STAG Technical Database Section 2

Analysis of Problems and Opportunities

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Transport Scotland

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2. Analysis of Problems and Opportunities

The view that there are problems with the transport system is the root of any transport appraisal. 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.

2.1 Introduction

The identification of problems and opportunities within the transport and land-use system under consideration must form the basis of the development of a STAG transport study.

The process of defining objectives, described in Section 3, and the identification of problems and opportunities, the subject of this section, are parallel and iterative processes. An initial assessment of problems and opportunities should inform Objective Setting, which in turn may highlight the need for further investigation of problems and opportunities.

It is essential that consideration is given to existing and future problems and opportunities that may potentially arise. Similarly, those perceived by stakeholders should also form a thorough part of this assessment during Pre-Appraisal.

The identification of opportunities is often given insufficient attention during a STAG study and it should be recognised that this is an equally important task to be completed during the Pre-Appraisal process. As such, opportunity analysis should be given appropriate and explicit attention during Pre-Appraisal.

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

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

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.

When considering problems it will also be important for the practitioner to consider issues and constraints that face the study. '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 Government and/or Transport Scotland requires a textual statement of the problems, issues and constraints along with the appraisal to accompany each submission.

2.2 Terminology

In this section, problems are effectively the genesis of an option and are measurable through shortfalls in meeting the objectives. For example, rapid traffic growth in recent years would be a problem if it were acting against an objective to improve local air quality or were 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.

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.

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 be easily 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 practitioner to explore such problems and explain the real root cause of any shortfall in meeting objectives.

Constraints and uncertainties are matters that a study will have to consider when developing an option, but are largely outside of the immediate influence of the study.

2.3 Establishing the Do-Minimum and Reference Case Scenarios

In order to properly identify future issues, problems, and opportunities on the transport network, as well as how long current ones may persist, it is necessary to understand how the demand, supply, and cost of travel in the study area is likely to change in the future. This will provide a baseline against which all interventions can be considered. This baseline should be developed alongside the analysis of problems and opportunities.

Note that at the Pre-Appraisal stage there is no expectation that this baseline will be modelled in a transport or land-use model, although if outputs from such models are readily available they may be used to inform the baseline; however, the baseline established during Pre-Appraisal should be as consistent as possible with that used for modelling purposes in the later stages of the appraisal.

Relevant factors which may affect the demand for transport are:

- New developments in the study area (e.g., residential, retail, offices);
- Changes in national demographics (e.g. an increase in the proportion of the elderly may increase demand for leisure travel and shift travel demand from peak to off-peak);
- Changes in travel behaviour and information available to travellers;
- Changes in the size and composition of the local population;
- Transport infrastructure pricing policies;
- Vehicle ownership and use;
- Passenger transport service pricing policies; and
- Transport regulatory policies.

Relevant factors which may affect the supply of transport are:

- New infrastructure (e.g., roads, rail stations, cycle facilities);
- Passenger transport service costs
- Management of existing and new infrastructure;
- Changes to existing infrastructure (e.g. high-occupancy vehicle only lanes); and
- Changes to existing transport services (e.g. increased frequency on public transport).

Some factors which may affect the cost of travel are:

- Congestion;
- Parking charges;
- Fares (e.g. the advent of integrated ticketing on public transport); and
- Travel time.

Note that these lists are not exhaustive.

The identification of these factors forms an important part of any study; however, the resources devoted to this process should be proportionate to the scale of the study. In most cases it will be sensible to limit the analysis to the geographical area of the study; however, if there are significant changes occurring outside the study area, such as competing developments or new infrastructure schemes, these should be included.

There is also a set of external factors which will affect the transport baseline; these include national GDP growth, fuel prices, and vehicle efficiency changes. These factors will typically be outside the scope of the setting of the baseline at the Pre-Appraisal stage. They should, however, be addressed at later stages, in line with the guidance set out in Section 13.6.

In all cases, it is important that predicted changes in future land-use are based upon documented evidence, and that this evidence is recorded.

Information relating to the demand, supply and costs of transport at a national level for current and future forecast years can be provided by the LATIS service (Land Use and Transport Integration in Scotland, see Section 17.2). An application for LATIS data (extracted from the LATIS Transport and Land-Use models) can be made by visiting: www.latis.org.uk. Section 2.4 Data Analysis, sets out further sources of data that can inform the process.

It is recognized that practitioners may wish to use local data to inform this process, but it should be noted that Transport Scotland view the data contained within LATIS as the most likely view of the future. Section 2.4 Data Analysis, sets out further sources of data that can inform the process.

To assist in the definition of a Do-Minimum and Reference Case, the factors influencing demand, supply and costs of travel should be analysed for the study area, each in turn, and used to construct an uncertainty log as illustrated below. The following classifications of uncertainty should be used.

Table 2.1 - Classifications

Probability	**Status**
Near certain: The outcome will happen or there is a high probability that it will happen.	Policy or funding approval. Tenders let. Under construction.
More than likely: The outcome is likely to happen but there is some uncertainty.	Submission of planning consent application imminent. Adopted local plans*
Reasonably foreseeable: The outcome may happen, but there is significant uncertainty.	Adopted local plans* Draft Local plans Development conditional upon the intervention going ahead.
Hypothetical: There is considerable uncertainty whether the outcome will ever happen.	A policy aspiration

*****Whilst adopted local plans may be viewed as containing interventions that are likely to happen, it should be recognized that they will typically represent a local authority's aspiration for the local area, and therefore their forecast changes to land-use and development should be treated with caution, particularly where these forecasts imply levels of growth which are significantly above the national trend. It will typically be appropriate to subject these predicted change to sensitivity tests.

Note that, for transport improvements which affect the trunk road network or rail infrastructure, commitment from Transport Scotland or Scottish Ministers is required before a scheme should can be classified as 'near certain'. For improvements which impact upon local authority controlled infrastructure, the commitment of the relevant local authority is required.

The results of this process should be formally recorded in an uncertainty log and reported as an appendix to the STAG report. As at all stages of Pre-Appraisal, a wide range of stakeholders should be consulted to ensure that the uncertainty log has a broad basis of support. Although the initial development of the uncertainty log should occur during the Pre-Appraisal stage, the evidence used to arrive at the assessment should be recorded and kept under review as the study develops. It is essential that the allocation of likelihoods to proposals be carried out in a way that is realistic and based on local knowledge.

The uncertainty log should also highlight the interactions between different factors. Where the uptake of a development is conditional on a transport intervention going

ahead it is recommended that the uptake is forecast using integrated transport-land-use modelling.

An example of part of an uncertainty log is given below:

Table 2.2: Uncertainty Log

Factor	Time	Uncertainty	Impact on interventions	Comments
Factors affecting demand				
400 house development at location W	2010	More than likely	Medium	Land identified in local plan for housing. Application submitted to local planning authority.
Larger housing development (10,000+) at location X	2015	Hypothetical	High	Identified as one of five locations by local authority for new town development. Part of initial consultation process prior to inclusion in structure plan.
Superstore at location Y	2012	Reasonably foreseeable	Low	Currently speculative project – land-use identified in structure plan (fairly high uncertainty about timing and exact location).
Factors affecting supply				
Increase in rail capacity at location Z	2010	Near certain	Low	Under construction.
Factors affecting cost				
Local integrated ticketing scheme	2012	Reasonably foreseeable	Low	Business case under preparation for funding of a scheme.

As well as uncertainty over the occurrence of any given factor, it is recognized that it is equally possible for there to be uncertainty relating to its timing. This should be reflected in the uncertainty log, but it is left up to practitioners to agree with stakeholders the best approach to adopt when there is more that one source of uncertainty associated with a single factor.

It is also recognized that, due to the long timescales of transport interventions, some factors may occur in the relatively distant future. The uncertainty log should reflect the fact that uncertainty increases the further into the future the time period being considered. There is no set time horizon over which potential factors should be considered; rather, the time horizon for the study is left up to the judgement of the practitioner and stakeholders.

Again, it is emphasized that the resources devoted to this stage of Pre-Appraisal should be proportionate to the scale of the study.

Defining the Do-Minimum

The do-minimum is defined as the most likely transport situation over the course of the appraisal period if no intervention were to occur. It should therefore be based on the assessment set out in the uncertainty log. At the local level, the composition of the do-minimum will involve the practitioner to exercise judgement, but Transport Scotland expect that only factors which are classed as 'near certain' or 'more than likely' would be

included in the do-minimum, with factors classed as 'reasonably foreseeable' or 'hypothetical' reserved for sensitivity testing through the use of reference cases.

The do-minimum should also include minor changes which can be expected to be carried out as conditions deteriorate, should the proposed interventions not go ahead. These improvements should not be significant, with any significant changes considered as an option in their own right as part of Option Generation, Sifting and Development (see Section 4).

The do-minimum should be:

- Unbiased: (that it, as likely to be exceeded as undershot, on any relevant measure);
- Coherent and self-consistent (if X is 'highly likely' to be accompanied by Y, then both X and Y should be included);
- Free-standing (not dependent on other scenarios for its definition); and
- Realistic and plausible.

Demand and land-use in the do-minimum

As discussed above, Transport Scotland view the forecast data within LATIS as the most likely view of the future at a national level. Forecast demand within LATIS is based on recent planning and population data. Therefore, when preparing studies which will, or which may be reasonably expected to:

- Impact on the performance or operation of the trunk road network;
- Impact on the performance or operation of the rail network;
- Require funding from Transport Scotland or the Scottish Government; or
- Require support from Transport Scotland or the Scottish Government at any stage of the statutory process.

Transport Scotland requires that, at the regional or city level, demand should be consistent with LATIS forecasts. Other than in exceptional circumstances, which should be discussed with Transport Scotland, deviations from these forecasts should only be included as a reference case.

Defining the Do-Something

For the purposes of an economic appraisal, the do-something is defined as the do-minimum with the transport intervention; i.e., there is no additional development in the do-something. Where practitioners are undertaking an assessment of the operation, environmental or patronage impact of an intervention, however, the expected level of additional development should be included in the do-something.

Defining the Reference Case

Practitioners may also find it helpful to develop a 'reference case', which includes other non-controversial but as yet uncommitted transport schemes and/or development profiles, and which can be used as a baseline for option comparison. At the Pre-Appraisal stage, it will typically not be necessary to develop reference cases; it is simply important that the uncertainty around the forecast do-minimum is recognised. During the Part 2 Appraisal, however, practitioners should develop references cases to match the assessment of uncertainty as set out in the uncertainty log. Practitioners should not feel limited to developing a single reference case. The number of reference cases used should be sufficient that, in the view of the stakeholder involved, the uncertainties set out in the uncertainty log are adequately reflected.

If all uncertainties are treated separately, the likelihood exists that a large number of potential reference cases could be developed. Such an approach is likely to be impractical and disproportionate, and instead factors should be grouped when forming references cases. This should be done using the analysis in the uncertainty log, taking account of any interdependencies of different factors.

Again, it is expected that reference cases will be:

- Coherent and self-consistent; and
- Evidence based and defendable.

See Section 13.6 for more information on the use of reference cases in sensitivity analysis.

2.4 Data Analysis

For a full understanding of the study area and the transport system under consideration, 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.

The nature and extent of data analysis within a STAG study 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 scale of the Pre-Appraisal analysis undertaken for the study area and potential impacts of the options to be considered.

It is possible for a small-scale option (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 option.

However, practitioners must ensure that the analysis of data provides evidence of problems and/or opportunities. The analysis of data should provide a significant contribution to the basis of a STAG study and simply providing contextual information must be avoided.

An appropriate evidence base is crucial when moving to the Objective Setting phase of Pre-Appraisal and the setting of SMART Transport Planning Objectives as the STAG study progresses. This is reflected by the iterative nature of the Analysis of Problems and Opportunities, and Objective Setting.

2.4.1 Roads

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

- Traffic and junction turning counts – data is generally collected using video capture with manual classification of vehicles (MCCs) or using automatic traffic counters (ATCs or loops). A large number of ATC sites exist across Scotland operated by Traffic Scotland or Local Road Authorities. Data from these sources can be used for establishing the volume and key movements of road traffic, its

composition and the extent and duration of peak periods. Count data over time can be used to establish growth trends and peak spreading effects. Advice on the collection of traffic data 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 surveys is given in DMRB Volume 12;
- Floating vehicle data from Geographical Positioning System (GPS) or in-vehicle tracker based data. Floating vehicle data on a route-by-route basis offers an alternative to vehicle-based observed journey time data, and is calculated from a large sample of cars and/or fleet-based heavy goods vehicles. Additional metrics include standard deviation, turn-independent journey times and journey times by percentile. This can provide evidence of journey time variability, or for very specific time periods, provide evidence of the impacts of incidents/accidents affecting journey time reliability. The provenance, quality and potential biases within floating vehicle data should be well understood before being used in appraisal or for model calibration and validation.
- 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;
- Road Accident and Casualty data – there is a statutory obligation on the Police to collect data on personal injury accidents classified by severity. Transport Scotland aggregate this data within the Reported Road Accident Statistical Database and use it produce an annual statistical bulletin entitled "Key Reported Road Casualties Scotland" (see Section 17.2).This data can be used to assess the number and severity of accidents, accident rates, trends over time and to undertake spatial or cluster analysis..
- 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 the study, the turnover of spaces and pricing structure.

2.4.2 Public Transport

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 practitioner. 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.

Practitioners 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 time ensuring their commercial interests are protected.

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 or subsidy.
- *Concessionary fares surveys* – Transport Scotland, which operates the National Concessionary Travel Scheme of Older and Disabled Persons and for Young People, collect data to enable operator reimbursement and to identify and minimise fraudulent use of cards. In addition, many local authorities 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.

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. Fares information is published in the National Fares Manual or is available from the Rail Fares Price Index (See section 17.2). 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.

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; and
- *Customer satisfaction surveys* – including the National Passenger Survey undertaken by Passenger Focus and surveys undertaken by individual train operating companies (see Section 17.2).

2.4.3 Air Transport

The principal source of data on air travel is the Civil Aviation Authority (CAA) (see Section 17.2).

The Statistics section of the CAA website provides 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.

CAA's website also 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.
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.

Further high-level data is available in Scottish Transport Statistics.

2.4.4 Ferries

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.

2.4.5 Freight

Data on the volume of road freight traffic is routinely collected as part of Manual Classified Counts and at some Automatic Traffic Count sites. Weight 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.

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.

To obtain data on rail freight movement is much more difficult and practitioners should approach the operators, Network Rail, and rail enthusiast publications.

Aggregate data on freight carried by air is available from the Statistics section of the CAA website (see Section 17.2) but this provides no information on the commodities carried.

2.4.6 Other Data Sources

Practitioners 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. Further information about the survey is available from the Scottish Government website.
- *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 http://www.nrscotland.gov.uk/ .

2.4.7 Use of Transport Models

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.

Practitioners should, however, be cautious when using transport models:

- The availability of a transport model can result in a practitioner 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; and
- 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.

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); and
- Limited to the modes modelled and the interactions (assignment, mode split etc.) considered.

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.

The Scottish Government's Transport Model for Scotland (TMfS) offers practitioners a potentially rich source of information on existing and potential future problems in their area.

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.

Naturally, practitioners 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, and quantified projections, but in the last case it is important to make clear what assumptions have been made.

2.5 Identifying Problems and Opportunities

It is important to recognise that actual and perceived problems or opportunities within the transport system must be the rationale for a STAG study.

Perceptions of problems or opportunities with the transport system as identified by users, operators, the public at large and politicians can be as equally important as problems that can be quantified through data analysis.

The analysis of problems should look beyond the immediate manifestation of problems on the transport system. The analysis should, instead, explore the root causes and consequences of problems. At this phase of the Pre-Appraisal process, opportunities for improvements to the transport system and the way it is used should be thoroughly explored.

Practitioners should ensure that an appropriate analysis of data has been undertaken to provide a robust evidence base for the study before proceeding to more detailed appraisal.

2.6 Issues and Constraints

In parallel to problem and opportunity analysis, relevant Issues and Constraints should also be considered within the context of a STAG led study. It is important that the identification of problems and opportunities is considered within the wider context.

'Issues' are uncertainties that the study may not be in a position to resolve, but must work within the context of. Where there are uncertainties, there is a responsibility to develop an option that is either robust under different possible out-turns or, alternatively, is flexible enough to be adapted in response to changed circumstances.

Examples of Issues include:

- Uncertainty 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; and
- A study for a neighbouring area may lead to a proposal that results in significant changes to through traffic passing across a study area.

Practitioners should account for, or if possible neutralise, such Issues through liaison with neighbouring authorities, government departments and agencies, and transport operators.

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; and
- Scottish or UK fiscal policy.

Similarly, constraints on the shape of a particular option could be affected by:

- Sensitive areas of ecological or landscape or heritage importance;
- Built-up areas;
- Rivers or railway lines which are expensive to bridge;
- Rough 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.

An early appreciation of these issues will assist in identifying an option which is more readily acceptable than one which ignores them. 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 option, no option 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.

2.7 Participation and Consultation

It should be recognised that people will naturally have more reliable views about current problems, potential opportunities, Issues and Constraints than those predicted to occur in the future. Problem, Issue, Constraint and opportunity identification through consultation is therefore of most use in the base year or current year.

People are more likely to be concerned with issues that directly affect them, their immediate environments and lifestyles. Some may also be well informed on the more strategic Issues and could contribute a useful perspective on these. It is important not to underestimate the level of detailed knowledge people may have and it must be recognised that perceived problems, opportunities, Issues and Constraints can also feed into this stage of the Pre-Appraisal process.

In order to fully understand and confirm the issue under appraisal, there may be value in consulting with members of the public alongside key stakeholders. The scale and focus of this consultation must be proportionate to the appraisal itself and draw from other consultations where appropriate.

At more 'representative' levels, politicians, business groups, service providers and a range of interest groups will have more strategic perspectives. It is important that they are kept informed of the views and opinions of the wider public throughout the process.

At the outset a plan for stakeholder engagement should be prepared which sets out the nature and timing of the engagement and, additionally, how the outcomes will be used to inform the Transport Appraisal.

The views shared and information arising from participation and consultation can make an important contribution to the overall information gathering exercise which will inform the evidence base for the Transport Appraisal. Practitioners must, however, seek supporting evidence for any views and information emerging from participation and consultation which are included in the Transport Appraisal.

Workshops offer one helpful way to engage with stakeholders. It is important, however, that practitioners do not rely on workshop discussions and outcomes to form the basis of the Transport Appraisal, but consider these alongside the other evidence gathering and analysis undertaken as part of the Transport Appraisal.

2.8 Reporting

It is expected that the thorough analysis of existing and future problems and opportunities will have comprised an integral part of the methodology adopted to develop the study and, therefore, clear evidence of existing and future problems and opportunities should be presented in the STAG Report.

A textual statement of the assessment of problems and opportunities together with identification of any Issues and Constraints should be presented in the STAG Report. The statement should summarise the sources of data and any consultation activities undertaken. It should highlight the key problems, Issues, Constraints and opportunities are and, where appropriate, also provide details of associated severity/magnitude of such problems, Issues, Constraints and opportunities. Tables and figures may be useful but are not essential. The use of GIS and mapping software can help illustrate problems succinctly.

The summary 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 option.

Practitioners should avoid simply providing background information for the study area. The geographic scope of the study should be presented with clear evidence of the problems and/or opportunities together with the methods of analysis used.

A geographical display of problems, issues, constraints and opportunities can be very useful, in that it provides:

- Those involved with the study, including the public, with a display of current problems, Issues, Constraints and opportunities on the transport system in a comprehensible, rather than abstract, form;
- The practitioner with a means of "calibrating" the methods used for forecasting future problems, by comparing the numerical analyses in the base year with people's perceptions and adjusting the numerical analyses appropriately; and
- A direct stimulus to the development of solutions and the transport option as a whole.