilities for those without a car and to reduce severance; and
- **integration** - to ensure that all decisions are taken in the context of the Governments integrated transport policy.

3.3.3 These objectives should be taken as a given in the study areas. The intentions of these objectives are discussed below.

Environmental Impact

3.3.4 The environmental protection objective involves **reducing** the direct and indirect impacts of transport facilities and their use on the environment of both users and non-users. The environment impacts of concern include those listed in DMRB Volume 11. They include noise, atmospheric pollution of differing kinds, vibration, formal intrusion, severance, and impacts on intrinsically valuable flora and fauna, ancient monuments and historic buildings and so on. While some of these can be readily quantified, others such as severance are much more difficult to define and analyse.

3.3.5 More recently, the environmental protection objective has been defined more widely to include reduction of the impact of transport on the global environment, particularly through emission of carbon dioxide, but also by consumption of scarce and non-renewable resources.

Safety

3.3.6 The safety objective is concerned with **reducing** the loss of life, injuries and damage to property resulting from transport accidents and crime.

3.3.7 It has been common practice for some time in the UK to place money values on casualties and accidents of differing severity, and to include these within a cost/benefit analysis. These values include the direct costs of accidents, such as loss of output, hospital, police and insurance costs, and damage to property and, more controversially, an allowance for the pain, grief and suffering

incurred. However, in some cases there is concern with the direct safety performance of the system, it is therefore helpful to estimate accident numbers directly as well.

3.3.8 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 which reduce the opportunities for attackers to surprise travellers and facilities for making emergency calls. The security of car users increases when the instances when they are required to stop or travel very slowly are reduced, vehicles can be parked in safety and facilities for making emergency calls are increased.

Economy

3.3.9 The economy objective is concerned with **improving** (a) the economic efficiency of transport, and (b) the efficiency of economic activities.

3.3.10 Much economic analysis is concerned with defining efficient allocations of scarce resources. Economic efficiency is achieved when it is impossible to make one person or group in society better off without making another group worse off by a larger amount. In such a situation, it is impossible to find any measures for which - if they were undertaken - the gainers would be able to compensate the losers and still be better off themselves. In other words, seeking economic efficiency means taking all measures for which the willingness to pay of the beneficiaries exceeds the required compensation of the losers by an acceptable margin.

3.3.11 In practice, in transport appraisal, the economy objective is usually defined more narrowly. It is often concerned primarily with maximising the net benefits, in resource terms, of the provision of transport. This is turn involves maximising the difference between the consumer surplus of travellers and the resource costs of the provision, operation and maintenance of transport facilities. Consumer surplus can be thought of as the difference between the maximum which an individual traveller is prepared to pay to travel and the actual cost of that journey. Consumer surplus is, therefore, increased when travel time, operating costs and direct payments such as fares are reduced and also when more travellers are able to travel as a result of reductions in those costs.

3.3.12 Economic efficiency defined in this way is central to the principles of social cost/benefit analysis, and a higher net present value from an economic evaluation assessment represents a more efficient outcome.

3.3.13 While some cost/benefit analyses focus on the costs and benefits for motorised travel, and treat the impacts on pedestrians and cyclists, such as pedestrian delay, as an environmental impact, it is more logical to consider economic efficiency for all travellers together, whatever their mode of travel.

3.3.14 From this, somewhat **narrow**, viewpoint, cost/benefit analysis excludes environmental and safety impacts, but would subsume *overall* accessibility effects (for the reasons given below in paragraph 3.3.18). An alternative **broad** view of cost/benefit analysis would include all these effects, whether or not valued in money terms, and this broad view of cost/benefit analysis would yield the overall value for money of the option being appraised. As noted in Chapter 2, the Appraisal Summary Table provides the basis on which such a wider assessment of value for money will be made.

3.3.15 The second element of this objective is the efficiency of economic activities. It has often been argued that, the benefits to transport users and operators captured in a cost/benefit analysis are a satisfactory measure of the wider benefits to the economy, that is, the efficiency with which economic activities are undertaken insofar as they are affected by transport. However, others have

suggested that this fails to capture the additional benefits to economic development, particularly in areas where regeneration is a priority, of improved transport provision and transport links. SACTRA has recently been considering this argument and its final report was published in August 1999. The Department is expected to respond by early Spring.

Accessibility

3.3.16 In general terms, accessibility can be defined as ease of reaching. The accessibility objective is concerned with **increasing** the ability with which people in different locations, and with differing availability of transport, can reach different types of facility. The term accessibility has been used in the past in several different, often overlapping, ways, including the following:

- measurement of ease of access to the transport system itself in terms of, for example, the proportion of homes within x minutes of a bus stop or the proportion of buses which may be boarded by a wheel-chair user;
- measurement of ease of access to facilities, with the emphasis being on the provision of the facilities necessary to meet peoples needs within certain minimum travel times, distances or costs;
- measurement of the value which people place on having an option available which they might use only under unusual circumstances (such as when the car breaks down) - option value - or even the value people place on simple the existence of an alternative which they have no real intention of using - existence value; and
- measurement of ease of participation in activities (for personal travel) or delivery of goods to their final destination (for goods travel), provided by the interaction of the transport system, the geographical pattern of economic activities, and the pattern of land use as a whole.

3.3.17 Planners of public transport systems often focus on the first of these, while land-use planners often concentrate on the second. It is possible to argue that the first three views of accessibility are particular views within the general framework provided by the fourth. Thus, the fourth use may be regarded as the all-embracing measure of accessibility.

3.3.18 Recent work by David Simmonds Consultancy, ITS Leeds University and MVA for the DETR (1998) has shown that system-wide accessibility benefits are, to a very large extent, subsumed in a **fully-specified** cost/benefit analysis - that is, a cost/benefit analysis in which all traveller responses are properly included. Thus, couched in its most general and all-embracing form, the accessibility objective would duplicate the economy objective. The accessibility objective is therefore concerned with the more specific aspects, such as access to facilities by non-car-owners and community severance.

Integration

3.3.19 The general presumption in A New Deal for Transport (DETR, 1998) is that integration should increase, with the aim of ensuring that all decisions are taken in the context of the Governments integrated transport policy. More specifically, this means:

- integration within and between different types of transport, so that each contributes its full potential and people can move easily between them;
- integration with the environment, so that the transport choices available support a better environment;

- integration with land-use planning, at national, regional and local level, so that transport and planning work together to support more sustainable travel choices and reduce the need for travel; and

- integration with policies for education, health and wealth creation, so that transport helps make a fairer, more inclusive society.

3.4 Local and Regional Objectives

3.4.1 The five criteria or objectives of Central Government discussed in the previous section are very broad and may not fully reflect the specific regional and sub-regional circumstances if the individual studies. More specific objectives need to be set at the regional level through Regional Planning Guidance/Regional Transport Strategies as explained in Chapter 6 of draft PPG 11 (DETR, February 1999). Among other things, this sets priorities for transport investment across all modes, to support the objectives of the spatial strategy for the region. Outputs from the regional planning process should include integrated planning and transport proposals and objectives for both the major transport corridors and major urban areas. The Studies must reflect these strategic priorities and objectives for future land uses, and show how transport options can support them. Steering Groups are also free to set out other study-specific objectives as they see fit.

3.4.2 The sources for study objectives could include:

- regional planning guidance;

- local transport plans;

- development plans;

- the plans of transport provides in the study area; and

- aspirations of local groups.

3.4.3 However, it is important that these **objectives** should be fully up to date; they must:

- all nest within the Governments five main objectives, with no local or regional objectives lying outside the framework provided by the Governments objectives; and

- avoid at all costs indications of preferred solutions as these may then cause other better solutions to be overlooked in the process of establishing a strategy or plan.

3.4.4 By their nature, these objectives will be specific to each individual Study; there is no requirement for them to be the same in all Studies. It is therefore not practical to be prescriptive in this Guidance about the formulation of the local and regional objectives. **Some examples** of study specific objectives under each of the five Central Government objectives are as follows.

- **environmental objectives** could provide increased focus on particular aspects of the environment which were particularly vulnerable or in need of improvement; for example:

    to reduce traffic intrusion in a specified National Park or AONB or a conservation area; or

    to reduce local emissions in a specified town centre; or

    to reduce traffic noise in a specified residential area, etc.

- **safety objectives** could provide increased focus on particularly vulnerable sections of the public in particular locations; for example:

to reduce accidents to pedestrians and cyclists; or

to reduce accidents on a specified section of road.

- **economy objectives** could provide increased focus on regeneration objectives; for example:

  to improve road access to specified areas so that redevelopment may be encouraged; or

  to provide road access to hitherto inaccessible land so that development may take place.

- **accessibility objectives** could provide increased focus on particular aspects of accessibility; for example:

  to improve access to the public transport system for the mobility impaired; or

  to ensure that all households are within a specified walking time of a public transport service; or

  to reduce waiting or interchange times for public transport users;

  to promote walking and cycling.

- **integration objectives** could provide increased focus on specific means of ensuring or improving integration; for example:

  to support specific planning policies and local land-use development proposals.

3.4.5 In some cases, objectives may not obviously be directly related to the Central Government objectives. In many cases, these will be subsidiary objectives, devised to focus on the way in which the Central Government objectives can be achieved. For example, an objective to reduce road traffic growth is likely to have been proposed to focus on ways in which Central Governments environmental objectives may be achieved. Where this kind of objective is to be employed, it is important to ensure that options which appear to perform well against them also perform well against the primary Central Government objectives. For example, an intervention which reduced road traffic growth but worsened environmental impacts would be unlikely to be satisfactory. Generally, however, this kind of objective should be avoided so as not to constrain the search for solutions unduly.

3.4.6 It may also be feasible to identify some priorities between objectives. This would be useful where options meet one objective but conflict with another; the priorities would help decide the circumstances under which particular policy instruments should be considered. Again, these priorities between objectives need not necessarily be the same for all Studies.

3.5 Objectives and Targets

3.5.1 Objectives may be couched in general terms so that all they do is indicate the desired general direction of change; for example:

- to reduce the environmental nuisance caused by traffic.

3.5.2 They may also be couched in more specific terms which include the notion of a **target**; for example:

- to reduce traffic noise to below 68dB(A) in residential streets; or
- to reduce carbon monoxide levels to below 8.5 parts per million; or
- to reduce nitrogen dioxide levels to below 70 parts per billion.

There are advantages in this kind of more specific objective. It is clear when any one objective has been achieved and the degree of achievement can be measured by the extent to which conditions differ from the target.

3.5.3 However, the approach has considerable dangers. Using the example in the previous paragraph, the three objectives imply an equivalence between a noise level of 68dB(A), a carbon monoxide level of 8.5ppm, and a nitrogen dioxide level of 70ppb. A full set of detailed objectives containing targets which cover all the aspects of the five Government objectives would imply many more equivalences of this kind. In theory, this may seem a reasonable approach, but the key difficulty lies with establishing targets which imply the correct emphasis or importance of one objective in relation to another. In principle, it would be possible to derive a set of targets that people accepted as consistent through social research techniques, but the more objectives are involved the more difficult would such an exercise become.

3.5.4 In concept, of course, an objective specified in terms of a target is little different from a problem identified using a threshold. For example, an objective to reduce noise levels in residential areas to below 68 dB(A) amounts to the same as a problem identified as a noise level above 68 dB(A) in a residential area. The two concepts are sides of the same coin. Problem identification is discussed in the next section.

3.6 Problems

3.6.1 Problems may be identified in a number of ways, including:

- by **consulting** people about their perceptions of the problems both those that they encounter when travelling and those which result from other people travelling;
- by **consulting** representatives of the regional and local authorities and the transport providers to gain an understanding of the transport and planning professionals perceptions of problems with the transport system (also see Step 4 below);
- by conducting **audits** of specific elements of the transport system in order to gain a deeper understanding of the roles performed and to analyse the extent to which the expected aims are not met; and
- by **objective analysis** of problems through analysis of outputs from the transport model in comparison with thresholds so as to enable the geographic display of the worst conditions on a consistent numerical basis across the study area.

3.6.2 The first two methods are essentially parts of the **consultation** step of the Studies (see Step 4 in Figure 2.1). People will naturally have more reliable views about current problems than those predicted to occur at some future date. Problem identification through consultation is therefore of most use in the base or current year.

3.6.3 **Audits** can be useful ways of exploring in some depth particular aspects of the transport system. Again, however, their focus is on the current situation and past history so that trends can be identified, rather than on speculations about the future. Examples of elements of the transport system which may be suitable for detailed audits include:

- the local public transport system;
- the national rail system insofar as it affects the particular study area;
- the trunk road system; and
- the local parking system.

3.6.4 Audits should be conducted by experts in the particular aspect of the transport system being audited. As an example, the aims of an audit of the local public transport system might be:

- to describe the current services in detail in terms of routes, frequencies and fares;
- to identify the operators providing each service;
- to identify which services are run commercially and which are provided through support from the local authorities;
- to analyse the quality of the services provided in terms of type and age of vehicle;
- to assess service reliability, including factors which affect reliability, such as availability of vehicles and staff; and
- trends in factors such as vehicle-kms operated, passenger-kms carried, fares and levels of subsidy.

The general aim is to develop a detailed understanding of the services currently provided and the financial and institutional framework which applies.

3.6.5 **Objective (or systematic) analysis** of problems lies at the heart of the problem-oriented approach to transport planning. A comprehensive list of types of problem can be achieved using the framework provided by the Governments five criteria or objectives.

3.6.6 Objective analysis of problems requires the adoption of thresholds. The idea is that when a condition is measured or predicted to differ from a threshold, then a problem is said to exist. A range of thresholds can be set, so that problems may be graded by **severity**. Thus, for example, noise levels which exceed, say, 68dB(A), 72 dB(A) and 76 dB(A) would be classed as, say, slight, moderate and severe noise problems.

3.6.7 This approach is, of course, not without its difficulties. By labelling problems of different types which are of a particular severity with the same label, an equivalence is being implied between problems of that severity. Thus, for example:

- if a noise level in excess of 68 dB(A) but less 72 dB(A), say, were to be classed as a slight noise problem, and
- if a carbon monoxide levels in excess of 8.5 ppm but less than 15 ppm, say, were to be classed as a slight air quality problem,

then this would imply an equivalent importance of the noise range 68 to 72 dB(A) and the carbon monoxide range 8.5 to 15 ppm. The danger from such implied equivalences needs to be recognised.

Evidence from consultations may be used to establish the relativities of the thresholds so that the thresholds and severity gradings reflect local opinions about problems of different kinds.

3.6.8 A further dimension to the analysis of problems is their **magnitude**. This would normally be given by the numbers of people affected. Problems should be classed by both severity and magnitude. A severe problem which affects no-one would not be one for which a solution would be necessary. A solution to a slight problem which affected many people could, on the other hand, be much more worthwhile.

3.6.9 When thresholds are defined, they can be used, with current data, to identify the locations, times of day, and groups of traveller or resident for which problems currently occur. Given an appropriate predictive model, a similar exercise can be conducted for a future year. The model can also be used to assess whether a strategy will overcome these current or future problems, and whether it will induce new ones.

3.6.10 The strengths of the approach in which problems are identified using an objective or systematic analysis are that it enables:

- problems to be identified across the study area on a consistent basis, on a geographical background for ease of appreciation;
- problems to be identified for the future years on the same basis as the base year (and these can be validated against local peoples opinions through consultation); and
- the effectiveness of the option being tested can be assessed by checking how well the problems at which the intervention was aimed would be ameliorated.

3.6.11 It is crucial to recognise that this approach may only show problems as symptoms. Some analysis of the underlying causes of the problems should always be considered. For example, it would not be safe to assume that a congestion problem should be solved by adding extra capacity at the location concerned. Other solutions, such as traffic reduction measures or road improvements elsewhere to take through traffic away from the problem area, may be more appropriate and may only be revealed by analysis of the causes of the problem.

3.6.12 It is attractive to think that consistency between Studies could be ensured by adopting the same thresholds for the same types of problems throughout the Studies. However, this is considered impractical and unnecessary - impractical because it is very unlikely that a single set of thresholds could be established to which there would be general agreement - and unnecessary because the Steering Groups and the public in the various study areas may have different ideas as to the relative importance and seriousness of different types of problem. Thus, while consistency in the way in which the information for the AST is derived is regarded as essential, locally determined problem analysis is how the local perspective can be introduced to the appraisal process.

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4 Policy Instruments

4.1 Introduction

4.1.1 Transport planners have available to them a wide range of instruments of transport policy. These are the means by which the objectives established in Step 1 (in Figure 2.1) can be achieved, and problems identified in Steps 2.4 and 3.4 overcome. The information presented in this chapter is a key input to Step 5 - options for solutions.

4.1.2 The 60 or so policy instruments outlined in this chapter cover both urban and inter-urban policy instruments. Owing to its origin in the Review of the Trunk Roads Programme, the current programme of Multi-Modal Studies consists largely of inter-urban studies. However, the need to consider issues such as pedestrian severance, or alternative modes for large point to point demands, means that the full range of instruments should be considered. Moreover, where inter-urban schemes bypass, or provide access into, urban areas, then the urban instruments will be very relevant. DETR guidance on local transport plans (DETR, 1999a) gives a clear lead that highway authorities should encourage cycling and walking, this should be borne in mind in all studies, whether roads based or multi-modal.

The instruments are considered under the headings of land use measures (Section 4.3); infrastructure provision (Section 4.4); management of the infrastructure (Section 4.5); information provision (Section 4.6) and pricing (Section 4.7). The text under each entry briefly describes the policy instrument, gives references for further information, and provides guidance on the range of situations in which the policy instrument might be applicable.

4.2 Integration of Policy Measures

4.2.1 No one measure on its own is likely to provide a solution to the transport problems within the Multi-Modal Study areas. Whilst all the instruments described in this chapter can contribute to the achievement of the Governments five objectives for integrated transport, it is anticipated that the most effective solutions will consist of packages of different measures.

4.2.2 Packaging measures effectively can:

- reinforce, extend or complement the impact of a particular measure - for example, the use of traffic calming to reinforce the benefits of building a bypass; a reduction in bus fares to extend the user-benefits of bus priority measures;
- mitigate potential adverse impacts of a particular measure - for example, traffic management systems to minimise the adverse impacts on accessibility and the environment of bus priority measures;
- make a package financially feasible - for example using revenue from parking charges, a fares increase or road pricing to finance new infrastructure; and
- increase public acceptability of a particular measure - for example road pricing may be more acceptable to travellers if the revenue raised is used to invest in public transport.

4.3 Land-Use Measures

4.3.1 **Developments within transport corridors and near to transport nodes** provide a way of concentrating denser development, and that which can more readily use public transport, in those areas where public transport is readily available. This can lead to a corridor-style development, and

has been used to considerable effect in cities such as Toronto (Knight and Trygg, 1977). Such strategies should reduce journey lengths, improve accessibility and have some efficiency and environmental benefits.

4.3.2 **Development mix** is strongly advocated in PPG13. By locating development in such a way that houses are closer to places of work schools, shops and leisure facilities, the need to travel and distances travelled can be reduced. The PPG13 Guidance on Good Practice (DoE/DoT, 1995), cites Almere in the Netherlands, parts of Edinburgh, Richmond and Crawley as examples of good practice in mixing land-uses as part of re-development or new developments.

4.3.3 **Development densities:** similarly, higher densities enable more opportunities to be reached within a given distance, and hence may encourage shorter journeys and use of slow modes. By increasing population and employment densities, they may also make public transport more viable. Some examples of schemes attempting to encourage centralisation in London and Watford are given in DoE/DoT (1995).

4.3.4 **Parking standards:** PPG13 requires local authorities to set maximum parking standards in their development plans, and the draft revision to PPG13 proposes national maximum standards for certain land uses, including retail, leisure and B1 offices. The final version of the guidance will clarify the position on maximum parking standards.

4.3.5 **Company Travel Plans.** In the UK, these are usually voluntary schemes whereby companies at existing sites encourage employees to use alternatives rather than driving alone. Recent tax changes also encourage employer-funding of public transport. There are several examples of Company Travel Plans in action, for example the HA toolkit has an example of the Highways Agencys own travel plan (HA, 1998). The largest benefits from these plans will result when a majority of companies in an area implement such schemes.

4.3.6 Company travel plans may also be required by a local authority to be submitted alongside a major planning application. Draft PPG13 (DETR, 1999c) sets out the context of when this can occur and the weight which might be given to a travel plan in a planning decision. It is important to ensure that it is secured through either a condition or a planning obligation. The final version of PPG13 will clarify the position on this.

4.3.7 **Flexible or staggered working hours** are designed to reduce demand for peak travel and the resulting congestion. They may also encourage car sharing or switch to public transport as employees can adjust their working hours to match the schedules imposed. A variant of flexible working is the four day week in which employees work the same hours per week, but travel on one fewer day.

4.3.8 **Commuted payments** were a form of developer contributions whereby a requirement for private parking provision at new developments would have been waived in return for payment to the local authority of a charge per space so that the local authority could have made provision in public car parks. Given the policy move from minimum parking spaces to maximum, signalled in the original version of PPG13 and reinforced in the recent draft revision, there is no basis in guidance for seeking commuted payments, as planning authorities cannot charge a developer for something that is not being asked for. Instead negotiations around planning obligations on transport should be based on achieving better access to a site by all transport modes, with an emphasis on walking, cycling and public transport. As the draft version makes clear, the policy change would have an inverse effect on costs, with lower levels of contributions appropriate for schemes in town centres and other sites well served by a choice of modes, and higher contributions to deliver improvements to access in poorly served, peripheral locations.

4.3.9 **Telecommunications.** The use of teleworking, teleshopping and teleconferencing are growing in popularity and practicality. Studies in the US and Holland suggest that teleworking can reduce car use; typical teleworkers work from home two days a week, and their cars are used much less on the days when they are at home (Hamer *et al*, 1991; Kitamura *et al*, 1991). The scope for teleworking and its impact on car use in the UK is not yet known, although attitudinal surveys suggest that up to 40% of commuters would prefer to work at home (Dodgson *et al*, 1997). Teleworking is seen as particularly attractive for long distance (inter-urban) commuters. A variant is Telecottages (common remote offices for use by teleworkers) where the aim is to encourage local economic development. There are over 100 telecottages already operational in the UK (DoE/DoT, 1995). Less is known about the likely impacts of teleshopping and teleconferencing.

4.4 Infrastructure Measures

4.4.1 **New road construction.** The success of new road construction and improvements in reducing congestion has come under increasing criticism. Increasing road capacity can, in some circumstances, induce additional traffic, thus partially eroding the road user time-saving benefits (1994 SACTRA Report).

4.4.2 There are particular direct environmental concerns associated with road improvements, such as land-take, habitat destruction or loss of landscape quality. There are also indirect impacts. New road schemes may encourage longer journeys and increased speeds. This in turn will make public transport, cycling and walking relatively less attractive, and increase fuel consumption and carbon dioxide emissions. Moreover, new roads may well, if not carefully designed, worsen accessibility across the alignment, particularly for pedestrians and cyclists.

4.4.3 New roads can, however, by bypassing particularly sensitive urban areas, achieve environmental and accessibility improvements. In this way, orbital roads can have a different impact from radial ones. However, these are only likely to be sustained if steps are taken to redesign the roads which are relieved of traffic.

4.4.4 Road improvements can also contribute to a reduction in accidents, by transferring traffic to higher quality roads whose accident rates should be much lower than those of typical urban streets. To some extent this effect, too, may be eroded by the induction of new traffic and increased speeds.

4.4.5 New roads are extremely expensive; costs of £20m per kilometre are not uncommon in urban areas, and provision for environmental protection may result in figures substantially above this. Even significant time and accident savings may be difficult to justify when set against such costs.

4.4.6 The impact of new roads on economic regeneration is complex. The Standing Advisory Committee on Trunk Road Assessment (SACTRA) published a report on transport and the economy in August 1999. This made a number of recommendations on the appraisal of economic impacts of investment in transport infrastructure. The DETR has yet to consider the report and to decide whether to accept the Committees recommendations. Pending the Governments response, Studies should follow existing guidance on the forecasting and assessment of regeneration effects of schemes.

4.4.7 **New off-street car parks** can contribute to user travel time savings by reducing the need to search for parking space. However, lack of parking also acts as a control on car use, and expansion may simply encourage additional car use. New off-street parking may therefore be best combined with a reduction in on street parking. This should reduce searching traffic (since parking locations are clearer), improve the environment and increase safety. It may, however, aggravate accessibility and security problems.

Provision for Public Transport

4.4.8 **Conventional rail provision** includes significant upgrades to existing infrastructure, as well as the reopening of closed rail lines and provision of new stations. There are several well documented studies of the impact of such measures, and procedures for predicting their effects (Nash *et al*, 1991). Such schemes can reduce travel time for existing users and attract users from other modes, and contribute positively to the environment by transferring journeys off the roads.

4.4.9 Rail infrastructure measures can also contribute positively to accessibility, by reducing access distances to public transport, by reducing waiting times and, particularly, by increasing in-vehicle speeds, since the trains are protected from road congestion.

4.4.10 **Light rail** can be expected to have a similar impact to conventional rail in many respects. Its main differences are that it can operate on street, have more frequent stops, and achieve better penetration of town centres. Light rail schemes are expensive, not least because of the requirements of street running. The guidance on Local Transport Plans (DETR, 1999) states that due to their expense, funding for light rail is not a priority, unless the objectives it meets cannot be met in other ways, and some funding can be found from other sources. In due course, local authorities may be in a position to develop light rail schemes using revenues from congestion charging or workplace parking levies.

4.4.11 **Guided bus** can provide a lower cost alternative to light rail. Totally separate rights of way can be provided along the length of the whole route, or solely where buses need to bypass congestion, as in most UK proposals. This allows much more extensive suburban coverage than can usually be achieved with light rail.

4.4.12 **Park and ride** extends the catchment of fixed track public transport into lower density areas, by enabling car drivers to drive to stations on the main line. It has also been used successfully in smaller cities such as Oxford and York in conjunction with dedicated bus services. By increasing the public transport use, park and ride can reduce congestion, environmental intrusion and accidents in inner urban areas. The impacts on environment and traffic outside urban areas is less clear. In some circumstances, park and ride may generate longer journeys and take part of its demand from passengers who previously used public transport for their whole journey. The net effect will depend on where the facility is located and implementation of complementary measures such as higher parking charges.

4.4.13 **Terminals and interchanges** provide a means of extending the coverage of public transport services, by reducing the time taken to interchange between bus services or between bus and rail. They also provide a focus for city centre bus services, and reduce the congestion of on-street stops and terminals. Good information provision, through ticketing, and simple, integrated timetables can also be used to improve existing and informal interchange facilities.

Provision for Cyclists and Pedestrians

4.4.14 **Cycle routes** provide dedicated infrastructure for cyclists, and hence extend cycle provision. They can achieve significant improvements in safety for cyclists and improve journey times. They may also attract more people to cycle in preference to driving, particularly if combined with other measures to make car use less attractive, such as parking restrictions.

4.4.15 **Pedestrian areas** can provide a dramatic improvement in the environment for pedestrians, increase safety, and enhance retail vitality in town and city centres.

4.4.16 Potential adverse impacts on accessibility for bus users, goods deliveries and for disabled people, and diversion to surrounding areas can be reduced through careful design. PPG13 Guide to Good Practice gives examples of York and Birmingham where such schemes have been well implemented. There is little evidence to support traders claims that pedestrian streets cause a loss in overall trade, although what changes may arise in the composition of shops is less well understood.

Provision for Freight

4.4.17 **Lorry parks** provide a means of reducing the environmental impact of on-street overnight parking of lorries.

4.4.18 **Trans-shipment facilities** aim to provide a means of transferring goods from the larger vehicles needed for efficient line haul to smaller, less environmentally intrusive vehicles for distribution in town centres. Other proposals have envisaged trolleying of goods over short distances and underground freight distribution.

4.4.19 **Encouragement of other modes** is likely to focus primarily on rail-borne freight, but in appropriate cases could extend to water and pipeline. There is potential in the hydraulic capsule piping approach (Howgego and Roe, 1998). Such schemes are still largely unimplemented, especially in the UK. Alternative modes are most likely to be competitive over longer distances.

4.5 Management Measures

Improved provision for the Car

4.5.1 **Conventional traffic management** includes a wide range of largely urban measures. These are well documented in IHT 1997 and include measures such as one-way streets, redesign of junctions, banned turns and controls on on-street parking. Such measures can have beneficial impacts on travel time and on accidents. Impacts on accessibility, bus services, deliveries, journey lengths and speeds will depend on the packaging and design of these measures. Effectiveness may also depend on enforcement.

4.5.2 **Urban traffic control (UTC) systems** are a specialist form of traffic management which integrate and co-ordinate traffic signal control over a wide area. They use signal settings to optimise a given objective function such as minimising travel time or stops and can also be extended to provide for bus priority and integration with information systems. These tools can also improve environment and safety.

4.5.3 **Intelligent Transport Systems (ITS)** covers a range of applications of information technology for transport. This includes motorway access control (ramp metering), automatic incident detection (AID), image processing of CCTV, selective vehicle priority, queue management techniques and many other experimental measures (see HA Toolkit). These can be deployed to relieve congestion and improve safety.

4.5.4 **Accident remedial measures** also cover a wide range of possibilities, and are much more fully documented elsewhere (IHT, 1990, 1997). Most blackspot treatment and mass action measures (such as skid-resistant surfacing) have high local safety benefits, but little impact beyond this. Area-wide measures are likely to have other impacts, and are considered below under the general heading of traffic calming.

Measures to Restrain the Car

4.5.5 **Traffic restraint measures** are designed to reduce the adverse environmental and safety impacts of car (and commercial vehicle) use. They have traditionally focused on residential streets (but are increasingly being extended to main roads) and have involved two types of approach: segregation, in which extraneous traffic is removed; and integration, in which traffic is permitted, but encouraged to respect the environment.

4.5.6 Segregation can be achieved by the use of traffic management techniques such as one way streets, closures and banned turns, which create a maze or labyrinth, which makes through movement difficult, and hence diverts it to more suitable routes. An alternative approach, more often used in city centres, is the traffic cell, in which an area is divided into cells, between which traffic movement, except perhaps for buses and emergency vehicles, is physically prohibited. Potential adverse impact on accessibility for local residents and on congestion and environment on diversion routes needs to be considered in designing such schemes.

4.5.7 Integration measures include traffic calming techniques such as low speed limits, speed humps, chicanes, pinch points, resurfacing and planting, all designed to encourage the driver to drive more slowly and cautiously. These can achieve significant reductions in speed and accidents. By making routes through residential areas slower, they can also induce re-routing to major roads, and hence a reduction in environmental impact. Such benefits may, of course, be offset by increases in congestion and environmental impact on the diversion route.

4.5.8 **Other physical restrictions on car use.** Possibilities include extensive pedestrian areas and traffic calming, and also the use of bus lanes (see paragraph 4.5.16) to reduce capacity at junctions and give clear priority to buses. More radical elements include closing roads or restrictions such as the City of London "ring of steel" scheme. By reducing traffic such schemes can offset some of the potential disbenefits such as increased travel time, and greater congestion.

4.5.9 **Regulatory restrictions on car use** have been used in several cities as an alternative way of reducing car use. Two main methods are in use; permits and number plate restrictions. In several Italian cities, permits are allocated to those who can justify needing their cars in the centre, and others are banned. A similar system is operated in Bologna, where 50,000 permits were issued restricting access to the centre. Number plate restrictions are in operation in Athens and Lagos, where an "odds and evens" system operates, in which cars with odd number plates can enter on alternate days, and those with even numbers on the other days. Such schemes can reduce congestion and journey lengths.

4.5.10 **Parking controls** can control car use by reducing the supply of spaces, restricting duration or opening hours, regulating use through permits or charging. The last of these is considered in paragraph 4.7.1. Local authorities are able to impose any of these controls on on-street space and in publicly operated car parks. Powers also exist under sections 43 and 44 of the Road Traffic Regulation Act 1984 to enable controls to be extended to privately-operated public car parks, although these have been only rarely used because of compensation implications. At present, there are, however, no direct controls which can be imposed on private non-residential parking, which typically accounts for 40% to 80% of all town centre spaces. The recently introduced Transport Bill contains provisions which will enable local authorities to levy a charge on workplace parking spaces (see paragraph 4.7.2). Targeted restrictions on duration or on categories of parker may be used to ease congestion.

4.5.11 **Car sharing** encourages drivers to share their cars with others or to car pool by taking it in turns to drive. Such schemes are highly likely to be more successful when linked to other policies such as company travel plans (see paragraph 4.3.5).

Provision for Public Transport

4.5.12 **Bus priorities** enable buses to bypass congested traffic and hence to experience reduced and more reliable journey times. The most common measures are with-flow bus lanes; others include bus-gates or bus only sections, exemption from banned turns, selective detection at signals, and UTC timings weighted to favour buses. Contra-flow bus lanes and bus access to pedestrian areas are designed specifically to reduce the adverse impact on buses of certain traffic management measures. Bus priority lanes can be designed to keep loss of capacity to other traffic to a minimum, for example by providing a setback at the stop line. In such cases travel time savings to buses can exceed 25% with minimal losses to other traffic. The segregation of traffic may also enhance safety. Combined with traffic management adverse impacts on accessibility can be minimised.

4.5.13 A more recent development in bus priorities has been the use of Red Routes in London (called Greenways in Edinburgh), in which bus lanes are combined with intensive and well enforced, parking restrictions. Travel time savings on the pilot Red Route were dramatic, while the evidence on effects on frontage access and trade is mixed (Wood and Smith, 1992).

4.5.14 **High occupancy vehicle lanes** extend the use of with-flow (and potentially contra-flow) bus lanes to other vehicles which make more effective use of scarce road space. These can include car sharers, taxis and commercial vehicles. Trials of this in an arterial corridor in Leeds since 1998 suggest traffic flows had fallen by around 14%. Average car occupancy in the morning peak has risen from 1.35 to 1.41 for the road as a whole, and 2.19 for the HOV lane (Leeds City Council, 1999). Experience elsewhere has suggested that HOV lanes can provide greater benefits than conventional bus lanes, provided that the delays to buses are not great. The bus operators in the Leeds scheme, have reported time savings of 3-6 minutes along the 1.5km HOV lane section.

4.5.15 **Public transport service levels** can be modified to increase patronage, and hence to attract diversion from car use. For bus services the main options are to increase route density or to increase frequency on existing routes. The first of these reduces walking time, while the second affects waiting time. Since both of these have a greater impact on passengers than does a similar change in time on the bus, they can be expected to be more effective in increasing patronage (Webster *et al*, 1980). The most appropriate allocation of a given fleet of buses between denser and more frequent routes will depend on local circumstances. Other bus service measures include the use of minibuses which can achieve greater penetration and may be more attractive (White, 1992); and demand-responsive bus services, such as dial-a-bus. There is also a wide spectrum of paratransit measures involving unconventional bus and taxi services; their impacts are too varied to summarise here. With rail services, the only option available is usually to increase service frequency.

4.5.16 **Bus service management measures** can be designed to improve the reliability of bus services and reduce operating costs, using fleet management procedures, and enhance their quality of service using real-time information. These measures are likely to be particularly beneficial in reducing uncertainty in travel time, and the extra waiting time resulting from irregular services, which are major disincentives to travel (Finnamore and Jackson, 1978; Webster *et al*, 1980). Such measures can generate significant efficiency benefits, and contribute to reduced car use. There are some recent examples of collaboration between local authorities and operators to achieve such benefits (McDonald and Tarrant, 1994).

4.5.17 **Quality Bus Partnerships** are agreements between local authorities and bus operators to enhance bus services (TAS, 1997). The aim is to achieve higher quality services that will attract more passengers. The local authority role is to enhance the infrastructure and bus priority measures, while the bus operator provides high quality buses, information, integrated services and integrated ticketing. There is strong evidence that such partnerships can increase public transport patronage,

and figures for trial corridors are between 5%-42% (TAS, 1997). Quality Bus Partnerships therefore offer accessibility and equity benefits, via improved public transport services and quality. The Transport Bill introduced on 1 December 1999 provides for a range of powers to promote and improve bus travel, including a statutory basis for Quality Partnerships, and an option for Quality Contracts which would enable local authorities to grant exclusive rights to operators to provide services to a local authority specification (subject to Ministerial consent).

Provision for Cyclists and Pedestrians

4.5.18 **Cycle lanes and priorities** serve the same function as cycle routes (paragraph 4.4.14) and experience with them is similar (Tolley, 1993). They reduce accidents for cyclists, and may encourage some increase in cycle use. The provision of improved cycling measures is a key element of school travel strategies and plans. Guidance is contained in the DETR publication *School Travel Strategies and Plans - A Best Practice Guide for Local Authorities* published in June 1999 (DETR, 1999d).

4.5.19 **Cycle parking** provision can be improved by, for example, introducing secure cycle parking, lockers or wardened facilities (such as in Leicester). By improving facilities and security for cyclists it may be possible to attract more people to cycling.

4.5.20 Improved **pedestrian crossing facilities** can improve safety and reduce travel time for pedestrians. It is not uncommon to find that total delay to pedestrians at city centre junctions exceeds that for vehicle users. In such circumstances, reallocation of signal time and linking of pedestrian phases, alone or as part of UTMC, may achieve accessibility benefits and reduce severance. Other measures such as parking controls and footway widening may also improve environment and safety for pedestrians.

Provision for Freight

4.5.21 **Lorry routes and bans** are primarily designed to reduce the environmental intrusion of heavy lorries and to improve safety. Routes can be mandatory or advisory. Bans can be area-wide (for example in the cells between lorry routes) or limited to particular roads, or applied solely to short lengths of road forming a screenline or cordon. They can be complete, or limited to certain times and certain sizes of vehicle, or with exemptions for access. CCTV is being increasingly used as an enforcement presence (IHT, 1997).

4.6 Information Provision

Improved provision for the Car

4.6.1 **Conventional direction signing** can provide benefits to car users, and other traffic, by reducing journey lengths and travel times; evidence suggests that around 6% of travel time may be accounted for by poor routeing, and that inadequate destination signing may as much as double the time spent searching for unfamiliar destinations (Jeffery, 1981). Conversely, direction signing can be used to divert traffic away from environmentally sensitive routes; however, familiar drivers are unlikely to respond to such measures.

4.6.2 **Variable message signs** enable drivers to be diverted away from known, but unpredictable congestion. They are very location-specific in their application, and hence in their benefits (Brown and Mackenzie, 1994). Benefits will primarily be in terms of travel times; although environmental and safety improvements may also be achieved. Inter-urban VMS signs from the HA Midlands Driver Information System have been found to significantly influence route choice in response to accident warnings on the carriageway ahead (Carden *et al*, 1999).

4.6.3 **Real-time driver information systems and route guidance** are a type of Intelligent Transport System application. Information from equipped vehicles or traffic sensors is used to provide radio or in-vehicle display messages (such as Trafficmaster) of delays, or to indicate preferred routes to avoid congestion. Dynamic route guidance systems can provide recommended routes to all equipped vehicles, dependent both on their destinations and the current traffic conditions. Most benefits will accrue to equipped vehicles, in the form of reduced travel times. Detailed mapping devices and combined route guidance and travel information systems are in development, and there is potential for systems of this sort to be linked in with wider ITS, allowing network managers to control the information sent to cars, and potentially enhance network efficiency.

4.6.4 **Parking guidance and information systems** are a further application of ITS principles, designed to reduce the high level of traffic searching for parking space in urban centres. Detectors identify car parks which are full or almost full, and trigger signs indicating the route to the nearest available space (examples can be found in IHT, 1997 and DoE/DoT, 1995). The efficiency and accessibility benefits from reduced searching may be associated with some reductions in environmental intrusion and accidents, depending upon local circumstances.

Measures to Restrain Car Use

4.6.5 **Public awareness campaigns** have been developed recently by several local authorities as ways of making residents, and particularly car users, more aware of the effects of their travel behaviour on the environment and in terms of sustainability, and to alert them to the alternatives available, including use of other modes and changes in destination and frequency of travel.

Provision for Public Transport

4.6.6 **Timetable and other service information:** improved information can generate additional patronage of public transport services (Pickett, 1982). This, in turn, can have accessibility and equity benefits and help to reduce car use.

4.6.7 **Real time passenger information** is now being provided, not just at major terminals, but at individual stations and bus stops, and on trains and (on the continent) in buses. Such information, on delays and alternatives, enables travellers to save time by taking alternative routes. Its main impact, however, is in reducing the uncertainty and stress associated with late running services. There is now some evidence that larger bus operators are prepared to invest in such information systems, in conjunction with local authorities, in order to increase market share. A further recent development are Trip Planning Systems (IHT, 1997), based on either dedicated terminals (at public transport interchanges and stations), over the telephone, or via the Internet.

4.6.8 **Operation information systems** use ITS-based fleet management facilities to identify locations of buses and to reschedule services to reduce the impact of unreliability.

Provisions for Cyclists and Pedestrians

4.6.9 **Static direction signs** can be used to enhance the use of cycle priority routes and to improve access within pedestrian areas for disabled pedestrians. Tactile footways are a further facility providing specifically for visually handicapped pedestrians. Public awareness campaigns can be used to encourage walking and cycling, and familiarise road users with appropriate signing.

Provision for Freight

4.6.10 **Static direction signs** may be the main element in voluntary lorry routeing schemes.

4.6.11 **Fleet management systems** have been introduced widely for freight vehicles, enabling them to respond more rapidly to the changing demands of Just in Time delivery schedules, and reducing the number of empty return journeys. They can also extend to dynamic route guidance to avoid congestion.

4.7 Pricing Measures

Measures to Restrain the Car

4.7.1 **Parking charges** enable demand to be kept below the supply of parking space. The wider impacts depend on the alternative used by the car driver; since parking on the fringes of the controlled area, or in private parking spaces, will inevitably have less impact on the environment and travel time than switching to public transport. As with parking controls (see paragraph 4.5.10), parking charges can readily be applied to publicly controlled parking space and powers exist to control charges at privately operated car parks under sections 43 and 44 of the Road Traffic Regulation Act 1984. Parking Advice from LPAC (1997) provides some useful information on applying parking policy.

4.7.2 **Workplace Parking.** Provisions in the recently-introduced Transport Bill would enable local authorities to levy a charge on all private non-residential parking at the workplace. The object of these powers is to reduce car-based commuting and ease congestion. Retail parking for consumers is excluded.

4.7.3 **Urban and Inter-urban Charging.** The current Transport Bill will enable local authorities outside London to introduce road user charging schemes or to levy a charge on workplace parking as part of a Local Transport Plan. Similar powers were granted to Londons Mayor and boroughs in the Greater London Authority Act 1999. The current Transport Bill allows for charging on trunk roads in two cases: road bridges and tunnels above 600 metres in length; and, when requested by a local authority to complement their own charging scheme.

4.7.4 There are no current plans to introduce more widespread charging on the inter-urban network. However, the studies are intended to develop medium to long term strategies to tackle the problems that exist within the study corridors. It is therefore important that all potential options are explored. It would therefore be appropriate for the studies to examine the contribution that charging on selected corridors and sections of the trunk road network might make to the delivery of the Governments transport objectives.

4.7.5 DETR is currently undertaking an extensive programme of research into road-user charging to implement the commitments given in the White Paper. Work includes an on-road demonstration project at site in England and Scotland and complementary off-road research. DETR is also working in the Charging Development Partnership, with those local authorities which have already identified road user charging or the workplace parking levy in their Local Transport Plans as a congestion management option. Options looked at in the studies involving charging schemes should be developed in consultation with DETR.

Provision for Public Transport

4.7.6 **Fare levels** can be adjusted on all public transport services, and will have a direct effect on patronage and on car use. Fare levels can be more flexibly implemented than service level changes, and may thus have a greater absolute impact on car use. Fare reductions can, therefore, contribute to efficiency and environmental objectives, as well as improving accessibility for public transport users and hence equity benefits. There is also some evidence that they can reduce accidents (Allsop, 1993).

4.7.7 **Fares structures** include the introduction of flat and zonal fares as alternatives to conventional graduated fares; lower off peak fares; and travelcards and season tickets which allow unlimited travel within a defined area. Changes in structure may contribute positively to efficiency, environmental and safety objectives, as well as improving accessibility by reducing the cost of marginal journeys. If appropriately designed, they may not impose a significant additional financial burden.

4.7.8 **Concessionary fares** provide lower fares or free travel to identifiable categories of passenger with special needs. These may include schoolchildren, elderly people and people with disabilities. While statutory school travel must be funded by local authorities, the others are currently optional. Their main benefits are in terms of equity and accessibility, in enabling people who would otherwise find public transport too expensive, or who cannot use cars, to travel.

Provision for Cyclists and Pedestrians

4.7.9 Pricing is rarely an issue for cyclists or pedestrians. However, some charges are made for secure cycle parking, especially if other amenities such as showers are available.

Provision for Freight

4.7.10 The fiscal measures described in paragraphs 4.7.1 to 4.7.5 are relevant for freight as well. Parking charges typically vary with vehicle type, and some congestion charging proposals envisage doing this.

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5 Summary Advice on Modelling

5.1 Introduction

5.1.1 The creation of a transport model, along with the collection of the necessary data, is potentially costly and time consuming. Thus, it is sensible to consider whether a model is required at all. The key factor to consider is whether it is possible to make robust decisions without a model. The test for robustness is that there should be a high degree of confidence that decisions would not be different if the analysis was conducted at a greater level of detail or precision (see Chapter 1, paragraph 1.1.15); thus, in this context, the issue is whether decisions made without the assistance of a model would be different if a model was available.

5.1.2 In practical terms, the decision to proceed without a model will depend on whether all of the consequences of a transport strategy or plan can be predicted without a model. The Multi-Modal Studies are intended to address the most severe transport problems. The consequences of transport strategies or plans providing solutions to these problems will often be particularly widespread and complex, involving direct and indirect effects, cross-modal effects and, in some instances, effects on land use as well as transport. It is important, that an appropriate level of effort is provided to assess these consequences, to ascertain the extent to which objectives are met and problems solved, and to estimate the value for money of the strategy or plan.

5.1.3 It expected that a computer model of some or all of the transport system will be required in each of the Multi-Modal Studies. Generally, given the nature of the Studies, these models will need to be multi-modal. In some cases, the model of the transport system may need to be linked to or embedded within a wider model of relevant aspects of land-uses and the economy.

5.1.4 It is vital that the scope for using existing models and data is carefully considered and that new models and data are up to the task. Careful consideration should be given, before resources are committed to data collection and model building, to the nature of the options which it is likely to wish to test and the required level of detail of the analyses.

5.1.5 This chapter provides advice on the form of models appropriate to the Studies in summary form only. More detailed advice is provided in Chapter 2 in Volume 2, which, in turn, contains information about other sources of advice which may be useful.

5.2 General Principles of Transport Modelling

5.2.1 The four fundamental features of a multi-modal transport model are as follows.

- The impedance to travel is measured by the **generalised cost** of travel. This usually consists of a linear addition of the elements of journeys, such as time spent walking, waiting and travelling in-vehicle, plus money costs of using private vehicles or public transport, with the various elements weighted to reflect their importance to travellers. It is through the manipulation of these elements of generalised cost that the impacts of transport interventions are represented in a model.

- The elasticity of the demand for travel to changes in generalised cost is modelled through use of a **demand curve**. The traveller responses generally represented in multi-modal models are change of mode and destination, with change of frequency and time of travel also being represented in some more sophisticated models. The accuracy of the demand model is also influenced by the extent to which the demand is segmented into separately identifiable and behaviourally distinct groups of travellers. The more such segments are treated separately, the greater the accuracy of the modelling, but also the greater the complexity of the model and the longer the run times. Simple models use aggregate elasticity values, which represent in a single number all traveller responses. More

complex models use linked hierarchies of equations which represent individual traveller responses separately and. it is argued, more realistically.

- As travel demand increases, so congestion on the transport system, especially the road system, increases, thereby increasing the generalised cost of travel. Transport supply effects of this kind define a **transport supply curve.** They may also occur in other aspects of the transport system, through over-demand for parking or crowding on public transport. The realism with which these effects are represented is usually a matter of detail - the more detail, the greater the realism. The accuracy of the model outputs may be as dependent on the realism of the implied transport supply curve as on the realism of the travel demand curve. The accuracy of the supply model is related to the level of spatial detail at which it operates. The larger the number of zones for any given area, the more accurate are the results likely to be, but the longer will be the model run times.

- The accuracy of the model output, especially the costs and flows which are used in the appraisal, are crucially dependent on the accuracy with which the equilibrium between travel demand and supply is determined. The need for this accuracy should not be overlooked by modellers.

These issues are discussed in more detail in Appendix A in Volume 2.

5.2.2 There is a trade-off between: (a) segmentation of demand, (b) degree of spatial detail, and (c) the accuracy with which equilibrium is found. With models of small areas, compromise may well be unnecessary, but with large study areas, treatment of some elements of the model in an approximate fashion may be inevitable if reasonable run times are to be achieved without compromising the robustness of the model results.

5.3 The General Principles of Land-Use Modelling

5.3.1 Transport models work on the assumption that land uses are fixed, both in location and magnitude. However, it may be relevant to consider the relationship between land-use and transport for three reasons:

- land-using activities and the interactions between them generate the demands for transport;

- those activities and interactions are to a greater or lesser extent influenced by the availability of transport; and

- the linkages between transport and activities may be important to the appraisal of transport strategies - especially when trying to consider whether the transport system is providing the kind of accessibility to activities that people and businesses require, rather than simply providing mobility for people and businesses.

5.3.2 It may be feasible to explore these issues without using land-use models. Different land use inputs can be used to explore the sensitivity of transport models to land use, while the impacts on land use of different transport strategies or plans can be assessed by planners, based on the outputs of transport models. However, these relationships are often complex, thus the use of a formal modelling approach may be valuable in some cases.

5.3.3 **Land-use/transport interaction models** represent the influences of transport upon different groups of economic agents (individuals and households, firms and other productive organisations, and national and local government) by modelling some or all of the markets (property, labour, and goods and services) through which they interact. As their name indicates, they model both the transport and land-use systems, and relate the behaviour of residents and firms to physical changes in land-use.

5.3.4 The economic interactions between activities, such as flows of workers to workplaces or of services to consumers, are obviously related to, though not identical with, transport demands. Land-use/transport interaction models can be classified into two broad groups according to their treatment of these interactions, as follows.

- One group consists of models where the economic interactions between activities are used in predicting where land-uses will locate. These are referred to as **integrated** models, because the land-use and transport algorithms are inextricably interwoven.
- The other group consists of models where the economic interactions between activities are, in the short term, controlled by the location of land-uses. These are referred to as **linked** models, because they can be created by linking a complete transport model (including generation and distribution) to a land-use model.

These issues are discussed in more detail in Appendix B in Volume 2.

5.3.5 A crucial issue to consider is that the Appraisal Summary Table (which is at the heart of the New Approach to Appraisal, as described in Chapter 6) requires measures of net transport user benefits.

5.3.6 At present, none of the land-use/transport interaction models are capable of producing the required estimates of user benefits. The difficulty is that user benefits are more difficult to accumulate in a rigorous fashion in a land-use/transport interaction model than in a transport model alone, and the required development work has not yet been undertaken.

5.3.7 Models of the linked type imply the development of separate land-use and transport models, which are then run iteratively. This approach automatically provides a transport model from which user benefits can be obtained. In contrast, use of the integrated type of model would require the construction of a separate, parallel transport model for this purpose.

5.3.8 Land-use/transport interaction models need to cover a large area if they are to show how activities will change in response to a transport intervention in a reasonably realistic manner. This and the additional complexity and data requirements of these models means that they will nearly always require greater resources than transport modelling alone.

5.4 Choice of Modelling Approach

5.4.1 There is no simple formula or flow chart which can be used to guide the modeller in making the choice of approach; it is a matter of considering the particular circumstances and requirements of each study and arguing the case for the preferred approach. Bearing in mind all the above considerations, the following paragraphs attempt to show how the arguments for a particular modelling approach should be constructed.

5.4.2 The key questions are:

- what is the nature of the problems at which the study is aimed, what are their likely solutions and the likely transport impacts (direct and indirect) of those solutions?
- should the study output include a strategy as well as a plan or can work proceed directly to the development of a plan?
- is it important to understand the impacts on the scale and location of economic activity in some detail?

- how big is the area to be modelled, bearing in mind that the modelled area should cover the area of influence of any likely solutions and, as a result, may be either smaller or larger than the study area?
- how many options are likely to need to be tested?

5.4.3 In the first instance, the modeller should prepare an outline specification of an appropriate modelling system, leaving on one side for the moment consideration of information about existing data and models and the proposed study timescale and budget, if pre-defined. This outline should consider the extent of the study area, the basic model components required, how they should be linked together and the appropriate level of detail. In parallel with, but separate from, this activity, information should be collated on existing models and data (this could be done after preparation of the outline specification, if time permits). When both strands of work are complete, the specification should be reviewed and developed, taking account of the constraints of timetable and budget and taking advantage of previous work.

5.4.4 As all Studies will aim to produce options for a plan, spatially detailed assignment models are likely to be a firm requirement. The issues of size of modelled area and number of options to be tested need to be confronted. Assignment models of large areas will be costly to develop, given their requirement for detailed origin-destination data, unless recently collected data of this kind are already available. Consideration therefore needs to be given as to:

- whether a single model covering most of the study area, or even beyond, is required; or
- whether a series of models covering different parts of the study area will suffice.

The latter approach is likely to be cheaper, but does rely on the absence of significant interaction between the areas to be modelled separately. If there is some interaction between the areas of interest - that is, what is done in one area could have a significant effect in another - then the assignment model should embrace all those areas which interact. In general, single models should be preferred for the smaller study areas.

5.4.5 The question which then follows is: what kind of demand model should be used with the spatially-detailed assignment models? Leaving aside land-use responses for the moment, there are two broad alternatives:

- a demand model which operates with a large number of reasonably small zones (if not exactly at the same degree of spatial detail as the assignment model); or
- a spatially aggregate transport model, which contains both demand and supply elements, and which operates with a relatively small number of quite large zones, and which is used to provide changes in the patterns of demand to the spatially detailed assignment models.

Spatially detailed models

5.4.6 If the area of interest is small, or if a larger study areas can be divided into a series of smaller areas which are relatively independent of one another, then the choice of modelling approach is easier than in the case of a large area which has to be modelled. With a small area of interest, the spatially detailed approach is likely to the most appropriate approach. Given their small size, run times should not provide a practical constraint to the number of options which can be tested.

5.4.7 However, if the area of interest is large, the question of run time becomes more important. It is quite feasible to create a four-stage model for even the largest of the Multi-Modal Study areas; for example, the Central Scotland Transport Model covers much of Scotland from the border to north of Perth. However, models of this size do take a considerable time - a matter of days - to run

on even the high specification PCs readily available today, particularly if convergence between demand and supply is to be achieved, and especially with policies which are intended to shift markedly the balance of demand between private and public modes.

5.4.8 Note that this comment applies to the whole model, including the process of iterating between demand and supply to convergence, and then assigning the demands to the detailed networks to convergence, and it applies to models of areas of all sizes. It is quite possible to test individual components using fixed demands and therefore using the assignment models only, with the full variable demand model being used only for combinations of components and the complete strategies or plans.

Spatially aggregate models

5.4.9 A spatially aggregate strategic transport model can be used to forecast changes in the patterns of demand by mode. These changes in patterns of demand would then be fed down to spatially-detailed assignment models. It will clearly be important to ensure that the cost changes forecast by the two tiers of models are consistent.

5.4.10 This spatially aggregate approach would be more suited to those Studies in which it is required to develop a strategy first so as to provide the framework within which the development of a plan can proceed. Strategic transport models are quicker to run and can therefore be used to test a large number of policy options in a relatively short period of time.

5.4.11 The use of a strategic (spatially aggregate) transport model covering the whole study area may also be useful where it is more convenient to create spatially detailed assignment models for a number of discrete areas within the whole study area. The strategic model would provide a means for forecasting changes in demand which would be consistent between all the areas subjected to more detailed modelling.

5.4.12 In addition to the considerations outlined above, there will be many detailed modelling issues to be considered. These will often arise as a result of the problems which need to be examined, or in order to satisfactorily model specific solutions. Where possible, these issues should be anticipated and accommodated in the development of the detailed specification of the modelling system. However, it may not be possible to anticipate all such issues, and thus the detailed specification should allow for refinements of the model during the course of the study.

Land use/transport interaction models

5.4.13 The question of whether or not a land-use/transport interaction model is required also needs to be addressed. To answer the question, it is necessary to consider whether:

- the potential solutions are likely to cause significant shifts in the scale and pattern of economic activity, including jobs;
- the investigation of alternative land-use policies is a matter of key concern; and
- there is likely to be significant interaction between transport and land-use strategies.

5.4.14 If one or more of these matters are important and more informal methods (see paragraph 5.3.2) are not considered to be appropriate, then a land-use/transport interaction model may well be appropriate. However, two features of these models noted earlier are worthy of re-emphasis here:

- they need to cover a large area in relation to the interventions to be appraised; and

- because estimates of economic benefits cannot be derived from these models at present, it must be possible to isolate the transport model from the land use model, or a separate transport model must be available, to enable benefits to be estimated in the usual fashion (as explained in Chapter 6 of this volume and Chapter 6 in Volume 2).

5.4.15 It is worth noting that the use of a land-use/transport interaction modelling is likely to be more practical at a spatially aggregate level rather than at the spatially detailed level at which the assignment models for plan development are likely to operate.

Specification of Model

5.4.16 Once a conclusion has been reached about the modelling, then, as noted in paragraph 5.4.3, a detailed specification of the modelling system needs to be developed, taking account of:

- the availability of existing data and models;
- the requirements for new data collection and the costs and time involved;
- the time likely to be required to create and validate the model(s);
- any constraints on the study timescale and budget; and
- the views of the study Steering Group.

Some iteration between these issues may be required. For example, it may be that, because of budget or timescale constraints, rather more use is made of existing data and models than might have been envisaged had those constraints not existed.

5.4.17 It may be that some adjustment to the initially preferred approach would be required to take advantage of existing data and models. However, it is crucially important that, in doing this, sight is not lost of the study requirements and an inappropriate modelling approach does not result. For example, it would not be sensible to attempt to develop a transport plan using a spatially aggregate transport model alone.

5.4.18 Of particular importance is the need to take appropriate advantage of the national models (of car ownership and trip ends) and datasets (census journey to work matrix, CAPRI rail trip matrix, and roadside interview data index) created by the Department (see Appendix D of Volume 2 for further details).

5.4.19 Even if there are no timescale or budget constraints, the cost-effectiveness of the initially selected approach should be considered. It may be that some appropriate simplification in the modelling approach may yield a significantly quicker or cheaper approach while still yielding answers that are sufficiently robust for the required aim of the study.

5.4.20 Getting the technical details of this right relies quite heavily on the judgement of the modeller. However, it is important that the functionality of the proposed modelling system meets the needs of the Steering Group and of those relying on the output of the model. Full use should be made of the documentation available which describes tried and tested modelling techniques (as listed in Chapter 2 in Volume 2).

5.4.21 In Volume 2, the principles of model selection are explored in greater detail than in this summary. Also provided in Volume 2 is advice on (a) sources of more detailed guidance on modelling, (b) sources of useful data, (c) use of the Departments national models of car ownership and trip ends, (d) the availability of software and (e) the need for specialist modelling knowledge.

6 The Appraisal Process

6.1 Introduction

This chapter describes the appraisal process. It is structured in the following manner:

- Section 6.2 explains the **appraisal framework**, including the multi-modal version of the Appraisal Summary Table which is used to assess the achievement of the Governments objectives for transport (Step 6 in Figure 2.1);
- Section 6.3 discusses the ways in which the achievement of **local and regional objectives** may be assessed;
- Section 6.4 discusses ways in which the amelioration of **problems** may be assessed;
- Section 6.5 discusses the treatment of the supporting analyses of **distribution and equity**, **affordability and financial sustainability**, and **practicality and public acceptability**; and
- Section 6.6 discusses the process of **distilling the appraisal information** towards a final appraisal summary so that recommendations may be made (Step 10 in Figure 2.1).

6.1.2 The analyses which should be undertaken to obtain the entries to the AST are explained in Volume 2. Volume 2 also includes advice on the methods which should be used to undertake the **environmental impact assessment** (Step 7.2 in Figure 2.1) and the **cost/benefit analysis** (Step 7.3).

6.2 Overview of the Appraisal Process

The New Approach to Appraisal

6.2.1 The New Approach to Appraisal was introduced in the Governments white paper A New Deal for Transport. The Approach was developed by the DETR during the 1998 Roads Review for two purposes:

- choosing between different options for solving the same problem;
- prioritising between proposals; and
- assessing value for money.

6.2.2 The Approach includes the identification and assessment of problems, the identification of options, and the assessment of those options. Throughout this process, the approach works within the framework provided by the five objectives of environment, safety, economy, accessibility and integration set out in A New Deal for Trunk Roads in England (DETR, 1998a).

6.2.3 An important element of the New Approach to Appraisal is the inclusion of an Appraisal Summary Table (AST). In the case of the Roads Review, this was a one page tabular summary of the main economic, environmental and social impacts of a transport option. An Appraisal Summary Table was produced for each option and set out simply and concisely the key consequences of different options for tackling a particular problem using the five objectives, some of which were divided into sub-objectives.

6.2.4 It was not intended that the Appraisal Summary Table would itself be sufficient for decision making. The AST does not automatically provide a mechanistic way of reaching a decision, but summarises the effects in each area so that decision-takers have a clearer and more transparent

basis on which to make those judgements. The inclusion of any sub-objective in the AST, with the associated qualitative and quantitative analyses, cannot be used to imply weightings between objectives in forming decisions.

Appraisal in the Multi-Modal Studies

6.2.5 The approach to appraisal to be adopted in the proposed Multi-Modal Studies embraces fully the principles of the New Approach to Appraisal. Those elements of the New Approach which are concerned with the identification and assessment of problems and the identification of options have been discussed in earlier Chapters of this Guidance. For the proposed Multi-Modal Studies, the appraisal process has the following four appraisal strands.

- An **Appraisal Summary Table** (AST) is a multi-modal version of the AST developed for the Roads Review and displays the degree to which the five **Central Government objectives for transport** (environment, safety, economy, accessibility and integration) would be achieved (Step 6.1 in Figure 2.1). It is from this AST that a **judgement** would be made about the overall value-for-money of the option or options in achieving the Governments objectives. The information provided in the AST and its more detailed supporting documents will enable a consistent view to be taken about the value of the strategies and plans developed for the different study areas.

- An assessment of the degree to which the **local and regional objectives of the study** would be achieved (Step 6.2 in Figure 2.1) is likely to be of particular interest to the regional and local authorities, and the local people. Overlap between this appraisal strand and the previous one is to be expected.

- An assessment of the extent to which the **problems** identified would be ameliorated by the option or options achieved (Step 6.3 in Figure 2.1) is also likely to be of particular interest to the regional and local authorities, and the local people, and additionally the local transport providers. The changes in conditions which lead to a change in problem severity will be subsumed by the changes already taken into account in the assessment of the achievement of objectives; to that extent, therefore, there will be multiple-counting between this appraisal strand and the previous two. However, while changes in problems are only part of the total effects of an option, they are, arguably, the most important changes. After all, the process will have started off by identifying problems; it seems sensible to check to see what the option would do for those problems.

- **Supporting analyses** of distribution and equity, affordability and financial sustainability, and practicality and public acceptability (Step 6.2 in Figure 2.1) are likely to be of interest to both Central Government and the regional and local authorities, as well as the local people. The local transport providers will be particularly interested in the impacts on the financial sustainability of their operations.

Treatment of Social Inclusion in the Appraisal Framework

6.2.6 Encouraging social inclusion is an explicit component of the Governments policies on transport (see in particular Chapter 2 of A New Deal for Transport, DETR, 1998b). The Appraisal Summary Table provides the framework for assessing the impact of a particular strategy or plan on objectives for social inclusion. The Qualitative Impacts column on the AST may be used to highlight for particular sub-objectives the effects on different social groups. The supporting analyses of distribution and equity may be useful in assessing what these particular impacts are (see paragraph 6.5.3 and those that follow). Where specific social inclusion objectives are identified in a particular study, the assessment of the achievement of local and regional objectives (see paragraph 6.3.1 and those that follow) also provides a vehicle for highlighting the impacts of a particular options on social inclusion.

The Multi-Modal Appraisal Summary Table

6.2.7 The top row of the Appraisal Summary Table has space for:

- the option number;
- the option description, which should be a few key words of text which summarise the main thrust of the option, along with a reference to a single page summary of the option, coupled with another single page (if required) of alternatives considered and rejected with brief reasons for their rejection;
- a reference to single page summary of the problems on the do-minimum transport system and a single page summary of the changes in those problems which would be brought about by the option; and
- the total cost of the option to Government (including investment, subsidy, maintenance, operating and enforcement costs), over the full appraisal period, and discounted to a present year.

6.2.8 The AST then has space to record the impacts of the option under the following **objectives** and *sub-objectives*.

- **environment** - to protect the built and natural environment

  *to reduce **noise**,*
  *to improve **local air quality***
  *to reduce **greenhouse gases***
  *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 fitne***
  *to improve **journey ambience***

- **safety** - to improve safety

  *to reduce **accidents***
  *to improve **security***

- **economy** - to support sustainable economic activity and get good value for money

  *to improve **transport economic efficiency***
  *to improve **reliability***
  *to provide beneficial **wider economic impacts***

- **accessibility -** to improve access to facilities for those without a car and to reduce severance

  *to improve **access to the transport system***
  *to increase **option values***
  *to reduce **severance***

- **integration -** to ensure that all decisions are taken in the context of the Governments integrated transport policy

  *to improve **transport interchange***
  *to integrate transport policy with **land-use policy***
  *to integrate transport policy with **other Government policies.***

The AST is shown in tabular form below.

6.2.9 The information presented in the Appraisal Summary Table is, where possible, based on the results provided by established techniques to assess the environmental, economic and social consequences of options. The approach is largely based on the Cost/Benefit Analysis (CBA) and the Environmental Impact Assessment (EIA). The Appraisal Summary Table brings information from these together to give a fair and unbiased overall description, without giving prominence to any one type of effect or to benefits expressed in monetary terms compared with those which cannot be monetised.

6.2.10 The main impacts in relation to each of the sub-objectives are summarised in text with any relevant quantified information. A summary assessment is then given to indicate whether the impact in each category is generally beneficial or adverse and how large it is. Where monetary values can be derived, as in the case of safety benefits or transport user benefits, the summary assessment uses those values. Where impacts can be quantified but not monetised, the summary assessment is quantitative. Impacts that cannot be quantified are assessed on a (usually) seven point scale (note that these scales are not necessarily cardinal in nature). Because each seven point scale measures a very different objective, they cannot be compared with each other.

Option		**Description**	**Problems**	**Present Value Cost to Government £m**
OBJECTIVE	**SUB-OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE MEASURE**	**ASSESSMENT**
ENVIRONMENT	**Noise**			net properties win / lose with scheme
	Local Air Quality			concentrations weighted for exposure
	Greenhouse Gases			tonnes of CO_2
	Landscape			Score
	Townscape			Score
	Heritage of Historic Resources			Score
	Biodiversity			Score
	Water Environment			Score
	Physical Fitness			Score
	Journey Ambience			Score
SAFETY	**Accidents**			PVB £m
	Security			Score

ECONOMY	**Transport Economic Efficiency**			Users: NPV £m Private providers: NPV £m Public providers: NPV £m Other Government: NPV £m
	Reliability			Score
	Wider Economic Impacts			Score
ACCESSIBILITY	**Option values**			PVB £m
	Severance			Score
	Access to the Transport System			Score
INTEGRATION	**Transport Interchange**			Score
	Land-Use Policy			Score
	Other Government Policies			Score

Use of the Appraisal Summary Table

6.2.11 The AST relates to one options only. In the case of a study which involves the development of a transport strategy (before going on to develop a plan to enact the preferred strategy), it may be that the options being tested and appraised are, in fact, alternative strategies - that is, complete packages of measures which apply to the whole study area. In these cases, an AST should be produced for each alternative strategy. It is expected that testing would also be undertaken to examine the contribution of each of the main elements of the strategies to the whole. In general, the discipline of the AST should be maintained for each element, although it may be that not all objectives need be addressed in every case. For example, if it was found that a particular element had a large negative economic value, it may be considered unnecessary to undertake any further analyses under other objectives.

6.2.12 Normally, a transport plan would be developed by testing individual elements separately before assembling the more promising components into a comprehensive whole. In developing a plan, it is likely that the individual elements would be examined in somewhat greater detail than might be the case with the elements of a transport strategy. It may be more appropriate, therefore, for a complete AST to be prepared for each element of a Plan and, where different options are considered for each element, for each option for each element, although some detail may be sacrificed in the early stages. Complete ASTs are required for each transport plan prepared, although these may be few in number.

6.2.13 Complete ASTs are required - for input to the distillation process described in Section 6.6 - for each alternative strategy and plan. ASTs may also be completed, either fully or partially, for

each of the elements of a strategy or plan which are tested separately, as an aid to deciding whether they should feature in any of the alternative strategies or plans.

Assessing the Overall Value for Money of the Option

6.2.14 The table of impacts in the AST will contain all the significant costs and benefits of an option (whether an individual intervention, or overall strategy or plan). The balance of this information gives the overall net value of the option. It takes account of **all** factors, not just the economic worth, and also takes account of all kinds of impact, both monetised and non-monetised, and qualitative as well as quantitative information.

6.2.15 The way in which this overall net value is derived is by **judgement**. The person assessing the overall net value - the assessor - is required to derive their own estimate by exercising their own judgement about the relative importance of the various impacts - the costs and benefits shown in the table of impacts in the AST. Thus, different people may come to different conclusions about the overall net value of an option, depending upon the weights which they attach to the impacts.

6.2.16 In order to make an assessment of value for money, assessors will need to compare their assessment of overall net value with the cost of the project. Because affordability to Government will often be a critical factor in deciding whether options are realistic and practical, it is recommended that the Cost to Government, provided at the top right of the AST, be used for this comparison. This cost will often include a different range of costs from that defined by the Costs term in the more usual Benefit Cost Ratio. Further guidance on this topic is provided in Appendix F in Volume 2.

6.2.17 In forming these judgements, the assessor may wish to consult the analyses which have been undertaken to derive the summary information presented in each line of the AST. Of necessity, the information in the AST is a summary and may not be readily understood by some readers of the table. In these circumstances, material underlying the AST may enable the assessor to gain the necessary understanding.

Interpretation of the Information in the AST Rows

6.2.18 The assessor also needs to be aware that the information in the different rows of the AST applies to different appraisal periods. In what follows, it is presumed that the transport model, on which much of the information is based, would represent a typical weekday in the forecast year or years.

- The **noise** indicator relates to an 18-hour period (0600 to 2400) on a typical weekday in the forecast year. This indicator is the same whether a single intervention or a strategy or a plan is being appraised. Usually, information for the year furthest into the future would be used.

- The **local air quality** indicator relates to the whole of the forecast year for strategies, and to an annual average hour in the forecast year for individual interventions and plans. Again, information for the year furthest into the future would be used.

- The **climate change** indicator relates to the whole of the forecast year, i.e., it is an annual figure. This indicator is the same whether a single intervention or a strategy or a plan is being appraised. Again, information for the year furthest into the future would be used.

- For overall strategies and plans, the **accident** and **option value** indicators are Present Values of Benefits, and **the transport economic efficiency** indicators are Net Present Values, which relate to all the days, both weekday and weekend, over all of the 30 years in the appraisal period, discounted

to a particular present value year. For individual interventions, these indicators may relate to all the days in a single forecast year, rather than the full 30-year appraisal period.

- The **reliability** and **severance** scores relate to a typical weekday in a single forecast year (the later year, if forecasts are produced for two years). This indicator is the same whether a single intervention or a strategy or a plan is being appraised.

- The entries under all the other sub-objectives relate to the point in time at which the intervention, strategy or plan would be implemented.

6.3 Appraising the Achievement of Local and Regional Objectives

6.3.1 As discussed in Chapter 3, it is not appropriate to be prescriptive about what local and regional study objectives are set. What is required, however, is that the Steering Group members agree what these objectives are, and that they provide an assessment of the performance of the strategies and plans against those objectives. In order to ensure that the assessment is not overly judgmental or impressionistic, the definition of a set of key indicators is recommended against which to measure the performance of the strategies or plans.

6.3.2 As noted in Chapter 3, it is expected that local and regional objectives will nest within Central Governments five objectives for transport. It may be possible, therefore, to structure the summary of the achievement of these objectives in a similar manner to the Appraisal Summary Table employed for Central Governments objectives.

6.3.3 In many instances, it may well be sensible and cost-effective to use the same indicators for assessing performance against local and regional objectives as are used to measure impacts in the Assessment Summary Table. Differences may arise in that different or supplementary indicators may be used for some impacts.

6.3.4 The assessment against local and regional objectives will focus on the performance of the strategies or plans from the perspective of the stakeholders (travellers, residents, environmental interests, business interests, planning interests) within the study area. This focus may give quite different results from the main analysis in the AST. For example, there will be particular interest in the impact of strategies or plans on regional economic activity and employment. Where the forecast is that region A will make economic gains of X and that these are implicitly partly or wholly displacement from region B, this needs to be made absolutely clear in the supporting documentation, since the regional view and the national view may then legitimately be different.

6.4 Appraising the Impacts on Problems

6.4.1 Chapter 3 has dealt with methods of identifying problems, considering both problems identified by objective measurement against thresholds, and problems identified from evidence of public perceptions. These methods will have led, at an early stage of the process, to the formulation of a statement of transport-related problems. Methods will have been devised for displaying and analysing problems such as plots, tables and text. The problem analysis will have been summarised on a single sheet for the do-minimum and each of the options.

6.4.2 During the appraisal process, the setting of thresholds and the appraisal of strategies or plans in terms of the amelioration of problems can give a sharper focus to strategy or plan development. It can also help to answer the question of whether problems are solved or at least addressed, or whether a number of problems remain. In order to do this, it will be necessary to find appropriate performance measures to indicate whether implementation of a strategy or plan moves the system towards, away from or across a threshold of acceptable performance.

6.4.3 In considering system trends, both absolute and relative performance are relevant:

- absolute performance refers to whether conditions are getting better or worse in relation to current (or base year) conditions; and
- relative performance refers to whether conditions under the strategies or plans are forecast to get better or worse in relation to the do-minimum case against which the strategies are tested.

As in other contexts in this report, these relative measures will only be meaningful if the base case is a realistic one which can genuinely be expected to occur in the absence of positive policy action.

6.4.4 The appraisal of strategies in terms of amelioration of problems is not without difficulties:

- there is a conceptual difficulty in suggesting targets or thresholds for important problems relating to economic efficiency, such as travel costs and journey times, and thresholds do not sit comfortably with appraisal practice which counts all time saving and operating cost changes whether in congested or uncongested conditions;
- any thresholds may be to a degree arbitrary, and it may be difficult to pitch thresholds at the right level - they may not be attainable or too easily achieved; and
- what is, or is not regarded as acceptable - where to set thresholds - is itself a moving target, scientific particularly in relation to air quality where the evidence on harmful effects of emissions is changing rapidly.

6.4.5 Overall, whilst assessment of strategies or plans in relation to their contribution to solving identified problems is a useful exercise which is important for the decision making process, it is not a substitute for assessing the extent to which strategies or plans offer value for money against objectives.

6.5 Supporting Analyses

6.5.1 There are three additional groups of issues which are relevant to the choice of multi-modal strategy or plan but do not fit easily within the AST. This is because the AST always takes the perspective of the overall public interest at a national level, whereas the following issues reflect a more focused view of the implications of the proposed strategy or plan for particular groups of users, non-users, operators and public sector authorities. These issues are:

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

6.5.2 Each group is dealt with in a separate Supporting Analysis, which should be provided to the assessor(s) (decision-maker(s)) along with AST, its supporting worksheets, and other information on the achievement of local and regional objectives and the amelioration of problems. The following sections outline the main issues and offer guidance on how to carry out the assessment. The decision as to how much importance to place on each Supporting Analysis in choosing between alternative strategies will be a matter for the assessor(s).

The Distribution and Equity Supporting Analysis

6.5.3 This supporting analysis is designed to show the distribution of the overall impacts summarised in the AST, thereby enabling a judgement to be made about the fairness of the impacts across those affected by the strategy or plan.

6.5.4 The main determinants of the distributional analyses that can be undertaken will be:

- the spatial basis for the transport model and the degree of segmentation of the travel demand within the model; and
- the geographical relationship between the interventions making up the strategy or plan and factors which have a geographical position, such as the population, designated areas, water resources, etc.

6.55 In the following paragraphs, some ideas are presented about the kinds of distributional analysis which could be carried out and ought to be considered under each of the sub-objectives in the AST for which distributional analyses are appropriate.

6.5.6 **Noise and local air quality** are related to traffic. Thus, the geographical distribution of noise and air quality can be displayed at the level of detail at which traffic information is output from the transport model. A GIS is a useful tool for relating changes in noise and air quality to factors such as population, sensitive areas, and so on.

6.5.7 The geographical distribution of the physical impacts of the interventions on **landscape, townscape, biodiversity, heritage and water resources** can be displayed using a GIS. The worksheets for these impacts will provide useful supporting information on the nature of the resource and its rarity, importance and so on.

6.5.8 Savings in **accidents** included in the accidents row of the AST are calculated from changes in personal injury accidents by severity class (slight, severe, fatal) and type of road. Tabulations can therefore be prepared to show the distribution of the changes in accidents by these dimensions. Plots may also be prepared using a GIS showing the changes in accidents on individual roads, although not by specific location.

6.5.9 The **transport economic efficiency** worksheet (explained in Chapter 6 in Volume 2) provides a breakdown of the Net Present Value against the following recipients of costs and benefits/disbenefits:

- personal travellers by mode (car, bus and coach, rail, walk/cycle, other);
- freight (road, rail, other); and
- transport system operators (road, rail, bus and coach, other).

6.5.10 The personal traveller benefits/disbenefits may also be broken down by trip purpose. This could be done by the two broad categories to which different values of time are applied: work and non-work. Alternatively, with some extra computation, it could be done by each of the trip purposes distinguished in the transport model.

6.5.10 All these calculations are conducted on a matrix basis. This means that the incidence of the benefits/disbenefits accruing to each origin or destination zone can be displayed geographically.

6.5.11 Given that the aim of some elements of a strategy or plan may be to stimulate economic regeneration in specific areas, the distribution of the **wider economic impacts** in this sense will be implicit in the analysis which underlies the entry into the AST.

6.5.13 Analyses of **access to the transport system** are undertaken on a spatial basis, against the background of car ownership. This analysis therefore provides useful information about the distribution and fairness of an options impacts.

6.5.14 It is not clear that distributional analyses under the **other sub-objectives**, although possibly feasible, would add much or be worthwhile in the context of large-scale studies. Their value should therefore be considered carefully before any further analysis is undertaken.

The Affordability and Financial Sustainability Supporting Analysis

6.5.15 Although the prime criterion against which strategies and plans are to be assessed is overall value for money, as expressed in the AST, steering groups should have regard to the financial performance of the strategies or plans. In doing so it will be helpful to distinguish between services provided by the private sector and those provided by the public sector. Appendix B sets out default assumptions regarding the sector providing the different modes. The role of this analysis is to provide an overall assessment of the likely public expenditure required to ensure the provision of the option under consideration.

Affordability and Financial Sustainability (AFS) - Sheet 1 of 2								
Private Sector Affordability and Financial Sustainability								
Private Sector Investment	TOTAL (undiscounted)		**Breakdown by organisation**					
Investment Cost			**Rail route 1**	**Rail route 2**	**Bus corridor 1**	**Bus corridor 2**	**Rail freight**	**Other**
Year I								
Year ii								
Year iii								
Year iv								
Year v								
TOTAL		*(1)*						
Capital Grants		*(2)*						
Private Sector Operators	TOTAL (undiscounted)		**Breakdown by organisation**					
Year 1			**Rail route 1**	**Rail route 2**	**Bus corridor 1**	**Bus corridor 2**	**Rail freight**	**Other**
Change in operator costs		*(3)*						

Change in operator revenue		*(4)*						
NET IMPACT		*(5)=(4)-(3)*						
Subsidy		*(6)*						
Year 5								
Change in operator costs		*(7)*						
Change in operator revenue		*(8)*						
NET IMPACT		*(9)=(8)-(7)*						
Subsidy		*(10)*						
Year 10								
Change in operator costs		*(11)*						
Change in operator revenue		*(12)*						
NET IMPACT		*(13)+(12)-(11)*						
Subsidy		*(14)*						
Private Sector NET IMPACT								
Investment net of capital grant		*=(1)+(2)*						
Operations net of subsidy								
Year 1		*=(5)+(6)*						

Year 5		*=(9)+(10)*						
Year 10		*=(13)+(14)*						

Affordability and Financial Sustainability (AFS) - Sheet 2 of 2						
Public Sector Affordability and Financial Sustainability						
Public Sector Investment	TOTAL (undiscounted)		**Breakdown by organisation/budget**			
Investment Cost			HA	Local hways	Light rail	Other
Year I						
Year ii						
Year iii						
Year iv						
Year v						
TOTAL		*(15)*				
Private Sector Contributions		*(16)*				
Investment net of contributions		*(17)=(15)+(16)*				
Public Sector Operations			**Breakdown by organisation/budget**			
Year 1			HA	Local hways	Light rail	Other
Change in operator costs		*(17)*				
Change in operator revenue		*(18)*				
NET IMPACT		*(19)=(18)-(17)*				
Year 5						
Change in operator costs		*(20)*				
Change in operator revenue		*(21)*				

NET IMPACT		*(22)=(21)-(20)*				
Year 10						
Change in operator costs		*(23)*				
Change in operator revenue		*(24)*				
NET IMPACT		*(25)-(24)-(23)*				

6.5.16 To aid this process, an Affordability and Financial Sustainability (AFS) table should be completed for each strategy or plan. Advice on completing an AFS table is provided in Appendix B. The table summarises the **financial** impact on private sector providers (Sheet 1) and on public sector providers (Sheet 2), of carrying out one particular strategy. Impacts are measured relative to the agreed do-minimum baseline case so they represent changes in costs and changes in revenues. The entries in the table include the initial investment costs associated with the option, the change in ongoing operator costs and revenues and the financial transfers between the private and public sectors which are being assumed as part of the option definition.

6.5.17 Any costs which are identical in the do-minimum and the option, for example the fixed component of highway maintenance costs on the base network (the Group 1 costs in DMRB Volume 13 Section 1 Part 2 Ch. 9), will not appear in the AFS table. However, costs which are common to all options but which do not appear in the do-minimum, such as maintenance of a new road link which appears in all options, must be included in the AFS tables for all options.

6.5.18 It is important to note that the AFS table presents **financial** impacts. In addition, it only provides information on operating costs and revenues for selected years during the appraisal period. This information is useful for the consideration of affordability and financial sustainability, since it enables the timing of costs and the build-up in revenues to be considered. Assessors should note that the Transport Economic Efficiency (TEE) table (which supports the AST and is discussed in depth in Volume 2, Chapter 6) provides complementary information. There, all revenues and costs are considered over the whole appraisal period and presented in present value terms. This provides an overall assessment of the economic impact of the project.

6.5.19 The key question for Financial Sustainability is the extent to which strategies or plans are self-supporting from revenues that is, can revenues cover operating costs for each year during the operating period; can revenues cover all costs, including investment costs? Where options would not be fully self supporting, this raises the question: what grant or subsidy would be required to deliver the option?

6.5.20 The costs, revenues and net impact should be disaggregated by modal groups and, where feasible, by corridor or operator. Where a strategy or plan is self supporting overall but for certain groups the outcome is not self supporting, this is important information which needs to be brought out, since grant or subsidy may still be required if the strategy or plan is to succeed.

6.5.21 Where grant or subsidy does appear to be needed, Studies will need to consider whether the need for support would be likely to meet the relevant decision criteria. This will only be feasible in most cases at a very broad brush level of analysis, the content of which should be made clear by the consultants. Further advice on this is given in Appendix B.

6.5.22 In assessing Affordability, it will be necessary for the Steering Group to take a view as to the likelihood of public funds being available of the scale suggested by the total requirement from the two sheets. Advice on affordability will be provided by Government Offices and the SSRA. Where appropriate, affordability may be improved by the use of possible parking or road user charges, though this should be considered as a longer-term option

The Practicality and Public Acceptability Supporting Analysis

6.5.23 In the past, some studies have been less effective than they might have been because their recommendations breached some constraint. Thus strategies or plans may be desirable but not fundable, or may create a majority of winners with a minority of uncompensated losers who will form a vocal opposition, or may be contingent on future funding to complete a network which cannot be guaranteed, or may be risky against certain scenarios. There therefore needs to be an overall assessment of the practicability of each strategy or plan and, where relevant, what countervailing or complementary measures are needed to make the strategy or plan practical. Ideally, these measures should be built into the strategy or plan for testing, but it is recognised that this may not always be possible.

The following checklist may be helpful in assessing practicability.

- **Feasibility**. What is the likelihood of the decision being implemented? Technical and legal issues need to be considered as well as political and funding aspects. Consideration of feasibility and phasing will be interconnected.

- **Enforcement**. Does the strategy or plan require other, supporting enforcement measures to ensure that it is effective? If possible, measures should be self-enforcing.

- **Area of interest ("breadth" of the decision)**. What is the scale of the strategy or plan? How wide a range of activities and how many/what agencies does it involve? This is not merely a matter of specifying the geographic extent of the strategy or plan but of clarifying, for example, the role played by the local authorities compared to that by other bodies whose activities are embraced by the strategy or plan.

- **Complexity ("depth" of the decision)**. Does the strategy or plan involve numerous factors? Most transport policy decisions are, of course, complex but the extent varies. Removing traffic from a town centre, for example, encompasses a wide range of complex technical issues. Other decisions, for instance re-directing a cycle route, may be relatively simple.

- **Time-scale**. What is the time-scale for the implementation and of the effects of the strategy or plan?

- **Phasing**. What is the trade-off between making at least some kind of decision at an early stage (even though it may be revised later), as against postponing it? Early implementation of the elements of the strategy or plan that can be undertaken quickly will achieve political (and often public) support. The phasing of funding must be closely allied to the phasing of other elements of the strategy or plan, for example, design and construction. While all the strategy or plan components will need to be implemented if the original objectives are to be met fully, some policies can be adopted in stages.

- **Partitioning**. Can the strategy or plan be broken down into a series of simpler, discrete components? For example, could a proposal for area-wide traffic calming be divided up into smaller, more manageable, units? Parts of partitioned strategies or plans may not be implemented over a longer time period because they become redundant. Progressive pedestrianisation of a town centre is another illustration of the possible partitioning of proposals. Whereas the requirement of phasing implies that one measure follows another, the issue of partitioning merely means that a measure can be broken into separate components, but that all will not necessarily be implemented.

- **Complementarity**. Are the proposals complementary or are they independent? Some measures will make a significant contribution only if undertaken in association with others. Others are quite distinguishable and separate. Thus, the benefits of complementary measures undertaken in unison are greater than they are individually but the joint implementation may be more difficult to achieve.

- **Conflicts**. Does the measure conflict with others that have been or are likely to be made? Is the construction of a new radial route compatible with bus-priority measures on a parallel road, for instance? It is particularly important that measures do not conflict: consistent policies are essential for effective strategies or plans.

- **Political nature of policies and proposals**. How should the strategy or plan relate to the way that political choices are made? It is important that technical choices, which are primarily concerned with the specification of schemes and measures, are not confused with political choices, relating to policies.

6.5.25 The analysis of practicality should have given some clues to public acceptability. In addition, public acceptability will be judged from the responses to the public consultations in Steps 4 and 11 in Figure 2.1 (see Chapter 2). Again, the outcome of those consultations should trigger the question "is the strategy fatally flawed, or are there accompanying measures, which could help to overcome the problems?". Also, it is essential to ensure that the public is presented with a base case against which to assess the alternatives.

6.5.26 As well as the acceptability of the strategy to the general public, another dimension which must be considered under this heading is the level of support for the strategy from the key stakeholders who will be involved in implementation of the approved strategy. It cannot be stressed too strongly that this is not an academic exercise; these are studies which are intended to lead to practical results on the ground. Part of the task of the consultants and steering groups will be to create a shared plan to which the key stakeholders have a genuine commitment. This commitment must be achieved by involving the stakeholders via the steering group or otherwise, at every stage of the study from option definition to screening to strategy definition to final appraisal.

6.6 Distillation Towards the Final Appraisal Summary

6.6.1 To recap, the appraisal process of strategies or plans will have four strands:

- the Appraisal Summary Table, from which the overall value for money in achieving central Governments objectives for transport should be derived;

- assessment of the degree to which local and regional objectives would be achieved;

- assessment of the degree to which problems would be ameliorated; and

- supporting analyses of the implications for distribution and equity, affordability and financial sustainability, and practicality and acceptability.

Distillation of the Appraisal Information

6.6.2 The AST is, by definition, a **summary** of the indicators which are to be used to assess the extent to which the Governments objectives for transport would be met by the option. It enables the assessor to gauge the overall value for money of the option. **The final AST for each of the options should be confined to a single page and should present the impact on all the sub-objectives - even where the impact is very small or neutral.**

6.6.3 However, to assist in the process of selecting the preferred option, some distillation may be required to focus more on the important facets. In this context, important facets means:

- that information which contributes significantly to the overall worth of an option; and
- that information which helps the decision-taker distinguish between options.

6.6.4 This means that the information used to select the preferred option could vary between Studies. For example, if impacts on heritage were significant and radically different between options in one study and completely unimportant in a second study, information about heritage would be required in the first case but not the second. Thus, the omission of information under any one sub-objective or objective from the working ASTs would imply that it was unimportant in the particular study and that it did not assist in distinguishing between options, **but** it would not imply that the issue had **not** been considered. That it was unimportant in the particular study could be verified by inspection of the final ASTs for the study which should present the impact on **all** the sub-objectives.

6.6.5 Summaries of the information under each of the other appraisal strands should also be prepared. These should also fit on a single page to match the AST, and should be along the following lines.

- The **local and regional objectives** should nest within each of the five objectives of Central Government, and the summary of the options effectiveness against these objectives should follow the format of the AST. If there are more local and regional objectives than can fit within a single page, a selection should be made, omitting those for which relatively insignificant impacts were found for the option concerned.
- The **problems** for the forecast year do-minimum case will have been summarised on a single sheet of paper (with map background) at the outset. For each option, a further single sheet should be produced which shows how the do-minimum problems would change with the option.
- The main points from the **supporting analyses** should also be summarised on a single sheet of paper for each option. This means identifying the important points about the option from each of the three supporting analyses: distribution and equity, affordability and financial sustainability, and practicality and public acceptability.

The Final Appraisal Summary

6.6.6 For each strategy or plan option, there will, at this stage, exist up to seven single sheets which summarise various aspects of the appraisal, as follows:

- an annotated map describing the strategy or plan option;
- possibly a separate sheet listing the alternatives considered and their reasons for rejection (if this information cannot be fitted onto the previous sheet);
- an AST for Central Governments objectives;
- a summary of the achievement of local and regional objectives;
- a map showing the changes in the do-minimum problems which would be brought about by the strategy or plan option (backed by two maps showing the problems in the base year and in the horizon year on the do-minimum network, which are, of course, common to all options); and
- a summary of the main points from the Supporting Analyses.

In addition, there will also be worksheets for each sub-objective on the Central Government AST, though these may not be provided for the assessor unless requested.

It may be that the assessor (Steering Group members) can cope with this level of information and that no further distillation is necessary. If further distillation is required, it is suggested that the following steps are taken:

- delete that information in the summary of achievement of the local and regional objectives which adds little or nothing to the comparable information in the AST for Central Governments objectives; and
- delete any information from the Supporting Analyses which are not central to the appraisal.

6.6.8 Judgement will play a clear role in this distillation process. The original summary sheets and worksheets should always be retained so that other people can judge the distillation process for themselves.

References

Department of the Environment, Transport and the Regions (1998a). A New Deal for Trunk Roads in England.

Department of the Environment, Transport and the Regions (1998b). A New Deal for Transport: Better for Everyone.

Appendix A

Final Programme of Multi-Modal and Roads-based Studies

Tranche 1 - to begin 1999-2000

Multi-modal studies
West Midlands to North West Conurbation
London Orbital
Access to Hastings
Tyneside
West Midlands Area
South and West Yorkshire Motorway Box
London to SW and South Wales
North South Movements in East Midlands
SE Manchester
Cambridge to Huntingdon
A453 (M1-Nottingham)

Roads-based studies
A1 Bramham to Barton
A66 Safety
M40/A46 Longbridge roundabout
A3 Hindhead
M1 Junction 19
A419 Blunsdon

Tranche 2 - to begin 2000-2001

Multi-modal studies
Southampton to Folkestone
London to South Midlands
West Midlands to Nottingham
London to Reading
Hull
London to Ipswich

Roads-based studies
Deeside Park Junctions
Norwich to Great Yarmouth
A5/A483 Shrewsbury to Chester
A38 Derby Junctions

Provisional Tranche 3

Multi-modal studies
A34 North from Southampton
A47 West of Norwich
A1 North of Newcastle

Appendix B

1 Completing the Affordability and Financial Sustainability (AFS) Tables

1.1 The AFS Tables are intended to assist analysts and assessors in their consideration of affordability and financial sustainability. Because these issues will be subject to a significant level of uncertainty for the proposals examined during the Studies, analysts should not be constrained by the layout of the tables illustrated in Chapter 6. Analysts should not hesitate to make changes to the layout which would make the Tables more useful for the Study in hand.

1.2 It will usually be helpful for the information in both Tables to be disaggregated from the perspective of individual stakeholders as far as is feasible. Thus, for the Private Sector Table, disaggregation of the modal information by corridor or operator should be considered. For the Public Sector Table, it will usually be possible to disaggregate by central and local government. In addition, it may at times be desirable to subdivide local government to show highways separately.

1.3 Chapter 6 in Volume 2 provides a broad overview of costs, identifying those which should be regarded as investment costs and those which should be regarded as operating costs. These two groups are represented separately in the AFS Tables.

1.4 In many cases, investment will take place over a number of years. Where this is the case, and the distribution can be anticipated, it should be shown on the AFS Tables. Guidance on this for highway schemes is given in DMRB Volume 13, Section 1, Part 2, Chapter 7.

1.5 For operating costs and operator revenues (where applicable), the values required are the differences between the Do minimum and the Do something (strategy) scenarios. In addition, the Private Sector table should include details of any subsidies assumed for the option being considered. It is recommended that all these figures should be prepared for three separate forecast years, to allow the cumulative effects of the strategy to be assessed. Analysts will need to use their judgement to choose the number and timing of years to be considered, in order to meet the needs of the Steering Group. It will usually be appropriate to use the same years as are used to carry out the Transport Economic Efficiency analyses (see Volume 2, Chapter 6).

1.6 The Public Sector table should record any Private Sector contributions, where there is evidence to suggest that these will be forthcoming.

1.7 All values in the AFS Tables should be net of any indirect taxes that can be reclaimed by operators (public and private sector).

Default funding arrangements and current sources of grant and subsidy

1.8 In order to complete the Affordability and Financial Sustainability (AFS) table it is necessary to make assumptions regarding the sector providing the different modes and the funding routes available for their funding. In order to provide overall consistency between Studies, the following paragraphs and Table B.1 set out default funding arrangements that should be assumed. The text and Table briefly discuss current sources of grant and subsidy, the key decision criteria adopted and provide references to further advice.

1.9 **Roads (both trunk and other):** Schemes identified in the Studies should generally assume public sector funding. Alternative procurement options (such as procurement under Public-Private Partnership arrangements) are unlikely to be relevant for the Studies.

1.10 **Bus services:** New services identified in the studies with potential commercial viability should be considered as private operator funded schemes. For services which appear to be unlikely to be commercially viable, the extent to which operating grant is likely to be required to induce private sector take-up should be considered. Details on service subsidy agreements are covered in DOT Circular 5/85[1].

1.11 **Bus Infrastructure:** Proposals for major bus infrastructure should be considered for funding through Local Transport Plans. Any potential for private sector contributions should also be identified where possible.

1.12 **Light Rail:** Grant funding for the capital costs of light rail schemes is available under Section 56 rules. Such funding is only available for schemes expected to make an operating surplus.

1.13 **Heavy Rail:** New passenger services identified with potential commercial viability should be considered as private operator schemes. For services which do not appear to be commercially viable, the potential grant required from the SSRA[2] should be considered. Details on the appraisal of support for passenger rail services are contained in SSRAs planning criteria (1999).

1.14 **Rail freight:** Two forms of grant are available for moving freight by rail: Freight Facilities Grant and Track Access Grant. Advice on the grants can be found in DETRs Rail Freight Grants (1999).

Table B.1 Funding Routes and Default Assumptions for Multi-Modal studies

Mode	**Default assumption for funding in Studies**	**Funding Routes for non-commercially viable services**
Road	Public sector provision by HA or LHA	For LHA, through Local Transport Plan
Bus	Private sector bus operator	Tendered subsidy to bus operator - Circular 5/85 service subsidy agreement
Bus- infrastructure	Public sector provision by Local authority	Through Local Transport Plan
Light Rail	Public sector provision by Local Authority	Contribution towards capital costs - Section 56 (for schemes with operating surplus)
Heavy Rail passenger service	Private sector train operating company, Railtrack	SSRA grant to private rail operator, Railtrack
Heavy Rail freight service	Private sector rail freight operator, Railtrack	DETR Rail Freight Grants

Calculation of values to be used in the Transport Economic Efficiency worksheet

1.15 In order to calculate the values to be used in the Transport Economic Efficiency (TEE) worksheet (discussed in depth in Volume 2, Chapter 6), the following adjustments must be made:

- interpolation and extrapolation of operating costs, revenues and, where appropriate, subsidies to cover the whole appraisal period;

- adjustment for differences between financial analyses and social cost/benefit analyses, as discussed in DMRB Volume 13 Section 1 Part 2 Chapter 6;
- adjustment to the market price unit of account (see below);
- adjustment to the price base year (1994) using the Retail Price Index (and, for road construction costs, the Relative Price Factor - see DMRB Volume 13 Section 1 Part 2 Chapter 7);
- adjustment to the discount base year (also 1994) using HM Treasurys test discount rate (6% per annum).

1.16 Care will be required to ensure that the adjustment to the market price unit of account is carried out correctly. Where costs are not subject to VAT (or VAT can be reclaimed by the operator) these costs should be multiplied by (1+t), where t is the average rate of indirect tax on final consumption. However, where costs are subject to VAT which is not recoverable (such as construction costs borne by the Highways Agency), no further adjustment is required.

1 In addition, a revised version of the TAS Partnership Code of Good Practice for Local Authority Tendering for Local Bus Services was published in June 1999

2 OPRAF was rebranded SSRA in July 1999