

Summary

The view that there are problems with the transport system is the root of any transport proposal. In this Guidance, a *problem* is something that results in a shortfall in meeting objectives. The definition of objectives and the identification of problems are naturally iterative exercises, one informed by the other.

The *problem identification* stage should not be limited to just the identification of problems that can be quantified through the analysis of data or the use of a transport model. It should also consider "perceived problems", that is problems that are experienced but cannot be easily encapsulated through data analysis.

The problem identification process should look beyond their immediate manifestation on the transport system and should explore their root causes.

Existing or new data can assist in the identification of problems and guidance is given on which data may be helpful and how it can be used. Transport models are also a potential source for analysis of existing and potential problems, but models must be treated with caution. Their contribution is limited to the modes and interactions that are modelled and this may not cover the full set of problems pertinent to a study. Each model is underpinned by a set of implicit and explicit assumptions that will influence any assessment of problems. Such assumptions will need to be understood and considered.

Consultation with stakeholders and the public can provide a valuable input into the problem identification process.

When considering problems it will also be important for the planner to consider *issues* and *constraints* that face the planning exercise. "Issues" are uncertainties that the study may not be in a position to resolve, but must work within the context of. "Constraints" are the bounds within which a study is being undertaken.

The Scottish Executive requires a textual statement of the problems, issues and constraints along with the appraisal to accompany each submission.

3. ANALYSIS OF EXISTING AND POTENTIAL PROBLEMS

3.1 Introduction

- 3.1.1 Alongside the definition of the objectives, the identification of existing and potential problems with the transport and land-use system under consideration should form the starting point for the development of a transport proposal.
- 3.1.2 The process of defining objectives, described in the previous chapter and the identification of existing and potential problems, the subject of this chapter, are necessarily parallel and iterative processes. An initial assessment of problems should inform objective setting, which in turn may highlight the need for further investigation of problems. It is unlikely that objectives can be finalised until the problem identification exercise is complete.
- 3.1.3 As well as a clear statement of objectives the Scottish Executive expects to see that a consideration of existing and potential problems has been an integral part of the methodology adopted to develop a proposal. A statement of existing and potential problems that the proposal is intended to address or ameliorate is therefore required.
- 3.1.4 Whilst this chapter focuses on problem identification, the potential for opening up opportunities should be tackled. Throughout the analysis process described in this chapter, planners should be asking whether a given problem conceals a hidden opportunity.

3.2 Terminology

- 3.2.1 In this chapter, *problems* are effectively the genesis of a proposal and are measurable through shortfalls in meeting the objectives. For example, rapid traffic growth in recent years would be a problem if it was acting against an objective to improve local air quality or was causing congestion that was seen to be suppressing economic growth. In contrast, if traffic growth could be accommodated on the network it need not be a (local) problem.
- 3.2.2 Problems with the transport system can be experienced by its users as well as third parties who are impacted upon by the use of the system.
- 3.2.3 It is important to recognise that perceptions of problems with the transport system by users, operators, the public at large and politicians can be equally as important as problems that can be quantified through analysis of data. Such problems are called *perceived problems* in the text although this should not be taken to have any pejorative meaning; just because a problem is perceived and cannot easily be quantified does not mean that it has no basis and should not be addressed. Indeed, the analyst should strive to capture the perceived problems as thoroughly as possible. There will be however, cases where perception of a problem is misplaced; the onus is then on the planner to explore such problems and explain the real root cause of any shortfall in meeting objectives.

3.2.4 *Constraints* and *uncertainties* are matters that a study will have to consider when developing a proposal, but are largely outwith the immediate influence of the study.

3.3 Analysis of Data

3.3.1 Analysis of data routinely collected by local authorities, central government and its agencies, and transport operators can provide a valuable source for the assessment of existing transport problems. For larger exercises it may be appropriate to undertake bespoke surveys to explore a particular problem. Larger exercises may also involve data collection to support model development; such data can be a further valuable tool to support the assessment of transport problems; its use should not be limited to developing models.

3.3.2 The appropriate nature and extent of data analysis within a planning exercise is clearly correlated with its duration and the resources available. In a similar way to the development of objectives, the effort put into analysis of data must be commensurate with the potential effects of the proposal that are likely to be considered. It is possible for a small-scale proposal (in terms of cost) to have wide ramifications and in such cases an extensive problem identification exercise may be warranted. In some cases, however, there may be no need for any data analysis at all. At the other extreme a substantial exercise is likely to be appropriate for a transport corridor study or major public transport or road proposal.

3.3.3 As discussed in Chapter 2 the problem identification exercise should look beyond the immediate manifestation of problems on the transport system, such as road congestion. It should explore the root causes of the immediate problems. In the case of congestion this may be questions of personal mobility, changes in land-use patterns and economic activity and so on. Transport proposals that will be considered should seek to address the fundamental problems as well as those that appear most immediate.

3.3.4 The range of data sources that may provide useful information is large and it is not the intention to cover them here in great depth. Rather, as an aid to a data analysis exercise, examples of data sources and what can be determined from them are given below.

3.3.5 It is taken that users of this guidance are familiar with data routinely or occasionally collected by their own organisations, but recognising that readers may be unfamiliar with data sources available from the Scottish Executive, a compendium of some of the most significant national data sources is given in Appendix A.

Road Data

3.3.6 Examples of road and traffic data that can be analysed to support an assessment of transport problems include:

- *traffic counts* – from either manual classified counts (MCCs) or automatic traffic counts (ATCs), which are regularly collected by the appropriate road authority. These can be used for establishing the volume of road traffic, its composition and the extent and duration of peak periods. Count data can be used to

establish growth trends and peak spreading effects. Advice on the conduct of traffic counts and their reliability is given in the *Design Manual for Roads and Bridges* (DMRB Volume 12).

- *journey time surveys* – can be used to identify the impact of congestion on travel times, identify highly congested junctions and quantify delays. If journey time surveys have been repeated periodically over a number of years they can show how travel times and/or journey speeds have changed. Advice on undertaking journey time savings is given in DMRB Volume 12;
- *roadside interviews (RSIs)* – routinely collected for model development, RSIs collect much rich data that, other than its use in modelling, is often not analysed or presented in detail. Information available from RSIs includes journey purpose and car occupancy, both usually segmented by time of day. RSIs can also be used to collect data on parking and trip chaining amongst other issues. Advice on conducting RSIs is given in DMRB Volume 12;
- *accident data* – there is a statutory obligation to collect data on personal injury accidents classified by severity. Accident data can be used to assess the number and severity of accidents; time trends can be identified and, if combined with a GIS, can easily be used to identify accident clusters or blackspots. The Scottish Executive's Road Accidents Statistical Database includes details of all injury accidents reported by the police authorities in Scotland (see Appendix A);
- *parking surveys* – parking surveys can include a simple inventory, that is an assessment of the number of parking spaces in an area, appropriately segmented (long stay, short stay, PNR, public etc). More detailed surveys can include assessing occupancy of spaces, the duration of study, the turnover of spaces and pricing structure;

Public Transport Data

3.3.7 Much data on the use of public transport and the characteristics of public transport users is routinely collected by public transport operators as well as the public sector. Despite much data being regarded as commercially confidential by operators there is still a significant number of data sources readily available to the planner. Even in situations where public transport data is regarded as commercially confidential, it is often possible to make use of such data by anonymising the data, combining it with other sources or indexing data rather than using it in the form in which it is provided. Planners should not be deterred by issues of commercial confidentiality. Often public transport operators will perceive a direct or indirect benefit from supporting a project or study and they will be willing to consider how their data can be used to inform the process, while at the same ensuring their commercial interests are protected.

3.3.8 For identifying problems related to the use and operation of buses and coaches, the following are examples of potential data sources:

- *counts* - local authorities often have cause to undertake bus passenger counts. These can be undertaken at bus stops where boarders and alighters are counted or can be passenger counts undertaken as buses cross screenlines. Such counts can either be taken on-bus (with the operators' permission) or off-bus by experienced surveyors. Count programmes may be undertaken to support a model development exercise or can be undertaken on a regular basis across a

screenline with the object of monitoring temporal trends. A large study may warrant bespoke bus passenger counts to support the problem identification stage;

- *origin–destination (O-D) surveys* – like roadside interviews these are almost always undertaken as part of a model development exercise. Also like RSIs, bus O-D surveys contain much rich data on the passengers’ profile such as their journey purpose, ticket type, access mode, and age and gender;
- *level of service data* – in the deregulated era it can be difficult to keep track of changes to bus routes and the level of service on each route. Current timetable data should be available from operators. Local authorities have a statutory responsibility to provide information on bus services in their area, although the time required to process such data into a useful format should not be underestimated. Data on current fares is readily available from operators, but unless the mix of ticket types sold is known it is often difficult to identify the average fare paid. Often fares may appear to be increasing but the average fare paid may be static or decreasing due to greater availability or take-up of discount fares.
- *concessionary fares surveys* – local authorities that operate concessionary fares schemes often routinely collect data to enable revenue allocation. Such surveys can often be a source of data for wider bus use and patronage trends;
- *satisfaction surveys* – while an operator’s own market research is likely to remain confidential, local authorities and other bodies are in a position to conduct their own bus passenger satisfaction surveys;
- *tendered bus services* – data collected to support the tendering of social bus services can shed light on the changing pattern of bus service provision.

3.3.9 For data on rail services and passengers, the position regarding the availability of passenger counts and origin destination surveys is very similar to that for bus. Information on rail services is available from the published national passenger timetable and fares information is published in the National Fares Manual. The same sources can be used to look at changes over time. Again, calculating an average fare paid by rail passengers is difficult due to the wide availability of discount tickets and limited period offers.

3.3.10 Additional sources of data on the rail industry include:

- *reliability and punctuality performance*. Train operating companies are obliged to monitor and publish the reliability and punctuality of their services against standards established as part of their franchise agreements. Historic reliability and punctuality data is available from the Strategic Rail Authority (SRA);
- *customer satisfaction surveys*. The SRA undertakes a customer satisfaction survey, the results of which are published periodically. If more detailed analysis is required, the SRA should be consulted.

Air Transport Data

3.3.11 The principal source of data on air travel is the Civil Aviation Authority (CAA). They have three data sources that may be relevant:

- the annual report, UK Airport Annual Statement of Movements, Passengers and Cargo;
 - the annual report, UK Airlines Operating, Traffic and Financial Statistics;
 - a rolling annual survey of passengers at the UK's principal airports (including Glasgow, Edinburgh, Inverness and Aberdeen).
- 3.3.12 The first two sources provide data on the number of passengers using airports, the routes they use, cargo and mail handled and aircraft movements. Data for the most recent years can be downloaded from the CAA's website. Published reports for recent and earlier years are available for purchase.
- 3.3.13 The CAA's passenger survey contains much rich data on the characteristics of air passengers including their ultimate origin/destination and surface access mode. Reports are produced periodically on the characteristics of passengers at the surveyed Scottish airports. The database is available for purchase from the CAA's agents. Specific cross-tabs on the data can be commissioned.
- 3.3.14 Timetables for scheduled air services are readily available from airlines and airports. The Official Airline Guide (OAG) summarises all scheduled air services and can be a useful source for examining how service patterns have developed over time. Data on charter/inclusive tour services and freight-only services is usually available from operators and airports.

Ferries

- 3.3.15 Aggregate data on the use of ferries is published in Scottish Transport Statistics. Ferry operators should be contacted if any more detailed data is required. Ferry timetable information is available from the operators.

Freight

- 3.3.16 Data on the volume of road freight traffic is routinely collected as part of Manual Classified Counts and at some Automatic Traffic Count sites. Weigh in Motion sites can provide data on vehicle loadings. Origin-destination data collected at RSIs, in the main, provides data on the O-D of goods traffic although occasionally they will also include questions on the commodities being carried by HGVs.
- 3.3.17 Two government surveys, the Continuous Survey of Road Goods Traffic (CSRGT) and the Continuous International Road Haulage Survey (CIRHS) provide useful data on the total freight transported by road to and from each UK county or region, the commodities carried, the types of vehicle used and the length of haul.
- 3.3.18 To obtain data on rail freight movement is much more difficult and practitioners should approach the operators, the SRA and rail enthusiast publications.
- 3.3.19 Aggregate data on freight carried by air is available from the CAA sources but this provides no information on the commodities carried.

Other Data Sources

3.3.20 Planners should not feel restricted to conventional data sources relating to the supply and use of the transport system when seeking to identify transport problems. Other data routinely collected by local authorities, Government departments and agencies and other public bodies may be helpful. Examples include, but are not limited to:

- *land use data* – data on new house completions or retail floor area can be used to illustrate rapid growth in transport demand, similarly data on vacant properties can indicate decline. Trends in an area’s attractiveness can be informed by retail and office rents. Similarly house price data can inform a view of trends in the residential sector. Uncompleted planning permissions can give an indication of potential future problems, as could data on land zoned for different development;
- *surveys of development plans* – development plans should contain a positive and sustainable vision of an area’s future, with structure plans providing a long term vision, looking forward at least 10 years, supporting and encouraging sustainable patterns of travel. Local plans often contain detailed analysis of environmental, social and community issues and problems, including integrated transport issues;
- *Scottish Household Survey* – this is a continuous survey that commenced in 1999. About 15,500 different households across Scotland are interviewed each year. The survey collects transport-related data, as well as data for a number of other topic areas. The questions cover household car ownership and use; the accessibility of bus services; the frequency of driving, cycling and walking; travel to work and to school; and other transport topics, including Travel Diary information. Anonymised copies of the survey data, which have been sent to COSLA and deposited at the UK Data Archive, may be used for analysis by local authority area and for specific population sub-groups. Further information about the survey is available from the Scottish Executive.
- *The Census* – The National Census is undertaken every ten years. The Census provides data on household structures, car ownership and journey to work characteristics amongst other things. Information from the 2001 Census results for Scotland may be found at www.scot.nhs.uk.

Accessibility

3.3.21 Problems in a study area may be related to its poor accessibility, where accessibility is defined as the relative ease with which individuals or firms can reach amenities or services of importance. There may also be an issue where some spatial or social groups suffer from relatively poorer accessibility than other groups. Problems may also arise from the related issue of severance caused by the existing (or planned) transport network. Transport models can assist (to a degree) with the calculation of accessibility indices and advice on the use of models in the problem identification stage is given in §3.4. In Chapter 10, the topics of accessibility and severance are covered in more depth.

Environmental Data

3.3.22 The problems that a proposal may be designed to address could include existing or potential future environmental problems. Further details of data sources for the

identification of environmental problems is given in Chapter 6 where the need to establish a baseline for the environmental appraisal is described.

3.4 The Use of Transport Models

3.4.1 Transport models can be a valuable aid in assessing existing and potential future problems. Transport models can usually be easily interrogated to produce summaries of network-wide conditions as well as modelled flows and delays on particular links or at particular junctions. If the models include public transport as a mode or modes, then data can be produced on route or corridor flows (and potentially overcrowding) as well as network-wide summary data. Transport models can also be used to provide data on the gross volume of trips made in the modelled area, and in some cases mode split and journey purposes. Plotting desire lines can be helpful. Output from transport models can also be used to derive other measures that may help quantify problems. Examples include, but are not limited to, emissions of pollutants or accessibility indices.

3.4.2 Planners, however, should be cautious when using transport models:

- The availability of a transport model can result in a planner devoting much attention to extracting data which in reality may reveal little, if problems lie elsewhere. Scoping the exercise of extraction of data from a model will be important before starting the exercise.
- The analysis of problems that can be undertaken using a transport model is limited to the time periods and modes included in the model. There may be significant problems in other time periods or with non-modelled modes. The analysis of problems should not be limited to what can be extracted from a model;
- Transport models are only as good as the input demand and supply data. Analysts should carefully consider a model's calibration and validation before embarking on any significant work. A poor model can lead to mis-identification of problems.

3.4.3 Transport models can be used to identify potential future, as well as existing, problems. However, each and every forecast is:

- underpinned by a set of explicit (or sometimes implicit) assumptions and exogenous forecasts of key variables (e.g. traffic growth);
- limited to the modes modelled and the interactions (assignment, mode split etc.) considered.

3.4.4 When a transport model is being used to identify future problems this must be accompanied by a clear statement of the assumptions that underpin the forecasts.

3.4.5 The Scottish Executive's Transport Model for Scotland (TMfS) which replaces the Central Scotland Transport Model (CSTM3) may offer planners a potentially rich source of information on existing and potential future problems in their area.

3.4.6 In large-scale studies, model development often forms part of the process prior to testing and then appraisal. The problem identification stage will usually precede any model development and application.

3.4.7 Naturally, planners should not feel that the absence of a transport model means that they cannot make assessments of what potential future problems may be. A structured approach should be taken to scoping the future conditions relevant to the study in both the transport field and beyond. Appropriate techniques include professional level consultation, opinion gathering techniques such as Delphi and quantified projections, but in the last case it is important to make clear what assumptions have been made.

3.5 The Link to Consultation

3.5.1 So far this chapter has covered mainly quantified sources on the use or supply of transport that can be used to identify transport problems. To reiterate a point made at §3.2.3, the identification of perceived problems with the transport system is equally important. This leads to a natural link between the problem identification stage and a study's participation and consultation activity. Moreover, participation and consultation activities can identify a whole range of problems with the transport system that are not captured by available data sources.

3.5.2 Approaches to consultation and participation are provided in Chapter 13. At this juncture it is noted that the identification of problems can be informed by:

- Professional consultation and discussion between the planner and transport professionals;
- Consultation with a wider reference group – meetings, workshops, or written consultation with representative bodies;
- Consultation with elected members to Councils, the Scottish Parliament and the UK and EU Parliaments;
- Public consultation – such as surveys or public meetings;
- Structured market research.

3.5.3 When designing a participation and consultation programme, the potential link to problem identification should be considered explicitly.

3.6 Constraints and Uncertainties

3.6.1 In parallel with the identification of problems, planners should also identify constraints and uncertainties that have to be considered when developing their transport proposal.

3.6.2 Where there are uncertainties the onus is upon the planner to develop a proposal that is either robust under different possible out-turns or alternatively is flexible enough to be adapted in response to changed circumstances.

3.6.3 Examples of uncertainties which a study may identify are:

- It is unclear at the time of the study whether a major road or rail link will be built that will affect the study area;
 - The impact of a major new land-use development has yet to become clear;
 - A study for a neighbouring area may result in a proposal that results in significant changes to through traffic passing across a study area.
- 3.6.4 Planners should endeavour to clarify, or if possible neutralise, uncertainties through liaison with neighbouring authorities, Government departments and agencies and transport operators.
- 3.6.5 *Constraints* represent the bounds within which a study is being undertaken. These may include but are not limited to:
- The statutory powers of an authority to promote change;
 - The funding levels that can realistically be obtained;
 - Scottish, UK or EU legislation;
 - Scottish or UK fiscal policy.
- 3.6.6 While it is proper for a study to highlight how a change in the constraints it faces may contribute to the development or success of a transport proposal, no proposal should be developed that is dependent upon a change to the constraints upon a study, unless the promoting organisation is in a position to change those constraints.

3.7 Presentation of Analysis of Problems

- 3.7.1 Accompanying the appraisal of a proposal, a textual statement of the assessment of problems, issues and constraints should be presented in the STAG report (ref. Chapter 14). The statement should summarise the sources of data and any consultation activities. It should highlight what the key problems, issues and constraints are. Tables and figures may be useful but are not essential. The use of GIS and mapping software can help illustrate problems succinctly.
- 3.7.2 The summary of problems, issues and constraints should be comprehensive in its identification of problems, issues and constraints facing a study, but it should also be concise. If necessary, supporting technical appendices should be prepared, to present the detail of analysis or surveys but these are only likely to be necessary for the largest appraisals such as those for a transport corridor study or for a major road or public transport proposal.