Oxera

How should the ex post evaluation of trunk road schemes be enhanced?

Report prepared for Department for Transport

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Final report

Executive summary

This report considers the feasibility of enhancing the way in which the Highways Agency and the Department for Transport (DfT) evaluate the impacts of major road schemes. It concludes that it would be possible and worthwhile to enhance existing approaches, and suggests a way forward. The study was conducted by Oxera, in conjunction with Mott MacDonald, Social Research Associates (Sra), the Tavistock Institute and the Transport Studies Unit, University of Oxford (TSU). The work was overseen by a Steering Group comprising representatives from the Highways Agency and the DfT.

Background

The DfT is committed to evaluating its policies and interventions, in accordance with binding cross-government requirements.[1] Recent guidance and consultation published by the DfT highlights how important effective evaluation is to scheme management and ongoing policy-making:

> An evaluation … is an independent quantitative and qualitative assessment of the processes of implementing a scheme and its impacts. Evaluating major schemes will help the Department meet its commitment to assess the impacts of its policies, and provide the Department and authorities with valuable evidence to inform future scheme development and decision-making.[2]

In 2001, the Highways Agency introduced Post Opening Project Evaluation (POPE), its programme for evaluating post-implementation impacts of major road schemes. Each scheme now undergoes the same analysis one year and three to five years after opening. POPE has clear benefits in the way it has brought a systematic approach to evaluation and improved data retention to aid analysis. However:

- POPE has thus far been limited to traffic volumes, travel times and accidents (although a need for it to address environmental impacts has already been recognised);
- POPE has not been mapped against the needs of the users of evaluation, and evaluations are not tailored to the specific issues raised by particular schemes;
- evidence is lacking on how road scheme evaluations have assisted, and could assist, policy-making;
- relatively little money is spent on POPE—for example, in 2004/05, the Highways Agency evaluated around 50 schemes, at an average scheme cost of £12,000 (ie, evaluation represented 0.1% of the £507m Highways Agency major improvements budget[3]).

Therefore, in late 2003, the DfT commissioned this study to assess the feasibility, potential extent, value and cost-effectiveness of additional evaluation activities.

[1] For example, Cabinet Office (1999), 'Modernising Government', White Paper; HM Treasury (2003), 'The Green Book: Appraisal and Evaluation in Central Government'; Office of the Deputy Prime Minister (2004), 'Assessing the Impacts of Spatial Interventions: Regeneration, Renewal and Regional Development—The 3Rs Guidance'; and Office of Government Commerce (2005), 'The OGC Gateway™ Process'.
[2] DfT (2005), 'Guidance for Local Authorities Seeking DfT Funding for Major Transport Schemes' , draft guidance currently subject to consultation.
[3] Source: Highways Agency Business Plan, 2003/04.

Methods

The study team used evidence from past evaluations, detailed case studies, and consultation with experts and stakeholders to assess potential interest in evaluations, and to develop possible tools and techniques to address them. The approach included:

- identifying and assessing over 300 transport evaluation documents;
- carrying out six detailed case studies of transport scheme evaluations;
- interviewing potential evaluation users from the DfT, the Highways Agency, other government departments, external organisations, and the communities in three of the case study areas;
- drawing on this evidence to develop a wide selection of evaluation options across all key scheme impacts, supported by an assessment of their benefits and costs (these form a prototype 'toolkit' on which future evaluators could draw);
- using this toolkit, revisiting the three road-based evaluation case studies, to determine how evaluation might have been carried out differently in each.

Findings

1. **There is unmet demand for evaluation evidence from a wide range of potential customers**—appraisers want evidence that would assist the development of appraisal tools and techniques; policy-makers want to know that schemes deliver planned benefits and that roads policy is proving effective; designers and implementers want good-practice evidence on delivering roads; and communities want to know that their concerns are effectively addressed.

2. **There are important issues that evaluations currently do not cover**—the greatest demand is for evidence on landscape, severance, local air quality and reliability impacts, as well as on the processes involved in delivering schemes.

3. **There is no mechanism for drawing together and addressing different interests, and the dissemination of findings is ineffective**—at present, the Highways Agency is responsible for commissioning evaluations, subject to DfT guidance, but the range of interests represented in this process is limited to a small number of officials. Many consultees were unaware of evaluations or of their findings. It is not surprising that there is unmet demand for evaluation evidence if its customers are unaware that it is being conducted and have no opportunity to shape it into something that meets their needs. Likewise, it is not surprising that some stakeholders cannot immediately appreciate the potential benefits of evaluation if they are unaware of its existence.

4. **It would be feasible to address the demand for wider evaluation evidence**—the DfT/Highways Agency can learn from other transport evaluations, both in the UK and internationally, that have covered a wider range of issues, and proved more effective. The study team was specifically required to consider problems associated with transferability of evidence; timeliness of findings; boundaries; assessment of cause, effect and attribution; estimating counterfactuals (ie, what would have happened had no scheme or a different scheme been implemented); and confounding factors and unexpected events. The toolkit that has been developed demonstrates that practical difficulties can usually be overcome and that more complex issues, including the counterfactual, are not always relevant.

5. **The benefits of additional evaluation would exceed additional costs**—enhancing evaluation would cost more. As a guide, covering *all* of the top ten information needs for *every* scheme would cost an average of £40,000–£50,000 per scheme (not including tailored social research, the costs of which would vary according to requirements). Evaluating to this degree the 35 schemes planned for the next three years could cost around £600,000 per year. However, the study team recommends a cheaper, more flexible approach, with evaluations addressing a smaller number of key information needs in varying levels of detail, over different timescales and in proportion to scheme

size. The costs of such an approach are difficult to predict, although it is possible that they might not increase at all if the DfT/Highways Agency choose to replace POPE's current core focus (volumes, times and accidents) with an entirely flexible approach.

The study team also found that, in addition to local authorities, other bodies would be willing to contribute resources (eg, professional expertise) to evaluations that are relevant to their organisational priorities. Furthermore, costs should fall over time as the evidence base develops and information gaps, at least at the national level, are reduced.

While it is not possible to place a meaningful monetary value on the tools proposed, the study team identified a number of detailed benefits of adopting them. Such benefits include improved modelling and forecasting; more effective scheme design and post-opening mitigation; the identification of unanticipated impacts; improved information on attitudes to roads; evidence on high-profile issues; and examples of how to reduce costs and speed up delivery. More generally, this analysis suggests that key outcomes from improved evaluation could include:

- policy accountability—within the DfT and the Highways Agency, and externally;
- improving appraisal where it is currently weak, or where there is a large degree of uncertainty about its conclusions;
- closing the appraisal–decision-making–evaluation loop (eg, informing decisions on which road scheme choices are most appropriate where);
- developing a cumulative knowledge base;
- enabling continued improvements in project processes and implementation.

The study indicates that such benefits from a well-planned, flexible and disseminated programme would clearly outweigh evaluation costs (which, in comparison with spend on roads or appraisal, would still be extremely small).

Recommendations

There would be value in adopting a more flexible and targeted approach to road scheme evaluation that could cover a broader range of issues and address a wider audience. Given the current 'lull' in scheme orders before the next batch begins in 2006, now would be an appropriate time to make the following proposed changes.

1. **The POPE framework should be retained, but enhanced**—POPE's strength is that it captures and records pre-implementation data, which, despite the amounts of public money channelled into appraisal and public inquiries, was not previously collected systematically (if at all).

2. **POPE should cover a wider range of issues, while allowing individual evaluations to be tailored to address key information needs**—evaluation coverage should not be restricted by the appraisal framework. This study reveals a number of areas where appraisal coverage is not as complete as it might be (eg, social impacts). The DfT and the Highways Agency need to consider whether there should be a common core set of issues to be covered by every evaluation. This assessment, however, concludes that a common core could be too restrictive, potentially locking in costs that would not need to be spent once a knowledge base had been established, and/or providing evaluation evidence for which there is no demand.

3. **POPE should be directed by a national programme board, with champions in the DfT and Highways Agency**—change should come from the top and be carefully governed by a system that provides the DfT and the Highways Agency oversight, and enables national stakeholders to feed in their interests. The first priority should be the appointment of a 'champion' at senior level for both the DfT and the Highways Agency, tasked with developing POPE into a programme that meets the needs of its users. A programme board would enable national stakeholder representation, and could comprise, for example, policy-makers, appraisers, and stakeholder organisations; and

set national priorities for evaluation at regular intervals (eg, annually). It would clearly take several years to develop a robust evidence base (given the 'patchy' distribution of scheme openings), but the programme board could in time develop, record and use (eg, via meta analysis) evidence to inform the overall policy on road schemes.

4. **Tailored evaluation plans for each scheme should be agreed through consultation with local stakeholders**—the plan for each scheme, designed to incorporate the needs of national (as expressed by the programme board) and local stakeholders, should be determined between Order Publication Report (OPR) and the start of works to enable 'before' data collection to begin. By involving local and national stakeholders in evaluation plans, it should be possible to encourage their assistance, to help cover some of the costs involved in enhancing POPE.

5. **The DfT/Highways Agency should move from an annual evaluation budget-setting round to a situation where evaluation costs are built into scheme costs**—this would conform with latest government guidance that major scheme promoters should agree with the DfT on how their projects are evaluated.[4] Until this happens, evaluation is unlikely to be taken as seriously as it should. However, the programme board would need to monitor evaluation costs very closely to ensure that they remain reasonable and that the approach is cost-effective.

6. **Guidelines are required on choosing from the menu of options in the toolkit, and the options need to be tested on the ground**—once evaluation priorities for each scheme have been established, evaluators will need to choose between the approaches available in the toolkit for each impact. An early priority, therefore, is the development of guidelines for making these choices. In addition, while most consultees felt that a more substantial evaluation approach was required, some remained concerned about practicalities and costs. Although this study indicates that most practical issues are surmountable, many of the suggested approaches have not been tested on the ground, and the cost estimates are based on various assumptions. Some of the early evaluations conducted under a revised POPE programme should therefore involve piloting the toolkit approaches. The outcomes of these pilots would help the DfT/Highways Agency and the programme board to keep the development of POPE under close scrutiny.

7. **The programme board should develop a more active and tailored approach to dissemination**—this would assist the process of benefits realisation, increasing the value derived from additional resources required for evaluation. A tailored programme of dissemination should match the requirements of different evaluation customers: some (eg, policy-makers) need key messages from a meta analysis, while others (eg, appraisers) require in-depth reports from individual schemes. Occasional stakeholder events could also be valuable in disseminating methods and findings.

[4] DfT (2005), op. cit.

Contents

List of tables

List of figures

1 Introduction

This is the final report from the study team, led by Oxera, for the Department for Transport (DfT) commission 'UG573—The Ex Post Evaluation of Trunk Road Schemes.' The work, which began in November 2003, was carried out in conjunction with Mott MacDonald, Social Research Associates (Sra), the Tavistock Institute and the Transport Studies Unit, University of Oxford (TSU). The study was overseen by a Steering Group comprising members of the DfT and the Highways Agency, and was supported within the study team by an expert panel of four experienced professionals from Oxera, Mott MacDonald, the Tavistock Institute, and the TSU.

This report addresses the following objectives in the research specification.

1) Critically review post-implementation trunk road scheme evaluations in England to date and identify potentially transferable lessons from elsewhere for the evaluation of road and other transport schemes. In particular, to:

   a) search for, identify, and review evaluations of major road or other transport schemes in England and other countries—describing the evaluations and assessing their value and effectiveness, and identifying the potential transferability of any approaches and methodological lessons;
   b) identify, review, and assess the potential transferability of any lessons from process and impact evaluation methodologies used in other, non-transport areas in the UK and overseas; and
   c) critically review DfT/Highways Agency approaches to trunk road scheme evaluation activities to date and assess how they have developed and how they have been employed; to analyse whether and how they might have been enhanced; and whether and how better use might have been made of them.

   The review of evaluation activities should not be restricted to studies commissioned by government departments and agencies.

2) Drawing and building on Objective 1, to identify and assess the feasibility, potential extent, value and cost-effectiveness of possible additional evaluation activities designed to identify and understand wider anticipated and unanticipated impacts and learn development and implementation lessons at scheme and policy levels, and to assess what methods they might use. This should include:

   a) identifying and reviewing the potential knowledge gaps and needs of key stakeholders to draw out possible priorities for evaluation and understand how these might be met;
   b) identifying and assessing the practical and methodological issues raised by any possible additional evaluation activity and the potential solutions to these; and
   c) ensuring that all proposed solutions pay particular reference to proportionality, cost-effectiveness, relevance, timeliness and flexibility.

1.1 Study background

The Social Research and Evaluation (SRE) division of the DfT produced a discussion paper in 2002,[5] which noted that relatively little attention has been paid to the ex post evaluation of Strategic Road Network[6] (SRN) schemes compared with the considerable effort expended on ex ante appraisal. For example, in 2004/05, the Highways Agency evaluated around 50 schemes, at an average evaluation cost per scheme of £12,000 (ie, evaluation represented 0.1% of the £507m major improvements budget[7]).

However, ex post evaluation is becoming increasingly important to roads policy. This is being driven both by developments in roads policy itself, and also wider government initiatives.

– *Managing Our Roads*—this 2003 DfT discussion paper, which has been reflected in the Future of Transport White Paper,[8] sets out how projected increases in demand for road use could be managed. It notes that action is already being taken with regard to land-use planning and other measures designed to reduce demand, including workplace and school travel plans and improvements to walking, cycling and public transport. However, it also sets out further work under three headings: managing the existing network to maximise its capacity; making use of new technology; and, importantly for the current study, the provision of additional capacity on the inter-urban road network, perhaps alongside measures to reduce or freeze demand. The paper states that further improvements to the road network will require thorough appraisal, supported by robust evaluation.

– *Speeding Up Delivery*—according to the Progress Report on the Ten Year Plan for Transport,[9] this Highways Agency initiative was designed to identify ways of speeding up the delivery of major improvement projects. Previously, major projects took, on average, 10.5 years from project commencement to the start of construction, which itself usually takes around two years. The initiative has reduced the time available for appraisal to five years, due to more rapid appointment of consultants, working with stakeholders earlier in the process, carrying out public consultation earlier and in less detail, more timely appointment of the contractor/designer, and sensible management of process risks. This initiative is ongoing, and evaluation can provide valuable support—process evaluation can be used to identify efficiencies that could be introduced and ways of managing risks more efficiently.

– *Guidance on Funding Major Schemes*[10]—this draft guidance, on which the DfT is currently consulting, notes that 'evaluating major schemes will help the Department meet its commitment to assess the impacts of its policies, and provide the Department and authorities with valuable evidence to inform future scheme development and decision-making.'

[5] DfT (2002), The Ex Post Evaluation of Trunk Road Schemes', SRE division discussion paper, October.

[6] Trunk roads, also known as the SRN, comprise nearly all motorways and the more important 'A roads'. The DfT is responsible for national roads policy as well as appraisal and evaluation guidance, while the Highways Agency is responsible for building, managing and maintaining the SRN. Currently, the trunk road evaluation programme is a separate Highways Agency cost centre (as opposed to being allocated funds on a scheme-by-scheme basis, according to size/cost, etc), and the programme is managed by the Highways Agency.

[7] Source: Highways Agency Business Plan, 2003/04

[8] DfT (2004), 'The Future of Transport: A Network for 2030', July.

[9] DfT (2002), 'Transport Ten Year Plan 2000: Delivering Better Transport—Progress Report.'

[10] DfT (2005), 'Guidance for Local Authorities Seeking DfT Funding for Major Transport Schemes'.

– *Revised Green Book*[11]—this *binding* guidance on appraisal and evaluation across government has been revised recently to include greater emphasis on 'focusing on the end in sight, right from the beginning'; the 'unbundling' of the discount rate to concentrate on the social rate of time preference, with separate allowances for risk brought about by optimism bias, for example; and more weight on assessing the differential impacts of proposals on the various groups in society. Chapter 7 concentrates solely on ex post evaluation, stating that: 'when any policy, programme or project is completed or has advanced to a pre-determined degree, it should undergo a comprehensive evaluation.'[12]

– *The 3Rs Guidance*[13]—this (again) *binding* guidance on regeneration assessment led to the DfT providing guidance on the preparation of an economic impact report (EIR), which should measure the employment effects of transport schemes on regeneration areas.[14] Atkins (formerly WS Atkins), which currently holds the contract for carrying out evaluation for the Highways Agency, completed an EIR for one of its two Post Implementation Evaluation Studies (PIES), the A13 in south-east London. No further studies of this kind have been undertaken with regard to road schemes.

– *Making the Connections*[15]—this report by the Social Exclusion Unit into the links between transport, social exclusion and the location of service, proposes a strategy for reducing problems associated with access to work, learning, healthcare and amenities. The two pillars of the strategy are:

  – a new framework of accessibility planning, which has recently been reflected in guidance on accessibility planning;[16]
  – national policy changes to enhance accessibility.

Each of these developments suggests a role for both evaluation per se, and evaluation with a wider remit than is currently supported by DfT and Highways Agency evaluation activities.

1.2 Evaluation

Evaluation was defined as follows in the project specification:

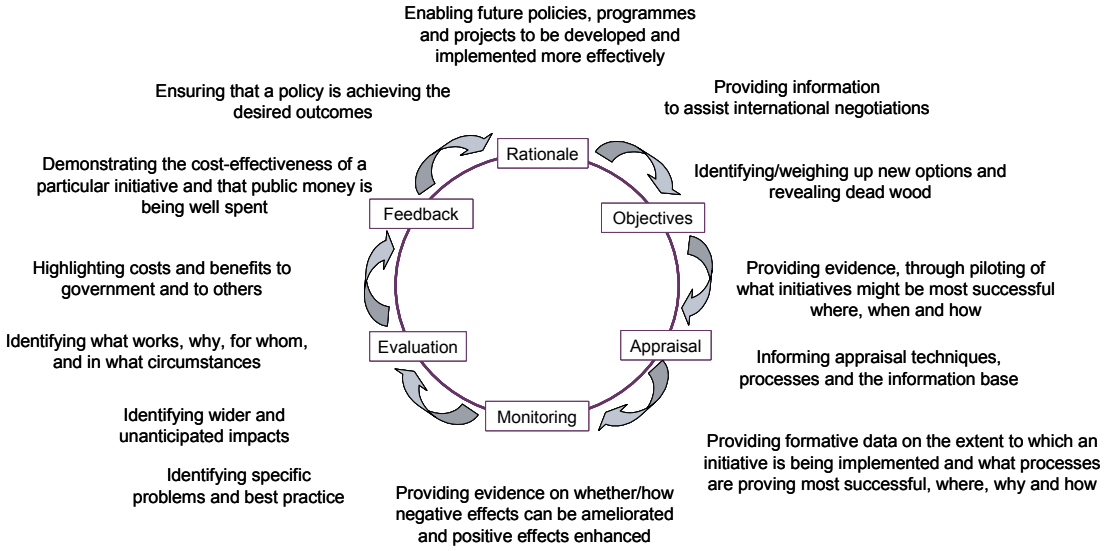
> '**Evaluation**' of road schemes is taken to mean process and impact evaluation from the point where the decision has been taken to go ahead with the scheme (that is, from the point where the construction contracts are awarded). It does not, therefore, include all the 'appraisal' processes leading up to the decision to go ahead. For the purposes of this study, however, there will be a need to understand how evaluations relate to appraisal outputs.

In other words, evaluation is the review of the *processes* that led to a road scheme coming to fruition, and the *impacts* that the scheme has had since its implementation. It should not be confused with *appraisal*, which is applied to determine whether a scheme should go ahead.

[11] HM Treasury (2003), 'The Green Book: Appraisal and Evaluation in Central Government', January 16th.
[12] Ibid., p. 45.
[13] Office of the Deputy Prime Minister (2004), 'Assessing the Impacts of Spatial Interventions: Regeneration, Renewal and Development—The 3Rs Guidance', Interdepartmental Group on the EGRUP review, May.
[14] DfT (2003), 'Guidance on the Economic Impact Report', July. This is the report by consultants Steer Davies Gleave, which states that the latest version of the guidance may be found in the Transport Analysis Guidance (TAG) area of the DfT's website.
[15] ODPM (2003), 'Making the Connections: Final Report on Transport and Social Exclusion', report by the Social Exclusion Unit, February.
[16] DfT (2004), 'Guidance on Accessibility Planning in Local Transport Plans', December 8th.

As highlighted by the SRE paper, appraisal and evaluation are critical at various stages throughout the government's policy, programme and project assessment cycle (see Figure 1.1). In many ways, the components of appraisal and evaluation are symmetrical. Issues such as identifying aims and objectives, developing measures, estimating forecasts or outturn costs and benefits, employing discount rates, and proposing counterfactuals are likely to be as important to evaluators as to appraisers.

Figure 1.1 The role of evaluation in the policy cycle



Source: Study team analysis.

The history of evaluation can be traced back over 4,000 years, but it is only in recent history (since the Second World War) that it has emerged as a distinct professional practice. According to the recently revised MEANS (*Means for Evaluating Actions of a Structural Nature*) handbook (the Tavistock Institute led the international team that carried out the revision), which provides guidelines for undertaking evaluations of EU Structural Fund Programmes, various national traditions have been developed, particularly across Europe, with respect to evaluation influenced by government structure and traditions in different countries. However, these can be viewed as being based on four main sets of ideas; scientific research and methods, economic theory, organisation/management theory, and political and administrative sciences. Table 1.1 shows how these four sets of ideas lead to different types of evaluation, while Appendix 1 provides further information on approaches to evaluation (see accompanying document for appendices).

Table 1.1 Purposes, methods and types of evaluation

	Scientific methods	Economic theory	Organisation/ management theory	Political and administrative sciences
Purpose	Knowledge production	Planning/ efficiency	Implementation; institutional strengthening	Accountability
Approach	Explanatory	Resource allocation	Formative; participatory/ development	Standards/ target-based
Type	Causal/ experimental	Allocative/ economic	Formative; participatory	Performance

Source: Revised MEANS handbook; now called the 'New Guide to Evaluating Socio-Economic Development', this evolving resource can be found at http://www.evalsed.info/.

Evaluations can be complex. This is highlighted by the study's research issues, which form a set of important factors that had to be taken into account during the development of the evaluation toolkit, which is one of the project's key outputs.

– To what extent might generic research tools be employed and transferable lessons learnt, given that road schemes differ?

– To what extent might effective evaluation on a wider scale be possible, given that the timescales for implementation of road schemes are usually very long, and it takes a long time for the impact to become apparent? How might any identified lessons usefully inform appraisal or policy development despite the long timeframes?

– How might cause, effect and attribution be established for road scheme impacts?

– How might robust counterfactuals for road schemes be established?

– How might road scheme evaluations cope with the problem of confounding factors and unexpected events? To what extent might evaluations enable an understanding of such uncertainties and assist risk management?

– How can the boundaries for impacts be defined, particularly as a major road scheme might affect many people elsewhere, often at long distances from the scheme's location?

Questions such as these are faced by most evaluations, and lessons learned in other fields were applied during the course of this study.

1.3 Research methods

The study team used evidence from past evaluations, detailed case studies, and consultation with experts and stakeholders to assess potential interest in evaluations, and to develop possible tools and techniques to address them. The approach included:

– identifying and assessing over 300 transport evaluation documents;
– carrying out six detailed case studies of transport scheme evaluations;
– interviewing potential evaluation users from the DfT, the Highways Agency, other government departments, external organisations, and the communities in three of the case study areas;
– drawing on this evidence to develop a broad selection of evaluation options across all key scheme impacts, supported by an assessment of their benefits and costs (these form a prototype 'toolkit' on which future evaluators could draw);
– using this toolkit, revisiting the three road-based evaluation case studies to determine how evaluation might have been carried out differently in each.

This report includes detailed descriptions of the methods in each chapter.

1.4 Acknowledgements

The study team would like to thank all those who have given their time to this project, including the Steering Group, staff at the DfT, Defra and Office of the Deputy Prime Minister (ODPM) who have provided comments on team outputs, and consultees from within the DfT and Highways Agency, external organisations, and scheme professionals and receptors. Their assistance has greatly contributed to the study team's understanding of the issues considered.

1.5 Structure of the report

The study contains a number of interwoven strands, which are discussed in the remainder of this report.

– Chapter 2 describes a systematic review—including the development of a review template, search terms, and information on the papers received and reviewed—of transport evaluation studies, guidance and reviews, and the selection of, and outputs from, six in-depth case studies of scheme evaluations. This review of evaluation methods provides a critique of those used on the SRN, and identifies transferable methods from international highway scheme studies and other UK and international transport evaluations. The case studies were designed to identify the effectiveness of the evaluation, thus building on the (then) indicative findings of the systematic review, as applied to each of the six cases, using media reports, scheme documents and consultation with professionals involved in the scheme and the evaluation.

– Chapter 3 presents the results of three strands of consultation—with senior staff at the DfT and Highways Agency; with external organisations with a potential interest in road scheme evaluation; and with scheme receptors in three of the six case study areas. The consultation was designed to identify priorities for future evaluation evidence, which would be mapped against that currently being provided by evaluations of SRN schemes; to canvass opinion on the ease of addressing these priorities; and to determine how evaluation evidence might best be presented and disseminated.

– Chapter 4 develops an evaluation 'toolkit', from which a set of tools could be selected to carry out the evaluation of a trunk road scheme. The toolkit was developed using the information obtained during the systematic review, which provided evidence of possible approaches, and the consultation exercises, which demonstrated where there is most need for evaluation evidence. Where the systematic review suggested that evaluation methods have not previously been applied in the priority situations highlighted by the consultations, they have been devised using professional judgement, with the help of, for example, appraisal methods tailored to post-implementation situations. Hence, the study team envisages that a piloting of the approaches developed thus far would be part of the roll-out of the toolkit. This chapter describes the task of assessing the practicality and feasibility of applying the tools (some of which have not been applied to trunk road evaluation before), their costs and benefits, and the extent to which they address the study's research issues. Finally, it describes a return to the three area study schemes, with the intention of applying the toolkit and determining the type of evaluation that would have taken place had the toolkit been available, taking account of the costs and benefits of the methods available.

– Chapter 5 concludes with an assessment of the feasibility of the ex post evaluation of trunk road schemes. It summarises what has been learnt by the study team in terms of the usefulness of Post Opening Project Evaluations (POPE); the value to consultees of evaluation; where stakeholder priorities lie; the practicality and cost-effectiveness of addressing these priorities; and how evaluation might be more effectively disseminated and organised.

– Background information, including proformas for each evaluation tool, is provided in the appendices.

2 Summary of systematic review and case studies

This chapter begins with a summary of a systematic review of transport scheme evaluation studies and guidance documents, before describing six in-depth case studies of evaluations selected from the review pool.

2.1 Systematic review

This review aims to identify scheme evaluation studies, and tease out the extent of evaluation coverage and possible methods. This section describes the methods used to identify around 300 documents, which were filtered down to nearly 120 studies for closer review. In addition, it describes how the review was conducted, using a template designed for the purpose, and its outcomes. The review was used to inform the selection of case studies and to provide an initial view of the gaps in the literature—in terms of both impacts and processes addressed by studies—and evaluation methods used.

2.1.1 Methods

The review began with a systematic search for UK and international scheme evaluation reports and guidance documents, using Internet search tools and contacts with key bodies.[17] Sources ranged from central and local government, academic institutions and supra-national bodies (eg, the World Bank) to pressure groups and motoring organisations.

Concurrently, review templates were developed to ensure that formalised information-collection approaches were adopted across reviewers, to aid future analysis of patterns in the literature and to assist with the shortlisting of studies for further consideration. The design not only ensured that basic information about the schemes being evaluated and the evaluation studies themselves were provided, but also enabled the presentation of critiques of the studies' effectiveness and robustness.

Template entries were added to an Excel database. Database fields were defined to record the answer to each question in the review template. Numeric and pre-coded answers were input into the database as recorded on the template. Prior to entry, text answers were coded into common groups to facilitate analysis. The database entries were then used to filter the reviewed documents to arrive at a shortlist of studies for further in-depth investigation as case studies, and to assist analysis of possible approaches in the latter part of the study.

2.1.2 Studies collected

The search identified nearly 300 documents, many of which appeared to be related to ex post evaluation but, on closer inspection, were related to ex ante appraisal or other issues. Obtaining documents proved difficult, especially from international sources—it was only possible to obtain 82 of the total 143 international documents identified. Even in the UK it was difficult to source literature and, in many cases, the sponsoring authority could not supply copies of key documents.

Ultimately, 120 UK and international documents were collected across three categories. Ex post evaluation **studies** are evaluations of specific schemes; ex post evaluation **guidance** documents provide instructions on the methodology for undertaking evaluations;

[17] Appendix 2 lists the search terms, tools and sources.

and ex post evaluation **reviews** either compare combinations of previous evaluations through case study assessment or critique methodologies. More specifically, 40 UK, and ten international highway scheme evaluations were assembled, along with 16 UK, and eight international non-road transport scheme evaluations.

DfT/Highways Agency highway evaluations

Of the 40 UK highway evaluations, 23 fell within four programmes of work carried out by the DfT/Highways Agency:

– Scheme Forecast Monitoring (**SFM**);
– Post Implementation Evaluation Studies (**PIES**);
– Post Opening Project Evaluations (**POPE**);
– Traffic Impact Studies (**TIS**).

To date, these programmes have addressed (or are in the process of addressing) 308 schemes.

Scheme Forecast Monitoring

The SFM process was initiated by the Department of Transport (DoT) in 1981 and has been replaced by POPE. It compared the observed traffic flows on completed trunk road schemes with forecast traffic flows for the Order Publication Report (OPR)/public inquiry stage. The purpose of this process was to provide feedback on the accuracy of the trunk road scheme appraisal process. The 217 schemes covered by the SFM process included 55 bypasses, 28 junction improvements, 15 motorway schemes, 20 online schemes, 87 rural improvements, and12 urban improvements.

Post Implementation Evaluation Studies

The PIES process was started in 1994 and ceased in 2002. Its objective was to compare outturn journey times, traffic matrices and accident rates from completed trunk road schemes with forecasts made when designs were finalised at the OPR stage. These forecast benefits are usually the same as those presented at a public inquiry. Depending on the degree of complexity, the road schemes were defined according to two categories:

– simple road schemes (bypasses of villages);
– medium complex road schemes (bypasses of medium-sized towns).

Of the 20 PIES completed, 14 were for simple schemes and six for medium complex schemes (see Table A2.1 in Appendix 2). Most of these studies were completed by consultant, Oscar Faber (now Faber Maunsell), with the exceptions of the A47 Norwich Southern Bypass completed by TecnEcon and the A13 Economic Impact Report by Atkins. All of the study reports were obtained from the consultants and the SRE Division.

Post Opening Project Evaluations

The POPE process incorporates improved monitoring procedures and a simpler evaluation process than the PIES, focusing on impacts on traffic volumes, travel times and accidents. Atkins is the current POPE consultant for the Highways Agency. At the inception of this study, it was anticipated that two POPE studies (one-year post-opening evaluations for the A43 Silverstone and A27 Polegate) would be made available by Atkins to the study team in January 2004.

The incomplete draft A27 and A43 studies were supplied by Atkins in April 2004, and work on other scheme evaluations is ongoing, including a five-year evaluation of the Newbury

Bypass. The study team was not made aware of any formal guidance for conducting POPEs. An internal Atkins discussion paper on extending POPE to include environmental evaluation was made available, as was draft guidance for the evaluation of environmental sub-objectives prepared by Halcrow in 2002.[18]

Traffic Impact Studies

The Highways Agency's programme of TIS for Targeted Programme of Improvement (TPI) schemes is designed to assist in understanding the immediate traffic impacts of new schemes. Twelve TIS have been carried out by the POPE consultant, Atkins, since 2002.

Other highway evaluations

Table A2.2 in Appendix 2 details the remaining 17 UK documents obtained by the study team. These report on one-off studies sometimes part-funded by the DfT/Highways Agency, covering a number of network enhancements, including new bridges, bypasses and motorways. Table A2.3 in Appendix 2 presents details of the 24 relevant international road scheme evaluation documents identified and obtained during the search. Table A2.4 sets out evaluation methods used by road scheme studies outside of SFM/PIES/POPE. The most innovative evaluation methodologies were employed to assess wider economic effects. The Severn Bridge, M40 case study, A55 expressway, M25 study, A50 Stoke on Trent and Appalachian Department Highways economic impact study (EIS) employed a range of economic consultation and comparative techniques, although none stood out as significantly better than the others.

Non-highways evaluations

Table A2.5 in Appendix 2 sets out information relating to the non-road transport scheme evaluation studies collected, and Table A2.6 discusses research tools used in non-highway transport evaluations, and their transferability to highway situations. Of the 19 priority non-highway transport scheme evaluations reviewed in detail, eight are light-rail studies, seven are rail-based, two consider guided busways, one draws lessons from multiple schemes, and one focuses on a cycling strategy.

Reviews of evaluation studies and guidance documents

These were generally disappointing (with a couple of exceptions) in that they revealed few innovative approaches to evaluation. Eleven evaluation study reviews were obtained, each of which studied a number of separate schemes in order to draw wider methodological conclusions or to propose policy improvements. The studies used empirical evidence from the evaluations, but most cases contained little in the way of rigorous critiques of the evaluations themselves.

A number of evaluation methods were demonstrated, the most innovative being a comparative method using 'control' regions to assess transport impacts. This method was referred to in three cases: French motorways, studies of the Severn Bridge and M62 in the UK, and the US Appalachian motorway programme. The effectiveness of the method was not reviewed in detail, with the exception of the UK case, where it was found that its use might be limited by the difficulties of finding appropriate comparison regions and isolating confounding factors.

The review of guidance was conducted to identify details on standard evaluation methodologies to support the assessment of evaluation studies and to provide information on transferable, innovative approaches for further stages of the study. No assessment was made of the adequacy or completeness of the guidelines.

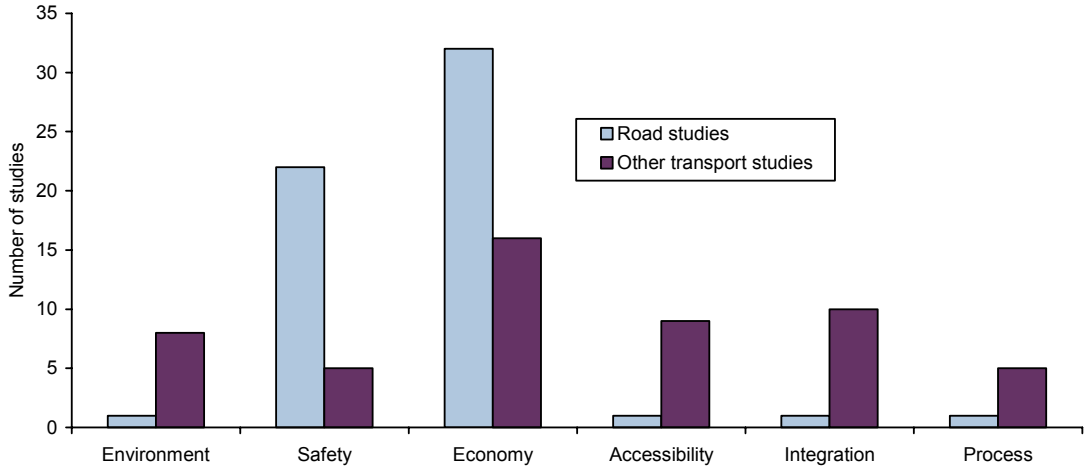
[18] Halcrow Group Limited (2002), 'Post Opening Project Evaluation of Environmental Sub-objectives (POPE-E) Guidance Manual', March.

The most interesting guidelines are those produced for the Federal Highways Authority (FHWA). These provide a set of best-practice guidelines to inform practitioners of efficient and thorough methods for conducting empirical studies of the actual economic development impacts of specific highway schemes. The methodology assesses measurements of gross economic changes occurring in the study area between the pre- and post-project periods. The gross measurements are then restated in comparison with the counterfactual case estimated through a control group, statistically estimated baseline, or structural economic model estimation of baseline expectations. The resulting net impacts are then further assessed in terms of the role of the highway scheme relative to other local factors taking place at the same time (confounding factors). This approach is still at a prototype stage.

2.1.3 Analysis and selection of case studies

Figure 2.1 shows the scope of road and non-road transport scheme evaluations, with impacts based on new approach to appraisal (NATA) objectives, and including process evaluation.

Figure 2.1 Impacts covered by road and non-road transport scheme evaluations

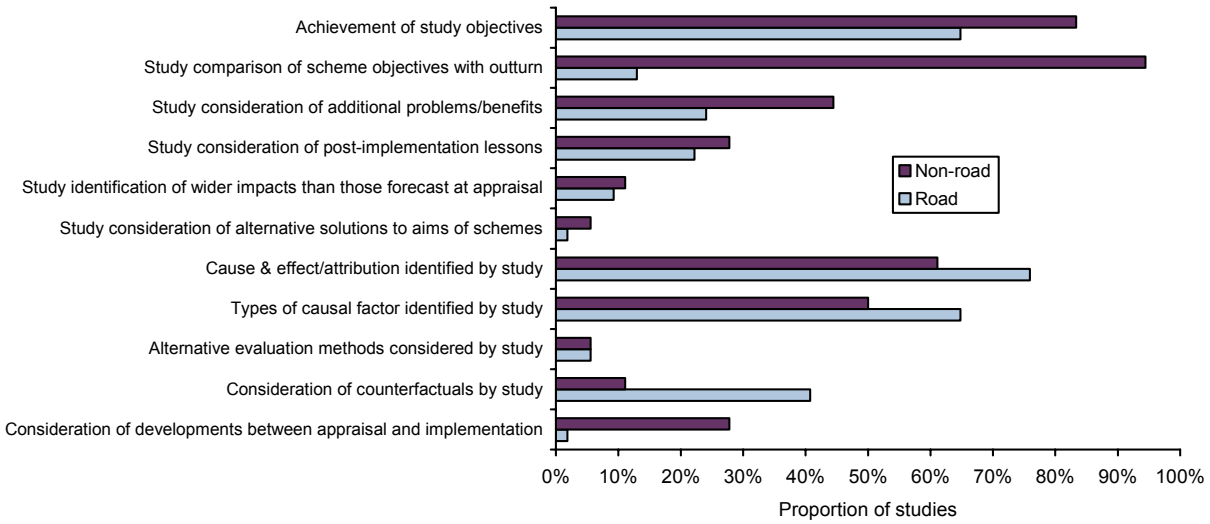


Source: Study team analysis.

The figure demonstrates the wider scope of non-highway scheme evaluations, relative to road scheme evaluations, which have tended to focus on traffic and accident impacts. While these have also been a key focus of non-highway evaluations, relatively more weight has been attached to evaluating regeneration impacts, and the impact on emissions, access and land-use policy. In both cases, process evaluation—the assessment of the processes of delivering schemes (appraisal, design, consultation, construction, etc)—has been rare.

Figure 2.2 depicts effectiveness scores from the template reviews of road and non-road transport scheme evaluations.

Figure 2.2 Effectiveness of road and non-road studies

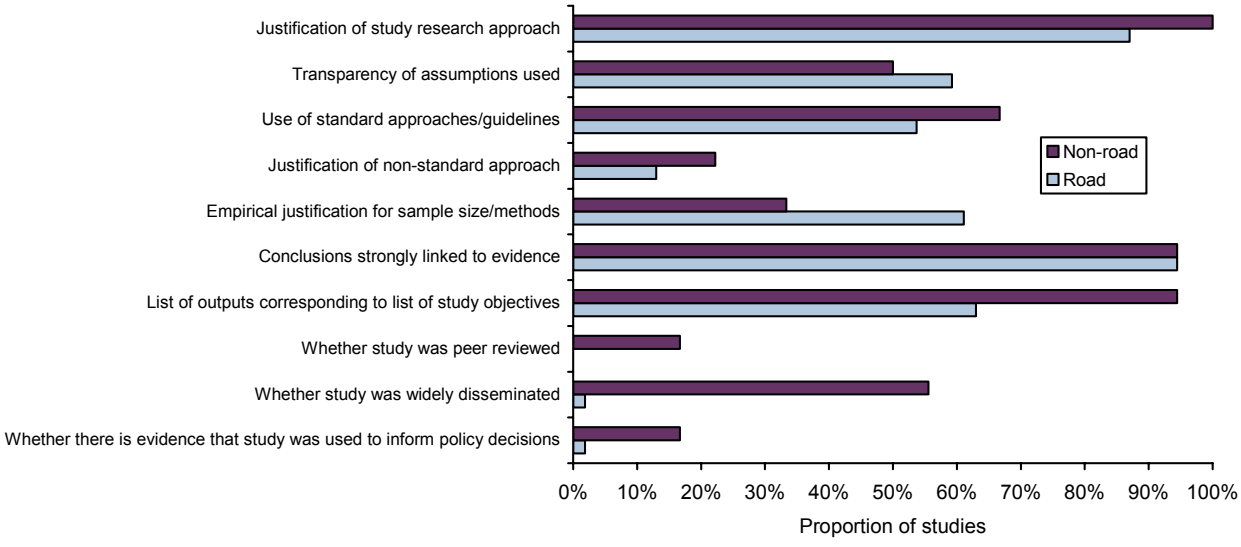


Note: Studies were classified by researchers as being either compliant or non-compliant with the template questions. The bars show the proportion of studies measured as compliant under each category.
Source: Study team analysis.

The figure shows that non-road studies are typically more effective than road scheme evaluations, except in relation to the consideration of counterfactuals, which occurred in over 40% of road studies, but in less than 10% of non-road studies. However, it is worth noting that the outperformance in this area by road studies is rather biased by the questionable categorisation of PIES as studies where the counterfactual has been estimated, whereas in reality these studies compared modelled outturn with appraisal forecast 'do nothing'.

Similarly, Figure 2.3 depicts quality scores from the template review.

Figure 2.3 Quality of road and non-road studies



Note: Studies were classified by researchers as being either compliant or non-compliant with the template questions. The bars show the proportion of studies measured as compliant under each category.
Source: Study team analysis.

The generally superior performance of non-road studies is more apparent in Figure 2.3 than in Figure 2.2, particularly in relation to peer review, dissemination and meeting study objectives.

2.1.4 Summary of findings

– Despite the number of transport schemes in recent years, evaluations are relatively rare and often difficult to acquire. Findings are presented in Table 2.1.

Table 2.1 Review findings

	TAG objectives addressed?					
UK and international studies	Environment	Safety	Economy	Accessibility	Integration	Process evaluation
40 road scheme evaluations	1	22	32	1	1	1
19 non-road scheme evaluations	8	5	16	9	10	5

Note: TAG, Transport Appraisal Guidance, the DfT's ex ante appraisal guidance, which is split into five objectives. TAG builds on the Guidance on the Methodology for the Multi-Modal Studies (GOMMMS), and the earlier NEW Approach To Appraisal (NATA).
Source: Study team analysis.

– The table shows the following:

  – for road schemes, the safety and economy TAG objectives have been the overwhelming focus, with other TAG objectives receiving limited coverage;
  – there have been few process evaluations, particularly of road schemes;
  – as a whole, non-road scheme evaluations have tended to cover a wider range of impacts, although most of these studies have focused on one or two particular impacts.

– Only nine studies[19] of those reviewed attempted to estimate counterfactuals (ie, what would have happened had the scheme not gone ahead), and the methods employed have not been particularly sophisticated.

– Of all the studies, only ten considered wider impacts than those forecast at appraisal.

– Non-road scheme evaluations have used certain methods that might be used in roads evaluations, such as before-and-after panel surveys and environmental impact testing. Non-road scheme evaluations also scored generally better in terms of quality and effectiveness, suggesting that there is scope for enhancing road scheme evaluations using transferable methods from other transport studies.

– Determining the boundaries of a scheme's impacts is vital. It affects the use and cost-effectiveness of methods (eg, household surveys and qualitative interviews) that some studies have found to produce the most useful results—indeed, these methods have been shown by evaluation in other sectors as most able to assist in demonstrating causality.

[19] Although PIES generated a comparison between modelled outturn and appraisal 'do nothing', this is rather different from comparing actual outturns with appraisal expectations. In addition, PIES did not prove to be cost-effective.

– Non-road scheme studies appear to have been more widely disseminated than road evaluations, but evidence on where and how evaluations have influenced policy-making is lacking.

2.2 Case studies

The remainder of this chapter reports on the in-depth examination of six evaluation case studies.

2.2.1 Objective

The objective of the case studies was to build on the systematic review of literature, by examining a wider range of documentation and interviewing key stakeholders. In particular, the following questions were addressed.

– What useful methods have been used to evaluate particular impacts/processes?

– Did the evaluation pick up important impacts and, in doing so, did it meet people's needs?

– If not, what should it have covered, and how?

– What are people's priorities between the alternatives?

– Did the evaluation manage to deal with any of this study's key research issues?

2.2.2 Case study selection

On the basis of the review (which highlighted which studies were most effective, innovative and of the highest quality) and input from the project Steering Group (which suggested that it would be desirable to consider one POPE, one PIE and one motorway-based study), 14 evaluations (see Table A2.7 in Appendix 2) were shortlisted as possible case studies.

The filtering criteria are summarised as follows:

– *scope of the study*—the number and type of impacts (expected and unexpected) addressed by each study;
– *distribution*—location and type of scheme evaluated;
– *effectiveness*—how well the study addressed the 13 indicators identified;
– *quality*—whether the study satisfied the ten indicators;
– *other review work*—whether the scheme has been subject to other reviews identified in the literature search.

A scoring system was devised to prioritise the importance of studies for further consideration. This compared scores for each study for effectiveness and quality (a simple summation of how many issues were addressed) with the number of impacts measured. From this list, the Steering Group selected six scheme evaluations worthy of more detailed investigation:

– A46 Leicester Western Bypass (medium complex PIE);
– A30 Okehampton Bypass (commissioned by the RAC);
– A27 Polegate Bypass (POPE);
– Jubilee Line Extension (commissioned by TfL);
– London congestion charging (commissioned by Transport for London, TfL);
– M40 (commissioned by the Council for the Protection of Rural England, CPRE).

2.2.3 Approach

A two-stage approach was implemented. First, a review of scheme documentation was undertaken to establish scheme objectives and issues emerging from appraisal and public inquiry, and to identify key individuals involved in preparing and analysing the scheme and those affected by scheme impacts. The key individuals identified were then interviewed in the second stage of the case study to gain a clearer understanding of the effectiveness of the evaluation, whether it assessed all the impacts of the scheme, and what priorities different individuals attached to the evaluation of scheme impacts.

The study team then identified anticipated and reported impacts of schemes, by level of importance, from the following sources:

– media coverage;
– pre-implementation reports;
– the views of the consulted parties.

This analysis enabled a comparison of what the evaluations had covered with what different commentators suggested they should have covered—ie, the possible gaps in the studies. For each of the above sources, a table was prepared summarising the impacts addressed and their level of importance. For ease of comparison, the same table format was adopted for all summaries, listing all TAG impacts, together with other impacts that the relevant source deemed important, and using the same scale for importance levels. The scale ranges from 'impact not addressed', to 'low', 'medium' or 'high' level of importance. The definition of levels of importance differs between sources, as follows.

– *Evaluation study*—the level of importance here reflects the depth to which the evaluation covered each issue. This was based on a review of the report, as it was not always possible to interview the evaluators.

– *Media articles*—the level of importance was based on a combination of the frequency of issues reported, the depth of coverage, and the period over which the issue was covered.

– *Pre-implementation reports*—where available, the inspector's report was the main source of information. The frequency of issues reported and the number of representations were a reliable indication of the level of importance. When the inspector's report was not available, the OPR documents were used for judgement, in which case the depth of the assessment was used as a measure of the level of importance. However, in a number of cases, it proved very difficult to locate the relevant documents. Hence, the table reports whether the impact was addressed in the evidence available.

– *Stakeholders*—those interviewed—who for the case study exercise comprised professionals involved in either the development of a scheme, or its evaluation—were asked to score from 1 to 5 those issues they deemed important for the scheme in question, and which should therefore be addressed in the evaluation (see Figure A2.1 in Appendix 2 for the form presented to consultees). The individual scores were then averaged across all interviewees' responses, and scores converted into 'low', 'medium', and 'high' levels of priority.

A46 Leicester Western Bypass

The main objectives of the scheme were to relieve Leicester of through traffic between the M1/M69 junction and the A46 and A607 north of the city, and to act as a distributor for traffic wishing to enter the city by linking up the major radial routes into the city centre.

The A46 Leicester Western Bypass was the last scheme to be evaluated using the medium complex PIES guidelines. Completed in 2002, this is one of the most recent evaluation studies gathered. The scheme raised major concerns, as it did not deliver the expected traffic

objectives, with unexpected impacts on the M1 and high levels of induced traffic. It is also a relatively large scheme, compared with those selected for the other case studies (costing £111m in 1998 prices), affecting a more complex urban environment. Table A2.8 in Appendix 2 summarises the evaluation methods used.

The findings of the appraisal, media and consultation programme, with regard to the nature and importance of impacts, are summarised in Table 2.2. The comparative weightings given to individual impacts are then compared with the perceived focus of the evaluation and its effectiveness in addressing the primary objectives of the scheme.

Reviewing the gap between the evaluation requirements and the delivered output identifies several findings. First, accidents and transport economic efficiency impacts that were viewed as being of high importance were effectively covered within the evaluation. Against this, a broad range of impacts identified as being of high importance were deemed to have been ineffectively covered (ie, placed little weight on the impact, or used an ineffective approach) or not addressed at all—in particular reliability, wider economic impacts, access to transport systems, and land-use policy.

Table 2.2 A46 Leicester Western Bypass: effectiveness of the evaluation study

	Scheme impacts by level of importance considered by:				
Scheme impacts	**Available appraisal reports**	**Media articles**	**Stakeholders**	**Evaluation study**	**Effectiveness (bold denotes gap)**
Noise	Assessment was not possible given the shortage of pre-implementation documents	Low	Medium	Not addressed	**Not covered**
Local air quality		Not addressed	Medium	Not addressed	**Not covered**
Greenhouse gases		Not addressed	Low	Not addressed	Not covered
Landscape		Not addressed	Medium	Not addressed	**Not covered**
Townscape		Not addressed	Low	Not addressed	Not covered
Biodiversity		Not addressed	Low	Not addressed	Not covered
Heritage		Medium	Low	Not addressed	**Not covered**
Water		Not addressed	Low	Not addressed	Not covered
Physical fitness		Not addressed	Low	Not addressed	Not covered
Journey ambience		Not addressed	Low	Not addressed	Not covered
Accidents	High	High	High	High	Effective
Security		Not addressed	Low	Not addressed	Not covered
Transport economic efficiency	High	High	High	High	Effective
Reliability	Assessment was not possible given the shortage of pre-implementation documents	Not addressed	High	Low	**Ineffective**
Wider economic impacts		Not addressed	High	Low	**Ineffective**
Option values		Not addressed	Medium	Not addressed	**Not covered**
Severance		Medium	Medium	Not addressed	**Not covered**
Access to transport system		Not addressed	High	Not addressed	**Not covered**
Transport interchange		Not addressed	Medium	Not addressed	**Not covered**
Land-use policy		Not addressed	High	Not addressed	**Not covered**
Other government policy		Not addressed	Medium	Not addressed	**Not covered**
Scheme-implementation process		Medium	Not addressed	Not addressed	**Not covered**
Impact on regeneration (eg, contribution to urban regeneration)		Not addressed	Medium	Not addressed	**Not covered**
Economic/social impacts (eg, inclusion)		Not addressed	Medium	Not addressed	**Not covered**
Access to opportunities/employment		Not addressed	Medium	Not addressed	**Not covered**

Source: Study team analysis.

A30 Okehampton Bypass

The A30 Okehampton Bypass was selected for review due to its focus on environmental impacts. This issue, as highlighted in a recent paper by Nellthorp and Mackie,[20] is becoming increasingly recognised as the most important in scheme selection at the appraisal stage. It was also a non-Highways Agency study commissioned by the RAC and carried out by the Transport Research Laboratory (TRL). Table A2.9 in Appendix 2 presents the scope, focus and process of the evaluation.

The completion of the evaluation in 1997 also provided adequate time for the different impacts to materialise and for the changes to settle down. At the same time, because the scheme had significant and contentious impacts (its route took the road through an area of Dartmoor National Park), it is still well remembered. A history of the scheme development is provided in Appendix 2.

Table 2.3 establishes the extent of the gaps between evaluation coverage and the needs of the identified sources. Reviewing the gap between the evaluation requirements and the delivered output identifies a number of findings. First, the noise impact that was viewed as being of high importance was effectively covered within the evaluation. Against this, a range of impacts that were identified as being of high importance were deemed to have been ineffectively covered or not addressed. These include:

– landscape;
– biodiversity;
– scheme-implementation process;
– wider economic impacts;
– local air quality;
– transport economic efficiency;
– other government policy;
– accidents;
– land-use policy.

[20] Nellthorp, J. and Mackie, P.J. (2000), 'The UK Roads Review: A Hedonic Model of Decision-making', *Transport Policy*, **7**, 127–38.

Table 2.3 A30 Okehampton Bypass: effectiveness of the evaluation study

	Scheme impacts by level of importance considered by:				
Scheme impacts	Available appraisal reports	Media articles	Stakeholders	Evaluation study	Effectiveness (bold denotes gap)
Noise	High	High	High	High	Effective
Local air quality	Medium	Low	High	Medium	**Ineffective**
Greenhouse gases	Not addressed	Low	Medium	Not addressed	**Not covered**
Landscape	High	High	High	Medium	**Ineffective**
Townscape	Not addressed	Medium	Medium	Not addressed	**Not covered**
Biodiversity	Not addressed	Not addressed	High	Medium	**Ineffective**
Heritage	Low	Low	Medium	Low	**Ineffective**
Water	Not addressed	Not addressed	Medium	Not addressed	**Not covered**
Physical fitness	Not addressed	Not addressed	Low	Not addressed	Not covered
Journey ambience	Not addressed	Not addressed	Medium	Not addressed	**Not covered**
Accidents	Not addressed	Low	High	Not addressed	**Not covered**
Security	Not addressed	Not addressed	Medium	Not addressed	**Not covered**
Transport economic efficiency	High	High	Medium	Low	**Ineffective**
Reliability	Low	Low	Medium	Not addressed	**Not covered**
Wider economic Impacts	Not addressed	High	Medium	Low	**Ineffective**
Option values	Not addressed	Not addressed	low	Not addressed	Not covered
Severance	Medium	Medium	Medium	Medium	Effective
Access to transport system	Not addressed	Medium	Low	Not addressed	**Not covered**
Transport interchange	Not addressed	Not addressed	Medium	Not addressed	**Not covered**
Land-use policy	Medium	High	Medium	Not addressed	**Not covered**
Other government policy	Medium	High	Medium	Medium	**Ineffective**
Scheme-implementation process	Not addressed	High	Not addressed	Low	**Ineffective**
Public perception	Not addressed	Not addressed	Low	Not addressed	Not covered
Business and developer perception	Not addressed	Not addressed	Low	Not addressed	Not covered
Distributional impacts	Not addressed	Not addressed	Low	Not addressed	Not covered

Source: Study team analysis.

A27 Polegate Bypass

The A27 Polegate Bypass in East Sussex was one of the first schemes to be evaluated under the current POPE guidelines. The draft evaluation was completed in 2004, following an earlier TIS in 2003 that provided the majority of the evaluation base data. The scope and focus of the one-year-after evaluation is set out in Table A2.10 in Appendix 2.

The primary objectives of the scheme were to improve the east–west strategic trunk road network along the south coast and to relieve severe traffic congestion within the town of Polegate. A history of scheme development is presented in the Appendix 2.

Table 2.4 sets out the case study findings. The structure and scope of the evaluation process were defined within the POPE methodology. Its coverage of broader research issues raised within this draft study was therefore limited.

Reviewing the gap between the evaluation requirements and the delivered output identifies a number of findings. First, transport economic efficiency and reliability impacts were viewed as being of high importance and were effectively covered within the evaluation. Against this, a broad range of impacts that were identified as being of high or medium importance were deemed to have been poorly or ineffectively covered. In particular:

– noise;
– air quality;
– landscape;
– biodiversity;
– water;
– accidents (understood to be covered in the POPE final report);
– severance (subjective and low-quality evaluation).

Table 2.4 A27 Polegate Bypass: effectiveness of the evaluation study

	Scheme impacts by level of importance considered by:				
Scheme impacts	Available appraisal reports	Media articles	Stakeholders	Evaluation study	Effectiveness (bold denotes gap)
Noise	High	High	High	Medium	**Ineffective**
Air quality	High	Medium	High	Medium	**Ineffective**
Greenhouse gases	Low	Low	Medium	Not addressed	**Not covered**
Landscape	High	High	High	Not addressed	**Not covered**
Townscape	Medium	Low	Low	Not addressed	**Not covered**
Biodiversity	Low	Medium	Medium	Not addressed	**Not covered**
Heritage	Low	Low	Low	Low	Effective
Water	Low	Low	High	Not addressed	**Not covered**
Physical fitness	Medium	Low	Low	Not addressed	**Not covered**
Journey ambience	Low	Low	Medium	Not addressed	**Not covered**
Accidents	High	Medium	High	Medium	**Ineffective**
Security	Low	Low	Low	Not addressed	Not covered
Transport economic efficiency	High	Medium	High	High	Effective
Reliability	High	Medium	High	High	Effective
Wider economic impacts	Medium	High	Medium	Not addressed	**Not covered**
Option values	Low	Low	Low	Not addressed	Not covered
Severance	High	High	Medium	Low	**Ineffective**
Access to transport system	Low	High	Low	Not addressed	**Not covered**
Transport interchange	Low	Low	Low	Not addressed	Not covered
Land-use policy	Medium	Medium	Medium	Not addressed	**Not covered**
Other government policy	Low	Low	Low	Not addressed	Not covered
Scheme-implementation process	Not addressed	Not addressed	Not addressed	Not addressed	Not covered

Source: Study team analysis.

Jubilee Line Extension

Originally scheduled to open in March 1998 at a cost of £1.9 billion, the 16km extension, running from Green Park to Stratford, was opened in three phases during 1999, at a cost of £3.5 billion. It was deemed that the impact of such a major investment in London's public transport network, representing the most significant addition to the London Underground system since the completion of the original Jubilee Line 20 years earlier, should be monitored and assessed. The broad aims set for the Jubilee Line Extension impact study were:

– to understand how the Jubilee Line Extension has affected London;
– to determine what lessons could be taken forward to improve forecasting and appraisal techniques.

Table A2.11 in Appendix 2 outlines the scope and focus of the evaluation, and summarises the methodology used to assess the extent of each identified impact.

The findings of the *available* appraisal documents, the media review and consultation programme, with regard to the nature and importance of impacts, are summarised in Table 2.5. The evaluation study appears to have been generally effective in assessing the anticipated impacts of the Jubilee Line Extension that were identified at the appraisal stage in light of the actual observed impacts.

Table 2.5 Jubilee Line Extension: effectiveness of the evaluation study

	Scheme impacts by level of importance considered by:				
Scheme impacts	Available appraisal documents	Media coverage	Stakeholders	Evaluation study	Effectiveness (bold denotes gap)
Noise	Not addressed	Not addressed	High	Low	**Ineffective**
Local air quality	Not addressed	Not addressed	Medium	Low	**Ineffective**
Greenhouse gases	Not addressed	Not addressed	Low/medium	Low	Effective
Landscape	Not addressed	Not addressed	Low/medium	Low/medium	Effective
Townscape	Not addressed	Not addressed	High	Low/medium	**Ineffective**
Biodiversity	Not addressed	Not addressed	Low	Not addressed	Not addressed
Heritage	Not addressed	Not addressed	Medium	Low	**Ineffective**
Water	Not addressed	Not addressed	Medium	Low	**Ineffective**
Physical fitness	Not addressed	Not addressed	Low/medium	Not addressed	Not addressed
Journey ambience	Not addressed	Low	Medium/high	Medium/high	Effective
Accidents	Not addressed	Not addressed	Medium/high	Not addressed	**Not addressed**
Security	Not addressed	Not addressed	High	Not addressed	Not addressed
Transport economic efficiency	High	Low	High	High	Effective
Reliability	Not addressed	Medium	High	Not addressed	**Not addressed**
Wider economic impacts	Not addressed	High	High	High	Effective
Option values	Not addressed	Medium	Medium/high	High	Effective
Severance	Not addressed	Medium	Medium/high	Medium/high	Effective
Access to transport system	Not addressed	Not addressed	High	High	Effective
Transport interchange	Not addressed	Not addressed	High	High	Effective
Land-use policy	Not addressed	Not addressed	High	Medium/high	Effective
Other government policy	Not addressed	Not addressed	Medium/high	Medium	Effective
Scheme-implementation process	Not addressed	High	Not addressed	Not addressed	Not addressed
Impact on regeneration (eg, contribution to urban regeneration)	High	High	High	Medium	**Ineffective**
Economic/social impacts (eg, inclusion)	High	Not addressed	High	High	Effective
Access to opportunities/employment	High	Low	High	Medium/high	Effective

Source: Study team analysis.

London congestion charging

Congestion charging was introduced in central London on February 17th 2003 by TfL and the Mayor of London. Its primary aim is to reduce traffic congestion in and around the charging zone, and it is intended to contribute directly to the Mayor's ten priorities for transport, as set out in his Transport Strategy published in July 2001. A history of scheme development is provided in Appendix 2.

TfL and the Mayor are carrying out a five-year programme of monitoring, for one year before the start of charging and four years after. TfL published three interim monitoring reports during the first year of operation, which set out findings for particular issues. These have been integrated into, updated and superseded by the 'Impacts Monitoring: Second Annual Report', published in April 2004, on which this case study was based. Table A2.12 in Appendix 2 sets out the evaluation's scope, focus and processes.

Table 2.6 draws together the conclusions from the *available* pre-implementation documentation, the media review, the consultation exercise and the evaluation study itself, to provide an overall measure of study effectiveness.

As Table 2.6 illustrates, the evaluation study appears to have been generally effective in assessing the key impacts of the congestion charging scheme that were deemed to be of high importance by the appraisal reports, by the media, and the interviewed stakeholders. The two impacts that were not effectively covered despite being of medium importance were local air quality and accidents.

Table 2.6 London congestion charging: effectiveness of the evaluation study

	Scheme impacts by level of importance considered by:				
Scheme impacts	Available appraisal reports	Media articles	Stakeholders	Evaluation study	Effectiveness (bold denotes gap)
Noise	Low	Not addressed	Not addressed	Low	Effective
Local air quality	Low	Medium	Medium	Low	**Ineffective**
Greenhouse gases	Low	Not addressed	Not addressed	Low	Effective
Landscape	Not addressed	Not addressed	Low	Not addressed	Not addressed
Townscape	Low	Not addressed	Low	Low	Effective
Biodiversity	Not addressed	Not addressed	Low	Not addressed	Not addressed
Heritage	Not addressed	Not addressed	Not addressed	Not addressed	Not addressed
Water	Not addressed	Not addressed	Not addressed	Not addressed	Not addressed
Physical fitness	Not addressed	Not addressed	Low	Not addressed	Not addressed
Journey ambience	Low	Not addressed	Low	Low	Effective
Accidents	Low	Low	Medium	Low	**Ineffective**
Security	Not addressed	Not addressed	Low	Not addressed	Not addressed
Transport economic efficiency	High	High	High	High	Effective
Reliability	High	High	Medium	High	Effective
Wider economic impacts	High	High	High	High	Effective
Option values	Not addressed	Not addressed	Low	Not addressed	Not addressed
Severance	Low	Low	Low	Low	Effective
Access to transport system	Not addressed	Not addressed	Low	Not addressed	Not addressed
Transport interchange	Not addressed	Not addressed	Low	Not addressed	Not addressed
Land-use policy	Not addressed	Not addressed	Not addressed	Not addressed	Not addressed
Other government policy	Medium	Not addressed	Low	Not addressed	**Not addressed**
Scheme operation and enforcement, and revenues	High	High	High	High	Effective
Traffic patterns	High	High	Medium	High	Effective
Public transport: buses	Medium	Medium	Low	Medium	Effective
Public transport: Underground and rail	Medium	Medium	Low	Medium	Effective
Social impacts	Medium	Medium	Medium	Medium	Effective

Source: Study team analysis.

M40 southern section

The M40 motorway was intended as a national transport link. The 'southern section'—the London–Oxford link, built as a replacement for the former A40 trunk road—was completed in 1973. Table A2.13 in Appendix 2 sets out the evaluation methodology.

This evaluation was selected for review to ensure that a motorway scheme was covered by the case studies, and because the evaluation was intended to look at long-term impacts. The evaluation study was commissioned by the CPRE to examine the local development and traffic effects of motorways and other major new roads.[21] The scope of the evaluation was rather limited, and the long time period (31 years) since scheme completion meant that the scope of the case study was restricted to considering the evaluation only, and interviewing one of the authors. The main issues highlighted were as follows.

– *Original appraisal criteria*—the original appraisal process was based on the premise that there would be no future development impacts resulting from the motorway construction beyond those that were already allowed for. However, opponents of this assessment held that the view was largely motivated by political considerations rather than land/transport policy, as it enhanced the net benefit of the proposed scheme by potentially underestimating the overall undesirable impacts. Furthermore, the appraisal did not consider 'second-order' effects and was largely focused on immediate transport-related impacts.

– *Methodological* issues—the overall approach to the impact study might be viewed as highlighting the weakness of the appraisal process used in the assessment of the M40 project by comparing anticipated outcomes with actual ones and examining whether indeed there had been no additional unforeseen development and traffic effects resulting from the scheme (as was believed at the appraisal stage). To this extent, there was little attempt to quantify the identified effects.

– *Policy issues*—the need for an integrated approach to transport and land-use planning was emphasised. Essentially, the authors argued that there might be overall policy benefits if transport projects were not assessed purely as such, but viewed from a wider strategic perspective, incorporating broader associated issues.

Little consideration is given by the evaluation to other, wider impacts of the M40 motorway that could have been examined in the course of the assessment; however, as the authors argue, the study was confined to development and traffic effects in the immediate vicinity of the motorway itself.

A notable feature of the impact study is the extent to which it makes policy recommendations resulting from its findings. By comparing anticipated outcomes with actual ones, the study highlights the gap between the prevailing planning policies of development restraint in the affected areas and major transport projects such as motorway construction. In particular, the authors stress the need for consistency and linkage between land use and transport planning.

2.2.4 Summary of case study findings

The case studies raised a number of interesting issues, which are summarised below.

– *Availability of pre-implementation information*—the study team spent a large amount of time tracking down original appraisal reports, public inquiry documentation and other

[21] Headicar, P. and Bixby, B. (1992), 'Concrete and Tyres—The Local Development Effects of Major Roads: A Case Study of the M40', report published by the CPRE.

public record papers. It is a concern that these documents either no longer exist or are very difficult to locate, given the amount of public money spent on the appraisal process. However, POPE is now making it a contractual commitment for scheme contractors to provide the Highways Agency with a documentation package as part of its project activities.

– *Focusing on traffic and accident impacts tends to overlook important factors*—the case studies highlighted the importance of a number of impacts and process issues that PIES and POPE approaches do not pick up. In particular, the Polegate POPE, designed to follow the POPE guidelines, was not able to control for the scheme objectives of alleviating safety and environmental problems within Polegate. The lack of stakeholder consultation inherent in POPE would also seem to be of concern. One consultee remarked that 'the scoping of the study cannot be decided in the guidelines, and should be defined on a scheme-by-scheme basis', perhaps using focus groups at the start of the process to ensure that the most important issues are being covered. However, it would seem that POPE evaluations tend to be limited by the availability of resources.

– *Demonstration of feasibility of evaluating non-traffic impacts successfully*—the Okehampton and Jubilee Line evaluations considered a number of impacts that DfT/Highways Agency road scheme evaluations did not, including environmental and social impacts, typically with some success.

– *Dissemination to local communities of evaluation findings is valuable*—the finding from the DfT/Highways Agency consultation that evaluation of the majority of individual schemes should be continued is borne out by the findings of the case studies. Local communities value real factual data, with appropriate explanations (the TIS are a good example of this).

– *Use of the counterfactual*—the counterfactual was explicitly referred to in both the A27 Polegate evaluation and the Jubilee Line Extension impact study, and implicitly examined in the A30 Okehampton case. This demonstrates that approaches are available for overcoming this methodological barrier; however, it would seem that this area of research is in its infancy. The counterfactual generated in the Polegate study—a comparison of forecast 'do minimum' with outturn cannot be judged a 'true' counterfactual, while the Okehampton paper provides inference about the effects of an alternative routeing, without much supportive evidence. The experience of the Jubilee Line Extension study team, which changed its method of obtaining a counterfactual during the period of the study, is useful. It had intended that information collected from 'before' surveys could be used to make forecasts, assuming that the Jubilee Line Extension had not been constructed, which could then be compared with 'with scheme' outturns. However, post-implementation, it placed far less reliance on these baseline forecasts, and recommended that the best estimate of the counterfactual can only be made post-opening. This was achieved using reference areas[22] to determine whether an observed change in an indicator in an area affected by the Jubilee Line Extension is indeed attributable to the Jubilee Line Extension. However, it is unclear whether the use of reference areas can gain ground as an accepted means of identifying what would have happened in the absence of a policy intervention.

[22] These were preferred to 'control areas', in light of the unique conditions found in several of the candidate areas. Reference areas differed according to the type of indicator under consideration, but represented a larger area that is likely to be subject to similar pressures that would have been experienced by the relevant part of the Jubilee Line Extension corridor. For example, the central London fringe area was used as the reference area for property pressures affecting the Isle of Dogs, and the inner east London area was used as the reference area for unemployment rates along most of the corridor.

3 Consultation findings

This chapter reports the findings of three separate yet consistent sets of consultation exercises undertaken as part of this study.

– Section 3.1 presents the comments made by senior members of the DfT and the Highways Agency during semi-structured interviews carried out in the spring of 2004.

– Section 3.2 reports the findings of a questionnaire-based consultation, conducted during the summer of 2004, with a number of external stakeholder organisations.

– Section 3.3 summarises a report prepared by Sra on three 'area studies', which involved consultation with local scheme stakeholders in the autumn of 2004 in three out of the six case study locations from Chapter 2—Leicester, Polegate and Okehampton.

The aims of the consultations were, first, an assessment of what stakeholders consider evaluation is and is not covering well; and second, the identification of key stakeholder priorities for filling any gaps, building on the shortlist of options identified during the review phase of the study.

It was particularly important to ensure that the *whole range* of TAG objectives and sub-objectives, *and* other objectives not covered by TAG, were discussed with stakeholders, and not merely those that previous evaluation studies have focused on.

The output of the consultation exercise was twofold. First, it allowed an assessment of priorities for ex post evaluation studies, feeding into the matrix for assessing evaluation methods, which evaluates these priorities in terms of their practicality, cost-effectiveness, proportionality, relevance, timeliness and flexibility. Second, it provided an important context in relation to these priorities, identifying the needs and knowledge gaps of the various levels of stakeholders.

3.1 DfT/Highways Agency consultation

This section describes the process of selecting interviewees from the DfT and Highways Agency, the semi-structured interview approach, and the results of the consultation exercise. The aim of this exercise was to provide an assessment of the success of previous and current road scheme evaluations in meeting objectives, and of whether there are knowledge gaps that future evaluations could help to fill.

A large majority of respondents felt that evaluation is an important tool that should be used more by the DfT and the Highways Agency. Its value differed according to the types of people being interviewed. Some respondents were less interested in each individual evaluation but needed to know that evaluation is being carried out as part of the provision of a robust evidence base for decision-making. Others felt that evaluation is a vital tool for policy-makers and scheme appraisers, and should be enhanced significantly.

3.1.1 Selection of interviewees

The choice of the interviewees in this initial consultation was determined by the need to obtain a cross-section of opinion covering the major stakeholders who might have an interest, direct or otherwise, in this project. Thus, policy-makers, such as Roads Policy, were interviewed to gain an insight into their perspective about what role evaluation could play in policy-making—it is likely that they will be direct customers of any future evaluation work arising from this study. The study team also sought the opinions of other policy-makers, such

as Local Transport, Freight Logistics, and Regional Transport, as future evaluations based on the findings of this study might be of direct relevance to them.

Similarly, representative opinion was sought from those who might be carrying out such evaluations, such as Highways Agency staff. The study team also sought to interview specialists, such as economists, transport modellers and social researchers, who could provide specific insights based on their area of work. In all cases, senior personnel were interviewed, since reflecting the knowledge and views at the top of the division or directorate was considered important.

3.1.2 Interview approach

Each interviewee was informed in advance by letter about the purpose of the project, some early findings from the systematic review, and the themes to be discussed during the interview. It was decided that the interviews should be semi-structured, thus combining the benefits of having a set of issues to be raised (agreed in advance with the DfT) with those associated with enabling discussions to flow more freely than would be possible with a formal questionnaire. It was also agreed with participants that discussions would take place according to a principle of non-attribution of responses, thus enabling the interviewers to obtain meaningful insights from the interviewees. The structure adopted for the interviews is set out in Appendix 3.

3.1.3 Consultation responses

The reporting of responses was split into five elements, relating to the knowledge and usefulness of previous evaluations, the usefulness of evaluation per se, its most useful focus, the ease of addressing priorities, and dissemination methods and targets.

Knowledge and usefulness of previous evaluations

As anticipated, it was mainly those directly involved in producing reports and analysis, or providing particular kinds of input to policy to which evaluation would add value, who had any real knowledge or ideas of how it might be used or where the technique may have been previously employed in relation to roads.

Levels of awareness varied, from those who had commissioned previous road scheme evaluations, those who were aware of evaluations in other areas of transport (such as the Jubilee Line Extension and local transport plan, LTP, evaluations), to those (who were in the majority) with limited or no awareness of a road scheme evaluation programme, or reports on individual schemes.

There was a range of comments as regards the current evaluation programme (ie, POPE), which was explained to consultees in advance of the interviews. One group believed that POPE was a reflection of the usefulness of PIES—ie, that POPE emerged because it was believed that too many resources were being directed into a programme that was insufficiently beneficial. POPE reflects a requirement to concentrate on journey time and accident monitoring (which another consultee suggested can proxy for the main benefits of road schemes), and tries to address the previous difficulties of appraisal and 'before' data, but omits the counterfactual and the impact of confounding variables. It was felt that it had met external scrutiny, having received input and agreement from the National Audit Office (NAO). Evaluation was considered to be only a snapshot relative to the timeframe for appraisal of 30 (now 60) years.

Others felt that POPE's usefulness could be enhanced by linking scheme impacts to the DfT's public service agreement (PSA) targets. This was consistent with a wider view that the present road scheme evaluation programme does not deliver all that it could and is open to improvement. For example, there could be more effective links to approaches to appraisal. In addition, a number of robust arguments were presented for the inclusion of the counterfactual—interviewees were typically of the opinion that the counterfactual is crucial to

the success of evaluation in terms of enabling improved decision-making. Finally, to some, previous evaluations seemed to be 'perspective-biased'—with too much emphasis on traffic modelling—and should have used a multi-modal, multi-disciplinary approach.

The usefulness of evaluation per se

This question generated extensive discussion and raised many issues, including the current robustness of data and findings.

– *Those familiar with evaluation* considered that it has the potential to improve learning on a continuous basis, especially in relation to policy-making, performance monitoring, improving appraisal and responding to new scenarios. Indeed, it was suggested that the need to improve decision-making is the key to the success of evaluation, and that this should be its primary focus, with the input into improving appraisal seen as a subsidiary objective. This was perhaps related to another view that forms of enquiry other than evaluation may be more valid for 'enhancing [appraisal] models'. Another view was that modelled data is no substitute for actual ex post measurement. This reflected perceived limitations of the value of recalibrating traffic models ex post as a form of evaluation—consistent with the improving decision-making criterion, such an exercise was considered only able to improve appraisal models, and not inform policy. Consultees stated that evaluation might form an ideal additional means of performance monitoring, since it could be used to clarify issues such as the delivery of value for money, best value and other benefits that currently may not appear in appraisal. It could also help target policy choices in the optimal way—'improving the effectiveness of policy levers', and provide evidence on whether roads and public transport are delivering the expected benefits.

– *Those with little knowledge or experience of evaluation* had an identifiable view that 'people needed to know that this was being done and being done robustly'. Interviewees spoke about the value of long-term evaluation, the need for evaluation to be 'done well, with counterfactuals and the ability to distinguish the impact of a scheme', and of the usefulness of pilot studies. They considered that there should be as much evidence as possible for ministers to draw on when making decisions, and, hence, the aspects covered by evaluation should form part of a framework uniting all the issues.

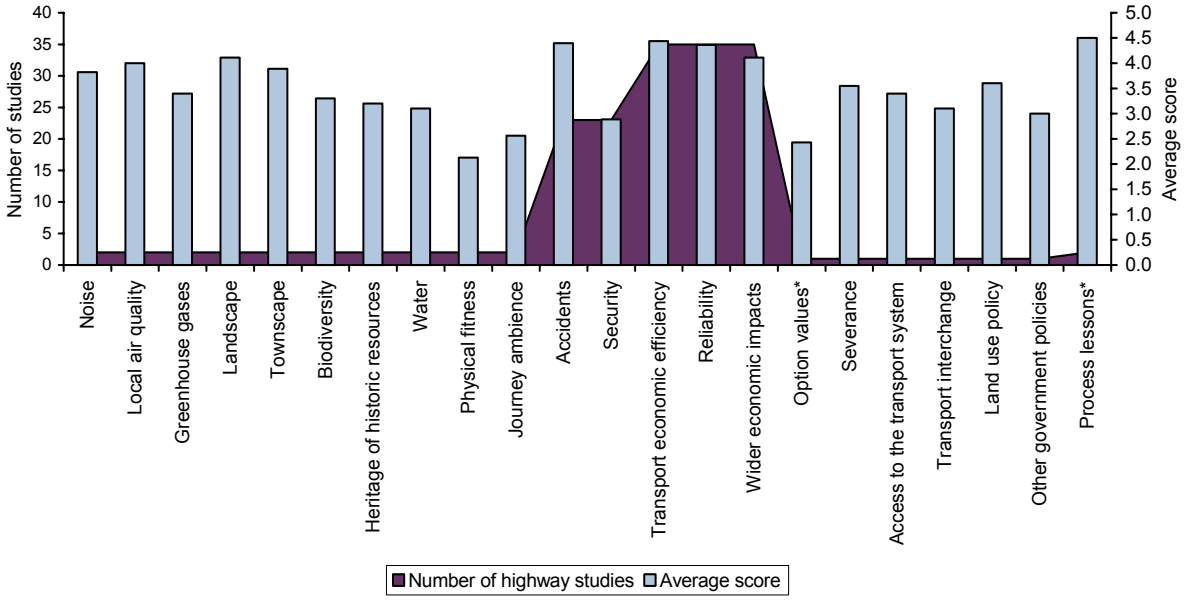
Overall, the consulted parties had much to say about what may currently figure both in appraisal and ultimately in evaluation. Appraisal and evaluation were perceived generally as growing in importance, which in turn means that the data and information forming both elements has to be reliable. However, the potential political downside of more 'question marks' was noted—ie, the risk of raising more questions than answers. Nevertheless, if evaluation were to be enhanced, transparency and openness would have to be the focus of data collection, regardless of the conclusions of the analysis. Interviewees commented that evaluation should reflect the enlightened approach to appraisal, and be planned from the outset. It should feed back into policy-making and should therefore, of necessity, be carried out by those with a degree of independence. It should also feed into appraisal methods, deliver lessons learned and strengthen information provided to policy-makers (such as in appraisal summary tables).

The most useful focus of evaluation

From a list based on current appraisal criteria (but also including process evaluation and space to comment on areas that the current appraisal framework does not cover, see Appendix 3), the interviewees were asked to select those areas that, in their view, would add the most useful focus to evaluations (see Figure A2.1 in Appendix 2). Some declined to give their views in this respect, either because of time constraints or because they did not feel that they were sufficiently knowledgeable about the basis for each potential option to make a valid choice. Those who took part (covering a similar range of individuals as the full sample) used a scoring system, in which '5' denoted high importance and '1' low importance, in terms of the need for ex post evidence. Averages were then taken for each appraisal criterion.

Figure 3.1 compares these averages with the extent to which UK highway evaluations have covered them (see Figure 2.1).

Figure 3.1 Priorities for the focus of future evaluations



Note: * Denotes an element where four or more of the 11 respondents to the questionnaire did not indicate a priority (process lessons) or ticked the 'don't know' option on the form (option values).
Source: Study team analysis.

The figure demonstrates that consultees prioritised a large number of areas yet to be evaluated. Particular gaps appear to relate to process, severance, land-use policy and environmental issues.

Areas where interviewees felt the current appraisal framework to be lacking in coverage included distributional analysis, quality of life, land values, customer satisfaction and public acceptability—how does this change as a scheme moves from pre-implementation, through construction to opening and beyond? These were typically seen as high-priority areas by those putting them forward.

The ease of addressing priorities

A number of barriers to enhancing the road scheme evaluation framework were alluded to. These related to the following.

– *Limitations of evaluation methods*—consultees highlighted the difficulty of assessing the counterfactual (eg, the usefulness of the extended reference area used in the Jubilee Line Extension evaluation was questioned); the difficulty of identifying links between road schemes and their impacts on the wider economy; limitations with 'theory of change' approaches (as used in the ongoing LTP evaluation); and evaluation's perceived inability to cope with long timescales of impacts. Some suggested that certain simple procedures are being done already, such as looking at traffic impacts, and that it would be more difficult, and may not be cost-effective, to evaluate subjective criteria.

– *Potential cost*—some interviewees commented that the funding and resourcing of changes to evaluation was of concern, as it was not clear who would bear these costs. However, a contrasting view was that the evaluation of trunk road schemes is an evolutionary process within which methodological issues pertaining to evaluation may be resolved over time. According to the consultees, this study should therefore provide a list of priorities—small, real steps forward; leading to more ambitious avenues that are

still manageable; and 'perfection'. Consultees also stated that the study should consider ideals and not rule them out because of cost.

– *Practical issues*—barriers highlighted related to the quality (or even simply the presence) of 'before' data collection and storing, which was seen as critical to the robustness of evaluation findings. Related to this point was the observation that it is important to bear in mind the links between appraisal and evaluation—that is, for evaluation to work properly, the areas to be evaluated should, as a matter of course, be included at the appraisal stage.

Dissemination methods and targets

The responses to this element indicated several communications needs, some areas of which overlap.

– *The target 'audience'*—there were strong indications of different customers with different needs, including appraisers, who want detailed understanding of how impacts occur and the lessons to be learnt; policy-makers, who want to know the key lessons and whether the anticipated or proposed outcomes are being delivered; and local authorities and other project sponsors, which are interested in evaluations of individual schemes. There were also strong indications that evaluation's audience should not be restricted to practitioners, but also to board members at the DfT and Highways Agency, with evaluation being built into the highest level of performance management.

– *The nature of information supplied*—the point was made several times that individuals in senior positions can suffer from a surfeit of information and necessarily need to be selective. Some indicated that they had a clear idea of the nature of the information they wanted to see, while others were less specific, citing, for example, that they would want 'relevant results from evaluations'. Equally, there was variation with regard to how in-depth the information supplied should be. A number of options emerged regarding the format of information supplied, including annual reports providing high-level data on the extent to which proposed scheme benefits have materialised); meta evaluations (ie, analysis from a number of evaluations of the same impact); specific scheme findings (particularly for controversial schemes or those with important policy implications); and thematic reports (eg, separate reports considering environmental or social impacts of schemes).

– *How the information is supplied*—a number of dissemination methods were suggested, including concise reports to senior staff of lessons learnt (perhaps tailored to their areas of interest); email notification of publications (although others commented that this might get lost among a daily welter of information; placing reports on the Highways Agency and DfT websites; and a substantive annual report that allows more general issues to be drawn out.

– *Education on the role of evaluation*—in terms of who should, or needs to, receive information on evaluations, one outcome of this consultation exercise was the identification of the general need to raise levels of awareness and knowledge about the advantages of evaluation. The consulted parties confirmed that 'change needs to be led from the top', since increased evaluation is likely to lead to some people taking on more responsibilities, who in turn need to see the value in what they are doing. The necessary cascade of information and communicating its value indicate that a process of 'education' has to be valued 'at the top' and disseminated such that there is confidence in the process that leads to COBA (road cost–benefit analysis), and that policy advisers use a reasonably full evidence base.

Collectively, this information suggests that a *reasonable* range of options may be required, from which a recipient can choose the stage and level at which information on proposed or delivered evaluations would be provided.

3.1.4 Summary

– *Knowledge and usefulness of previous evaluations*—there was a marked lack of awareness of previous road scheme evaluations, which have tended to be disseminated quite narrowly to local authorities and practitioners. When the results of the systematic review were put to interviewees, the general response was that counterfactuals should be part of the methods used, and that limiting evaluation to traffic levels and accidents is inconsistent with the approach to appraisal.

– *Usefulness of evaluation per se*—a real need for evaluation was expressed by a substantial majority of interviewees. Those involved with appraisal consider robust evaluation to be part of a toolkit alongside other methods of inquiry; however, policy-makers expressed a desire to know the outcomes of decisions that have been taken, particularly in light of a policy focus on delivery.

– *Most useful focus*—transport economic efficiency, accidents, reliability, wider economic impacts, landscape and local air quality all scored highly as areas of focus for evaluation. Lower priorities included physical fitness, option values (although a number of interviewees were not aware of the meaning of this criterion),[23] journey ambience and security. Process issues were given high scores by those who responded to this question.

– *Ease of addressing priorities and going forward*—interviewees were aware of the difficulties associated with carrying out robust evaluations. Areas mentioned include the counterfactual, the existence of high-quality data, the expense, and the ability to provide timely, relevant information in relation to long-term impacts. However, there was a general feeling that these methodological concerns imply an incremental approach in which these issues are dealt with over time, rather than placing less focus on evaluation.

– *Dissemination methods and targets*—different parties expressed different preferences for both *how* evaluation findings should be presented, and the *content* of any outputs. Many expressed a preference for an annual report with concise, relevant information, summarising the findings of evaluations undertaken that year. However, it was also recognised that local stakeholders (and potentially others for schemes with wider policy implications) will have an interest in the findings of individual evaluations.

3.2 External consultation

The next set of stakeholders comprised organisations outside of the DfT and the Highways Agency. The DfT provided of a list of key external consultees, which was used to determine who might be approached. Ultimately, 25 organisations were approached, with an identified individual in each contacted, and their agreement to take part in the consultation obtained. Each individual was sent a letter introducing the study, together with a questionnaire, copies of which are provided in Appendix 3. Eleven responses were received, from the Commission for Integrated Transport, the Confederation of British Industry, the Countryside Agency, Defra, the Department for Regional Development, the Environment Agency, English Heritage, the RAC Foundation, the NAO, the Scottish Executive and the Welsh Assembly Government.

Consultation was intended to reveal what stakeholders considered evaluation to be doing well currently, and in what areas it might improve. Where areas for improvement were identified, stakeholder priorities were requested.

[23] 'Option values' refers to the value associated with a road scheme increasing or decreasing the options available for transport users to undertake their journeys.

3.2.1 Consultation responses

Again, the reporting of responses was split into five elements, relating to the knowledge and usefulness of previous evaluations, the usefulness of evaluation per se, its most useful focus, the ease of addressing priorities, and the organisation of evaluation.

Knowledge and usefulness of previous evaluations

Five of the 11 respondents had seen previous evaluation reports. All five agreed that the findings presented in those reports were based on reliable, convincing evidence, and the majority considered that study findings were relevant and informative to an appropriate range of stakeholders. Most considered the findings well disseminated, while the majority, with one exception, agreed that the studies being referred to addressed the appropriate range of issues raised by the schemes.

The usefulness of evaluation per se

All consultees expressed an interest in the implementation and outcomes of road schemes. Typical comments suggested that consultees have an interest in whether investment in road schemes is delivering value for money, and the expected benefits, effectively and as planned, while still balancing environmental and other negative impacts in a reasonable fashion.

Respondents suggested that a number of processes could benefit from evaluation evidence.

– Assessing the accuracy of appraisal, and the reasons why outturns differ from predictions, to improve future appraisal (and, hence, future projects).

– Informing decision-makers of the likely effectiveness and value for money of a planned investment in achieving government policies, and of associated measures that may be required to ensure its benefits are realised.

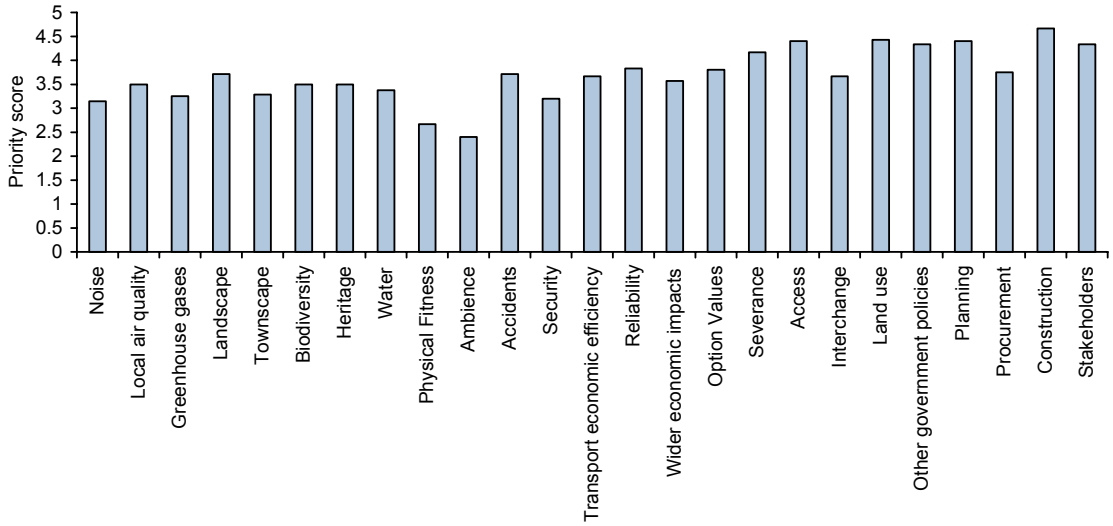
– Two consultees noted that evaluation can be employed to enhance accountability of government, providing quality control and evidence that predicted impacts actually take place.

– One respondent highlighted the usefulness of evaluation in demonstrating the effectiveness of mitigation measures, that it might be used to investigate the cumulative effects of more than one scheme in an environmentally sensitive area, and that it could potentially demonstrate the impact of schemes not being given the go-ahead.

The most useful focus of evaluation

Against a slightly longer list than that used for the DfT/Highways Agency consultation, which splits 'process' into planning, procurement, construction and stakeholder involvement (see Appendix 3), the questionnaire asked respondents to mark specific areas from 1 to 5 according to the level of importance they attributed to using evaluation to provide more evidence in that area. All but one consultee stated their priorities in this way. Figure 3.2 presents average priorities by impact and process issue.

Figure 3.2 Priorities for the focus of future evaluations



Source: Study team analysis.

The figure demonstrates that evaluation of social impacts, and impacts on land use and other government policies, were scored relatively higher by the external organisations, while process evaluation was again considered a worthwhile source of evaluation evidence. Interestingly, evaluation of planning and construction processes was where most weight was placed by consultees. In comparison to the DfT/Highways Agency consultees, the evaluation of environmental impacts, with the exception of landscape, was seen as less of a priority.

The ease of addressing priorities

As with the DfT/Highways Agency consultation, a number of barriers to enhancing the road scheme evaluation framework were alluded to. However, these were not generally considered to be insurmountable. Potential barriers included:

– the collection of sufficient and reliable 'before' data, and a commitment to a fairly long-term programme of 'after' monitoring, using a relevant set of indicators;
– the development of a counterfactual;
– obtaining evidence on socio-economic effects;
– changes in processes, policies and procedures between scheme design and opening.

The degree of scheme size and complexity was seen to be positively related to the degree of difficulty associated with providing evaluation conclusions.

The organisation of evaluation studies

This category covers responses to a number of questions, relating to which organisations should be canvassed for their views on the relevant impacts to consider when evaluating; whether an organisation could provide resources or a financial contribution towards an evaluation; how to achieve independence in undertaking evaluation; and how evaluation findings should be disseminated.

– *Views to consider*—this question elicited a large number of suggestions for potential consultees. These included, at a minimum, those directly affected by a scheme (eg, road haulage firms, the emergency services, local residents), local and national decision-makers, and statutory consultees. Other ideas included those indirectly affected by a scheme (eg, business representatives, and those with an interest in an area's transport system).

– *Contribution*—seven of the 11 responding organisations suggested that they might be willing to make a financial contribution to an evaluation, particularly where it would be relevant to their research interests. A large majority of organisations also stated that they would be willing to provide some resources to an evaluation, either by providing expert assistance or simply by being kept informed. Some consultees had experience of commissioning evaluation studies.

– *Independence*—respondents suggested a number of ways in which the independence of evaluation findings and conclusions could be ensured. A number of respondents suggested the formation of a steering group by the DfT that allows for stakeholder interests to be represented. Further points highlighted the importance of transparency and openness in the process, and the role of an independent review and validation of findings. One respondent observed that the evaluator should have no conflicts of interest.

– *Dissemination*—eight of the 11 respondents favoured receiving evaluation outcomes in an annual report covering the main findings from that year's evaluations, while seven considered email notification of individual scheme evaluation reports useful. Two consultees suggested that dissemination could also occur via publication on a website.

3.3 Area studies

The three area studies, drawn from the six case studies, drilled down further into the implications and outcomes of how stakeholder (eg, local authorities) and receptor (eg, residents, users) views were (or were not) included in appraisal and evaluation. In particular, they aimed to identify and examine where receptors and stakeholders considered omission in evaluation coverage to be important, and what their resulting impact had been. The emphasis on scheme receptors would provide a useful insight into any differences between professional opinion and members of local communities in respect of priorities for evaluation.

It is important to note that these area studies were not intended as evaluations—nor were they intended to develop a robust representative picture of local views. As such, the findings should be read with caution. Instead, their aim was exploratory—to investigate whether there might be differences between the perceptions of different stakeholders and the experts of the impacts of schemes; and to feed into the study team's consideration of evaluation methods (Chapter 4) by informing the options and issues raised by building more local involvement into evaluations.

The three schemes chosen as area studies—the A46 Leicester Western Bypass, the A30 Okehampton Bypass, and the A27 Polegate Bypass—include bypasses of a village, a town and a city; they include the most recent Highways Agency evaluation methods (PIES and POPE), and a non-Highways Agency evaluation, and offer the opportunity to assess views and outcomes on a range of impacts with a good mix of users and non-users. They are all road-building schemes, as opposed to the Jubilee Line Extension and London congestion charge, and the issue of lapsed time is less important in these three instances than in the case of the original M40. For example, while the Okehampton Bypass was completed in the 1980s, the controversy over its construction so close to Dartmoor means that the story of its completion remains fresh in the memory of a large proportion of the community.

3.3.1 Area study methodology

The study team employed the same framework in all three areas to enable a more robust analysis based on comparison. A methodology was required that would allow a degree of transferability of results. In addition, the study team sought to validate and assess evidence from earlier study elements to identify whether the opinions of professionals reflected the views of the public. In particular, the study team focused on:

– the finding that some issues relevant to evaluation were not covered by appraisal, with implications for the ease of evaluating these impacts and for the interests of local area stakeholders;
– the lack of process evaluation in the transport sector, which could cover, for example, the inclusiveness of the consultation process;
– the contrast between professional and stakeholder views.

3.3.2 Application of the methodology

The first stage involved desktop research, which considered existing reports and available documentation in order to use and build on previous evidence. The next stage reflected the 'community' theme of the area studies phase, thus including as many people as possible who actually live close to and use these roads and/or are affected by them. Examples included residents, through-users, businesses and community group representatives.

A flexible research framework was developed, which could:

– produce outputs to be assessed in terms of whether there may be generic uses that might or might not be possible to include in evaluation; and
– be customised for the circumstances appertaining to individual schemes.

In addition, it was recognised that appraisal terms could be misunderstood, and 'everyday' language was therefore used to develop an alternative set of criteria when asking consultees which factors should be prioritised were their local scheme to be evaluated.

Emphasis was placed on exploring what local people and businesses care about—what they would like to be taken into account during the appraisal and evaluation stages of trunk road development, and how this may be carried out. The types of issues explored are set out below:

– *severance*—studies have shown that severance is not measured by distance alone, but that perceived barriers can be just as important;
– *local economies*—the effects of a scheme on local trade and house prices;
– *vitality*—likely to be linked to general quality of life, and the positive and negative aspects of change;
– *crime and security*—crime and personal security respond to changes in transport provision at both objective and perceived levels;
– *heritage*—while currently covered by appraisal, the studies sought to examine whether people would value evaluation of impacts on this element of their environment;
– *environment and ecology*—from a range of community perspectives;
– *modal shift*—are people able to move around more easily as a result of a scheme, using public transport and, for example, cycling?

The role of perceptions was considered in the application of the methodology. Although perceptions govern actions and have as strong an impact as 'reality', it was considered important to establish, as far as possible, differences between what people perceive and what actually occurred. This involved working with organisations at an overarching level—for example, local authorities and other organisations such as chambers of commerce, which were able to provide information to set against perceptions. In addition, the study team built in its own objective tracker elements and other hard evidence was sought to match against peoples' perceptions. Therefore, materials were sought that may be compared with recollections. Some of the outcomes from the media investigation carried out for the earlier research were also helpful.

To maximise the range of approaches employed and types of consultees contacted, the study team adopted varying targets and techniques for each area. Common questions were included, which were developed around rating the factors that it was thought should have been prioritised when evaluating the new roads. These factors were adapted from the NATA

headings and sub-headings. Later in the study, the study team was able to compare the ratings with those of the professional stakeholders that took part in the separate consultation exercise.

The methods used for the three case studies are described in detail in Appendix 3, and are summarised below.

– For the A46 Leicester Western Bypass study, parish councils were the primary source for consultees to assess whether there might be one way of quickly representing the views of a large number of local people, despite playing little role in the original consultation. Parish council records from the 1970s (when the scheme was appraised) were examined, and face-to-face interviews with local interest groups conducted. Local written records including correspondence and newsletters were also examined.

– For the A30 Okehampton Bypass, the emphasis was on the opinion of businesses, although others were also consulted. Questionnaires were sent to local businesses, institutions and interest groups located on and around the road in advance of questioning respondents in more detail to gain an understanding of the emerging issues. Responses were low (10%), reflecting the elapsed time from scheme inception, but the sample was boosted by face-to-face interviews representing approximately one-third of local businesses and other stakeholders covering a range of types and size of organisation. Ordinarily, a fully developed and resourced evaluation would have sought a much higher response rate, but this was less important for this demonstration exercise. Interviews were conducted with residents and car drivers as 'through-users', who were intercepted at two petrol stations along the bypass. In addition, local residents were interviewed in public areas of the town. Archives were also used to build up a picture of opinion—for example, one local resident had retained a copy of all newspaper clippings on the bypass, together with a personal photographic record of its construction. These sources of information gave an indication of the evolving opinions of residents, businesses, and local authorities at the time of the appraisal, construction and evaluation of this bypass.

– For the A27 Polegate Bypass, local community groups and residents were the focus. Questionnaires were sent to 60 community groups, located around the bypass area. These groups were identified with the help of the local authority and desktop research, plus site visits. Subsequently, visits were made to many of these groups, and discussions held with their members, with a resulting response rate of over 80%. The advantage of this approach was that the community groups included a wide range of types of individual, although often with similar needs. For example, the elderly and people with pushchairs had similar needs in crossing the road. This approach via community groups can enable the views of people who had lived locally for different lengths of time to be explored. It was also considered important to include, where possible, the views of those 'passing through' the area as these people are often neglected in appraisal and evaluation consultation. As with the Okehampton Bypass, such individuals were intercepted at two petrol stations along the bypass, as well as in cafes and restaurants in the locality.

3.3.3 Results

Results are presented in Table 3.1, which compiles the evidence from each of the three studies within the assessment framework employed.

Table 3.1 Summary of results

Evidence headings	Appraisal stage	Evaluation stage
Counterfactuals—what other solutions were put forward and why were they not adopted?	*A46*—one parish council put forward its own scheme, which was rejected. Another voted by majority in favour of a route that demolished fewer properties and would cause a smaller increase of traffic through the village than other options *A30*—three routes were proposed: two to the north (rejected), one to the south (accepted). The rationale for this—emphasising agriculture and the need to protect farming land—is now almost irrelevant *A27*—several routes proposed, with media coverage suggesting one route preferred locally, but another chosen for greater time and economic benefits	–
Breadth of involvement—who was or was not consulted?	*A46*—parish councils all involved to some extent, and kept community informed *A30*—consultation packs and over 5,000 questionnaires issued; four local exhibitions attended by around 2,000 people; public inquiry. Evaluation suggested around half of respondents thought the appraisal consultation was adequate *A27*—exhibitions and public inquiry; newsletters to keep residents and stakeholders informed. 'They were very good at keeping us informed.'	*A46*—limited participation *A30*—200 household surveys carried out by TRL in 1996 *A27*—no respondents aware of the evaluation taking place
Quality of involvement—how substantive was the input from different groups?	*A46*—one parish council felt that the decision had already been made and did not consider that it had a fair chance to influence proceedings, while another stated that it received no support from the local MP or the county council in its objections *A30*—many representative groups were actively involved. The route decision was referred to a special parliamentary committee, whose decision was overturned in the House of Commons, making locals feel that the decision had already been made before the consultation started *A27*—most found the exhibitions and newsletters useful and that they had adequate opportunity to put forward questions and concerns. Some concern that exhibitions were more 'presentation than consultation'	*A46*—many were apathetic due to the experience at appraisal *A30*—three households per street (seven if road adjacent to the old A30). Businesses and organisations not consulted *A27*—resident groups unaware of evaluation

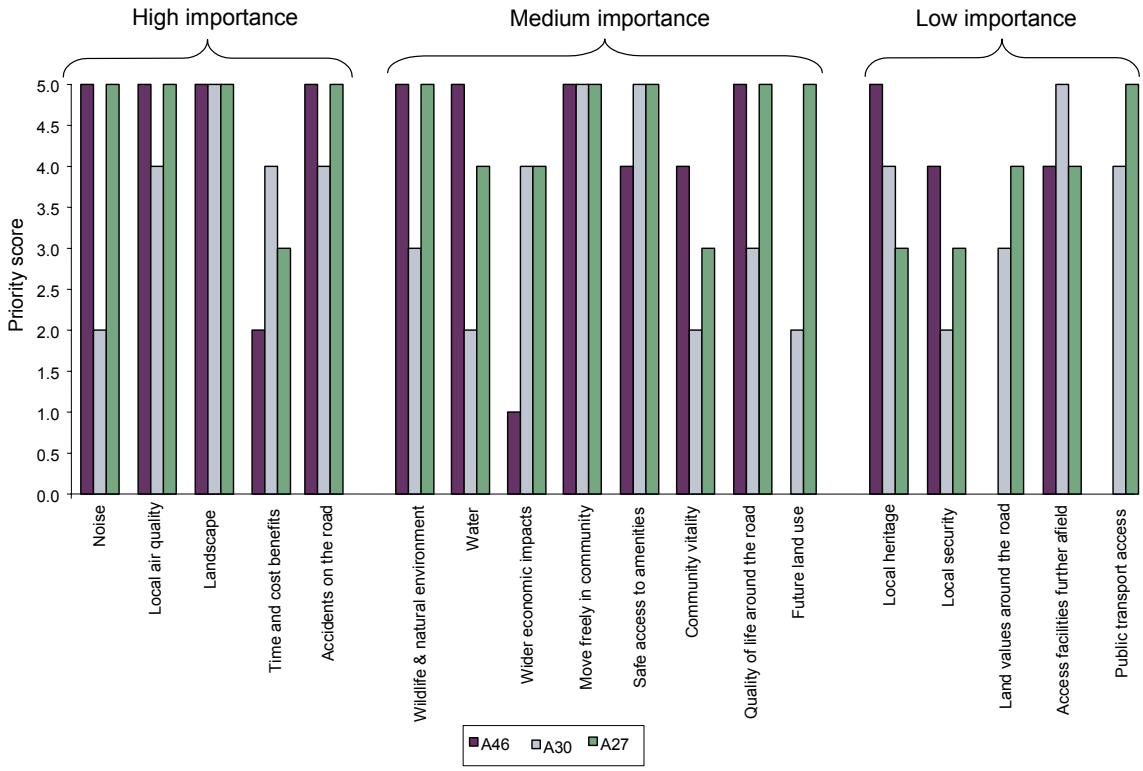
Evidence headings	Appraisal stage	Evaluation stage
Impacts omitted or included—rationale	*A46*—increased traffic in certain villages and effect on local historic sites	*A46*—evaluation questionnaire used the NATA framework to ask if people agreed with the route's objectives
	A30—a wide range of issues considered	*A30*—see Figure 3.3
	A27—noise a big concern for residents, but most were happy with the bypass, and those affected by increased noise were - compensated generously	*A27*—POPE one-year-after evaluation focuses on traffic impacts. The five-years-after evaluation will consider safety and environmental issues
Unanticipated impacts—were any issues flagged up but ignored, or were impacts genuinely unanticipated?	*A46*—outturn increase in traffic predicted by one parish council, while another correctly predicted the expansion of a local industrial estate	*A46*—increase in traffic and reduction in property values close to the route; noise and pollution also a problem. However, the scheme has reduced journey times, removed traffic from one village, and had a positive severance impact of creating a barrier between a village and the city
	A30—unrealised traffic flows in the town centre and weathering of the Fatherford viaduct	*A30*—over 97% of evaluation respondents thought the bypass had been effective in reducing through traffic, but due to current town congestion, over 50% thought the wrong route had been chosen. The noise evaluation omitted one village that is now suffering reduced property values
	A27—nothing substantive raised	*A27*—Polegate being used as a commuter hub, with commuters entering the town and parking to use the station. Poor signage means people are still using the old route. May be contributing to a smaller traffic reduction in the town centre than anticipated, but this may also be due to the town centre level crossing
Improving process	*A46*—Planners should come without any agendas and ask opinions from those who know the area. More publicity and dissemination needed at the planning stages	*A46*—evaluation consultation should have been more inclusive; many were unaware the evaluation was being carried out
	A30—Only 36% of residents thought the consultation process was effective in terms of listening and accepting local views. Limited consideration given to future land use	*A30*—evaluation should consider appraised impacts
	A27—Praise for process from the majority of respondents. However, improvements could be made, including the use of more local meetings involving community groups, and providing feedback on how things have changed after consultation. Again, the issue of 3D models was raised to assist the large proportion of elderly local residents	*A27*—people still keen to talk about their feelings about the bypass and where other things need to be addressed in the town (eg, traffic calming and more crossing points)

Evidence headings	Appraisal stage	Evaluation stage
Measurement techniques—how might more subjective impacts be assessed?	*A46*—talking to people concerned about being unable to move and sell their houses because of the effect of the bypass *A30*—3D modelling of the project to display project concepts would address literacy issues. Use of simple key indicators—eg, 'ability to access facilities outside of your community' could be measured using journey times to those facilities *A27*—listening to local people enabled severance and biodiversity impacts to be reduced	*A46*—one village was concerned about the impact on historical features, considering local people best placed to tell what is important to them *A30*—see appraisal stage column *A27*—talking to people and asking them if things have improved as a result of the bypass. Main complaint is that 'the engineers built the bypass and then disappeared', with some of the opinion that more or complementary work needs to be carried out in the town centre

Source: Study team analysis.

Figure 3.3 shows the results of the prioritisation exercise. Each impact area is categorised and labelled as high, medium or low importance according to the level of priority accorded to it by the professionals interviewed for the case studies reported in Chapter 2. The columns reflect the average rankings of interviewees for evaluation evidence for each impact area from the three area studies.

Figure 3.3 Priorities for the focus of future evaluations



Note: Responses in the A46 exercise relating to impacts on land use and property values around the road, and the ease of use of public transport were reported as 'no agreement' among consultees, as responses were widely dispersed.
Source: Study team analysis.

The figure shows a number of differences between professional and scheme-receptor priorities. Receptors prioritised environmental and accident impacts, impacts on the wider economy and accessibility, whereas professionals (and, indeed most evaluations) placed relatively more weight on traffic and journey time impacts.

3.3.4 Summary

The area studies revealed a number of interesting issues. The first relates to appraisal, where consultation in Leicester and Okehampton was felt to be a 'box-ticking' exercise, with little weight placed on the views of local people or organisations. The importance of the opinions of local experts has been borne out with their predictions of scheme impacts in Leicester proving correct. However, consultation methods improved markedly by the time of the Polegate consultation, which was praised by local residents. Enhancing consultation enhanced scheme design, with severance and environmental impacts being mitigated. However, some potential improvements include using local community groups, which were keen to discuss issues; avoiding creating the perception that a decision has been taken before consultation occurs; and using 3D models of schemes to facilitate an understanding of the scheme.

The area studies also demonstrated that there is a range of potential techniques, which, with greater resourcing and development in real evaluations, could become useful tools. The benefits of evaluation were also drawn out, including the ability to identify areas where unanticipated (whether real, or predicted but ignored) impacts have occurred and why; to

recognise where remedial work is necessary (eg, traffic calming in Polegate); and to enhance public acceptability by showing that there is an interest in scheme outcomes, as well as in the design and construction.

Finally, the area studies demonstrated differences between professional opinion on evaluation priorities and those of scheme receptors. This has implications for the focus of future evaluations. Receptors prioritised environmental and accident impacts, impacts on the wider economy and accessibility, whereas professionals (and, indeed most evaluations) placed relatively more weight on traffic and journey time impacts.

3.4 Overall summary of consultation responses

3.4.1 Qualitative findings

Respondents displayed a marked lack of knowledge of road scheme evaluations; those who are aware of previous or ongoing evaluations considered that their usefulness could be enhanced. For example, it was suggested that evaluation findings could be linked to PSA targets, and have a multi-modal, multi-disciplinary approach. Some consultees considered the development of a counterfactual to be crucial.

Almost all consultees were positive about the likely benefits of evaluation, including its potential to improve decision-making, demonstrate whether investment in road schemes is delivering value for money and the expected benefits (while balancing negative impacts), improve appraisal, and respond to new scenarios.

Some external organisations expressed a willingness to contribute financially, or in terms of resources, to evaluations, should the issues raised be of relevance to their objectives. Consultees argued that the independence of evaluation could involve an independent review of findings, perhaps by a steering group established by the DfT, which would allow for stakeholder interests to be represented.

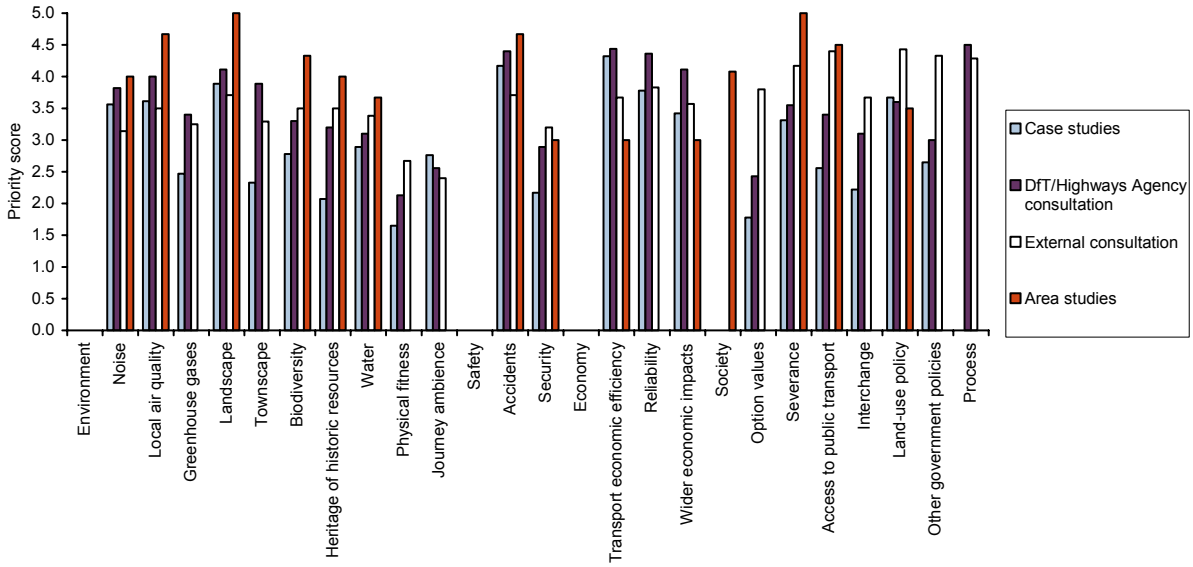
Practical issues, such as the spatial and temporal levels of aggregation of data sources, and the ease of collecting and storing adequate ‘before’ data were raised as potential barriers to meeting respondents’ needs. In addition, the difficulties of estimating a counterfactual and of providing timely results in the face of long-term impacts, and changes in processes, policies and procedures between scheme design and opening were also cited.

Dissemination should ensure that evaluation results reach a wide audience, including senior officials at the DfT and the Highways Agency, in an open and transparent manner. Results from meta evaluation, which would take scheme outcomes from a number of locations and attempt to draw wider lessons, and results from individual scheme evaluations, were both seen as important by different evaluation ‘customers’.

3.4.2 Inputs into developing an evaluation toolkit

Figure 3.4 presents consultee priorities for future evaluations, which form an input into a set of matrices (see Chapter 4) linking evaluation priorities with practical approaches.

Figure 3.4 Average priority scores for future evaluations



Note: The area studies score for 'society' covers scores relating to 'ability to access safely public amenities', 'ability to access facilities outside the community', 'community vitality', and 'quality of life'. The area studies score for severance relates to 'ability to move freely within your community'. The area studies score for land-use policy is a combined response to 'land values around the road' and 'future land use around the road'.
Source: Study team analysis.

The figure demonstrates that the following categories of evidence were priorities for most consultees for evaluation:

– accidents;
– process issues;
– local air quality;
– landscape;
– reliability.

Categories of lower priority for evaluation evidence were:

– physical fitness;
– journey ambience; and
– security.

Consultees from the area studies tended to have different views from case study and DfT/Highways Agency professionals in relation to transport economic efficiency, wider economic impacts and land-use policy (low priority compared with a high priority among professionals); and biodiversity, severance and access to public transport (high priority for receptors but a lower priority for professionals). External organisation representatives placed less weight on evaluation evidence on accidents, landscape and local air quality, and more weight on process issues, severance, access to public transport and land-use policy.

4 Proposed evaluation methods

This chapter describes the development of a set of evaluation options, and the resulting evaluation toolkit, devised by the study team in response to the practical and methodological issues raised by the gaps between evaluation coverage and stakeholder needs identified in earlier stages of the study. The output, for each evaluation option, is an identification of the study team's view of the likely requirements, including data and resources. Given the importance of data availability to the success of previous trunk road scheme evaluations, an examination of options in light of current data collection, and how this data collection would need to be extended, is a key element.

The toolkit enables the examination of feasibility, potential extent, value and cost-effectiveness of possible additional evaluation activities, and is designed to identify and understand wider anticipated and unanticipated impacts and learn development and implementation lessons at scheme and policy levels.

This chapter also describes a return to the three area study schemes to test the practicality of the toolkit for use in developing scheme evaluations.

4.1 Approach

Following the tasks discussed in the previous two chapters, the study team had available a set of evaluation options with which to evaluate stakeholder priority impacts and processes. These emerged from the systematic review (where options were tested for effectiveness and quality), and from suggestions made by consultees. These options were then refined, and new ones developed using professional judgement where required, in light of the need for feasible, transferable methods, and assessed against the study's research issues. They were also priced according to the study team's professional experience of similar tasks, and the potential benefits of each option for a variety of evaluation customers were considered. Valuing the benefits of each tool was not attempted; instead, each has been categorised according to the types of process likely to benefit from evaluation of the impact using each particular tool.

This information was presented in an assessment matrix for each impact and process issue of relevance to road schemes. Each matrix consists of a row for each evaluation tool, grouped under the impact or process issue to which the tool relates. Columns cover:

– consultee priorities (indicated by scores out of five);
– significant drivers of decision-making cited by Nellthorp and Mackie (2000);[24]
– relevant references used in the development of the tool;
– the tool's name;
– the extent to which it addresses project research issues;
– its cost (split where appropriate by data collection and analysis);
– the areas of analysis likely to benefit from the evaluation of that impact or process issue, the marginal benefit from more complex tools for the same impact or process issue, and the conditions under which benefits would be derived (eg, meta evaluation may be required to maximise the usefulness of a particular option).

[24] Nellthorp, J. and Mackie, P.J. (2000), 'The UK Roads Review: A Hedonic Model of Decision-making', *Transport Policy*, **7**, 127–38.

The matrices are is intended to present the range of options in a clear, concise manner that enables the user to ascertain quickly which methods would be most appropriate for the evaluation under consideration.

In order to ensure that each member of the study group working on the development of the toolkit was taking all of the necessary information into account, and that evaluation options were being developed consistently, a proforma was developed by Mott MacDonald, and agreed with the Steering Group. This covered the following areas:

– impact/process issue name;
– name of tool;
– evaluation type (eg, before versus after, counterfactual);
– comparison type (eg, empirical, qualitative);
– description of method;
– description of tools and data requirements;
– horizontal linkages (eg, does the tool depend on data collected elsewhere in order to be effective?)
– assessment of practicality and effectiveness;
– research issues;
– documented evidence of previous application;
– estimated cost (split by data collection and analysis).

Proformas for each tool are presented in Appendix 4.

In order to provide some practical evidence on the applicability of the evaluation approaches proposed and their likely benefits, the three road scheme case studies—which were considered by the area studies—were revisited. The aim was to determine how particular methods could have been applied in each of the case studies concerned.

Section 4.4 provides:

– an overview of the key issues for each of the schemes, based on information that had previously been obtained and assessed from the original appraisal, the study team consultations with stakeholders, the area studies, and the evaluation reports;
– an assessment of a selection of study methods that could be (or could have been) used to address some of these key issues for each of the three schemes. This assessment has involved consideration of the application and practicality of the proposed approaches, including commentary of potential benefits and costs;
– a description of minor refinements to some of the proforma detail resulting from this exercise.

Section 4.5 summarises the chapter.

4.2 An evaluation toolkit

This section presents the evaluation options developed, using the agreed assessment matrix. For ease of reference, four sub-matrices are shown at the end of the chapter, together with a summary table of approaches, with impacts grouped together under the headings of environment, safety, economy, and society. While each tool is discussed below, more detailed information can be found in the proformas section of Appendix 4.

4.2.1 Environment

Table 4.1 comprises the matrix for a number of environmental impacts, which relate closely to the impacts assessed by appraisal. Each of the tools is described in more detail below.

Table 4.1 Environment tools

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
Noise	3.56	3.82	3.14	4.00	***	POPE-E papers (Halcrow and Atkins); TAG; DMRB; Okehampton Bypass	1) Before-and-after measurement	Not addressed	Addressed	Longer timescales possible	Addressed	Addressed	Addressed	Data: £1,000–£4,000 Analysis: £1,000–£2,000	Appraisal Scheme and mitigation design Ex post remedial action National and local accountability *Conditions*: meta evaluation
							2) POPE-E method plus properties affected analysis	Not addressed	Addressed	Longer timescales possible	Addressed	Addressed	Addressed	Data: £2,000–£5,000 Analysis: £1,000–£2,000	Marginal benefits: gives improved indication of impacts
Local air quality	3.61	4.00	3.5	4.67		POPE-E papers (Halcrow and Atkins); TAG; DMRB; Okehampton Bypass	1) Links analysis	Addressed (outturn versus predicted DM)	Addressed	Longer timescales possible	Partially addressed	Addressed	Use same boundaries as appraisal	Data: free Analysis: £500–£1,000	Appraisal Scheme design Public inquiry evidence
							2) Properties affected analysis	Addressed (outturn versus predicted DM)	Addressed	Longer timescales possible	Partially addressed	Addressed	Use same boundaries as appraisal	Data: £1,000 Analysis: £2,000– £3,000	Marginal benefits: gives improved indication of impacts
							3) Dispersion analysis	Addressed (outturn versus predicted DM)	Addressed	Longer timescales possible	Partially addressed	Addressed	Use same boundaries as appraisal	Data: £2,000–£3,000 Analysis: £5,000–£10,000	Marginal benefits: delivers good understanding of change in exposure of people and vegetation

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
Greenhouse gases	2.47	3.40	3.25	n/a		POPE-E papers (Halcrow and Atkins); TAG; DMRB; Defra (2003), 'Local Air Quality Management Guidance'.	Links analysis	Addressed (outturn versus predicted DM)	Addressed	Longer timescales possible	Addressed	Addressed	Use same boundaries as appraisal	Data: none Analysis: £1,000	Appraisal Policy choices National accountability *Conditions*: meta evaluation
Landscape	3.89	4.11	3.71	5.00	***	POPE-E papers (Halcrow and Atkins); TAG; DMRB; Okehampton Bypass	1) Short-term monitoring	Partially addressed	Addressed	Does not cover longer timescales	Partially addressed	Addressed	Reflected	Data: £1,000–£5,000 Analysis: £1,000–£10,000	Scheme, mitigation and maintenance strategy design Appraisal Ex post remedial action *Conditions*: social impact assessment
							2) Medium-term monitoring	Partially addressed	Addressed	Covers intermediate timescales	Partially addressed	Addressed	Reflected	Data: £1,000–£2,000 Analysis: £2,000–£5,000	Marginal benefits: better understanding of medium-term impacts
							3) Long-term monitoring	Partially addressed	Addressed	Covers longer timescales	Partially addressed	Addressed	Reflected	Data: £1,000– £5,000 Analysis: £6,000–£10,000	Marginal benefits: better understanding of long-term impacts

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
Townscape	2.33	3.89	3.29	n/a		POPE-E papers (Halcrow and Atkins); TAG; DMRB; Okehampton Bypass	1) Short-term monitoring	Partially addressed	Addressed	Does not cover longer timescales	Partially addressed	Addressed	Reflected	Data: £1,000– £5,000 Analysis: £1,000–£10,000	Scheme, mitigation and maintenance strategy design Appraisal Ex post remedial action *Conditions*: social impact assessment
							2) Medium-term monitoring	Partially addressed	Addressed	Covers intermediate timescales	Partially addressed	Addressed	Reflected	Data: £1,000– £2,000 Analysis: £2,000–£5,000	Marginal benefits: better understanding of medium-term impacts
							3) Long-term monitoring	Partially addressed	Addressed	Covers longer timescales	Partially addressed	Addressed	Reflected	Data: £1,000–£5,000 Analysis: £6,000–£10,000	Marginal benefits: better understanding of long-term impacts
Biodiversity	2.78	3.30	3.50	4.33		POPE-E papers (Halcrow and Atkins); TAG; DMRB; Okehampton Bypass	1) Short-term monitoring	Partially addressed	Addressed	Does not cover longer timescales	Partially addressed	Addressed	Reflected to the extent that species boundaries are known	Data: £1,000–£5,000 Analysis: £1,000–£10,000	Scheme and mitigation design Appraisal Ex post remedial action Public accountability
							2) Medium-term monitoring	Partially addressed	Addressed	Covers intermediate timescales	Partially addressed	Addressed	Reflected to the extent that species boundaries are known	Data: £3,000–£20,000 Analysis: £2,000–£10,000	Marginal benefits: better understanding of medium-term impacts

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
							3) Long-term monitoring	Partially addressed	Addressed	Covers longer timescales	Partially addressed	Addressed	Reflected to the extent that species boundaries are known	Data: £3,000–£20,000+ Analysis: £2,000–£10,000+	Marginal benefits: better understanding of long-term impacts
Heritage	2.07	3.20	3.50	4.00	***	POPE-E papers (Halcrow and Atkins); TAG; DMRB; Okehampton Bypass	Before-and-after analysis	Partially addressed	Addressed	n/a	Partially addressed	Addressed	Reflected to the extent that feature boundaries are known	Data: £1,000–£2,000 Analysis: £1,000–£5,000	Scheme and mitigation design Appraisal Ex post remedial action Scheme implementation Public accountability
Water	2.89	3.10	3.38	3.67		POPE-E papers (Halcrow and Atkins); TAG; DMRB	1) Short-term monitoring	Partially addressed	Addressed	Does not cover longer timescales	Partially addressed	Addressed	Reflected to the extent that sufficient knowledge exists	Data: £1,000–£5,000 Analysis: £1,000–£10,000	Scheme and mitigation design Appraisal Ex post remedial action Scheme implementation Public accountability
							2) Medium-term monitoring	Partially addressed	Addressed	Covers intermediate timescales	Partially addressed	Addressed	Reflected to the extent that sufficient knowledge exists	Data: £3,000–£20,000 Analysis: £2,000–£10,000	Marginal benefits: better understanding of intermediate impacts
							3) Long-term monitoring	Partially addressed	Addressed	Covers longer timescales	Partially addressed	Addressed	Reflected to the extent that sufficient knowledge exists	Data: £3,000–£20,000+ Analysis: £2,000–£10,000+	Marginal benefits: better understanding of long-term impacts

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
Physical fitness	1.65	2.13	2.67	n/a		TAG	Qualitative appraisal versus outturn analysis	Partially addressed	Addressed	Could cover longer timescales	Partially addressed	Partially addressed	Use same boundaries as appraisal	Data: Marginal cost as part of wider survey of social impacts Analysis: £500	Appraisal *Conditions*: social impacts assessment
Journey ambience	2.76	2.56	2.4	n/a		TAG	Qualitative appraisal versus outturn analysis	Partially addressed	Addressed	Could cover longer timescales	Partially addressed	Partially addressed	Use same boundaries as appraisal	Data: marginal cost as part of wider survey of social impacts Analysis: £500	Appraisal *Conditions*: social impacts assessment

Notes: HA, Highways Agency; N&M, Nellthorp and Mackie (2000); ***, significant driver of decision-making; DMRB, *Design Manual for Roads and Bridges*; DM, do-minimum.
Source: Study team analysis. See Appendix 2 for full details of the relevant references.

Noise

Noise was ranked as a top ten priority for evaluation evidence by all consultees except the external organisation representatives. Noise was also deemed a significant driver of decision-making by Nellthorp and Mackie (2000). This might reflect the experience of case study consultees (professionals close to the development and evaluation of a scheme), DfT/Highways Agency staff and scheme receptors of how substantive an issue noise can be (and, hence, the cost of mitigation) on a scheme-by-scheme basis.

Benefits from evaluating noise impacts

Simple evaluation relating noise to outturn traffic levels would be beneficial as part of a wider evaluation of outturn costs and benefits. Repeated over a sample of schemes, this would enhance performance monitoring and local and national accountability. Undertaking *measurement* of ex post noise levels should also be valuable—for example, in relation to the effectiveness of mitigation measures. It would also be beneficial to understand how different mitigating combinations/approaches might work in different circumstances, and it would be particularly useful to relate this analysis to the road surface used and the traffic mix to identify which combinations of circumstances are likely to lead to greater or lower noise levels.

As part of a wider social assessment of a scheme, residents' opinions of noise could be canvassed ex ante and ex post to see whether opinions change over time—this would also collect data on tranquillity (eg, around local beauty spots). Furthermore, it would enhance understanding of how different communities (eg, urban versus rural) react to noise levels. Evaluation could also highlight the need for remedial action in particular locations.

Noise evaluation toolkit

The study team developed two options for evaluating noise impacts of a new road scheme.

– *Option 1*—measure actual noise levels before construction and after opening at representative receptors. This approach would aim to determine whether post-opening levels were correctly predicted at individual sites/receptors and monitor noise insulation regulation (ie, 68dB(A)) thresholds; check on DMRB noise change and nuisance; and extrapolate measured data to 15 years after opening using regional traffic forecasts to allow comparison with appraisal forecasts of noise levels at this point in time. This approach is essentially a spot-check on individual properties and locations to check against original measurements, and would provide a reasonable check on appraisal methods.

– *Option 2*—the second approach supplements the first and aims to check and validate appraisal using a noise contour model. The first approach can be criticised for being too selective and prone to missing unanticipated impacts, so the second approach would check the 'whole' noise environment predictions from appraisal. Further extensions could involve a before-and-after attitudinal survey, as part of a wider survey covering other impacts of interest, and the use of a geographical information system (GIS) address point database to enable the number of residential properties experiencing significant changes (positive or negative) in noise to be identified. These extensions could potentially involve low incremental costs, and could deliver incremental benefits that outweigh them.

Local air quality

Again, evaluation evidence on this impact was given a top ten ranking by all consultees except the external stakeholders. Indeed, the area study consultees ranked it joint-third out of 18 options, suggesting that scheme receptors are concerned about the health effects of changing traffic patterns.

Benefits from evaluating air quality impacts

Assessing how actual exposure to localised pollutants relates to the appraisal predictions would enhance understanding of how changes in the levels and mix of traffic affect local air quality. This would lead to more accurate modelling and forecasting of impacts, and, hence,

to more robust evidence to present at public inquiries, and more effectively designed and sited mitigation measures. Again, a simple measure would be beneficial as part of a wider evaluation of outturn costs and benefits. Repeated over a sample of schemes, this would enhance performance monitoring and local and national accountability.

However, this approach would not necessarily capture all 'at risk' sites, nor would it capture all indicators of pollution. More complex approaches would enable a clearer understanding of this issue at appraisal, and may reveal impacts not previously appreciated. For example, appraisal does not currently cover non-residential properties' exposure to poor air quality, an assumption that evaluation may be able to test. In addition, local health impacts may be discernible, along with how these impacts are distributed across the community.

Air quality evaluation toolkit
Three options were developed for evaluating the local air quality impacts of a new road scheme.

– *Option 1*—a simple approach would be to replicate the analysis undertaken at appraisal, which reports the number of road links expressing significant changes (positive or negative) in roadside air quality. Data required would be actual outturn traffic flow and composition data and, assuming that this is already collected for analysis of transport economic efficiency outturns (see below), it would be at zero cost. Analysis would also be relatively inexpensive, suggesting that this should be undertaken as a minimum to enable future meta evaluation.

– *Option 2*—a slightly more involved approach would consider the number of residential properties experiencing significant changes (positive or negative) in air quality (defined as NO_2 and PM_{10}) and whether air quality objectives are breached. If the predicted concentrations are greater than the relevant Air Quality Objective, more detailed measurement may be required. This should be agreed with the local authority and undertaken in accordance with Defra Technical Guidance TG(03) as appropriate. Again, this would replicate analysis carried out for appraisal. New data would have to be collected, at relatively low cost, and analysis would cost £2,000–£3,000. However, the benefits are likely to include a substantially clearer understanding of impacts, including cause, effect and attribution. This option could also include a qualitative assessment of confounding factors, using a desk-based analysis of developments and interviews with relevant stakeholders to determine the impact of new sources of air pollution.

– *Option 3*—the third proposed option would deliver a robust understanding of the change in exposure of people and vegetation to localised pollution as a result of a new road scheme. It would supplement Option 2 with the use of an advanced dispersion model, and would consider population-weighted exposure, and the impact of NOx on vegetation, nitrogen deposition and acid deposition. Data collection costs of £2,000–£3,000, and analysis costs in excess of £10,000, suggest that this option would only be appropriate for larger or more controversial schemes, or across a handful of smaller schemes in order to understand this impact in more detail. A further extension could involve a before-and-after attitudinal survey, as part of a wider survey covering other impacts of interest.

Greenhouse gases

This impact area was ranked as a low priority by case study, DfT/Highways Agency and external organisation consultees, being 15th, 13th and 18th priority, respectively (scheme receptors were not asked to rank evaluation evidence on this impact specifically). Given that one of the DfT's PSA targets now relates to greenhouse gases and wider concerns about climate change, this area might have been expected to have received a higher priority ranking. That it did not could suggest that consultees prioritise more immediate impacts such as accidents and local air quality.

Benefits from evaluating CO_2 impacts
The POPE-E method of converting outturn traffic data into a CO_2 measure is likely to be appropriate for most applications and, when summed over a number of new scheme evaluations, would provide an indication of the contribution of the roads programme to the recently incorporated PSA target, subject to the data being collected and used in a meta evaluation.

CO_2 evaluation option
The study team has developed one option for evaluating the greenhouse gas impacts of a new road scheme. It is proposed that the Guidance on the Methodology for Multi-modal Studies (GOMMMS)/TAG method for reporting the change in total tonnes of CO_2 per annum is repeated using actual traffic flow and composition data, taking a similar approach as for the simple local air quality option and ensuring that comparison only occurs using comparable road classes. Actual measurement of changes in CO_2 is not possible.

Landscape and townscape

Since the evaluation options developed for these two types of impact are similar, and the likely benefits and costs of each option are equally similar, the impacts were considered together. However, evaluation evidence on landscape impacts is a much higher priority for consultees than townscape impacts evidence. Landscape evidence was the joint-top priority for area study consultees (who were not asked to consider townscape explicitly), and was ranked third, fifth and ninth, respectively, by the case study, DfT/Highways Agency and external consultation respondents. In contrast, townscape was ranked 16th, eighth and 17th, respectively by the same consultees. Moreover, Nellthorp and Mackie (2000) found landscape to be a significant driver of decision-making for their Roads Review.

Benefits from evaluating landscape and townscape impacts
An assessment of the effectiveness of mitigation measures would provide evidence on whether impacts can be reduced, and the circumstances in which some planting or other aesthetic strategies work better than others.

Including questions on landscape and townscape impacts as part of a wider consultation within an overall evaluation strategy would provide appraisers and scheme designers with a clearer appreciation of the landscape needs of interested parties. This might include the use of photomontages to aid participants' understanding of the impacts of a scheme. For example, can evaluation provide evidence that stakeholder wants and needs in relation to landscape and townscape mitigation are different from professionals' perceptions of what these are? Improved landscape design is likely to result from such research. Surveys may also highlight areas where remedial action is necessary. National bodies such as the Countryside Agency and English Heritage could be included in consultation, given the possibility of nationally or even internationally important sites being affected by road schemes.

Longer-term evaluations (up to 30 years) are likely to provide important data for use in future scheme designs and ongoing maintenance strategies. Evaluation could also provide evidence on the cumulative impacts of schemes within designated landscapes or along certain transport corridors, and on the impacts of schemes not being given the go-ahead.

Landscape and townscape evaluation toolkit
The study team developed three options for evaluating landscape and townscape impacts of a new road scheme.

– *Option 1*—a desktop study and a site inspection immediately after scheme opening to compare published plans with actual impacts, together with an assessment of the effectiveness of the implemented mitigation. However, an assessment conducted immediately post-opening would essentially only demonstrate the magnitude and nature of the features that have been lost or adversely affected, and would allow little time for the positive effects of mitigation to materialise. Depending on the extent of analysis

deemed necessary, the simple analysis of landscape or townscape would cost between £2,000 and £15,000 in total. There might also be benefit in adding questions to a wider survey of scheme receptors concerning landscape and townscape impacts, and analysing media articles in relation to a scheme, as piloted during the case and area studies.

– *Option 2*—building on the first option, this approach would involve medium-term evaluation information to be collected, at suggested intervals of one, five and 15 years after opening. This would require the safe storage of necessary materials from appraisal and evaluation to enable their use in later evaluations. Surveys might be repeated according to these timescales. This option would involve a relatively low incremental cost per scheme, and would enable improved analysis of these impacts, which are, by their nature, long-term.

– *Option 3*—the final option would consider very long-term impacts, building on the medium-term analysis to provide long-term (30 years plus) analysis of the establishment of the landscape and townscape designs, and the interaction between the original design and ongoing maintenance operations. An incremental cost of £7,000–£15,000 per scheme would deliver a robust understanding of long-term impacts; however, there is some concern that funding for such a long-term evaluation could not be credibly committed. Instead, it may be the case that, were design information to be available for schemes built 30 years ago (such as the M1), a sufficient evaluation of landscape and/or townscape impacts could be carried out now.

Biodiversity

Impacts on wildlife and the natural environment were ranked seventh out of 18 options for obtaining more evaluation evidence by area study consultees, perhaps reflecting an increased desire to ensure that the *local* environment is not adversely affected by a road scheme. In contrast, biodiversity evaluation evidence was ranked 11th by case study respondents, and 14th by both DfT/Highways Agency experts and external organisations.

Benefits from evaluating biodiversity impacts

Assessments of the effectiveness of mitigation measures should enable decisions to be taken about whether more or less money should be spent on mitigation measures, and in which circumstances. Evaluation may also highlight the need for remedial action in some locations. In addition, it may be the case that evaluation evidence can enable controversial schemes to become less controversial if it can be shown that mitigation measures in similar locations have been successful.

Appraisal may benefit from a clearer understanding of different approaches used by appraisers, a meta assessment of the validity of the multi-criteria analysis used at appraisal, and identification of unpredicted impacts (eg, a different traffic mix leading to different outcomes) to determine whether they might have been predicted (thus informing future appraisals).

Biodiversity evaluation toolkit

Three options were developed for evaluating biodiversity impacts of a new road scheme. They follow the same pattern as the approaches outlined above for landscape and townscape impact evaluation.

– *Option 1*—the first, simple approach would cost the same as the simple landscape/townscape approach, and would use a desktop study combined with site inspection to compare the published environmental design with actual mitigation or compensation on the ground, including a first analysis of the effectiveness of mitigation. If a scheme biodiversity management plan were completed as part of the scheme design, the audit would be extended to determine its completion. Typically, this would require a two-to-five-year timeframe.

– *Option 2*—the second approach would add one-, five- and 15-year timescales to the first approach, costing rather more than the second landscape/townscape method due to the complexity of the impacts.

– *Option 3*—long-term evaluation of impacts around 30 years after opening.

Clearly, these methods require excellent records of appraisal and early post-implementation evaluation to deliver the expected benefits that long-term evaluation could offer.

Heritage

Heritage impacts were attributed lower priority rankings for the need for evaluation evidence by all consultees. However, it is recognised that heritage impacts might be important for individual schemes, and this is perhaps reflected by the finding by Nellthorp and Mackie (2000) that heritage was a significant driver of decision-making for the Roads Review.

Benefits from evaluating heritage impacts

Assessments of the effectiveness of mitigation measures should enable decisions to be taken about whether more or less money should be spent on mitigation measures, and in which circumstances. It may be the case that evaluation evidence can enable controversial schemes to become less controversial if it can be shown that mitigation measures in similar locations have been successful.

Heritage evaluation option

The study team developed one option for evaluating heritage impacts of a new road scheme. Buried archaeological remains are essentially unchanging; any impact would typically occur during the construction phase and be mitigated at that time (either by excavation or leaving remains in situ), rather than resulting in long-term post-implementation ongoing changes. While the visual setting of visible features such as listed buildings and ancient monuments would be subject to change over time, these impacts would be covered by the landscape and townscape techniques. The proposed approach would involve a desktop study immediately after implementation, comparing original survey findings and the proposed mitigation strategy with any on-site findings, actual mitigation undertaken, and analysis of its success. This could be completed at moderate cost, and a few evaluations of this type should provide some useful evidence for future appraisals and mitigation exercises.

Water quality

Evaluation evidence was given a relatively low priority score by consultees, being tenth out of 21 for case study respondents, 16th out of 22 by both DfT/Highways Agency and external organisations, and 12th out of 18 by scheme receptors.

Benefits from evaluating impacts on water quality

Assessments of the effectiveness of mitigation measures should enable decisions to be taken about whether more or less money should be spent on mitigation measures, and in what circumstances. Evaluation may also highlight the need for remedial action in some locations.

It may be the case that evaluation evidence can enable controversial schemes to become less controversial if it can be shown that mitigation measures in similar locations have been successful.

Appraisal may benefit from a clearer understanding of different approaches used by appraisers, a meta assessment of the validity of the multi-criteria analysis used at appraisal, and identification of unpredicted impacts (eg, a different traffic mix leading to different outcomes) to determine whether they might have been predicted (thus informing future appraisals).

Water evaluation toolkit
The study team developed three options for evaluating impacts of a new road scheme on water quality. They follow the same pattern as the approaches outlined above to landscape and townscape impact evaluation.

– *Option 1*—the first, simple approach would cost the same as the simple landscape/townscape approach, and would use a desktop study combined with site inspection to compare the published environmental design with actual mitigation on the ground, and analysis of the effectiveness of mitigation using water quality monitoring immediately after, and five years after opening.

– *Option 2*—the second approach would add one, five and 15-year timescales to the first approach, costing rather more than the second landscape/townscape method due to the complexity of the impacts.

– *Option 3*—long-term evaluation of impacts around 30 years after opening.

Clearly, these methods require excellent records of appraisal and early post-implementation evaluation to deliver the expected benefits that long-term evaluation could offer. Local water companies might be willing to contribute financially to evaluations of water quality impacts.

Physical fitness

Ranked the lowest priority for evaluation out of all options by case study consultees and DfT/Highways Agency experts, and second-lowest by external organisation respondents, the study team placed relatively less weight on developing evaluation approaches for this impact.

Benefits from evaluating physical fitness impacts
Since appraising physical fitness impacts is a relatively undeveloped subject, appraisal may benefit from a clearer understanding of different approaches used by appraisers, and of how new road schemes affect, for example, the likelihood of travelling by foot and bicycle, or the use of facilities such as sports clubs and nature trails (eg, the provision of a footbridge in Polegate to allow an existing nature trail to retain its link with the town).

Physical fitness evaluation option
One method has been proposed for evaluating physical fitness impacts. The assessment of impacts on physical fitness would use qualitative data to identify impacts according to the TAG definition. It is expected that this sub-impact would generally be considered as part of a wider evaluation involving attitudinal/household/traveller surveys and that fitness questions could be built into these surveys. This would involve low marginal costs of data collection and analysis, which seems reasonable given the low priority for evaluation evidence.

Journey ambience

This impact was afforded a similarly low priority score by most consultees, with external consultees suggesting that this is their lowest priority for evaluation evidence, and DfT/Highways Agency staff scoring this as their third-lowest priority impact. Case study consultees gave journey ambience a slightly higher priority (12th out of 21).

Benefits from evaluating journey ambience impacts
Appraisal may benefit from a clearer understanding of different approaches used by appraisers, and of road users' needs with respect to the journey in different contexts. For example, does road surface matter? Does routeing matter (eg, urban versus rural)? Are improved service station facilities valuable? Or is ambience dominated by congestion in terms of peoples' attitudes towards journey experience? It could be argued, for example, that users of the M6 Toll are in some respects demonstrating willingness to pay for improved journey ambience by paying to use the new road—it is unclear that the benefits of the toll alternative are dominated by shorter, more certain journey times.

Journey ambience evaluation option

The study team developed one option for evaluating journey ambience impacts of a new road scheme. This option is identical in approach and marginal cost to the physical fitness tool. However, this might be a candidate for inclusion in a wider social impact evaluation sooner rather than later, given the importance of distinguishing the value of journey ambience impacts from values attached by road users to other impacts.

4.2.2 Safety

Table 4.2 presents the matrix for two safety impacts—accidents and personal security.

Table 4.2 Safety tools

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
Accidents	4.17	4.40	3.71	4.67	***	A46 PIES; A27 Polegate and A43 Silverstone POPEs; DMRB	1) Similar to POPE	Partially addressed	Addressed	Longer timescales possible	Partially addressed	Partially addressed	Expected to be set during evaluation planning	Data: free Analysis: <£2,000	Appraisal Scheme design and implementation Policy choices National and local accountability *Conditions*: meta evaluation
							2) POPE, plus Stage 4 Road Safety Audit	Partially addressed	Addressed	Longer timescales possible	Addressed	Partially addressed	Expected to be set during evaluation planning	Data: free Analysis: £2,000–£5,000	Marginal benefit: improved understanding of cause and effect
Security	2.17	2.89	3.20	3.00		TAG	Audit of indicators and consultation	Partially addressed	Addressed	Longer timescales possible	Partially addressed	Partially addressed	Capture of long-distance users will need to be carefully planned	Data: see survey costs Analysis: £2,000–£5,000	Appraisal Scheme design Remedial action *Conditions*: social impact assessment

Notes: HA, Highways Agency; N&M, Nellthorp, J and Mackie (2000); ***, significant driver of decision-making.
Source: Study team analysis.

Accidents

The case study consultees ranked the provision of evaluation evidence on accidents second out of 21 possible priorities. Similarly high scores were obtained in the other three consultations—DfT/Highways Agency and external consultees ranked accidents evidence third and eighth out of 22, respectively, while scheme receptors ranked this evidence fourth out of 18 options.

Benefits from evaluating accident impacts

Improved 'before' data (collected over a longer timeframe, including during construction) would provide a richer dataset on which to base evaluation conclusions, and may reveal impacts associated with the construction period not previously appreciated. This should assist with deciding between policy options, scheme design and implementation. Appraisal may also benefit from evaluation data that informs the analysis of the rate of decline in accidents, and establishes how damage-only accidents might be considered by appraisal. Robust evaluation data may also provide evidence on costs per accident, or on accidents as incidents—eg, how long they take to clear up, and how much of the carriageway they block. Key to these benefits from evaluation being derived would be an evidence database that collects results from each scheme evaluation for future analysis.

Accident evaluation toolkit

Two options were developed for evaluating accident impacts of a new road scheme.

– *Option 1*—similar to the existing POPE practice, the first approach would use accident and casualty data gathered by the Highways Agency's road-maintaining agents, available free of charge through the STATS19 database. Accident data for lower-order roads may have to be purchased from the respective highways authority, unless it is supporting the evaluation. An aggregated accident dataset for these lower-order roads is already available for use by the DfT and Highways Agency. This aggregated dataset does not, however, contain a text description field for accidents, which is essential for a more detailed analysis of accidents. Although the aggregated dataset is sufficient for analyses on a more aggregate level, the more detailed information would have to be purchased from the respective highways authority for the purpose of the described evaluations. It also relies on traffic volume and journey time data collected for evaluating traffic impacts. It is proposed that the current POPE method, which compares outturn COBA values with appraisal predictions, be augmented with more 'before' data (three to five years, instead of two), and the calculation of accident rates (personal injury accidents per million vehicle-kilometres). The additional data could be used to identify impacts such as the effect of construction of the scheme on accident patterns. Given the ready availability of data, and GIS accident-analysis software, this method should prove relatively inexpensive, at just under £2,000 per scheme. It should be noted that, while the use of personal injury accident (PIA) gives the best and most reliable indication of accident occurrence currently available, there is a recognised problem of underreporting of accidents. More detailed research has shown that accidents involving vulnerable road users (such as children and the elderly) are underreported in this dataset. This means that use of PIA data could result in an underestimation of risk for vulnerable road users. There is currently no method available to correct for this bias in information. The accident evaluation module in COBA is, for a large part, based on the method as described in HEN1. Additional required information to assess economic effects of changes in accident occurrence (eg, economic costs of PIAs) can be derived from HEN1.

– *Option 2*—the second option applies techniques set out in DMRB HD 19/03 for a 'Stage Four Road Safety Audit', which requires monitoring of accidents, one year and three years after the opening of a highways-improvement scheme. The option also proposes that the audit be supplemented with data from the MOLASSES database and ITEA (a DfT division) GIS databases, should they prove useful. The analysis would consider changes in the 'accident population' in terms of numbers, type, etc, which would then be

compared with control data. Particular links or junctions with substantive differences from expectations would be investigated further. Data used would again be from STATS19 and traffic analysis conducted for other elements of POPE. It could be supplemented with interviews with key agencies (eg, the emergency services and Highways Agency Traffic Officers), both to provide an estimate of the counterfactual, and to understand the impacts of the scheme more fully. Marginal analysis costs would be in the range £2,000–£5,000, and, overall, this more detailed analysis would enhance the appreciation of cause and effect. If the construction period is long (ie, more than one year), it could be advisable to include a separate analysis of the construction period. In addition, it is worth noting that road safety effects of schemes can include a migration of accident locations as well as a change in accident types or road-user types. To be able to assess these possible changes, the boundaries of the study area must be carefully selected to include possible migration effects, and possible changes in accident or road-user types need to be assessed.

Personal security

This was an area of lower priority for most stakeholders. It was ranked 18th out of 21 evaluation options by case study respondents; 19th out of 22 by DfT/Highways Agency and external consultees; and joint-lowest priority by scheme receptors. Accordingly, the study team has paid relatively less attention to this impact area than for higher-priority areas.

Despite the relative low priority afforded to evaluation evidence relating to this impact by consultees, if this impact were to become more important to stakeholders, evaluation could have the following benefits:

– highlighting different approaches applied by different appraisers;
– providing an improved understanding of differences between perceptions and behaviour for different parties;
– assessing the impact of schemes on emergency services;
– highlighting the need for remedial action if a facility has been installed with insufficient awareness of the impact on perceptions of personal security.

The method developed would use the appraisal summary table (AST) in the first instance to identify key issues at appraisal, and determine how these issues have been addressed. It would then use indicators defined by TAG to determine the extent to which outturns have differed from appraisal. Data on these indicators would be generated by including questions in a wider attitudinal survey of road users and non-users to identify their views on the scheme's impacts in this area. Analysis would cost £2,000–£5,000. The study team does not propose that personal security impacts would be the sole driver for carrying out attitudinal surveys.

4.2.3 Economy

The economy matrix is provided in Table 4.3.

Table 4.3 Economy tools

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
Transport economic efficiency (TEE)	4.32	4.44	3.67	3.00	***	POPE; TUBA; M6 Toll; Manchester motorway box	1) Links analysis	Not addressed	Addressed for simple schemes	Longer timescales possible	Not addressed	Not addressed	Difficulties can be addressed	Data: £4,000–£5,000 Analysis: £500	Appraisal Policy options Scheme implementation Performance monitoring Ex post remedial action *Conditions*: meta analysis; well-planned data collection and recording
							2) COBA comparison	Not addressed	Addressed for simple schemes	Longer timescales possible	Not addressed	Not addressed	Difficulties can be addressed	Data: £4,000–£5,000 Analysis: £1,500	Marginal benefits: enables COBA comparison
							2) TUBA comparison	Not addressed	Addressed for simple schemes	Longer timescales possible	Not addressed	Not addressed	Difficulties can be addressed	Data: £4,000–£5,000 Analysis: £1,500	Marginal benefits: enables evaluation of multi-modal impacts
							3) Modelled comparison	Addressed (outturn versus predicted DM)	Addressed	Longer timescales possible	Addressed	Addressed	Difficulties can be addressed	Data: £50,000+ Analysis: £50,000+	Marginal benefits: enables assessment of generated traffic, and better understanding of cause and effect

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
Reliability	3.78	4.36	3.83	n/a	***	POPE; TAG	1) Driver stress index	Not addressed	Partially addressed	Longer timescales possible	Not addressed	Not addressed	Use same boundaries as appraisal	Data: as per TEE Analysis: £500	Performance monitoring Appraisal Ex post remedial action National and local accountability *Conditions*: Meta evaluation
							2) Standard deviation of journey time	Partially addressed	Addressed	Longer timescales possible	Partially addressed	Partially addressed	Use same boundaries as appraisal	Data: £3,000–£5,000 Analysis: £2,000	Marginal benefits: all-round improved understanding of impacts
Wider economic impacts	3.42	4.11	3.57	3.00	***	Skye Bridge; London congestion charging; A55; JLE; Croydon Tramlink; Manchester Metrolink; A50; David Simmonds review; Rephann matched pairs paper	1) Assessment of published indicators	Addressed	Addressed	Inherently longer timescales can be taken into account	Addressed	Addressed	Can be addressed	Data: Purchase fees £100–£1,000 Analysis: £1,000–£2,000	Appraisal Policy choices Public inquiry evidence *Conditions*: evidence database
							2) Business surveys	Addressed	Addressed	Inherently longer timescales can be taken into account	Addressed	Addressed	Can be addressed	Data: depends on extent of survey Analysis: £8,000	Marginal benefits: better understanding of business and employment impacts

Priority					Relevant references	Tools	Research issues							Costs and benefits	
Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
						3) Econometric modelling	Addressed	Addressed	Inherently longer timescales can be taken into account	Addressed	Addressed	Could prove difficult to overcome	Data: limited if existing model used Analysis: £30,000 (with existing model)	Marginal benefits: Model can be used to control for impacts not caused by the scheme

Notes: HA, Highways Agency; N&M, Nellthorp and Mackie (2000); ***, significant driver of decision-making; TUBA, transport-user benefit appraisal.
Source: Study team analysis. See Appendix 2 for details of the relevant references.

Transport economic efficiency

This impact, which covers traffic and journey time effects of a scheme, was ranked higher by case study respondents (first out of 21 impacts and process issues) and DfT/Highways Agency respondents (second out of 22) than by external organisation consultees (tenth out of 22) and scheme receptors (joint-lowest priority). Nellthorp and Mackie (2000) report this as a significant driver of decision-making in the Roads Review.

Benefits from evaluating transport economic efficiency impacts

Given the relative weight accorded to journey time savings in the appraisal process (and by some consultees), any additional robust evidence in this area should be beneficial to appraisers and policy-makers, improving forecasting and decision-making. In particular, evidence regarding long-term impacts of a scheme on congestion would be beneficial—how long (and in what circumstances) does it take for congestion benefits to be eroded by generated or abstracted traffic? However, this type of analysis would have to take account of all the other factors affecting congestion, and may be costly unless simple measures are repeated at regular intervals post-opening (perhaps extending beyond the five-year POPE time horizon).

For performance-monitoring purposes, replicating simple analysis over a number of new schemes would provide a useful evidence base. This would, however, require the construction of a robust evidence database, which would need to be used regularly to ensure its cost-effectiveness. More complex analysis, involving origin–destination data (as currently being tested by the Highways Agency), may prove fruitful and less costly as databases improve over time with more widespread use of in-vehicle technologies. This could provide a much clearer picture of how travel patterns are affected by a scheme.

It is also important (and valuable) to assess the disbenefits of online scheme construction, relative to the benefits revealed post-opening.

Transport economic efficiency evaluation toolkit

Four options were developed for evaluating the journey time impacts of a new road scheme.

– *Option 1*—as with accident impacts, the first option is very similar to the existing POPE practice. It would use changes in vehicle-hours as a result of the scheme as a simple proxy for transport efficiency benefits. These can be calculated by multiplying traffic volumes (collected using carefully sited traffic-counting systems) by transit times (usually collected using moving observer techniques) for selected key links. Morning and afternoon peak journey time surveys are usually conducted in the year after opening and factored up to annual hours. These are then compared with the vehicle-hours in the appraisal (COBA) 'do-minimum' and 'do-something' models for the same links. It will be applicable to simple schemes, such as Making Better Use schemes (MBUs), for which the comparison of outturn quantified economic performance is not required. The POPE consultants have found that, for simple schemes with limited traffic generation, this technique provides a good estimation of total transport economic efficiency benefits. With a total cost of around £5,000 for simple schemes, this would appear to represent good value for money.

– *Option 2*—the second option goes one step further and compares appraisal predictions of costs and benefits with outturn benefits (changes in vehicle-hours from Option 1 valued using COBA) and costs. This method is useful for the evaluation of straightforward schemes that have limited generated traffic; it does not require outputs from any transport model. With only a relatively small marginal cost (£1,000), it would appear to be worth undertaking the more tangible valuation (which could be used to increase national and local accountability) of outturn transport efficiency benefits, which can be valued along with accident outturns and compared with scheme costs. However, the method will not evaluate multi-modal impacts and is not suitable for use with schemes appraised using TUBA.

– *Option 3*—building on the previous two options, this approach uses TUBA instead of COBA to allow for evaluation of multi-modal impacts. In this case, individual key links would be set up as complete origin–destination pairs first. This could then be followed by analysis of link times, distances and flows, and a simple scheme with a fixed-trip matrix should produce a fairly robust result at a marginal analysis cost of around £1,500. The study team has recommended that this option be investigated as it is relatively inexpensive, and would enable the evaluation of multi-modal impacts, which are currently omitted from the analysis. However, a scheme with a variable-trip matrix might not produce correct results; more research would be required to define a method in this case.

– *Option 4*—the final option formed the basis of the PIES carried out in the late 1990s, and involves the replication of the ex ante traffic and TUBA models. Data collection and analysis would cost in excess of £50,000 each, and could only be justified for large, complex schemes reflecting policy priorities. Moreover, this type of evaluation would have to be planned well in advance, as it relies on the well-planned collection of pre-opening data. The benefits would lie in the ability to develop a (modelled) counterfactual, and a clearer understanding of cause and effect, while the replication of the TUBA model would be an extension to the PIES analysis, which focused on COBA and did not take multi-modal impacts into account.

Reliability

This impact appears to be a relatively higher priority for evaluation evidence—fourth out of 21 options for case study consultees; fourth out of 22 for DfT/Highways Agency staff; and sixth out of 22 for representatives of external organisations. Reliability was a significant driver of decision-making in the Nellthorp and Mackie (2000) analysis.

Benefits from evaluating reliability impacts

Repeated collection of simple data (relating, for example, to an outturn driver stress index) would enhance understanding of reliability impacts in different situations (including during construction), and the time period over which these benefits are accessible.

More complex methods would provide much more robust evaluation evidence, including potentially monetised benefits based on actual traffic data, as opposed to modelled data, which could be used to enhance the case for roads-related expenditure. This information can be collected relatively soon after scheme opening to provide timely results to stakeholders and policy-makers. It may also highlight the need for remedial action.

A combined evaluation of reliability and transport economic efficiency impacts should enable a clear picture to be built up over time of how the road improvements programme is delivering against the PSA congestion target. It could also inform future target setting. It should provide an understanding of wider impacts on travel patterns, beyond simply road users—for example, has the scheme led to abstraction from public transport, and is this in the wider public interest?

Reliability evaluation toolkit

The study team developed two options for evaluating the reliability impacts of a new road scheme.

– *Option 1*—currently being applied to one-year-after evaluations by POPE consultants, Atkins, this approach recalculates the TAG driver stress index, using data on traffic volumes and journey times to compare appraisal forecast with outturn. It is an admittedly simple proxy for reliability impacts, and is only useful for comparing WebTAG forecasts with outturns, but would cost only around £500 per scheme. It would therefore seem appropriate to collect this data for a number of schemes to enable a meta evaluation to be carried out. Nevertheless, as ex ante appraisal becomes more sophisticated, and more robust data on origin–destination journey time variability becomes more affordable, Option 1 might be used less in favour of Option 2.

– *Option 2*—this would require more substantial data collection, both ex ante and ex post, to enable a comparison of journey time variability, measured as the standard deviation. Based on data on journey time variations for selected origin–destination pairs at different times of day and days of the week, this method could not be applied immediately due to a lack of ex ante data. However, the planned development of the HATRIS (Highways Agency Traffic Information System) database may support this method. Current ITIS data is too unreliable, but development of this in the future may make it more applicable.

  The study team considers this method capable of providing a step-change in the robustness of reliability evidence; however, to be practicable, it is reliant on the development of future data-collection systems and the institutionalisation of the new method in ex ante assessment methodology. Data collection would cost £3,000–£5,000 and analysis would cost £2,000.

Wider economic impacts

Despite the weight often attached to regeneration benefits of transport schemes, and due to the relative paucity of ex post evidence in this area, evaluation evidence on wider economic impacts was cited as being of only medium priority. It was ranked highest by DfT/Highways Agency consultees (sixth out of 22), eighth out of 21 options by case study respondents; 12th out of 22 by external consultees; and joint-lowest priority by area study consultees. However, Nellthorp and Mackie (2000) found it to be a significant driver of decision-making.

Benefits from evaluating wider economic impacts

The knowledge that certain types of road scheme deliver greater regeneration benefits than others would enable policy-makers to make more informed decisions about what to build and where. In other words, this would identify wider lessons, reveal impacts not previously appreciated, help appraisers understand this issue, and improve the way in which this area is dealt with in appraisal. Currently, displacement effects are recognised and assumed to be dominant. Regeneration in regeneration areas is assumed to be worthwhile in its own right, despite the likelihood that it arises as a result of displacement.

Evaluation should also highlight the extent of lost business within a town or village as a result of a bypass scheme. The Okehampton area study showed that the increase in visits from neighbouring towns and villages helped reduce any economic loss to traders in the town due to displaced through-traffic. In contrast, the area study of Polegate, where the local hardware shop had to close down, demonstrated that improved access to larger retail outlets outside the town could affect local shops negatively.

Wider economic impacts evaluation toolkit

The study team developed three options for evaluating the wider economic impacts of a new road scheme.

– *Option 1*—this involves review and analysis of published data sources and indicators of change in the local economy. Depending on data and indicator availability, this will allow for some assessment of change over time within a 'local' area, which can also be benchmarked against regional and national changes (which is in keeping with the approach adopted for PSA targets) and against selected 'control' areas. The proforma details the published indicators that can be used in the assessment. The method is reasonably cost-effective, given knowledge of access, use and analysis of various data sources, and the use of control areas can enable the development of a counterfactual. However, it is subject to problems associated with the spatial aggregation and frequency of the data it relies on.

– *Option 2*—the second option involves conducting business surveys (following TAG methods, and contacting the same businesses as at appraisal, if possible) to allow comparison of TAG forecasts of wider economic impacts with outturns. It would also allow assessment of a variety of non-TAG impacts, such as the quality of jobs created. Analysis of survey data would cost around £8,000, while the survey costs would depend

on method, sample size, questionnaire design and length, and the minimum response rate required. Each survey would need to be tailored to ensure all that businesses affected are identified and a representative sample surveyed.

The study team considers this the only effective way of evaluating scheme impacts on business and employment at a micro level. Before-and-after lessons at this level are vital to the maturity of ex ante assessment methods, which are themselves at an early stage of development.

– *Option 3*—the third option, the development or use of an econometric model, would only be used where the scheme has had a significant impact on a large economy or geographical area. This method is only recommended if an existing model is available and the scale of economic impact determines the need for detailed assessment. Given this availability, it would enable the development of a counterfactual, and control for impacts not caused by the scheme, at reasonable cost.

4.2.4 Society

Table 4.4 sets out the final matrix, considering the evaluation of road scheme impacts on society.

Table 4.4 Society tools

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
Option values	1.78	2.43	3.80	n/a		TAG; JLE; ongoing HIE study	1) Simple checklist	Partially addressed	Addressed	Longer timescales possible	Not addressed	Not addressed	Use same boundaries as appraisal	Data: £1,000 Analysis: <£2,000	Appraisal Policy options Public inquiry evidence Scheme implementation
							2) Use of GIS/ accessibility models	Partially addressed	Addressed	Longer timescales possible	Partially addressed	Partially addressed	May be possible to obtain an improved idea of boundaries of effects	Data: depends on extent of survey Analysis: £2,000–£5,000	Marginal benefits: better link to appraisal method; improved understanding of impacts
Severance	3.31	3.55	4.17	5.00		TAG; ongoing DfT study on severance (TRL); Croydon Tramlink; OECD review of transport impact on regional development; Neighbourhood Initiatives Foundation 'Planning For Real'	1) Before-and-after checklist	Not addressed	Addressed	Covers intermediate timescales	Not addressed	Partially addressed	Use same boundaries as appraisal	Data: £5,000 (to include pedestrian surveys Analysis: <£2,000	Scheme design Appraisal Policy options Ex post remedial action *Conditions*: social impact assessment
							2) Option 1 plus robust qualitative research	Not addressed	Addressed	Covers intermediate timescales	Partially addressed	Partially addressed	Extent of impact boundaries might be ascertained	Data: pedestrian survey £5,000 Analysis: £2,000–£5,000	Marginal benefits: Improved interpretation of data

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
							3) Targeted surveys; accessibility planning; and/or community audit	Can be addressed	Addressed	Longer timescales could be covered	Addressed	Partially addressed	Extent of impact boundaries can be ascertained	Data: depends on extent of surveys required Analysis: £5,000–£10,000	Marginal benefits: enables a much-improved understanding of the impacts
Access to public transport	2.56	3.40	4.40	4.50		TAG; Croydon Tramlink; South Yorkshire Supertram; DfT Technical Guidance on Monitoring Accessibility	1) Accessibility indicators and checklist	Not addressed	Partially addressed	Might cover longer timescales	Not addressed	Not addressed	Use same boundaries as appraisal	Data: £1,000 Analysis: £2,000–£5,000	Scheme design Appraisal Policy choices Scheme implementation *Conditions*: social impact assessment
							2) Option 1 plus robust qualitative research	Can be addressed	Partially addressed	Might cover longer timescales	Partially addressed	Partially addressed	Use same boundaries as appraisal	Data: £1,000 plus qualitative research cost Analysis: £5,000 to £10,000	Marginal benefits: better understanding of the local significance of particular impacts
							3) Accessibility modelling	Addressed	Can be addressed	Further investigation required	Addressed	Addressed	Use same boundaries as appraisal	Data: depends on use of existing model, and extent of surveys Analysis: £5,000 (including counterfactual); survey (count) analysis £5,000	Marginal benefits: effects on particular groups of people could be assessed; counterfactual can be constructed

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
Wider accessibility issues				4.08		DfT technical guidance on monitoring accessibility	Use of accessibility models	Can be addressed	Addressed	Longer-term impacts can be addressed	Addressed	Addressed	Complex and potentially problematic	Data: depends on use of existing model Analysis: £5,000 (including counterfactual)	Scheme design Appraisal Policy choices Scheme implementation
Interchange	2.22	3.10	3.67	n/a		TAG; JLE; Manchester Metrolink; South Yorkshire Supertram; Croydon Tramlink	1) Checklist	Partially addressed	Partially addressed	Longer-term impacts can be addressed	Partially addressed	Partially addressed	Use same boundaries as appraisal	Data: £1,000 Analysis: <£2,000	Scheme design Appraisal
							2) Checklist plus interview surveys	Can be addressed	Partially addressed	Longer-term impacts can be addressed	Addressed	Addressed	Extent of impact boundaries can be ascertained	Data: depends on extent of survey Analysis: £5,000–£15,000+	Marginal benefits: better understanding of the counterfactual and cause and effect
Land-use policy	3.67	3.60	4.43	3.50		Croydon Tramlink; JLE; M40; M62	1) Checklist/ record of changes	Partially addressed	Partially addressed	Longer-term impacts can be addressed	Can be addressed	Can be addressed	Extent of impact boundaries can be ascertained	Data: small Analysis: depends on extent of local authority contribution	Appraisal Policy choices Scheme location and design *Conditions*: meta evaluation; social impact assessment

	Priority					Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
							2) Option 1 plus interview surveys	Partially addressed	Partially addressed	Longer-term impacts can be addressed	Can be addressed	Can be addressed	Extent of impact boundaries can be ascertained	Data: depends on extent of local authority contribution Analysis: depends on extent of local authority contribution	Marginal benefits: provides corroboration of data collected for the checklist
Other government policies	2.65	3.00	4.33	n/a		TAG	1) Checklist/ record of changes	Partially addressed	Partially addressed	Longer-term impacts can be addressed	Can be addressed	Can be addressed	Extent of impact boundaries can be ascertained	Data: none Analysis: <£2,000	Appraisal Policy choices
							2) Option 1 plus Delphi survey	Addressed	Addressed	Longer-term impacts can be addressed	Can be addressed	Can be addressed	Extent of impact boundaries can be ascertained	Data: none Analysis: £2,000–£10,000+	Marginal benefits: corroborates checklist, and can provide enhanced evidence on the extent of impacts
Quality of life	5.00			4.08		ODPM '3Rs' guidance; appraisal and evaluation of community strategies; evaluations of Sure Start, City Challenge, and New Deal for Communities; Best Value reviews; and neighbourhood renewal initiatives	1) Quality-of-life indicators	Not addressed	Addressed	Longer-term impacts can be addressed	Not addressed	Not addressed	Could be addressed depending on data availability	£500–£2,500+	Policy choices Appraisal Scheme design and mitigation

	Priority				Relevant references	Tools	Research issues						Costs and benefits	
	Case studies	DfT/HA	External	Area studies	N&M		Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
						2) Quality-of-life measures from relevant local surveys	Not addressed	Addressed	Longer-term impacts can be addressed	Not addressed	Not addressed	Can be addressed	£500–£2,000	Marginal benefits: able to identify scheme-specific impacts
						3) Boundary-specific surveys and possible qualitative research	Can be addressed	Addressed	Longer-term impacts can be addressed	Can be addressed	Partially addressed	Can be addressed	Depends on nature and extent of survey and any qualitative work	Marginal benefits: provides understanding of cause, effect and attribution. Note that all three options combined would give enhanced benefit as they are complementary
Social exclusion					Same principles used in the evaluation of other government spatial interventions (eg, the National Evaluation of New Deal for Communities, Sure Start, City Challenge)	1) Checklist/ descriptive analysis of change	Partially addressed	Addressed	Longer-term impacts can be addressed	Partially addressed	Partially addressed	Partially addressed	Depends on the extent of analysis required	Appraisal Scheme design Policy choices *Conditions*: social impacts assessment
						2) Analysis of suites of indicators	Not addressed	Addressed	Longer-term impacts can be addressed	Not addressed	Not addressed	Could be addressed depending on data availability	Data: <£1,000 Analysis: £2,500–£7,500	Marginal benefits: provides data to support the descriptive analysis of Option 1

Priority					Relevant references	Tools	Research issues						Costs and benefits	
Case studies	DfT/HA	External	Area studies	N&M			Counterfactual	Transferability	Timescales	Cause, effect & attribution	Confounding factors	Boundaries	Cost/scheme	Beneficiaries
						3) Use of quantitative and qualitative techniques	Partially addressed	Addressed	Could cover longer timescales	Partially addressed	Partially addressed	Partially addressed	Depends on type, scale and complexity of quantitative and qualitative research employed	Marginal benefits: allows for potential paucity of data and enhances the robustness of the overall analysis

Notes: Scores are simple average scores out of five across consultees for each exercise. The DfT/Highways Agency score for quality of life is based on two responses only. The area studies score for 'society' covers scores relating to 'ability to access safely public amenities', 'ability to access facilities outside the community', 'community vitality', and 'quality of life'. The area studies score for severance relates to 'ability to move freely within your community'. The area studies score for land-use policy is a combined response to 'land values around the road' and 'future land use around the road'. HA, Highways Agency; N&M, Nellthorp and Mackie (2000); JLE, Jubilee Line Extension; HIE, Highlands and Islands Enterprise.
Source: Study team analysis. See Appendix 2 for details of the relevant references.

Option values

The DfT/Highways Agency experts and case study consultees attached a low priority to evaluation evidence on this impact, while external consultees scored it as a top ten priority. However, the study team encountered a lack of understanding of this impact during the case study and DfT/Highways Agency consultations, which it attempted to overcome with an explanation of the impact in the external consultation questionnaire.

Benefits from evaluating option value impacts

In light of this lack of understanding, well-conducted evaluations should enhance understanding of how the value of increased options to travel should be treated during appraisal, and may reveal differences in approach between appraisers.

Option values evaluation toolkit

The study team developed two options for evaluating the option value impacts of a new road scheme.

– *Option 1*—designed to provide a low-cost indication of the changes to transport options brought about by the trunk road scheme, including changes to transport infrastructure and service provision, this option would investigate factors affecting the provision of services, potentially involving interviews with operators and local authority representatives. The success of the method depends on adequate evaluation planning to avoid the need to search for pre-opening public transport timetables. A simple approach would be warranted if a significant impact on the amount of travel options available as a result of a road scheme is unlikely. The data would cost around £1,000, and analysis would cost up to £2,000.

– *Option 2*—increasing levels of detail would be required, however, if a road scheme has led to, for example, a well-publicised reduction in public transport provision in the area. Then, it may be advisable to re-run the original appraisal, which currently identifies the size of the resident, business and wider communities affected by services that have been withdrawn, added or changed as a result of the road scheme. Further input could be obtained by including questions in a wider survey, or commissioning focus groups. The analysis required for the assessment of option values is very complex and would require specialist input. Analysis would cost £2,000–£5,000.

Severance

Evaluation evidence on severance impacts of road schemes received a variety of priority scores. ‘Move freely within your community’ was ranked as joint-top priority by area study consultees, while severance evidence was ranked sixth by external consultees. It was ranked ninth and 11th by case study professionals and DfT/Highways Agency staff, respectively.

Benefits from evaluating severance impacts

Being able to forecast severance impacts more effectively—and thereby mitigate any negative impacts—and ‘design in’ any positive impacts could radically change the public acceptability of road schemes at a local level. Helping appraisers appreciate the more subtle impacts of road schemes in this area could be very beneficial, particularly if evaluation can provide an indication of how appraisal differs between appraisers. Enhanced guidance on the weights to apply in the appraisal multi-criteria analysis could be a result.

Survey evidence is likely to reveal impacts on communities not previously appreciated. For example, the Polegate area study—while neither scientific nor intended to provide evaluation evidence—was able to highlight the impact of the bypass on milk and paper deliveries in certain locations.

Severance evaluation toolkit

Three options were developed for evaluating the severance impacts of a new road scheme.

– *Option 1*—involves the production of a before-and-after checklist—a qualitative statement summarising observed changes in pedestrians' and other non-motorised users' patterns of travelling to community facilities, and changes to the physical network of pedestrian/non-motorised users' utility and recreational routes brought about by the road scheme. The reporting would also include a qualitative statement on the mitigation measures that have been implemented as part of the road scheme and a comparison with those identified/proposed pre-scheme.

  The method is designed to be low-cost and practical where the objective is to reduce community severance between motorised and non-motorised travellers, with the strategic indicator identifying sections of transportation infrastructure with a change in severance. It has also been designed to match the current appraisal guidance on defining severance, and may merit change if this guidance changes. Where severance is identified as a major issue, the method has limited effectiveness if pedestrian surveys are not collected as part of the post-scheme evaluation to compare with pre-scheme counts. The data, including pedestrian surveys, would cost around £5,000, and the analysis up to £2,000.

– *Option 2*—this approach builds on that applied by Option 1 to include stakeholder before-and-after surveys, the methods of which can be decided at pre-implementation stage with the stakeholders. They will depend on the speed of response required, and the cost attributed to this element of the study. Surveys could take the form of personal interviews, telephone or mail surveys, or via the Internet, or a combination if a pre-designed questionnaire is preferred. They might usefully be designed to ascertain whether mitigation measures have been effective, and, if not, why. Data and consultation costs would amount to around £8,000, and analysis would cost £2,000–£5,000.

– *Option 3*—this method would build on the previous two options and use more complex/detailed techniques, such as face-to-face interviews and focus groups, to identify and quantify particular impacts of community severance and the implemented mitigation measures. The groups that may be disproportionately affected could also be identified. If there are particular areas where severance is anticipated or subsequently perceived, there could be a role for targeted research—eg, on-site interviews of pedestrians at a range of times, travel diaries, and count surveys. An alternative would be to use an accessibility model to determine severance impacts. Option 3 contains some reasonably expensive techniques, which would have to be applied carefully to ensure that their benefits (eg, enhanced appraisal, decision-making or local accountability) are realised. Analysis would cost up to £10,000.

Accessibility

As with severance evidence, evidence on 'access to public transport' (the appraisal criterion) received mixed rankings—14th from case study respondents; 12th from DfT/Highways Agency experts; second from external organisations; and sixth from scheme receptors. Scheme receptors also ranked 'safe access to community amenities' joint third, and 'ability to access facilities further afield' joint seventh.

Benefits from evaluating accessibility impacts

How a road scheme affects the ability of individuals to access the transport system is a key area of knowledge that is currently unavailable to policy-makers. A picture built up over time of how these impacts emerge, including an appreciation of how schemes affect user and non-user attitudes, would enhance appraisal, and may reveal impacts not previously identified. It may also influence national roads policy, including decisions taken on which roads to build, where, and how. Evaluation may also serve to provide an indication of how appraisal differs between appraisers.

Accessibility evaluation toolkit
The study team developed three options for evaluating the impacts of a new road scheme on access to public transport, with the third also applicable for evaluating wider accessibility impacts.

– *Option 1*—a low-cost option primarily aimed at identifying the post-opening situation and comparing this with the appraisal, using, where possible, existing indicators that the local authority may have in place, and information on other important local developments (which should be highlighted elsewhere in the evaluation). These indicators could include mode shares of journeys to school, and numbers of households within x minutes of a bus service. Data would cost £1,000, and analysis would cost £2,000–£5,000.

  It is possible that, as part of the appraisal, a GIS model was set up, which evaluators should make use of. GIS modelling would assist in comparison of before-and-after situations of areas in excess of a certain distance or walking time from a public transport service, and can be used in mapping physical changes (eg, in location of bus stops, or changes in physical access).

  This approach would not disaggregate the specific effects that could be directly attributed to the scheme; what it seeks to demonstrate are any significant changes between outturns and appraisal, and it therefore determines whether a more detailed evaluation might be required.

– *Option 2*—this option builds on the first approach, and would involve undertaking targeted qualitative research to obtain an improved understanding of the local significance of particular impacts. It is envisaged that this would employ interview tools such as face-to-face interviews, focus groups, or interviews/surveys of users of public transport. Household surveys might also be used where there is a wider benefit associated with evaluating a number of key objectives of the road scheme. Data would cost from £1,000, and analysis would cost £5,000–£10,000.

– *Option 3*—the third approach, which could be applied to the more specific issue of access to public transport, or to wider accessibility impacts, takes advantage of recent developments in the approach to appraising accessibility impacts. The use of GIS-based accessibility modelling is becoming standard practice in transport assessments. Various models exist to assess accessibility by mode including: walk, cycle, public transport and private vehicle models. The use of these models for ex post evaluation, perhaps complemented by robust qualitative research, would facilitate a detailed examination of scheme impacts on accessibility by different modes in terms of a number of variables (eg, population affected). It would also enable the development of counterfactuals.

  The study team concluded that, while a more costly approach (analysis would cost up to £10,000), the application of accessibility models to ex post evaluation is worthy of further investigation.

Transport interchange

Evaluation evidence regarding impacts on transport interchange received a relatively low priority score from case study, DfT/Highways Agency and external organisation consultees. Area study respondents were not requested to provide rankings in relation to this impact.

Benefits from evaluating interchange impacts
Considering the impacts of a scheme on transport interchange would enable improvements to be made to future modelling exercises, and the design of future schemes. More detailed analysis would serve to increase understanding of the multi-modal impacts of new road schemes, and of the relative weights afforded to different elements of the appraisal. Evaluation may also serve to provide an indication of how appraisal differs between appraisers.

Interchange evaluation toolkit
Two options were developed for evaluating the interchange impacts of a new road scheme.

– *Option 1*—the first proposed approach would be relatively simple and cheap to implement, involving identification of the post-implementation situation, and comparing this with the pre-scheme appraisal. Where possible, indicators suggested in TAG would be used. The intention is that, when evaluation is being planned, the AST would be checked to see if there were any substantive issues, and consideration would be given to whether interchange issues are being covered elsewhere. Applying this checklist approach would be relatively inexpensive, and could be used to provide transferable lessons. Data would cost around £1,000, and analysis up to £2,000.

– *Option 2*—the first approach could be augmented with the inclusion of questions relating to interchange impacts in a wider set of evaluation surveys of transport users (which would not be specially commissioned to examine this impact). This could be carried out at low cost, and could lead to an understanding of cause and effect where there is a need to identify the extent to which a scheme has had interchange impacts. Analysis costs would be £5,000–£15,000.

Land-use policy

Evaluation evidence on this impact area was given a relatively high priority by case study, DfT/Highways Agency and external organisation consultees, with the latter set of respondents ranking it as their top priority. In contrast, scheme receptors scored evaluation evidence on 'land values around the road' and 'future land use' joint 13th out of 18.

Benefits from evaluating land-use policy impacts
Well-designed evaluation that provides evidence on what types of scheme affect, and are affected by, land-use changes would be very valuable. This information would enable more effective decisions to be made about scheme location, and even about whether a new road should be built at all—is there a way of making land-use policy that would obviate the need for the road scheme altogether? The evaluation should enable more accurate traffic forecasting to be undertaken through the provision of improved assumptions about model inputs and levels of traffic generation.

Land-use policy evaluation toolkit
Two options were developed for evaluating land-use policy impacts of a new road scheme.

– *Option 1*—the first, lower-cost approach would involve the development of an ongoing record of land-use policy changes, particularly as regards Special Protection Areas, Areas of Outstanding Natural Beauty, national parks, Broads management plans, cultural heritage areas, and land-use development (ie, planning applications/decisions). These would be consistent with data collected at appraisal, and could therefore be compared with the appraisal. The approach should also be able to establish an ongoing record of changes, against which other changes relating to traffic-flow data, environment objectives, etc can be informed. It may be that boundaries need to be extended to cover a wider area than the scheme corridor to assess the extent of the impact. Given that GIS is becoming a more common tool, it is believed that the evaluation database should be GIS-compatible.

  This simple method, if extended across a number of schemes, would provide useful evidence on typical land-use changes in response to a scheme announcement, and how this differs from conventional traffic modelling. It may also demonstrate the planning considerations required alongside a new road scheme to ensure future land use is in keeping with the scheme's objectives. If resources can be provided by the local authority for this element of evaluation, this could be an inexpensive and valuable approach.

– *Option 2*—the second approach would build on the first, including interviews with stakeholders in local and sub-regional planning to understand cause and effect, and with

communities to ascertain whether changes in land use have been viewed positively or negatively, and whether people perceive these impacts as being related to the road scheme under consideration. Again, the possibility of local authority involvement could make this an inexpensive and valuable approach, particularly if further questions could be added to a community survey being conducted elsewhere in an evaluation.

Other government policies

As with access to public transport, there was a divergence of opinion between case study and DfT/Highways Agency consultees and external organisation representatives about the value of additional evaluation evidence regarding this impact. Case study and DfT/Highways Agency consultees ranked this evidence 13th and 18th, respectively, while external organisation representatives ranked it third. Area study consultees were not requested to rank evaluation evidence of this type.

Benefits from evaluating impacts on other government policies

An evaluation of how a road scheme fits with other government policy objectives would be a useful way of understanding the links between changes to the SRN and other policy drivers, such as crime reduction, and access to healthcare and education. This would assist the Highways Agency in specifying schemes to meet these other policy objectives, were evidence provided suggesting that policy targets in other areas were not being met as a result of the roads programme.

Evaluation toolkit

The study team developed two options for evaluating the impacts of a new road scheme on other government policies. These follow the same pattern as the options developed for land-use policy impact evaluations.

– *Option 1*—the first approach involves the same process as TAG to compile relevant documents as an initial action (which would be undertaken as part of the pre-scheme appraisal), as well as a documentary analysis to understand the interaction between the scheme and other policy developments. It would also consider whether the road scheme benefited from, hindered, or was unaffected by, the particular policy. As part of pre-scheme appraisal, identification of conflicts and synergies is usually presented in tabular form, although it may be possible to consider setting the database up in GIS and/or Access.

  Given that policy is set in many areas, and changes over time, it is unlikely that any evaluation checklist could cover all impacts of, or on, road schemes. However, meta evaluation of a number of schemes should enable, for example, the top ten cross-government impacts of, or on, road schemes. There would be no data costs, but analysis would cost up to £2,000.

– *Option 2*—this approach augments the first with selected interviews of experts from other government departments (using the list in GOMMMS), employing a Delphi survey approach. This technique consists of a series of questionnaires sent to a pre-selected group of experts. The questionnaires are designed to elicit and develop individual responses to the task specified and to enable the experts to refine their views as the group's work progresses. Analysis costs could be relatively high, but this form of evaluation could overcome the difficulties associated with the constantly shifting policy map, and provide an improved understanding of cause, effect and attribution. There would be no data costs, but analysis would cost £2,000–£10,000.

Quality of life

Measuring and evaluating the impact of a scheme on quality of life is currently not part of standard transport appraisal, but has been identified as a high priority in this study for inclusion in evaluation. A number of consultees separately identified this as an impact area not covered by appraisal but one that perhaps should be, and one that would benefit from evaluation evidence. Accordingly, the study team has investigated the feasibility and

practicality of evaluating quality-of-life impacts of road schemes. For example, the first task facing an evaluator would be to identify whether 'quality of life' is deemed to be important by professional stakeholders, local residents or business stakeholders, the local media, or indeed a representative sample of residents and businesses potentially affected by the scheme (this lesson is relevant to the evaluation of any impact). Furthermore, all or each of these groups might define or rank quality of life and its various elements in differing ways and the accommodation of these differences in the design of an evaluation would have to be explored in more detail.

Benefits from evaluating quality-of-life impacts
Evaluation of road scheme impacts in this area would provide robust evidence on the contribution of enhancing the road network to improvements in quality of life. This would have implications for transport and other government policies.

Quality-of-life evaluation toolkit
The study team developed three options for evaluating the impacts of a new road scheme on quality of life.

– *Option 1*—involves the collection, combination and assessment of quality-of-life indicators, based on the use of a range of recognised measures, which would be combined as a package in order to measure and assess changes in the quality of life within an area. It is dependent on a sufficiently wide package of salient indicators being available relating to the area concerned.

  Where 'local' indicator data is available, this can be compared over time, as well as benchmarked against corresponding regional and national measures. Any notable variance can be used by the evaluator as an indicator for closer analysis within the overall evaluation process. By examining and assessing a range of indicators together, such an approach can potentially play a role in identifying imbalances between social, economic and environmental impacts.

  This approach would be relatively inexpensive (£500–£2,500), and could provide an enhanced understanding of road scheme impacts, including those not previously appreciated, and could therefore improve the effectiveness of appraisal methods. It might also help in the assessment of mitigation.

– *Option 2*—this option would make use of quality-of-life measures (as opposed to indicators) that may have been collected locally (independently of the scheme evaluation)—for example, by a local authority for other purposes such as best value reviews, community strategies and/or for local transport plans. Availability of relevant trend data from any of these sources will depend on local circumstances and would need to be investigated, especially in terms of data definitions, date(s) and quality of data and geographical coverage. Where such data is available, it could be used in a stand-alone way, or in combination with any analysis resulting from Option 1. This would again be a relatively inexpensive option (£500–£2,000), which would deliver potentially more robust results relative to the first approach, in light of the use of data developed independently of the evaluation.

– *Option 3*—the issue of data coverage would be addressed by this approach. It may transpire that the available data does not match the boundaries of scheme impacts, which could hide relevant impacts, or lead to false conclusions. The use of targeted survey evidence would, in this situation, be valuable, and could be achieved at low marginal cost, assuming that surveys are being employed elsewhere in the evaluation (costs would depend on the nature and extent of survey and qualitative work). Boundary-specific surveys could help identify contextual developments and, with appropriate survey methodology, implementation, questionnaire design and analysis, could assist in identifying any differential impacts in terms of geography and demography. Such surveys can also help in addressing cause and effect, and the

possible role of the road in residents' or businesses' ratings of quality of life and related issues. For further enhanced analysis, qualitative techniques could also be employed to help understand the nature and extent of relationships between local changes and the views and perceived impacts on quality of life or particular aspects of quality of life affected.

Social exclusion

As with quality of life, this impact area was included due to its importance as an area of government policy, and because certain consultees suggested that they would value evaluation evidence in this area.

Benefits from evaluating impacts on social exclusion

Reducing social exclusion is a key government aim, so evaluation aimed at establishing these impacts of road schemes could be beneficial. Since social exclusion is not appraised per se, evaluation could indicate which elements of appraisal have the greatest impact on social exclusion, and the extent of their success in predicting impacts. It may highlight impacts not previously appreciated, and demonstrate both how to choose between schemes, and how schemes could be designed more effectively to reduce social exclusion. The use of appropriately sized quantitative survey techniques and qualitative research specific to the boundary impact area, and target groups with appropriate sampling, could have numerous benefits, especially in those cases requiring more robust evaluation evidence on social exclusion impacts, and for identifying transferable lessons.

Social exclusion evaluation toolkit

Having consulted the DfT, the Neighbourhood Renewal Unit and the Social Exclusion Unit, the study team developed three options for evaluating the impacts of a new road scheme on social exclusion.

– *Option 1*—it may be the case that the approaches covered within the accessibility and other government policies proformas will be sufficient to provide a comprehensive evaluation of relevant social exclusion impacts. However, it might also be the case, particularly for some schemes, that additional activities focusing on evaluating social exclusion impacts should be built in.

  Factoring in the needs of socially excluded people and areas is now a requirement in local transport planning, and the Social Exclusion Unit's 'Making the Connections' report contains 37 cross-government action points in its strategy to improve access to jobs and services.[25] The DfT has overall responsibility for this report's implementation, monitoring of progress and evaluation.

  At a minimum, it is recommended that a written description, which aims to capture the ways in which the scheme has addressed, or contributed to, each of the 37 action points (as appropriate) in 'Making the Connections', is provided as part of the overall evaluation process (especially if this has not been covered elsewhere).

– Option 2—complementing the first approach would be the use of a suite of indicators of change within the scheme's impact boundary. These would include measures relating to government deprivation floor and PSA targets. These would be compared over time and against regional and national measures for benchmarking, assessment of change and contextual developments. However, even with continuing developments to make neighbourhood-based area statistics more readily available, evaluating spatial initiatives with particular regard to their impacts on social exclusion generally still requires specially commissioned quantitative and qualitative approaches, which are covered by Option 3.

[25] Social Exclusion Unit (2003), 'Making the Connections: Final Report on Transport and Social Exclusion', February.

– Option 3—as with quality-of-life impacts, evaluators might not be able to find data relevant to the specific study area, in which case the use of quantitative surveys and qualitative research techniques (including stakeholder panels) for the evaluation would be recommended. Where some type of interview survey is being carried out as part of the evaluation of a scheme, it is recommended that data relating to social exclusion is also collected. It may be considered that data collected as part of the process of accessibility planning and wider economic impacts is sufficient; however, this needs to be carefully thought through and may be insufficient for a particular scheme, and for measuring and assessing its impact overall and on different groups of socially excluded people. It is recommended that this approach is, or can be, combined with Options 1 and 2, where assessing impacts on social exclusion is deemed to be of particular relevance and importance within the overall evaluation of a scheme. This more thorough approach can help to address cause and effect and possibly contribute to attribution through the use of appropriate research methodologies and implementation. There is potential for smaller-scale qualitative approaches to obtain a more in-depth understanding and analysis of findings—especially in those instances requiring more robust evaluations—for establishing and understanding how a scheme has had an impact on social exclusion, and for identifying transferable lessons.

4.2.5 Process

The DfT and Highways Agency staff that assigned a priority ranking to obtaining process evaluation evidence scored it the highest out of all alternatives. Process evaluation evidence was also deemed a relatively high priority by external consultees, who placed it fourth out of 22 options. The external consultation provided an idea of where the most appropriate focus for process evaluation should lie. Evidence on construction processes was ranked highest (not only among process evaluation options, but also more generally), followed by planning processes, stakeholder involvement and procurement.

Benefits from evaluating process issues

A well-executed process evaluation will provide timely information on the causes of departures from a scheme's original business case—be it in relation to cost, timescales for completion, or the extent of disruption caused by construction. It can also help in the assessment of new processes, such as Early Contractor Involvement under the Highways Agency's Speeding Up Delivery programme. Used well, it can provide information to contractors on how their processes could be improved *during implementation*.

Across road schemes, carrying out a number of process evaluations would provide evidence on how processes—including design, public consultation, procurement and construction—could be improved, thus providing higher-quality roads, delivered more rapidly and at lower cost. For example, the area studies are notable in demonstrating the value of good local consultation, with the advances in Highways Agency consultation processes notable when satisfaction with this process aspect is compared between Polegate and Okehampton.

Process evaluation option

The study team has developed one method for evaluating scheme-implementation processes. However, construction impacts should be picked up by options proposed under impact headings such as transport economic efficiency and accidents.

The method has been developed in conjunction with the Tavistock Institute. Expert panel member, Dr John Kelleher, made the following comment:

> I think the key thing with process evaluation is *an audit of conformance with best practice* (or rather like with accounting standards a requirement to 'conform or explain [why it was not appropriate to conform]').

Best-practice standards would include the requirements of the Office of Government Commerce's (OGC) Gateway Review Process, and also application of standard risk

management approaches, whole-life costing of construction, etc. This type of evaluation is analogous to the demands large manufacturers (eg, in the car, aerospace or electronics industries) or retailers make on their suppliers with regard to quality assurance, information, human resource development systems, etc. In these cases, companies are not simply specifying required outputs, but also required processes, with specifications supported by routine audits and inspections (a type of 'open book' requirement).

In light of this advice, the study team proposed an audit-based approach to evaluating each stage of the road-planning, procurement and construction process. The audit would be based on an assessment of statutory documentation that must be produced during the process and interviews with key stakeholders. The audit process is matched to—but adding value to—the OGC Gateways, which the Highways Agency has incorporated into its major schemes Early Contractor Involvement process, and would make a wider assessment of the development of the business case than the Gateway process permits. It would establish how key decisions are made, which stakeholders were involved (and how, including an assessment of whether their skills were appropriately involved), and the cumulative impact on project delivery to time and budget. The evaluation could also make use of key performance indicators, which are being considered by the Highways Agency. A checklist would be derived, stating which documents should be reviewed and which individuals consulted for each of the review stages, although consultation—who should be interviewed, about what and how—would have to be decided on a case-by-case basis.

The study team envisages a number of process evaluations taking place at any one time, costing around £5,000–£10,000 per scheme. The results would form a cumulative knowledge base that would be disseminated quickly to practitioners involved in scheme implementation. This should improve processes, and also inform impact evaluations by providing information on why and how decisions were taken that led to particular outcomes post-implementation.

4.3 Discussion

This section discusses the approaches to evaluation set out above, the coverage of research issues, the importance of crosscutting methods, and the relationships between benefits and costs.

4.3.1 Coverage of research issues

The matrices demonstrate the extent to which study research issues are likely to be barriers to implementing the approaches that have been developed. The impact of the research issues is summarised here.

– *Counterfactual*—this was mentioned as an evaluation priority by a number of consultees. However, the approaches that have been developed only partially address the counterfactual, reflecting the fact that a counterfactual is not always required—for example, when employing process evaluation and when evaluating the usefulness of mitigation measures. In addition, it would appear that the approaches do not necessarily require the development of expensive models (using, for example, control areas) that can deliver counterfactuals to provide beneficial evaluation. While these have been included as options for more complex or sensitive schemes, the benefits of more typical schemes appear to be outweighed by the costs. Less expensive options, such as the use of interviews with local experts, have generally been included instead.

– *Transferability*—the approaches developed are generally transferable between types of schemes, with the only barriers being cost and the need to develop guidelines on the application of the approaches in particular circumstances. Transferable lessons from individual evaluations would have to be carefully identified, but this should emerge from robust meta evaluations.

– *Timescales*—longer-term evaluation is possible for the majority of approaches, but it would have to be carefully planned and resourced. Timely lessons should emerge from most evaluations with the successful development of indicators of final outcomes, although this in itself might require longer-term evaluations to determine the appropriate set of indicators. Longitudinal issues with surveys are considered later in this section.

– *Cause, effect and attribution*—the combination of quantitative data, supported by qualitative data, should deliver a reasonable understanding of causality. The use of control areas for the evaluation of wider economic impacts would deliver more robust results.

– *Confounding factors*—these should emerge as a result of most of the approaches put forward. More specifically, this research issue should be overcome in a similar way to the cause, effect and attribution issue.

– *Boundaries*—evaluation boundaries could either use those applied at appraisal (although this would not test whether these were sufficient, but would be appropriate for some applications), or develop new boundaries of impacts. The latter has been reflected in a number of the approaches developed for the study. Boundaries would only be problematic where available data does not reflect scheme impact boundaries, or where interactions are complex.

4.3.2 Crosscutting tools

Table 4.5 shows the use of crosscutting tools by impact evaluation area.

Table 4.5 Application of crosscutting tools in the proposed approaches

Impact	Environment surveys	Traffic data collection	Accident data collection	Social research tools	Socio-economic data sources
Environment					
Noise	1, 2	1, 2 (volume, speed, mix, road surface)	×	1, 2	×
Local air quality	2, 3	1, 2, 3 (volume, speed, mix)	×	1, 2	×
Greenhouse gases	×	1 (volume, speed, mix, link length)	×	×	×
Landscape	1, 2, 3	×	×	1, 2, 3 (possible)	×
Townscape	1, 2, 3	×	×	1, 2, 3 (possible)	×
Biodiversity	1, 2, 3	×	×	×	×
Heritage	1	×	×	1 (possible)	×
Water	1, 2, 3	×	×	1, 2, 3 (possible)	×
Physical fitness	×	×	×	1	×
Journey ambience	×	×	×	1	×
Safety					
Accidents	×	1, 2 (volume, speed)	1, 2	×	×
Security	×	1 (volume, speed)	1	1 (possible)	×
Economy					
Transport economic efficiency (TEE)	×	1, 2, 3, 4 (increasing levels of detail on volume, speed, mix, link length)	×	×	×
Reliability	×	1 (volume, link capacity), 2 (journey time variation by origin–destination pairs)	×	×	×
Wider economic impacts	×	3 (as per TEE)	×	1 (possible), 2, 3 (possible)	1, 2, 3

Impact	Environment surveys	Traffic data collection	Accident data collection	Social research tools	Socio-economic data sources
Society					
Option values	×	1, 2 (as per TEE)	×	2	1, 2
Severance	×	1, 2, 3 (as per TEE, plus pedestrian surveys)	1, 2. 3	2, 3	3 (possible)
Access to public transport	×	1, 2, 3 (as per TEE)	×	2	1, 2, 3
Wider accessibility	×	1 (as per TEE)	×	1	1
Interchange	×	1, 2 (as per TEE, may require some additional data)	×	2	1, 2
Land-use policy	×	×	×	2	1, 2
Other government policies	×	×	×	2	1, 2
Quality of life	1, 2, 3	1 (depends on indicators developed)	1	1, 2, 3	1, 2, 3
Social exclusion	2		2, 3	2 (possible), 3	2, 3

Note: Figures in the table relate to the options developed for each impact area and their use of the crosscutting tools.
Source: Study team analysis.

Environmental surveys

The table demonstrates that environmental surveys are required for most environment evaluation approaches. Their use depends on the type of impact being studied, but could include surveys of the usefulness of mitigation measures (eg, landscape design and usage and availability of badger tunnels), surveys of the levels of particular emissions (eg, noise and PM_{10}), or of design and implementation documentation to enable checks to be made on how the outturn scheme compared with expectations.

Traffic data

Current POPE traffic data collection, which involves a combination of link traffic volumes (which the Highways Agency already collects, or can request from local authorities for lower-order roads) and journey times (usually from specially commissioned floating vehicle surveys), should suffice for most applications, except for the PIES-type analysis, and the more complex reliability evaluation (which would require reliable data as it becomes available from the HATRIS system).

Accident data

Current POPE accident data collection, which employs the STATS19 database, could be augmented in some situations with pre-existing data from the appraisal, and would also be employed in the assessment of some social impacts. Socio-economic data (as described in the first wider economic impacts proforma) would be used to understand wider economic impacts, and to develop indicators of social impacts.

Social research data

Social research data can be a very valuable information resource on the attitudes and behaviour of individuals and organisations. Social research can provide evaluators with hard data on the impacts of schemes on people's perceptions (eg, do they think that things have improved and why?). It can help evaluators understand the processes behind the implementation of schemes, and why particular impacts are, or are not, emerging. As well as providing measures of change over time, such data can also help evaluators identify cause and effect and the additionality of a scheme.

Good evaluations should draw on evidence from a wide range of sources. Indeed, wherever possible, evaluators should use more than one method and measure to assess a specific process or impact (known as 'triangulation'). Taking noise as an example, evaluators might draw on secondary data (eg, existing roadside monitoring or any local survey data on attitudes to noise as part of wider survey work) and collect their own primary data (eg, from targeted roadside monitoring, a tailored survey or set of focus groups).

Scheme evaluations should, therefore, maximise the use of existing secondary social research information, such as data from surveys conducted by local authorities (eg, for best value). Local Strategic Partnerships, or their members, may also be able to assist by providing data or allowing evaluators to piggyback on their planned data collections.[26].

However, despite continuing improvements in the availability of data, such as neighbourhood-based area statistics, scheme evaluations may still need to include specially commissioned quantitative and qualitative social research approaches—for example, to understand varying impacts on differing population groups by geography or demography. There are a number of social research tools and techniques available. The approach adopted should be determined on a case-by-case basis, according to the objectives and

[26] Evaluators may also find it helpful to make use of consultation data pre- and post-scheme implementation. This data may have been collected specifically on the scheme (eg, as part of public enquiries) or be wider consultation data collected for other purposes (eg, to inform local transport plans). However, the assumption that consultation data is the same as social research data should be avoided. Unless it has been collected to the standards required of social research data, it is unlikely to be representative and will supply only partial information.

priorities of the particular evaluation, the nature of the scheme, the contextual issues and available budget. This will require expert input.

Large evaluations may use large-scale representative sample 'before' and 'after' surveys (eg, of households, users and businesses) to gather quantitative data, alongside smaller-scale qualitative research (eg, in-depth interviews, focus groups and small-scale surveys of key stakeholders) to gain further insights and understanding.

– **Quantitative social research data** can be collected through large-scale random household surveys, user and non-user surveys, employer and employee surveys, etc. Large surveys might be appropriate where the type of detailed data required is not available from secondary sources, or representative statistical data is required for analysis and/or modelling purposes (eg, it might be useful to collect stated-preference data to help develop future appraisal techniques)

– **Smaller-scale qualitative approaches** (eg, 'depth' interviews, focus groups) can be employed to obtain an in-depth understanding and analysis of findings for those cases where it is deemed that this insight would be necessary or of benefit in understanding how a scheme has affected differing population groups and possibly for helping to identify transferable lessons or other key aspects required from the evaluation. Purposive sampling of respondents from the different population groups affected by the scheme (including those that are commonly 'hard to reach', such as commuters or carers who may have little spare time available to attend interviews/focus groups) can ensure that the findings of qualitative research are not skewed towards a particular population group.

With both quantitative and qualitative research, it is important that evaluators consider carefully who they need data from and the relevant area covered. For example, they may need data from residents, users, businesses or other stakeholders outside the boundaries identified at appraisal. Or they may need the views of particular social groups (eg, the elderly) and thus be required to over-sample. A longitudinal survey approach can be particularly useful in helping evaluators assess who is changing their views and behaviour over time and why.

It is particularly important that evaluators have the necessary skills to develop and conduct social research, and they may have to draw on expertise from elsewhere. Key methodological issues they are likely to face include the following.

– The choice and the development of tailored tools, including quantitative surveys involving face-to-face interviewing in the home or elsewhere, telephone interviewing, postal surveys; and qualitative methods such as focus groups or in-depth interviews. Each has its particular merits for differing circumstances and the choice of approach will be influenced by the evaluation objectives in question and contextual scheme considerations including the range and quality of other data available required for evaluation purposes.

– Identifying the necessary sample size, the choice of sample frame and sampling technique, which will again depend on the scheme in question and evaluation objectives and priorities. For example, if data needs to be analysed for separate geographies, such as for each village or community area along with the boundary area as a whole, the sample size and approach to sampling must be such that they enable data collected to be representative of each of the separate communities as well as the whole study area. This approach also applies when analysing potential impacts on separate demographic groups as well as the study population as a whole. Booster samples may also be needed if it is considered that their numbers may be so small as to be unrepresentative, when analysing the total sample data.

– The importance of achieving a high response rate, to ensure the robustness and credibility of the findings. Longitudinal data collection (eg, using panels) raises particular methodological issues, such as attrition, which scheme evaluations need to address through robust research design (eg, increasing initial sample size, careful collation and monitoring of movements, and chasing).

Providing technical advice on the appropriate choice and application of social research tools is beyond the scope of this project—and, in any case, precise requirements will vary according to each scheme. There is already a wide range of general advice on research designs and tools. For example, evaluators can draw on:

– advice issued by other government departments, non-departmental government bodies agencies, etc, including the Cabinet Office 'Magenta Book Guidance' (www.policyhub.gov.uk);
– the EU guide to the evaluation of socio-economic development (http://www.evalsed.info/);
– the ODPM's 'Assessing the Impacts of Spatial Interventions: the "3Rs" Guidance' (http://www.odpm.gov.uk/stellent/groups/odpm_about/documents/page/odpm_about_029332-07.hcsp);
– HM Treasury's 'Appraisal and Evaluation in Central Government', 2003 (http://www.hm-treasury.gov.uk/economic_data_and_tools/greenbook/data_greenbook_index.cfm3Rs);
– private sites such as 'The Worldwide Evaluation Information Gateway' (http://www.policy-evaluation.org/); the 'Web Centre for Social Research Methods' (http://www.socialresearchmethods.net/); and 'Social Science Information Gateway' (http://www.sosig.ac.uk/).

The costs of social research will depend on many factors, including: the number of surveys, interviews, or focus groups; whether a longitudinal element is built in; sampling; sample size; questionnaire design and length; minimum response rate to be achieved, and chasing; the nature of data analysis and reporting. The study team did not, therefore, attempt to build in social research cost estimates into the cost estimates for scheme evaluations. In some cases, costs may be relatively minimal where the approach is to use small-scale qualitative techniques. However, where the demands on a survey methodology and design are complex and require a robust approach to all its aspects, costs may become a key consideration. While there may be scope for compromise between evaluation and research objectives and overall costs, evaluators should take care to prevent standards falling short of those required for robust, effective and meaningful analysis, assessment and evaluation.

4.3.3 Costs and benefits

This study considers the incremental costs and benefits of different approaches to the evaluation of trunk road schemes. POPE involves the planning of scheme evaluations, collecting and recording before-and-after data on accidents, traffic volumes and journey times, and analysing the results. It is evaluation beyond this current level that has to be assessed.

On the benefits side, it is clear that it would not be meaningful to place a monetary value on the incremental benefits of enhancing POPE by drawing from the toolkit. However, the analysis in section 4.2 demonstrates that adopting the approaches proposed would be expected to generate a number of detailed benefits, including improved modelling and forecasting; more effective scheme design and post-opening mitigation; the identification of unanticipated impacts; better information on attitudes to roads; hard evidence on high-profile issues; and examples of how to reduce costs and speed up delivery. More generally, the study team's consultation suggested that key outcomes from more robust evaluation include the following.

– **Policy accountability** within the DfT and Highways Agency, and externally—targeted, well-disseminated evaluation should enable the DfT and Highways Agency to

demonstrate the ways in which it is using road schemes to resolve policy issues, from meeting PSA targets, to overcoming congestion and poor road safety in particular locations, thus leading to less controversial decision-making.

– **Improving appraisal** where it is currently weak, or where there is a large degree of uncertainty about its conclusions. For example, the impact of new road schemes on the wider economy is not well understood, while social exclusion is not considered separately by appraisal. Evaluation using the approaches developed should improve appraisal methods.

– **Closing the appraisal–decision-making–evaluation loop**—for example, informing decisions on which road scheme choices are most appropriate where, for whom, and in what circumstances, which should lead to fewer type 1—not going ahead when it should have (false negative) and type 2—going ahead when it should not have (false positive) errors in decision-making.

– **Developing a cumulative knowledge base**—over time, the study team envisages the evidence provided by toolkit-based evaluations to be recorded and used in a variety of ways (eg, for meta analysis, which looks over a number of scheme outcomes to understand what works, for whom, and in what circumstances) to develop indicators of change, which can be applied to provide timely conclusions on scheme impacts to stakeholders, and which should reduce the need for evaluation in the medium term.

– Enabling continued **improvements in project processes** and implementation—it will be clear from evaluations that the processes involved in delivering a project, the way it has been implemented, and the context in which it is placed, have determined its impacts. Examples where processes and implementation have led to both positive and negative outcomes should be used to improve learning across the Highways Agency and its contractors.

It is clear that these benefits would be maximised where evaluators have clear guidelines about which approaches work best in which circumstances. However, one approach to assessing *incremental* costs and benefits of using the toolkit at an aggregate level (ie, not taking into account scheme-specific issues that evaluation would have to respond to) would be to consider the costs and benefits of responding to the ten highest-priority areas where stakeholders require more evaluation evidence. Table 4.6 sets out the findings of this analysis, which is intended to provide a ‘flavour’ of the incremental costs and benefits of evaluation of an average scheme (in terms of size and complexity).

Table 4.6 Incremental costs and benefits of enhanced evaluation

Priority areas[1]	Incremental costs[2]	Processes to benefit	Incremental benefits	Benefit pre-conditions
Process	£7,500	Scheme-implementation; evaluation	High in certain circumstances at scheme level	Meta evaluation
Accidents	Nil	Appraisal; scheme design and implementation; policy choices; national and local accountability	Nil	Meta evaluation
Landscape	£5,000	Scheme, mitigation, and maintenance strategy design; appraisal; ex post remedial action	Evidence on long-term impacts; potentially improved mitigation	Wider social assessment
Severance	£8,500	Scheme design; appraisal; policy options; ex post remedial action	Local accountability; potentially improved ex post design; improved understanding of impacts	Wider social assessment
Reliability	£6,000	Performance monitoring; appraisal; national and local accountability; ex post remedial action	Richer evidence base to determine cause and effect; local accountability; potentially improved ex post design	Meta evaluation
Local air quality	£3,500	Appraisal; scheme design; public inquiry evidence	Potentially improved mitigation; local accountability	None
Transport economic efficiency	£2,000	Appraisal; scheme implementation; policy options; performance monitoring; ex post remedial action	Evaluation of multi-modal impacts	Meta evaluation
Land-use policy	£1,000	Appraisal; policy choices; scheme location and design	Better understanding of cause and effect; future planning policy	Meta evaluation
Access to public transport	£8,500	Scheme design; appraisal; policy choices; scheme implementation	Potentially improved mitigation; ex post changes to public transport services	Wider social assessment
Noise	£5,000	Appraisal; scheme and mitigation design; national and local accountability; ex post remedial action	Potentially improved mitigation; local accountability	None

Notes: The choice of approach to use for each impact or process issue is presented below. [1] Top ten priorities are indicative, and are derived using an unweighted average across consultee responses. [2] Incremental costs use the midpoint of the range set out in the proformas.
Source: Study team analysis.

To develop the table, the following approaches to evaluation were chosen (where a choice was possible).

– *Accidents*—Option 1 (use of STATS19 data, and more 'before' data than POPE currently uses), as the current POPE approach should be sufficient for most schemes.

– *Landscape*—Option 2 (desktop study and site visits immediately post-opening, plus at one-, five- and 15-year intervals thereafter), combining the benefits of structured timescales, with social research on impacts. Option 3 (adding 30-year evaluation) is only likely to be applied where a commitment to 30-year evaluation can be secured.

– *Severance*—Option 2, combining the benefits of pedestrian surveys, a qualitative indicator approach, and less extensive social research.

– *Reliability*—Option 2 (collection of ex ante and ex post journey time variability data), which would deliver substantial benefits relative to the status quo, in terms of understanding the impacts.

– *Local air quality*—Option 2, chosen to match the appraisal approach fully (by considering the number of properties experiencing significant changes in NO_2 and PM_{10}), without using a dispersion model (Option 3), which future evaluation could implement should appraisal start to use this technology.

– *Transport economic efficiency*—Option 3 (use of TUBA to assess traffic outturn costs and benefits), an improvement over the current POPE method, which allows for multi-modal impacts to be evaluated, without deploying the costly PIES-type Option 4.

– *Land-use policy*—Option 2 (for which the cost is assumed to be £1,000) combines the benefits of data collection on changes in land use with discussions with local agents of change to enable an improved appreciation of cause and effect.

– *Access to public transport*—Option 2, which augments a checklist approach using existing local authority indicators and GIS models from the appraisal with survey methods, but does not attempt to deploy accessibility models, which are as yet untested for ex post evaluation.

– *Noise*—Option 2 (use of a noise contour model), which should pick up unanticipated impacts by checking the 'whole' noise environment against appraisal predictions, rather than just in certain locations.

Table 4.6 suggests the following.

– Meeting all ten priority evaluation needs would cost an *additional* £40,000 to £50,000 per scheme, over and above the (approximately) £12,000 per scheme cost for POPE, plus social research costs and the cost of meta evaluation analysis, should similar evaluations be carried out that enable the development of an evidence base.

– At a scheme-specific level, this would enhance local accountability and planning responses to new road schemes, and might lead to improved mitigation of impacts, should the evaluation deem this worthwhile.

– Well-disseminated results from a robust meta evaluation should deliver improvements to policy choices, appraisal, scheme design and implementation, performance monitoring and national accountability, and public acceptability of road schemes.

It is worth reiterating that Table 4.6 is *purely indicative*, as costs are likely to vary from scheme to scheme, as are the impacts deemed worthy of evaluation, either due to scheme-specific issues, or changing policy priorities that require enhanced evaluation evidence. In particular, the study team does not suggest that evaluation covering the priority areas in Table 4.6 should form a core minimum. Rather, the evidence—that there are different potential users of evaluation evidence, with different needs, and that to meet these needs evaluators will have to select approaches carefully from the toolkit—suggests that evaluations will be different in different situations, and that a common core could be too restrictive, potentially locking in funds that would not need to be spent once a knowledge base had been established, and/or providing evaluation evidence for which there is no demand.

This chapter now considers how scheme-specific impacts (which can include the drivers behind a scheme being given the go-ahead, and particular issues associated with the local geography) might be evaluated.

4.4 Return to the case studies

In the first instance, it was necessary to identify the key issues for each of the three case studies. This was done by reference to the ranking of impact issues based on a number of sources. These included the original appraisal reports, the consultations with programme and local area stakeholders, media articles and the scheme evaluation reports themselves (see Chapter 2 for more details). The results of this exercise are summarised in Table 4.7.

Table 4.7 Key issues for each case study

		A46 Leicester					A30 Okehampton					A27 Polegate				
Main impact	Sub-impacts	Appraisal reports	Programme stakeholders	Media articles	Local area stakeholders	Scheme-evaluation study	Appraisal reports	Programme stakeholders	Media articles	Local area stakeholders	Scheme-evaluation study	Appraisal reports	Programme stakeholders	Media articles	Local area stakeholders	Scheme-evaluation-study
Environment	Noise				✓		✓	✓	✓		✓	✓	✓	✓	✓	
	Local air quality				✓			✓		✓		✓	✓		✓	
	Greenhouse gases															
	Landscape				✓		✓	✓	✓	✓		✓	✓	✓	✓	
	Townscape															
	Biodiversity				✓			✓							✓	
	Heritage of historical resources				✓					✓						
	Water environment				✓								✓		✓	
	Physical fitness															
	Journal ambience															
Safety	Accidents	✓	✓	✓	✓	✓		✓		✓		✓	✓		✓	
	Security				✓											
Economy	Transport economic efficiency	✓	✓	✓		✓	✓		✓	✓		✓	✓			✓
	Reliability		✓									✓	✓			✓
	Wider economic impacts		✓						✓	✓				✓	✓	

		A46 Leicester					A30 Okehampton					A27 Polegate				
Main impact	Sub-impacts	Appraisal reports	Programme stakeholders	Media articles	Local area stakeholders	Scheme-evaluation study	Appraisal reports	Programme stakeholders	Media articles	Local area stakeholders	Scheme-evaluation study	Appraisal reports	Programme stakeholders	Media articles	Local area stakeholders	Scheme-evaluation-study
Accessibility	Option values															
	Severance				✓					✓		✓		✓	✓	
	Access to the transport system		✓							✓				✓	✓	
Integration	Transport interchange															
	Land-use policy		✓						✓						✓	
	Other government policies								✓							
Sustainability	Quality of life				✓										✓	
	Social exclusion															

Source: Study team analysis.

Since the main objective of this part of the study was to 'test' the application and practicality of a selection of approaches, the case study documentation was then reviewed and, together with the overview of key issues, specific impacts were selected for testing for each of the three schemes. This process is developed further below.

4.4.1 A46 Leicester Western Bypass

Key issues emerging from a review of scheme documentation are as follows.

– *Transport economic efficiency*—this was evaluated by replicating the SATURN traffic model used in the appraisal for the outturn situation and re-running COBA and TUBA with the resultant matrices. Various tests were carried out using fixed and variable assignments. The recommended modelling solution involved comparing a recreated do-minimum matrix, which was derived from the replicated do-something matrix. There were problems with all approaches, and the study was very expensive and time-consuming. However, the complexity of traffic impacts relating to this scheme indicates that substantive modelling was probably required.

– *Other economic impacts*—reliability and wider economic impacts were not considered by the evaluation, and it is possible that these issues were not raised by the appraisal (although the study team was not able to obtain appraisal documents to verify this) as it pre-dated NATA. A46 case study evidence suggested that these impacts were important, and are therefore worth considering in more detail.

– *Accidents*—rated as high priorities for evaluation evidence by A46 case and area study consultees.

– *Quality of life*—similarly, evaluation evidence of these impacts was ranked as a priority by area study respondents and, to a lesser extent, by case study consultees.

How each of these impacts might have been evaluated is considered in turn below.

Transport economic efficiency

Given that the scheme was driven by traffic congestion objectives, which had apparently failed to materialise within the city centre, and a greater understanding was sought about the effect of the scheme on suppressed demand and induced traffic, a complex approach to evaluating transport economic efficiency was warranted. None of the simplified approaches proposed would have been adequate for a scheme of this complexity. Adopting a new method, the modelled comparison, which is synonymous with the PIES approach used in the evaluation, was recommended for this study. However, this new method could only be used if the evaluation had been planned at the appraisal stage with the preservation of the traffic and economic models and the more accurate determination of a do-minimum traffic model, which was the major problem with the original evaluation. Alternatively, the routine storing of this information would overcome the problem of having to predict which schemes would require further analysis post-opening. This method is likely to be more expensive than the original approach and would only be cost-effective if it was decided that it was necessary to provide transferable lessons to other schemes and/or inform appraisal.

Reliability

An assessment of reliability according to the standard deviation of journey time would have provided significant evaluation information and could have been targeted at a few key routes (probably the four used in the original evaluation) to be cost-effective. This should include car and bus journey times given the nature of the urban area affected. Without more information on the ex ante situation, it is not possible to know if this evaluation would have been cost-effective, but given the complex urban environment and need to assess car and bus times, it would have cost up to £10,000 to carry out.

Wider economic impacts

Given the potential for large-scale wider economic impacts in the city and its environs, at a minimum, the assessment of published indicators (the simple study method) should have been conducted. This would have been practicable as the scheme had been open for seven years at the time of evaluation. At a cost of around £3,000, this would also have been cost-effective. It is highly probable that the statistical assessment using business surveys (the second proposed approach) would also have been appropriate. The first part of this method, a scoping survey, would identify whether impacts were significant and the boundaries of these impacts. The cost of the full assessment, probably at around £10,000–£15,000, could be justified in part by the need to gather more information on the scope of impacts to support appraisal and future decision-making.

Accidents

The most basic evaluation option–using the existing POPE approach—is considered practical in this case, as a similar approach was used in the evaluation and deemed to be effective. It also highlights the importance of setting up the appraisal mechanism beforehand. The data is readily available from STATS19 and the costs of analysis can be assumed to be small and subsumed within the overall COBA modelling tasks.

Quality of life

The first step in any evaluation of quality-of-life impacts (and, indeed, in any impact evaluation per se) should be to determine whether these are important to stakeholders. It is important to note that different stakeholder groups might define or rank quality of life and its various elements in different ways. How this would be accommodated within the overall objectives and terms of reference of a scheme evaluation would have to be decided on a case-by-case basis.

The choice between the three proposed approaches would depend largely on data availability at the local level. The first approach involves the collection, combination and assessment of quality-of-life indicators, and depends on a sufficiently wide package of salient indicators being available relating to the area concerned. In this case, the A46 area study found evidence that quality-of-life concerns related mostly to traffic, noise and pollution. A sufficiently well-planned evaluation would ensure that these stakeholder concerns were reflected in data collection, enabling this information to be employed in contributing to a notional index of quality of life specific to the study area.

However, this method could prove to be too simplistic to provide anything more than a high-level indication of quality-of-life changes brought about by the road scheme. In this case, applying the second approach could prove valuable, as it employs measures of quality of life that may have been collected locally (independently of the scheme evaluation)—for example, by a local authority for other purposes such as best value reviews, community strategies and/or for local transport plans. Again, the value would depend on the existence of sufficient, pertinent data.

In the absence of sufficient data to make the first two approaches robust in themselves, there may be a case for commissioning before-and-after surveys of households and businesses, which could include a suite of questions about quality-of-life impacts. As has been mentioned previously, the cost-effectiveness of such surveys increases as the number impacts they are used to evaluate increases. In this case, since surveys would also be used for assessing wider economic impacts, they would seem to be an appropriate means of obtaining evaluation data.

4.4.2 A30 Okehampton Bypass

Key issues in this case are described below.

– *Landscape*—ranked as the highest priority for evaluation evidence by area study consultees, the scheme appraisal was based largely on the work of the Landscape

Advisory Committee, comprising a panel of eminent landscape architects and environmental scientists, whose brief was to advise the DfT about the selection of a preferred route, on landscape and environmental grounds. The outcome emerged largely on the basis of a consensus view drawn from the experience of the panel, rather than from following a prescribed methodology, which makes ex post evaluation difficult in light of the absence of quantified data and judgements. The same can be said of the Royal Fine Arts Commission, which was asked to comment on the relative aesthetic merits of the various bridge structures proposed.

– *Noise*—noise was rated in the case study as of high importance and covered in the appraisal and evaluation. It also was a key issue for local residents at the inquiry. However, it was considered to be of low importance in the area studies although this was probably because the emphasis of consultation for this particular area study was on local businesses and through-drivers.

– *Biodiversity*—the A30 case study also identified biodiversity impacts as being of high importance for evaluation evidence.

– *Land-use policy*—the structure plan at the time of the inquiry was interpreted by West Devon Borough Council as implying that the town would continue to be an important focus for development. Facilities serving an extensive rural hinterland and planning policies existed on the basis of a need to relieve the town centre of traffic to allow for future development. The A30 Penzance to Exeter route is now part of the strategic trans-European road network, and fulfils regional and local functions. It is also part of the Highways Agency's Route Management Strategy programme. An ex post evaluation of a bypass scheme on a route such as the A30 should probably consider impacts in relation to land use.

– *Other government policies*—the evaluation study states that the Okehampton Bypass raised a fundamental tension between government policy on agriculture and government policy on national parks. While this debate is a historical one, it remains relevant to the context in which other scheme outcomes are set.

Possible evaluation options that could have been chosen are discussed below.

Landscape

Landscape effects were principally related to the visual intrusion of the scheme on nearby properties and the general 'fit' of the scheme into the landscape, including the aesthetics of the various bridge structures. The success of the planting scheme in terms of establishment and growth rate was a critical component of the scheme. The evaluation found that growth rates had exceeded expectations, and that the planting scheme had reduced visual intrusion much as predicted. It is likely that the proposed landscape approaches would give similar results, and that, like the evaluation, they would probably find it difficult to assess the relative success or otherwise of the aesthetics of the bridge structures. However, due to the highly subjective nature of this issue, it is difficult to suggest a suitable amendment to the proposed approaches to improve on the issue.

Noise

The first proposed approach is similar to that applied by the evaluators; however, it restricts the evidence being collected to those locations identified at appraisal as being exposed to substantive noise impacts post-implementation. The second approach, which checks the 'whole' noise environment, would seem to be more valuable in light of the relative importance of noise to stakeholders in this location. Indeed, this priority weighting would also justify a before-and-after attitudinal survey, as part of a wider survey covering other impacts of interest. The cost of the attitudinal survey would depend on the survey methodology, number interviewed and type of interview.

Biodiversity

Ecological studies for the original scheme were relatively limited as it was not presented as a major issue at the public inquiry, and very little data exists from which to make meaningful comparisons. The evaluation drew on survey work carried out post-opening by the Highways Agency as part of its ongoing commitment to manage the highway corridor, and concluded that probably no significant long-term adverse effects had occurred. Had detailed surveys been carried out at the time of the original appraisal, it would be possible, using the proposed approaches, to re-survey and evaluate the accuracy or otherwise of appraisal predictions.

Land-use policy

Either of the proposed approaches set out in proformas 5.2.1 or 5.2.2 could be applied, and it would depend on the scope of evaluation desired. At the time of the public inquiry, Okehampton was identified as an important focus for development and facilities as well as having a national public open space issue. Setting up a GIS-compatible database system to record land-use development against land-use policy would be useful in identifying how policies were being implemented as well as the impact on changes of land-use policy. This might also have had a benefit in identifying traffic and other impacts of land-use decisions, which in turn could have fed into later studies in the more recent Route Management Strategy work.

Such an evaluation could provide added value in informing debates between major land-use authorities such as the Environment Agency, Countryside Agency, National Parks Authority, Ministry of Defence and local and regional authorities involved in local development frameworks and regional spatial strategies.

Consideration would need to be given to how to identify factors influencing land-use policy changes that are distinct from the scheme as opposed to those that are an effect of the scheme. Cause, effect and attribution of impacts may be more effectively assessed through stakeholder and/or resident surveys as suggested in the second proposed approach.

It may be the case that the costs of setting up a database system and monitoring could be absorbed in the work required to be carried out by local authorities. Attitudinal surveys could be undertaken as part of a wider-ranging survey to evaluate a number of impacts associated with the scheme. It may also be possible to build consultation in line with local authority consultation that may take place with deposit of local development frameworks, or through market town health checks, etc.

Other government policies

Both options developed for evaluating this impact can be applied. Consultation with high-level stakeholders could effectively be organised via Delphi-style surveys, and this could equally apply to high-level consultation in land-use policy impacts, when there is a desire to engage with the statutory bodies, the National Parks Authority, Ministry of Defence, etc.

4.4.3 A27 Polegate Bypass

The review of evidence identified the following key issues.

– *Transport economic efficiency*—the scheme was primarily designed to reduce traffic congestion in Polegate. Transport economic efficiency benefits were, therefore, important in justifying the scheme. The original AST estimated present value benefits to road users of £38m, with a scheme benefit cost ratio of 2.8. The evaluation focused on assessment of transport economic efficiency, but paid little attention to reliability or wider economic impacts.

– *Accidents*—the original AST stated that the A27 scheme would remove through-traffic from the centre of Polegate and accrue large benefits to pedestrians through improvements in amenity and small time savings. The evaluation suggests that outturn traffic volumes indicate that 66% of the traffic has been removed from Polegate.

– *Severance*—the initial work carried out for the case study and the Sra area study for the Polegate scheme identifies severance as a major issue, not only on the existing A27, but also for certain properties and businesses, between some local residential areas, and for recreational users on specific routes. These issues were not identified in the OPR AST. The area study also suggested that some of these concerns still exist post-opening.

The application and practicality of the proposed approaches in the Polegate Bypass case are discussed below.

Transport economic efficiency

This was evaluated using the POPE simplified method for comparing appraisal forecast costs and benefits with one-year outturn results. Lessons were learned about setting boundaries, which were not properly set for the first analysis (impacts of a new scheme in Eastbourne were not included), resulting in a significant difference between outturn and forecast results. Once this problem was resolved through consultation with the ex ante consultants, the variation decreased. Since there were no significant impacts on modal shift, the approach adopted was appropriate and cost-effective.

Reliability

This was evaluated using the POPE simplified method (see proforma 3.2.1) for comparing TAG forecast driver stress index with outturn stress index. In this case the predicted and outturn stress index were almost identical. Since the stress index is based on observed traffic volumes and route capacity, the evaluation does not inform on how reliability, in terms of changes in the variation in journey travel times before and after opening, has been changed by the scheme. Therefore, no analysis of cause and effect can be made and no conclusions regarding transferable lessons to other schemes made. As in the Leicester case, it would seem as though there would have been merit in applying the more complex reliability evaluation approach, despite a higher marginal cost for this scheme. Data collection would have had to have been more comprehensive, with several extra journey time runs, and more statistical analysis of the results. This would have cost around £3,000–£5,000 more for the Polegate evaluation (assuming a similar spend for the ex ante assessment).

Wider economic impacts

These were not evaluated. The evaluation report's comment that 'the AST assertion that development of the Hastings Regeneration Area is dependent on the scheme is presumed to be true' is a strong statement—recent work by Mott MacDonald in Hastings has demonstrated that local access problems are a key part of the regeneration strategy needed for the area, and that remote improvements to the A27 were not vital.

Given that the wider economic impacts were not assessed as being of high importance at appraisal stage or by key stakeholders, which seems intuitively correct from the data available and local knowledge, it is not considered that a detailed evaluation would be appropriate. However, a simplified analysis, such as that set out as the first proposed approach, would have been useful in establishing a more substantial basis for any statements on possible impacts. For a cost of around £2,000, any significant changes in the local economy could have been identified and assessed, although the timescale of one year after was too soon for this (five years is the recommended minimum). This would also have addressed any unexpected impacts of the scheme, such as changes in accessibility.

Accidents

Local safety was one of the key aims of the scheme. Although it is not possible in a one-year-after evaluation to assess this impact with statistical robustness, the evaluation has proposed an initial assessment of the accident rate on selected links. It is suggested that the existing method offers benefits when viewed with a comparison of rates (personal injury accidents/million vehicle-km). However, there may be some merit in collecting more than two years' data before scheme opening to allow a more robust picture of the before situation to emerge. Indeed, this could be useful in identifying non-scheme-related trends. It is also

possible to continue data collection for this specific reporting from the original OPR collection to enable a longer-term profile to be determined.

Severance

The A27 area study suggested that, while some two-thirds of traffic has been removed from the town centre, a number of concerns remain that negative severance effects predicted by the local residents at the OPR stage have materialised and that this also includes the existing A27 through the town. This is an important area for further investigation as current severance appraisal is based on a direct relationship between the percentage change in traffic levels brought about by a scheme and the level of severance experienced or relief of severance. The study team's first proposed approach could be used in the first instance and this would identify whether the mitigation measures agreed at the public inquiry and reported in the inspector's report have been implemented. It would also identify changes in occupancy of local businesses, possibly any visible local downturn indicated by the number of vacant premises or premises closing down, and changes in location of any community facility, which may also affect travel patterns. This type of method would rely on familiarity with the location and would require photographic and volumetric evidence relating to the levels of pedestrian movements (and other non-motorised users) and mapping of current facilities and businesses operating to be carried out and reported at the OPR stage.

This approach also suggests selected discussion with community representatives, and it is considered that the results would be at a similar level to the information collected and reported in the area study. At this point, if outstanding issues were identified, more detailed stakeholder consultation/interviews might be conducted. The purpose of using the second proposed approach would be to understand why expectations of the original appraisal were not realised. Also, by widening the stakeholder consultation, it might be possible to pick up on any new severance that was not originally predicted. While the results would be scheme-specific, such findings that relate to severance that is still perceived on a bypassed road that has had a considerable reduction in traffic provide a possible transferable experience to the design in other similar schemes in the future.

The scoping of severance impacts can also be determined by using the first approach. It could be used as a pre-scoping study in advance of a one-year-after report, and could be carried out at, say, six-to-nine months after scheme opening, or possibly in line with any post-opening TIS.

4.4.4 Outcome

The return to the case studies has demonstrated the practicality of a number of evaluation approaches developed for this study. Moreover, it has shown how an evaluation might be planned for a particular scheme, taking account of priority impacts defined at a local level. Priorities might also be set at a national level, and the two sets of needs met within an evaluation framework.

The return to the case studies exercise led to some small changes to the economy proformas. The approach to the assessment of published indicators for wider economic impacts (proforma 3.3.1) was amended to include a small amount of consultation with local authorities and business organisations to assess boundaries of impact and help inform the assessment of cause, effect and attribution. It was concluded from re-visiting the case study that looking at the published indicators with no additional context was not effective. The indicators were also modified in line with the study team's findings.

The costs of the second approach to reliability impacts (proforma 3.2.2) were amended as a result of the re-visit, which showed that the previous estimate was too high. Finally, the third transport economic efficiency approach was modified to reflect further thinking on how a simplified TUBA evaluation could be conducted.

4.5 Summary

The toolkit enables the examination of feasibility, potential extent, value and cost-effectiveness of possible additional evaluation activities, designed to identify and understand wider anticipated and unanticipated impacts and to facilitate development and implementation lessons at scheme and policy levels.

This chapter has explained the tools available to scheme evaluators, their costs, benefits, and their ability to address study research issues. It has set out how they might be combined to form approaches to evaluating stakeholder priority needs for evaluation, both for an abstract scheme, and in three tangible cases. Four matrices present the information in summary form, and should provide sufficient information for the first stages of evaluation planning.

The evidence provided thus far enables the study team to conclude and make recommendations about the feasibility and scope of ex post evaluation.

Table 4.8 Summary of evaluation approaches

	1	2	3	4
Noise	Spot-check measures pre- and post- (rather than just model). Focus on threshold 68dB and receptors of concern. 15-year extrapolation based on regional forecasts + [surveys]	Noise contour modelling [+ targeted surveys]		
Local air quality (NO_2, PM_{10})	Measure using published road link air quality data related to actual traffic flow and composition	Related to numbers of residential properties affected	Population-weighted exposure based on dispersion model (+ possible use of surveys)	
Greenhouse gases (CO_2)	Model $C0_2$ tonnes p.a. using actual flows and composition. Compare with comparable road classes			
Landscape/ townscape	Desktop analysis + site inspection [+ surveys]	Repeat at 1, 5 and 15 years [+ surveys]	Repeat at 30 years (+ surveys) (or conduct now on old schemes)	
Biodiversity	Desktop analysis + site inspection— repeated species surveys [+ interviews with local wildlife groups]	Repeat at 1, 5 and 15 years	Repeat at 30 years	
Heritage	Desktop analysis + site inspection to focus on immediate mitigation	Wrap up in landscape and townscape	Wrap up in landscape and townscape	
Water quality	Desktop analysis of Environment Agency water quality data + site inspection	Repeat at 1, 5 and 15 years	Repeat at 30 years	
Physical fitness	Built into wider social research			
Journey ambience	Built into wider social research			
Accidents	Data analysis: use STATS19 data to produce COBA values, but extend to 3–5 years before + calculate PIA/million vehicle-km	Conduct a road safety audit. Detailed analysis of accident data (including accident population) at +1 and +3 years, including possible use of MOLASSES. Investigate specific blackspots. Compare with 'control'		
Personal security	Develop specific indicators on basis of AST. Build into wider surveys of users and non-users where an issue			

	1	2	3	4
Transport economic efficiency	Changes in vehicle-hours based on existing data on traffic volumes (annual average daily traffic volume from permanent sites and automatic traffic counts) plus transit times (using commissioned moving observer) for peaks between key links	Feed data from Option 1 into COBA to generate benefits and compare with costs for BCR	Use TUBA instead of COBA to allow for multi-modal impacts. Needs data on origin–destination (combining individual links). Would need testing for variable trip matrices, allowing for trip suppression and induced traffic	Replication of ex ante TUBA models as in PIES, to recreate and update original models and flush out details on differences. Needs pre- and post- surveys to establish detailed origin–destinations. Very expensive
Reliability	Calculation of driver stress index (changes in actual annual average daily traffic versus capacity)	Journey time data variability as standard deviation, for selected origin–destination pairs and times of day. New HATRIS data should make this easier		
Wider economic impact	Review and analysis of tailored range of key published local and regional indicators—see Appendix 4. Comparison with controls	Before-and-after surveys of businesses tailored to nature of scheme. Panel survey of key representatives (eg, Chamber of Commerce)	Development of any existing econometric models for major schemes	
Option values	Desk-based review of changes to public transport service provision + timetables, etc. Interviews with operators and local authority representatives.	Analysis of size and nature of resident community affected by changes in options (+ surveys or focus groups as part of wider research)		
Severance	Before/after checklist of changes matched against site visits + consultation with local authority officers. Possible targeting of key points to gather user survey data. Piggyback on existing local authority data, including data generated under accessibility planning	Pre-post stakeholder consultation—interviews, telephone/mail/Internet surveys. To be decided at pre-implementation stage	Targeted surveys; count surveys; on-site interviews of pedestrians at range of times; travel diaries. Possible focus on specific communities	
Accessibility	Compare local indicators pre-post (eg, mode share, bus punctuality; nearness to bus stop, etc). Qualitative analysis of change to bus provision. Existing accessibility planning GIS analysis + local public enquiries.	Household survey and or targeted surveys (eg. of specific groups, or of users of particular services). Part of wider social research	Access to public transport: use Accession or P-TAMs to do more detailed modelling of impacts	Wider accessibility: car, walk, cycle, etc. Use Accession or P-TAMs to do more detailed modelling of impacts
Transport interchange	AST checklist. Check to see whether interchange raised elsewhere (eg, relocation of bus stops)	Combine questions relating to interchange changes in wider social research		

	1	2	3	4
Land-use policy	Desk-based review of key documents—environment statements, inspection reports, regional spatial strategies and local development frameworks, village design statements, planning applications and decisions, Development Plans Representations Advisory Service, etc. Use national and regional data as comparator	a) Interviews with stakeholders in local and sub-regional planning (eg, authorities, developers, landowners, surveyors, etc) b) Community interviews (eg, household, focus groups, etc)		
Other government policies	Desk-based document analysis—identify key developments + assess of likely relevance and impacts	Consultation with experts in key departments using Delphi		
Quality of life	Initial analysis of local quality-of-life indicators (as part of BV and sustainable development)—mainly about identifying contextual developments. Possibly use other data (eg, house prices/sales)	Gather + analyse local survey data (eg, local transport plans, best value source selection (BVSS) + community strategies) relevant to quality of life, and that may also be picking up information on roads	Targeted survey work to address data gaps as part of wider social research. Qualitative research can also be used to further develop understanding of links between impacts and road scheme	
Social exclusion	Qualitative assessment of extent to which road scheme has contributed to 37 action points in Social Exclusion Unit report.	Analysis of key indicators (eg, compare data underlying indices of multi-deprivation at local, regional + national level)	Gather + analyse local survey data (eg, local transport plans, BVSS + community strategies). Targeted survey work to address data gaps as part of wider social research with additional smaller-scale qualitative techniques for more in-depth analysis	

Note: Square brackets: where survey work is being commissioned for evaluation, it might be appropriate for it to cover this impact area.
Source: Study team analysis.

5 Conclusions

The Highways Agency funds and manages a programme of road scheme evaluations (POPE), subject to DfT guidance. In late 2003, the DfT commissioned the study team to assess whether and how POPE might be enhanced. To address these questions, the study team reviewed past evaluations in detail and consulted a wide range of key stakeholders, before developing and testing possible approaches. In reaching its conclusions, the study team noted the following.

– An evaluation framework exists (POPE), which has the potential to be used for the development of a substantial knowledge base from trunk road scheme evaluations. This knowledge base should inform policy, appraisal, scheme design and implementation, and increase the accountability of the Highways Agency. However, this potential is currently confined to assessing before-and-after effects of schemes on traffic and accidents.

– POPE's focus on these two impacts is appreciated by stakeholders; however, the study team's evidence suggests that there would be value in extending the scope to include other priority areas, such as process evaluation, landscape, severance and reliability.

– POPE's great strength is its commitment to capturing and recording pre-implementation data. This would have to be replicated for additional areas of evaluation, although in some cases, where 'before' data has not been collected, and pre-implementation records no longer exist (a common occurrence before POPE came into existence), it may still be possible to collect useful post-implementation evidence. The three area studies, while not intended to provide role models for future evaluations, have demonstrated that people are willing to discuss road schemes some time post-opening, and that methods exist to understand the difference between subjective opinion and objective judgement.

– The study team has developed an evaluation toolkit for future evaluators to apply to trunk road schemes. This comprises a set of approaches that could be feasibly and practically applied, given sufficient evaluation planning. The description of the toolkit demonstrates how the approaches would be combined to evaluate particular impacts or process areas, and the study team believes that this demonstrates that evaluation priorities can be met using enhancements to POPE. The study team recognises that a number of the approaches to road scheme evaluation have yet to be applied, and that early evaluations based on the toolkit would involve testing and refining the details in different situations.

– The cost of meeting these priorities depends on the budget available, and the scope of evaluation deemed necessary on a scheme-by-scheme basis. Evaluation needs are most likely to be expressed at both national (evidence requirements in relation to policy and appraisal) and local (impacts relevant to the scheme in question) levels, and the evaluation plan, and, hence, the cost per scheme would have to be set in accordance with these priorities, subject to available resources. Whether this can be achieved using the existing budgetary arrangements, whereby the Highways Agency sets an evaluation budget on an annual basis, or whether this would be achieved more effectively by having evaluation expenditure set in relation to individual scheme cost, will have to be decided. In addition, the process for setting the priorities for evaluation has yet to be determined.

– Weighing these costs against potential benefits would also have to be undertaken on a scheme-by-scheme basis, taking local and national priorities into account. However, the

study team considers that, while it has not been possible to quantify the benefits from enhancing the scope of evaluation, there are clear benefits to doing so. The knowledge base for making choices about which schemes offer the most value for money is missing some key elements, relating in particular to wider economic impacts, and a number of social impacts. The study team considers evaluation to have the potential to deliver valuable insights relative to costs in these and other areas.

– This suggests that, rather than having a 'basic' evaluation approach to apply to all schemes, over which would be laid the evaluation of policy priorities, what is required is a flexible framework that allows timely evaluation evidence to feed into the policy cycle. This would combine the evaluation of scheme-specific priorities with national priorities, in a cost-effective manner, and hopefully meet the needs of all potential users of evaluation evidence.

– Realising some of the benefits from evaluation depends in certain cases on consistent, transferable evidence from a number of schemes being collected and used in a meta evaluation, which attempts to lift wider lessons from the data available. This again indicates that a framework approach is required. Where relevant, the areas where benefits are conditional have been indicated in the matrix. It is noteworthy that the final report from current POPE consultants, Atkins, will attempt to provide transferable lessons in this way.

– The study team's assessment is that that the area studies have revealed some potential opportunities for improvement in appraisal and the conduct of exhibitions and consultation. While the Polegate Bypass study demonstrated that scheme receptors have an improved view of this process relative to, for example, the Okehampton consultees, there is still room for improvement—for example, in the extent to which local expert opinion (and local opinion per se) is shown to be valued by those undertaking consultation.

– The evaluation toolkit has been developed with the study's research issues in mind. In the majority of cases, the approaches are able to address the research issues, or are sufficiently flexible to ensure that potential barriers do not prevent valuable evaluation being undertaken. For example, the true counterfactual is not entirely addressed by any approach, but the study team considers that this does not prevent the toolkit from potentially providing valuable insights into the policy cycle.

– Currently, the dissemination of evaluation evidence is limited. This finding applies to all evaluations, not only POPE. However, consultees have suggested a number of ways in which the findings of POPE could reach a wider audience, and also the potential composition of that audience. Directors of the DfT and the Highways Agency, policy-makers and appraisers have all expressed an interest in evaluation findings, as have members of stakeholder organisations, and local residents. This suggests that scheme-specific reports should be covered widely in the local press, and any important, transferable messages summarised and sent to those identified as interested parties. Annual reports, and other forms of meta evaluation, should be publicised with the aim of receiving national press coverage, and key messages presented to senior officials at the DfT and the Highways Agency. This evidence should form part of the two organisations' regular performance-monitoring programmes.

Taken together, these messages suggest that there are benefits to be derived from extending POPE, so long as it is planned well, robustly executed, and widely disseminated.

5.1 Recommendations

There would be value in adopting a more flexible and targeted approach to road scheme evaluation that could cover a broader range of issues and address a wider audience. Given

the current 'lull' in scheme orders before the next batch starts in 2006, making the following proposed changes now would be appropriate.

1. The POPE framework should be retained, but enhanced. POPE's strength is that it captures and records pre-implementation data, which, despite the amounts of public money channelled into appraisal and public inquiries, had not previously been collected systematically (if at all).

2. POPE should cover a wider range of issues, while allowing individual evaluations to be tailored to address key information needs. Evaluation coverage should not be restricted by the appraisal framework—this study has revealed a number of areas where appraisal coverage is not as complete as it might be (eg, social impacts). The DfT/Highways Agency need to consider whether there should be a common core set of issues to be covered by every evaluation. The study team's assessment, however, is that a common core could be too restrictive, potentially locking in funds that would not need to be spent once a knowledge base had been established, and/or providing evaluation evidence for which there is no demand.

3. The POPE programme should be directed by a national programme board, with champions in the DfT and Highways Agency. Change needs to come from the top and be carefully governed by a system enabling DfT/Highways Agency oversight, and for national stakeholders to feed in their interests. The first priority should be the appointment of a 'champion' at senior level for both the DfT and Highways Agency, tasked with driving forward the development of POPE into a programme that meets the needs of its users. A programme board would enable national stakeholder representation. It could comprise, for example, policy-makers, appraisers, and stakeholder organisations; and set national priorities for evaluation at regular intervals (eg, annually). It would of course, take some years to develop a robust evidence base (given the 'patchy' distribution of scheme openings), but the programme board could, in time, develop, record and use (eg, via meta analysis) evidence to inform the overall policy on road schemes.

4. Tailored evaluation plans for each scheme should be agreed through consultation with local stakeholders. The plan for each scheme—designed to incorporate the needs of national (as expressed by the programme board) and local stakeholders—should be determined between OPR and the start of works to enable 'before' data collection to begin. By involving local and national stakeholders in evaluation plans, it should be possible to encourage their assistance, to help cover some of the costs involved in enhancing POPE.

5. The DfT/Highways Agency should move from an annual evaluation budget-setting round to a situation where evaluation costs are built into scheme costs. This would align with latest government guidance that major scheme promoters should agree with the DfT how their projects would be evaluated. Until this happens, evaluation is unlikely to be taken as seriously as it could it. However, the programme board would need to monitor evaluation costs very closely to ensure that they remain reasonable and that the approach is cost-effective.

6. Guidelines need to be set for choosing from the menu of options in the toolkit, and the options need to be tested on the ground. Once evaluation priorities for each scheme have been established, evaluators will need to choose between the approaches available in the toolkit for each impact. An early priority is, therefore, the development of guidelines for making these choices. In addition, while most consultees felt that a more substantial evaluation approach was needed, some remained concerned about practicalities and costs. Although the study team has concluded that most practical issues are surmountable, many of its suggested approaches have not been tested on the ground, and its cost estimates are based on various assumptions. Some of the early

evaluations conducted under a revised POPE programme should therefore involve piloting the approaches in the toolkit. The outcomes of these pilots would help the DfT/Highways Agency and the programme board to keep the development of POPE under close scrutiny.

7. The programme board should develop a more active and tailored approach to dissemination. This would assist the process of benefits realisation—increasing the value derived from additional resources required for evaluation. A tailored programme of dissemination should match the different evaluation customers. Some (eg, policy-makers) need key messages from a meta analysis, while others (eg, appraisers) require in-depth reports from individual schemes. Occasional stakeholder events to disseminate methods and findings might also be valuable.

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