



Department  
for Transport

# Value for Money Framework

**Moving Britain Ahead**

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# Foreword

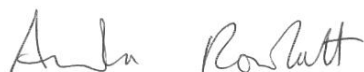
The Department for Transport (DfT) is committed to ensuring public resources are invested to enhance the UK's transport network and provide the greatest benefits to society, in the most efficient way. It is important that investment decisions are based on clear and robust value for money advice.

In DfT we take pride in the quality of our economic appraisal. Our transport appraisal guidance (WebTAG) draws on best practice in Government, academia, and industry; and we aim to ensure that it reflects the latest and best available evidence and appraisal methodologies. This provides transport analysts with a comprehensive, consistent, and robust approach for assessing the costs and impacts of transport interventions.

This new value for money framework sits alongside WebTAG and explains how to use the appraisal results to provide value for money advice for our decision makers.

This document draws on best practice within DfT and across Government, and reflects further work we have undertaken in this area. It aims to provide comprehensive guidance for assessing value for money and clearly communicating value for money considerations to decision makers – no matter how complex or unconventional the proposal may be. Key to this is ensuring that this framework sets out a clear approach for looking beyond the monetised benefit cost ratios when making value for money judgements, to take the full range of impacts of a proposal into consideration.

I believe that the decision-makers, policy colleagues, and analysts in DfT and local government who use this framework will find it a valuable addition to our suite of guidance. I hope that, ultimately, the application of this framework leads to better management of public resources.



Amanda Rowlatt, Chief Analyst and Strategy Director

July 2017

# 1. Introduction to the Value for Money Framework

## What is the purpose of this Framework?

- 1.1 'Value for money' is one of the key considerations of any decision involving the use of public funds across government. It is considered in the Economic Case of the 'Five Case' model of decision-making recommended by Her Majesty's Treasury (HMT) and adopted by the Department for Transport (the Department) in the "Transport Business Case"<sup>1</sup>.
- 1.2 As Accounting Officer, the Permanent Secretary has a duty to Parliament to ensure value for money (VfM) in all areas of the Department's expenditure. This includes the Department's procurement, projects and processes<sup>2</sup>.
- 1.3 This document aims to ensure that decision-makers receive straightforward, clear and consistent messages on value for money which guide them through the evidence to arrive at a judgement. This promotes sound decision-making and helps provide the Permanent Secretary with assurance that this duty is met.

## When should it be used and by whom?

- 1.4 Value for money should be considered as part of the decision-making process for any proposal which involves the use of public resources.
- 1.5 This document provides high-level guidance on the Department's approach to considering value for money in decision-making about **new proposals**.
- 1.6 Value for money should also be assessed after an intervention has been delivered, by using benefits management and evaluation to identify its actual impacts. Although these ex-post assessments lie outside the scope of this framework, it is important to consider how their evidence can inform value for money assessments of new interventions.
- 1.7 This document outlines the Department's approach to value for money assessments and provides guidance on how the outputs of these assessments should be communicated to decision-makers as part of a Value for Money Statement.

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<sup>1</sup> Impact Assessments and Regulatory Triage Assessments are not within the scope of this document. Guidance on these documents and value for money assessment of regulatory changes should be sought from the Better Regulation Unit.

<sup>2</sup> As described in Managing Public Money.

- 1.8 This guidance is primarily intended for use by analysts, policy officials, and decision-makers within the Department. It may also be a useful resource for external stakeholders.
- 1.9 Analysts, policy officials, and decision-makers within Local Government should also follow this Framework (including the supplementary guidance), which replaces the existing guidance found within the December 2013 document, “Value for Money Assessment: Advice Note for Local Transport Decision Makers”.
- 1.10 This document should be read alongside and is aligned to [WebTAG \(Transport Analysis Guidance\)](#) – the Department’s detailed advice on how to conduct modelling and appraisal of transport proposals. Accordingly, relevant sections of WebTAG are referenced throughout this document. However the separation of this document and WebTAG reflects the following distinction:
- WebTAG recommends how costs and impacts should be assessed in an appraisal and is primarily intended for use by the appraisal practitioner;
  - this guidance is intended for analysts and policy officials alike, and provides the framework for forming value for money advice and using the results of an appraisal to inform value for money conclusions.
- 1.11 This document should also be read alongside other key departmental and cross-governmental resources including:
- [The Transport Business Case](#): Guidance on how the Department assesses the overall business case for major investments;
  - [The Green Book](#): HMT guidance for central government organisations on the economic appraisal and evaluation of proposals; and
  - [Managing Public Money](#): HMT guidance on how to consider value for money before committing funds to a policy, programme or project.
- 1.12 These resources should be consulted to ensure methods used are consistent with best practice and proportionate to the size, scope and value of the proposal.
- 1.13 [Further resources](#) which may be useful, in addition to a [glossary](#) which defines some of the key technical terms used within the following chapters, are included at the end of this document, in Annexes A and B.

## 2. What Do We Mean by Value for Money?

- 2.1 Achieving value for money can be described as **using public resources in a way that creates and maximises public value**.
- 2.2 The use of public resources is defined as public sector capital and resource expenditure, stewardship of assets, and raising revenue.
- 2.3 Public value is defined as the total well-being of the UK public as a whole<sup>3</sup>. In a transport context, this covers all the **economic** (e.g. travel time, vehicle costs, tax revenues); **social** (e.g. health, safety, accessibility); and **environmental** (e.g. noise, air quality, landscape) impacts of a proposal.
- 2.4 This means that value for money is considered at a national level, not just in terms of how it will affect the local vicinity in which a proposal operates. This ensures that the assessment focuses on the impacts of a proposal that are 'additional' (lead to a net increase in overall public value). This allows us to distinguish between such occasions, and those where a proposal will lead to displacement (a shift in value from one location to another); leakage (value 'leaking out' from the targeted area to surrounding areas of the intervention); and/or deadweight (continuation of the status quo).
- 2.5 Considering the process through which an intervention has an impact on public value is a good place to start thinking about how value for money can be achieved. Box 2.1 shows an outline 'logic map' for a proposal, which provides a framework for understanding this process.

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<sup>3</sup> For some schemes, it may also be appropriate to consider the impact on non-UK residents. WebTAG unit [A5.2](#) Section 3.2.5 contains some additional information on this.



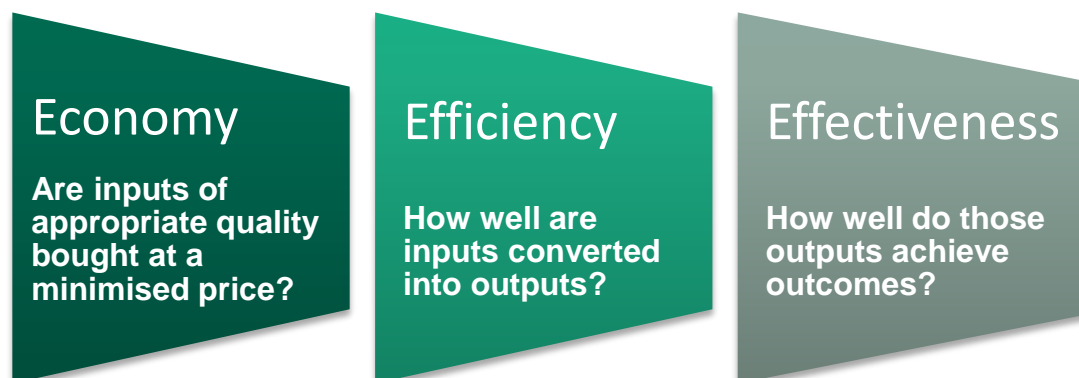
**Box 2.1: Logic map of a proposal with example**



Stage of Logic Map	Example
<b>Context</b> refers to the problems the proposal aims to address.	Congestion on the A1 (single lane).
<b>Inputs</b> refers to the resources required to deliver the proposal. It typically includes things such as staff, engineers, consultants, materials, land.	The land, labour and machinery, and enterprise for construction of an additional lane.
<b>Outputs</b> refers to the tangible deliverables of the proposal. It typically includes things such as roads, railways, stations built or maintained.	New lane constructed so that the A1 is now dual- rather than single-laned.
<b>Outcomes</b> refers to the short- and medium-term results of the proposal which may affect public value.	Shorter journey times, lower vehicle operating costs, increased reliability.
<b>Impacts</b> refers to the longer term effects of the proposal on the well-being of the UK public. It is the wider public value attributable to the proposal.	Increased productivity due to reduced commute times for travellers; agglomeration if the A1 connects / creates clusters.

2.6 From this logic map, it follows that value for money is primarily driven by how **economical** the purchase of inputs is; how **efficiently** those inputs are converted into outputs; and how **effectively** those outputs achieve outcomes<sup>4</sup>. Box 2.2 provides a description of these 'three Es'.

**Box 2.2: Drivers of value for money**



<sup>4</sup> These three Es are used in a similar form by the NAO. Website accessed on 02/02/16  
<https://www.nao.org.uk/successful-commissioning/general-principles/value-for-money/assessing-value-for-money/>

- 2.7 To then measure the extent to which a proposal represents value for money, an understanding of the effect of particular outcomes on the wellbeing of the public is also required. For example, in measuring the value for money of the proposal to build an additional lane on the A1 we need to know how much value the public place on increased reliability.
- 2.8 This relationship is not affected directly by policy decisions, but economics provides the tools with which to measure it.

## 3. Principles of Value for Money Assessment

### What is a value for money assessment?

- 3.1 Although the underlying relationship between the use of public resources and public value is complex, a useful assessment of value for money can be made through a comparison of the cost of public resources expected to be used for a proposal and its expected impact on public value (as defined in [Chapter 2](#)).
- 3.2 The aim of the assessment is to help decision-makers judge whether the expected costs of a proposal are justified by its expected benefits to the UK public as a whole, including both positive and negative impacts of the proposal on the economy, society, environment, and public accounts.
- 3.3 Consideration of these impacts is combined with an understanding of how these impacts are expected to vary across social groups.
- 3.4 The assessment also considers whether there may be alternative proposals to achieve an objective or solve a particular problem which deliver better value for money.
- 3.5 In combining these elements, the value for money assessment determines whether resources from the Broad Transport Budget (the public budget available for transport) are being used in a way that maximises public value.
- 3.6 To reflect this, the key output of a value for money assessment is a value for money category. A category provides a succinct summary of the extent to which value for money is achieved by a proposal. Further detail on the Department's value for money categories is found in [Chapter 5](#) of this document and in the "Value for Money: Supplementary Guidance on Categories" document.

### How is value for money assessed?

- 3.7 The Department has developed a process for assessing the value for money of major transport proposals over many years. The approach is based on the fundamentals of economic and transport appraisal, which are outlined in this chapter. Further detail can be found in HMT's [Green Book](#) and the Department's Transport Analysis Guidance ([WebTAG](#)).
- 3.8 WebTAG guidance focuses on the analysis of transport infrastructure investments, but the fundamental principles are largely applicable when assessing the value for money of any departmental investment or policy.

- 3.9 The assessment should incorporate any relevant evidence from the benefits management processes and evaluations of past interventions of a similar type.
- 3.10 A value for money assessment happens when it has been determined that a problem may be solved through expenditure. It comprises three key elements:
- development of appropriate options;
  - measurement of proposal costs and impacts; and
  - consideration of risks and uncertainties to provide confidence in the assessment.
- 3.11 These elements are discussed in detail below. A full assessment using these three elements culminates in the assignment of a value for money category and provides a framework for ensuring that the Department uses public resources in a way that maximises public value.

## Element 1: Option development

- 3.12 A wide range of possible alternatives to address an identified problem or meet a particular objective should be considered before recommending a specific proposal. These should reflect a variety of approaches and scales of intervention and should not be limited to infrastructure or single mode solutions where alternatives might be feasible.
- 3.13 Option development is especially important during the early stages of decision-making, but alternatives should be retained in a value for money assessment until we are sufficiently confident that the preferred option offers the best value for money and achieves its wider objectives. This process ensures we can be sure that we have properly considered whether there may be better value for money alternatives to a preferred proposal.
- 3.14 HMT's [Green Book](#) and [WebTAG guidance on the Transport Appraisal Process](#) provide detailed guidance on how options should be developed.

### What would happen without any new proposal?

- 3.15 One of the options developed must correspond to a case without an intervention. In WebTAG, this is known as the 'without-scheme' case. All other options should be compared against this, with the difference between the two allowing for measurement of the impacts of the given option.
- 3.16 For example, a cost impact of £10m does not necessarily mean that the total cost of the proposal is exactly that, but that the cost is £10m more than the cost of not going ahead with the proposal.
- 3.17 The without-scheme case should include all committed proposals. For most interventions, this should correspond to maintaining existing facilities and services, and include any other proposals for which implementation is planned and/or resource has already been allocated.
- 3.18 Key demand uncertainties within this case should be accounted for through appropriate scenario testing (as covered in Sections 4.2 and 5.2 of TAG unit [M4](#)) and described in the Value for Money Statement.

3.19 For transport infrastructure proposals, there should be no difference in elements of the transport network or land use between the with- and without-scheme cases other than the proposal itself. WebTAG Unit [A1.1](#) on Cost-Benefit Analysis provides outline guidance on the limited exceptions to this; and where it is clear that additional changes to the network would be required in the without-scheme case to accommodate future demand, further guidance may be found in WebTAG unit [M4](#) (Section 7.4).

## Element 2: Measuring costs and impacts

3.20 A value for money assessment should provide easily interpretable and comparable conclusions. Appraisal guidance has been developed for exactly this purpose – to encourage a consistent approach to measuring scheme costs and benefits. This enables decision-makers to draw conclusions easily about whether an individual proposal offers value for money and to compare the extent to which value for money is achieved across a range of options or proposals.

3.21 Where possible, it is preferable for impacts to be measured in monetary values (monetisation). This provides a powerful tool for comparing impacts and arriving at interpretable conclusions. [Chapter 7](#) of this document provides guidance for when it is not possible to monetise certain impacts.

3.22 When monetary values are used, to ensure valuations are comparable across impacts and across time, they should be:

- **deflated:** adjusted for the timing of their incidence by accounting for inflation;
- **discounted:** adjusted to account for the tendency to prefer the receipt of goods and services now rather than later; and
- **expressed in market prices:** include an adjustment for the fact that individual consumers perceive prices differently to businesses and government because they pay indirect taxes (such as VAT) that these organisations do not.

3.23 This is in line with WebTAG Unit [A1.1](#) and HMT's [Green Book](#) guidance on how to arrive at 'present values'.

### Costs

3.24 For the purposes of a Department for Transport value for money assessment, 'costs' refers to both the costs and revenues of a proposal which directly affect the public budget available for transport (Broad Transport Budget).

3.25 Costs and revenues to non-transport sector public sector bodies and private sector providers are considered as part of the 'impacts' of a proposal and as such are not counted as public resources.

3.26 This allows the Department to prioritise spending decisions related to the budget for which it is responsible, while appropriately considering the impact of those decisions on other public sector bodies, the private sector, and the UK public as a whole.

- 3.27 The costs of a proposal should in all cases be expressed appropriately (see paragraphs 3.21 to 3.22) in monetary terms (i.e. monetised) to arrive at the Present Value of Costs (PVC).
- 3.28 Where identified as appropriate in WebTAG Unit [A1.2](#) and HMT's [Green Book](#), risks to proposal costs should be considered through a Quantified Risk Assessment (QRA). This takes account of different possible outcomes and their likely probability. The key output of the QRA is a 'risk-adjusted' cost estimate.
- 3.29 To account for the tendency to be overly optimistic about expected costs, an appropriate level of optimism bias (OB) should be applied to the risk-adjusted cost estimate.
- 3.30 It is this final value which should be used as the Present Value of Costs (PVC), as the best approximation to the expected value of the proposal's costs.
- 3.31 WebTAG Unit [A1.2](#) contains definitive guidance on conducting QRAs and the application of appropriate levels of optimism bias in different transport contexts.
- 3.32 As a result of the PVC being deflated, discounted, expressed in market prices, and inclusive of an optimism bias uplift, it will differ from the costs typically quoted in financial documents.

### Impacts

- 3.33 For the purposes of a Department for Transport value for money assessment, impacts refers to the positive and negative impacts of a proposal on the UK public. Impacts include effects on the economy, environment, society and public accounts.

### Monetisation

- 3.34 WebTAG contains detailed guidance on appropriate methods for monetising many impacts of transport proposals.
- 3.35 Where impacts are monetised appropriately, together they are referred to as the Present Value of Benefits (PVB).
- 3.36 Some methods for identifying outcomes, impacts, and estimating their monetary values are more widely-accepted than others, because they are well-researched, tried-and-tested, and more robust.
- 3.37 As a result, the Department distinguishes between three 'types' of monetised impacts: established, evolving, and indicative monetised impacts. These are treated differently in the value for money assessment and presented separately in Value for Money Statements. This is discussed further in [Chapter 4](#) of this Framework.

### Non-monetised impacts

- 3.38 To provide a broad and accurate view of the total impact of a proposal, impacts which cannot be easily or satisfactorily monetised should also be considered and used to form value for money conclusions.
- 3.39 In such cases, the Department recommends the use of a non-monetised assessment of those particular impacts. This avoids the use of monetary values which may be highly inaccurate estimates of the impact on public value.

- 3.40 In these cases, the degree of confidence the Department has in the non-monetised valuation will vary depending on the quality of the approach taken and the data sources used.
- 3.41 WebTAG provides guidance on non-monetised methods. And in many cases the Department has greater confidence in these methods, than in alternative, non-WebTAG methods which attempt monetisation of the same impacts.
- 3.42 An assessment of non-monetised impacts should consider how the proposal will affect each impact individually. WebTAG uses a seven-point scale to denote the magnitude and nature of the impact, ranging from large adverse to large beneficial.
- 3.43 In special circumstances, it may not be feasible or proportionate to undertake a monetised assessment. In such cases it may be appropriate to draw value for money conclusions from an appraisal comprising only non-monetised impacts. Further guidance on when and how to adopt this approach can be found in [Chapter 7](#).

### **Distributional Impacts**

- 3.44 Value for money assessments for transport interventions should consider and highlight the distributional impacts (DIs) of the proposal.
- 3.45 A DI assessment considers how the impacts of the transport intervention vary across different social groups. WebTAG Unit [A4.2](#) gives guidance on how these should be appraised across eight key areas<sup>5</sup>.
- 3.46 The approach is proportionate, with a screening process to establish whether further appraisal in any of the eight areas is required. The appraisal provides a seven-point scale from 'large beneficial' to 'large adverse', similar to that used for WebTAG non-monetised appraisals.
- 3.47 It is especially important to highlight whether, as a result of the proposal:
- particular social groups are expected to disproportionately benefit or be disadvantaged across the range of areas assessed; or
  - significant positive or negative outcomes in any of the eight key areas are likely to occur for particular groups.
- 3.48 The outcomes of the assessment should be presented to decision-makers to provide a more holistic picture of the effects of a proposal by highlighting how impacts vary across social groups.
- 3.49 Appropriate use of a DI assessment may also aid the design and consideration of mitigations against the negative effects of a proposal.
- 3.50 There is uncertainty in estimating the nature of the relationship between distributional impacts and public value, which means the DI assessment is not directly comparable to the assessment of impacts on total public value.
- 3.51 In light of this, the conclusions of a DI assessment are considered alongside the value for money category, rather than as part of it. This also promotes a

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<sup>5</sup> The eight key areas are: user benefits, severance, personal security, accidents and safety, accessibility, affordability, noise and air quality.

transparent understanding of distributional impacts which might otherwise be lost within the overall impact on public value.

### Element 3: Consideration of risks and uncertainties

- 3.52 Before a value for money assessment can arrive at conclusions, the risk and uncertainty within the assessment must be considered.
- 3.53 All analysis is based in part on assumptions about how the world is or how it is expected to be in the future. Decisions should be purposefully made about which data and assumptions to include in analysis and how they will be used in the appraisal. The resulting implications should also be considered, to ensure the limitations of the analysis are clearly understood and articulated.
- 3.54 Uncertainty in both the expected costs and impacts of the proposal should be clearly communicated in advice to decision-makers when reporting value for money. For example, when reporting the expected costs the level of optimism bias used to produce the estimate should be specified.
- 3.55 This is discussed in more detail in [Chapters 4](#) and [6](#) of this Framework.

#### Increasing confidence in monetised impacts

- 3.56 Sensitivity analysis can be used to test the impact of the key risks and uncertainties on the Present Value of Benefits (PVB) of a proposal. Such analysis can provide greater confidence in the value for money conclusions drawn.
- 3.57 In sensitivity analysis, the assumptions and parameters used in the original appraisal ('core scenario') are varied to determine the effects this has on the value for money of the proposal.
- 3.58 When a WebTAG-based assessment is undertaken, sensitivity tests on the high and low scenarios of national demand and values of time are required, as set out in WebTAG Unit [A1.3](#).
- 3.59 Further sensitivity tests should be determined on a case-by-case basis in a proportionate manner. For transport proposals, guidance on this is set out in WebTAG Unit [M4](#). This includes:
- identifying the uncertainties underpinning the appraisal and modelling of the proposal;
  - assessing the likelihood of these risks being realised.
- 3.60 Much of the uncertainty in the assessment may arise from assumptions which are not economic or transport-modelling based. As a result, it is important that the value for money assessment is carried out with input from experts in other fields, such as operational researchers and engineers. This may lead to useful sensitivity testing on assumptions such as operating speeds, capacity and timetabling, for example.
- 3.61 In some cases, there may be potential biases in the analysis which are not tested formally through sensitivity analysis. This might be the case where data is known to be out of date, or where more detailed modelling has not yet been carried out. These biases and their implications for value for money conclusions



should also be considered and reported. Further guidance on dealing with potential biases can be found within the Supplementary Guidance on Categories.

## 4. Value for Money Assessment

- 4.1 As discussed above, the culmination of a value for money assessment is the value for money category. This is a succinct summary of the overall assessment, considering monetised and non-monetised impacts as well as uncertainty and risks in the analysis.
- 4.2 Where a standard economic appraisal has been undertaken, so that the majority of expected impacts are monetised, this category is primarily informed by two metrics: the Benefit Cost Ratio (BCR) and Net Present Public Value (NPPV).
- 4.3 As discussed in [Chapter 3](#), the level of confidence the Department has in the expected impacts of a proposal varies. As a result we distinguish between different 'types' of impact – established monetised, evolving monetised, indicative monetised, and non-monetised. These are treated differently in the value for money assessment, and inform the value for money category at different stages. Further detail on this is provided in this chapter.
- 4.4 Though the BCR and NPPV are the only metrics that directly inform the value for money category, additional metrics such as Cost per Additional Passenger Generated may be used to build a richer understanding of the impact of a scheme and support the value for money case. In particular, these metrics can be a useful way to compare proposals in meeting particular stated objectives – such as cost effectiveness – whereas the value for money assessment considers the impact on public value as a whole.

### Value for Money Metrics

- 4.5 In standard appraisal, where the majority of impacts are measured in monetary values, the value for money category is primarily informed by one of two metrics: the Benefit Cost Ratio (BCR) and the Net Present Public Value (NPPV).
- 4.6 These metrics provide a primary indication of the extent to which a proposal is expected to represent value for money. Other impacts, risks and uncertainties are then considered to arrive at a final value for money category and wider conclusions.
- 4.7 Both metrics are used to express the relationship between the Present Value of Costs (PVC) and the Present Value of Benefits (PVB), which are defined in [Chapter 3](#). The metrics are described in Boxes 4.1 and 4.2 below.

## Benefit Cost Ratio

- 4.8 When the Present Value of Costs is positive, as in most transport interventions, the Benefit Cost Ratio (BCR) should be reported in the Economic Case and Value for Money Statement.
- 4.9 For these cases, the BCR is the most useful and interpretable value for money metric. It provides a representation of the relative relationship between benefits and costs, and allows easy comparison of different options and between schemes. This is especially important, given that the Department works within a constrained budget.

### Box 4.1: Benefit Cost Ratio

The BCR is defined as:

$$\text{BCR} = \frac{\text{Present Value of Benefits}}{\text{Present Value of Costs}}$$

- 4.10 It indicates how much benefit is expected for each unit of cost. A BCR of greater than one indicates that the benefits outweigh the costs. For example, a BCR of 2.0 suggests that for each pound of Broad Transport Budget expenditure, two pounds of benefit to public value are expected to be generated.

## Net Present Public Value

- 4.11 In cases where the Present Value of Costs is negative or there are no costs or revenues to the Broad Transport Budget associated with the proposal, it is more appropriate to calculate and report the Net Present Public Value (NPPV).
- 4.12 In these cases the BCR is difficult to interpret and should not be reported. However in most cases it is still calculated in order to identify the value for money category. Further guidance on this is found in [Chapter 5](#) of this document and in the Value for Money: Supplementary Guidance on Categories.

### Box 4.2: Net Present Public Value

The Net Present Public Value (NPPV) is defined as:

$$\text{NPPV} = \text{Present Value of Benefits} - \text{Present Value of Costs}$$

- 4.13 Unlike the BCR, the NPPV does not measure the likely benefits relative to the likely costs. Instead, it measures the total impact on public value of a proposal. It is simply the sum of all benefits net of costs.
- 4.14 A positive NPPV indicates that there is expected to be an overall gain in public value as a result of the proposal.

## Assessing Value for Money

4.15 As discussed in [Chapter 3](#), to provide a holistic, transparent and useful view of a proposal's impact on public value, a value for money assessment includes consideration of three types of monetised impacts ('established', 'evolving' and 'indicative'), non-monetised impacts, and uncertainty.

### Types of impact

4.16 Some methods for identifying outcomes, impacts and estimating their monetary values are more widely-accepted than others, as they are well-researched, tried-and-tested, and robust.

4.17 To reflect this in a way which is useful for decision-making, the Department distinguishes between three types of monetised impact, and the way each of these types of impact is used in the assessment varies. This is discussed further below.

4.18 Box 4.3 provides a brief description of each ‘type’ of impact and how they are used. Box 4.4 provides a (non-exhaustive) list of impacts that typically fall within each category when the methodologies for monetisation set out in relevant WebTAG units are used.

**Box 4.3 Types of impact and their use in the VfM assessment**

<b>Type</b>	<b>Description</b>	<b>Use in Assessment</b>
<b>Established Monetised Impacts</b>	<p>The method used for estimating the impact and its monetary value is accepted, well-researched, and tried-and-tested.</p> <p>Values can be derived from current and predicted future market prices (e.g. fuel prices) or monetary values derived from research (e.g. values of travel time saved).</p>	Used to generate an initial value for money metric which is reported in the Value for Money Statement.
<b>Evolving Monetised Impacts</b>	Some evidence exists to support the estimation of a monetary value but this is less widely-accepted, well-researched or tried-and-tested.	<p>Included after initial value for money metric has been calculated.</p> <p>Generates an adjusted metric which is reported in the Value for Money Statement.</p>
<b>Indicative Monetised Impacts</b>	<p>Monetary valuation methods are not considered sufficiently widely-accepted, well-researched or tried-and-tested to be definitive.</p> <p>The methodologies are generally developing and a high degree of uncertainty in the magnitude of the impact exists.</p>	<p>Considered together at the last stage of the assessment.</p> <p>Do not feed into the initial or adjusted value for money metrics.</p>
<b>Non-monetised Impacts</b>	<p>Estimated magnitude of the impact is assessed on a seven-point scale.</p> <p>Approach to assessment can vary; can be informed by a variety of evidence sources and analytical judgement.</p>	

#### Box 4.4: Typical impacts of a transport proposal

Established Monetised Impacts	Evolving Monetised Impacts	Indicative Monetised Impacts	Non-monetised Impacts
<i>Included in initial and adjusted metrics</i>	<i>Included in adjusted metric</i>	<i>Considered after metric using switching values approach</i>	
Journey time savings Vehicle operating costs Accidents Physical activity Journey quality Noise Air quality Greenhouse gases Indirect tax	Reliability Static clustering Output in imperfectly competitive markets Labour supply	Moves to more/less productive jobs Dynamic clustering Induced investment Supplementary Economy Modelling*	Security Severance Accessibility Townscape Historic environment Landscape** Biodiversity Water environment Affordability Access to services Option and non-use values

*\*These are a class of models rather than a specific economic impact*

*\*\* A widely-used methodology for monetisation exists, but this is not included in WebTAG guidance because of concerns about its robustness. Detailed guidance is found in the Supplementary Guidance on Landscape.*

- 4.19 When selecting which impacts to consider in the assessment, due attention should be given to the quality and robustness of underlying data and to the size, scale and scope of the proposal.
- 4.20 For example, many larger transport proposals may be expected to have material impacts on the wider economy, and so it is often useful to assess such impacts, even where the methodology is still developing. Sensitivity testing should be used to provide an understanding of the impact of the uncertainty.

#### Including different types of impact in the assessment

- 4.21 Each 'type' of impact is included in the value for money assessment sequentially. This enables the generation of an initial assessment of value for money, in which we have the most confidence. This can then be adjusted to account for other impacts which are more uncertain.
- 4.22 Only the most established impacts are included in the Present Value of Benefits at first. This stage of the assessment generates an **initial** value for money metric upon which other metrics, which are less certain, are based.

- 4.23 The evolving monetised impacts are subsequently added to the original assessment to generate an **adjusted** value for money metric.
- 4.24 Both the initial and adjusted value for money metrics should be reported in the Economic Case and Value for Money Statement. The adjusted metric is also used to derive a provisional value for money category (see [Chapter 5](#) of this document and the “*Value for Money: Supplementary Guidance on Categories*” for further details).
- 4.25 The final stage of the value for money assessment requires consideration of **indicative monetised** impacts and **non-monetised** impacts. This involves determining whether these impacts, either individually or collectively, are likely to materially alter the overall value for money of the proposal. Further guidance on this approach, known as ‘switching values’, is found in the “*Value for Money: Supplementary Guidance on Categories*”.
- 4.26 For indicative monetised impacts, the degree of uncertainty in estimating the monetary value should be reflected through the presentation of an appropriately wide range of scenarios and sensitivities.
- 4.27 Recall that for non-monetised impacts, WebTAG recommends using a seven-point scale to denote the magnitude and nature of the impacts, ranging from large adverse to large beneficial. Indicative monetised evidence provides a similar tool for understanding the expected magnitude of the remaining impacts.

### Assessing uncertainty

- 4.28 Given the uncertainty in the estimation of all impacts, it is important to undertake appropriate and proportionate sensitivity analysis at all stages of the assessment. The results from these tests should be reported (often as ranges around value for money metrics) and explained so they can be considered when drawing final conclusions about value for money.
- 4.29 The value for money assessment thus reflects a consideration of all material economic, social and environmental impacts, including those which cannot be sufficiently easily monetised for inclusion in benefit-cost ratios.

# 5. Value for Money Categories

- 5.1 Value for money categories provide a succinct, overarching summary of the outcome of an often complex economic appraisal. They are based on an assessment of a proposal's benefits relative to its costs.
- 5.2 They help decision-makers understand the expected impact of a proposal on public value and the extent to which it represents value for money once all potential impacts (monetised and non-monetised) have been considered.
- 5.3 Using a consistent approach to express value for money conclusions also allows for easy comparison across proposals.
- 5.4 This chapter introduces the various categories used by the Department and explains how they correspond to the value for money metrics introduced in the previous chapter.
- 5.5 A 'high-level' overview of how to arrive at and report these categories following a value for money assessment is provided below. **More detailed, technical guidance can be found in the Value for Money Supplementary Guidance on Categories.**



## Category Definitions

### Proposals with significant transport budget impacts

- 5.6 In **standard cases**, where Broad Transport Budget cost outlays exceed revenues or cost savings, the Department uses six value for money categories. The relevant categories are detailed in Box 5.1.

#### Box 5.1 Standard Categories

*(Transport cost outlays exceed revenues or cost savings)*

VfM Category	Implied by...*
Very High	BCR greater than or equal to 4
High	BCR between 2 and 4
Medium	BCR between 1.5 and 2
Low	BCR between 1 and 1.5
Poor	BCR between 0 and 1
Very Poor	BCR less than or equal to 0

*\*Relevant indicative monetised and/or non-monetised impacts must also be considered and may result in a final value for money category different to that which is implied solely by the BCR. This chapter provides guidance on how to select the final value for money category.*

- 5.7 Four additional categories have also been introduced to reflect special cases where the proposal will result in **cost savings** (see Box 5.2).
- 5.8 Proposals that could result in cost savings include reductions in service, projects being de-scoped, fare rises and tolling schemes.

5.9 In all such cases, revenues or cost-savings to the Broad Transport Budget exceed any cost outlays when compared to the case without the proposal.

**Box 5.2 Cost Saving Categories**

*(Transport revenues or cost savings exceed outlays)*

Very High (and Financially Positive)	Proposal generates benefits to wider society and 'pays for itself' in the long-run since outlays are less than revenues and cost-savings combined.
Economically Efficient Cost Savings	Cost savings outweigh benefit losses and thus overall public value is increased, implying value for money.
Potentially Efficient Cost Savings	Benefit losses outweigh cost savings, but only to a limited extent. As a result, if the money returned to the budget were spent on proposals representing at least Medium value for money, public value would increase overall.  The ultimate outcome is therefore likely to represent value for money.
Poor (but Financially Positive)	Proposal results in benefit losses that outweigh cost savings to a greater extent. In these cases, even if the money returned was spent on a Medium value for money proposal, it would not lead to an overall increase in public value.  Whilst there may be strong strategic, financial, management or commercial reasons for proceeding with these proposals, they are not considered to have a strong economic case.

**Proposals with small transport budget impacts**

5.10 For proposals where there are no gross costs or cost savings<sup>6</sup> to the Broad Transport Budget, or these are close to negligible relative to other appraisal impacts (because the proposal has no costs or revenues, or these are almost entirely borne by non-transport budgets), there are two Categories.

5.11 A proposal is judged to be *Economically Positive* if it is expected to have a positive NPPV and *Economically Negative* if it is expected to have a negative NPPV.

5.12 This should include consideration of all impacts, including those which are not monetised within the reported metrics. The other impacts should be considered and reported using the 'switching values' approach set out below.

<sup>6</sup> Gross costs or cost-savings are all of the impacts which affect the PVC (affect the Broad Transport Budget) as defined in WebTAG as the costs and revenues which directly affect the public budget available for transport.

## Arriving at a value for money category

### General approach

- 5.13 As alluded to above, value for money is determined by considering the relationship between the costs and benefits of a proposal. Where a monetised assessment has been undertaken, the Department's approach to assigning a category starts by considering the appropriate metric (Benefit Cost Ratio or Net Present Public Value).
- 5.14 In line with HMT's [Green Book](#) guidance, the final metric used to assess value for money must account for all relevant risks, uncertainties and impacts. This ensures decision-makers have an understanding of both the impact of the proposal and how much confidence they can place in the underlying metric of that impact.
- 5.15 To begin with, the category should be derived from the **adjusted value for money metric** as it includes a reasonably broad range of impacts in which the Department has sufficient confidence. However the initial value for money metric may be used in cases where no evolving monetised impacts (as defined in [Chapter 4](#)) are expected.
- 5.16 Consideration then turns to other economic impacts and risks (both monetised and non-monetised) that have not yet been accounted for. The key question to ask at this stage is how likely is it that the value for money category will change if these impacts are included in the assessment.

### Selecting the final category

- 5.17 In some cases, the outcome of the value for money assessment will clearly point to a single category, suggested by the adjusted value for money metric. This is usual when:
- the adjusted metric sufficiently captures all the impacts of a proposal / very few impacts (either monetised or non-monetised) are excluded from the adjusted metric;
  - sensitivity analysis, and an assessment of risk and uncertainty, suggests a narrow range of value for money metrics.
- 5.18 Therefore, the adjusted metric provides a sufficiently accurate assessment of what the expected value of the metric would be when all risks, uncertainties and impacts are considered.
- 5.19 In other cases, assigning a value for money category is more complex. It requires coming to a judgement about whether there is sufficient evidence to suggest the value for money category should differ from that derived from the adjusted metric.
- 5.20 Questions under consideration include:
- How **confident** are we in the adjusted metric? What happens if we change our assumptions or the parameters used in the original analysis (e.g. changing the estimated level of demand)?

- What happens to the value for money metric if **indicative monetised impacts** are included in Present Value of Benefits? How confident are we that this will occur?
  - Is the expected magnitude of any of the **non-monetised impacts** sufficient to enhance or diminish the value for money category of the proposal? How confident are we in our estimation of these impacts?
- 5.21 To reach a judgement about what the final value for money category should be, an approach making use of ‘switching values’ is employed. It examines the extent to which the Present Value Benefits or Present Value of Costs of the proposal would need to increase or decrease to result in a change to the assigned value for money category. Analysis is then used to inform a judgement as to how likely this increase or decrease is to be realised.
- 5.22 In many cases the outcome of this process will point to a single value for money category. However it may be more appropriate to report a hybrid category (e.g. ‘Medium-High’) in cases where it is likely and reasonable to believe, that a proposal may fall into another category, based on analysis using ‘switching values’.
- 5.23 Where evidence suggests that the value for money category is likely to change under particular circumstances (e.g. lower-than-projected population growth, higher-than-expected construction cost inflation) and a fair degree of uncertainty exists about whether those circumstances will be realised, it may appropriate to report both the most likely category and the category that would likely be achieved if those circumstances occur. For example, “the proposal offers Medium value for money, but this could potentially drop to Low value for money under a low growth scenario”.
- 5.24 If sensitivity analysis or an assessment of impacts (monetised or non-monetised) beyond the adjusted BCR have been carried out and show that the value for money category is unlikely to change, this should also be made clear to decision-makers.
- 5.25 The following chapter contains further guidance on how to report a value for money assessment.

## 6. Reporting Value for Money

- 6.1 Any submission requesting a decision with value for money implications is accompanied by a '**Value for Money Statement**'. This includes the Economic Case for any transport investment proposal, in which inclusion of a Value for Money Statement is mandatory.
- 6.2 The Value for Money Statement provides decision-makers with a concise summary of the conclusions from the value for money assessment. It highlights the impacts, risks, assumptions and uncertainties present in the analysis and their implications for the proposal.
- 6.3 Its primary purpose is to aid the decision-making process. The statements typically range from a few paragraphs to a full page, depending on the complexity of the assessment and the audience to which they are presented. They should be clear to both economists and non-economists.
- 6.4 This chapter focuses on how value for money conclusions should be presented in a Value for Money Statement.

### Reporting the value for money assessment

- 6.5 The questions below provide a practical framework for ensuring the relevant information in the value for money assessment is presented in the Value for Money Statement. Guidance on how to answer them is found throughout this document.

#### **To what extent does the proposal represent value for money?**

- What is the value for money category of the proposal? ([Chapter 5](#))
- What does that category mean in terms of value for money? ([Section 5.6 to 5.10](#))
- Have a sufficiently wide range of options to solve the identified problem been considered? ([Chapter 3](#))
- Could other options to solve the identified problem represent better value for money?

#### **What are the key impacts of the proposal on the public?**

- What is the cost to the Broad Transport Budget? ([Section 3.24 to 3.32](#))
- What are the most significant monetised impacts (both negative and positive) of the proposal? e.g. journey time savings, reliability benefits
- Are there any significant non-monetised impacts? ([Section 3.38 to 3.43](#))

- How do these impacts vary across different social groups (distributional impacts)? ([Section 3.44 to 3.51](#))

### **Why do these impacts place the proposal in the reported category?**

- The initial and adjusted value for money metric ([Chapter 4](#) of this document provides guidance on which should be reported).
- Which uncertainties and impacts beyond the BCRs were considered when assigning a category? ([Section 3.52 to 3.61](#))
- A description of how these uncertainties and further impacts were used to come to the most likely category.

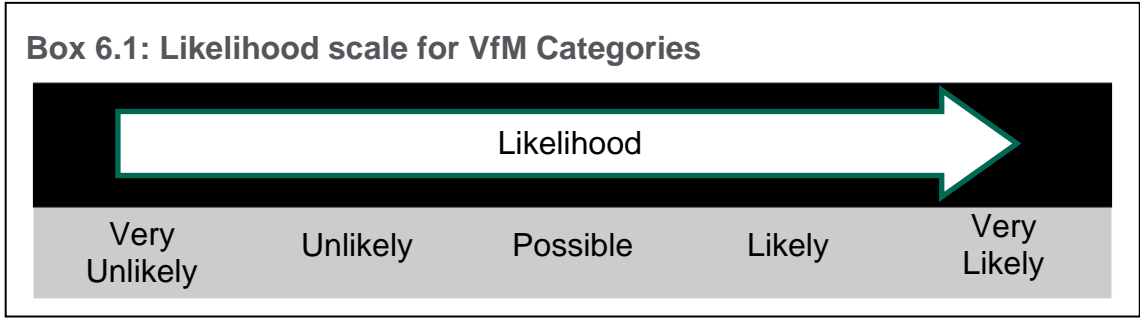
### **How confident can we be in the value for money reported category?**

(See also the Supplementary Guidance on Categories)

- How likely is the category to be realised? How likely is it to be different?
- What ranges of the value for money metric did sensitivity tests suggest?
- How have the key uncertainties and further impacts been considered in the process of determining the value for money category?
- How robust are the data sources and methodologies used to assess the impact?
- Are there any uncertain assumptions or important dependencies that particularly influence the category?
- Has any uncertainty from these been mitigated against?

## **Communicating uncertainty**

- 6.6 In cases where there is a large amount of uncertainty, particularly around key assumptions, and/or where a project is of key importance (in terms of scale of investment or exposure to risk), sensitivity analysis should be undertaken. This is a crucial step in mitigating uncertainty in the value for money assessment and increasing the level of confidence that decision-makers can place in the value for money conclusions drawn.
- 6.7 A 'switching values' analysis may subsequently be used to determine whether or not the results of this sensitivity analysis imply a value for money category different from that suggested by the adjusted BCR. Further guidance on how the results of sensitivity analysis may be used to inform the value for money category is set out in the Supplementary Guidance on Categories.
- 6.8 If the sensitivity analysis does imply a different value for money category, an assessment of likelihood must be undertaken in order to judge whether or not the value for money category should change. In this case, it may be useful to use the likelihood scale in Box 6.1 to express the degree of confidence in a value for money category.



6.9 Box 6.2 provides an example of how this might be presented as a table in a value for money statement. For consistency, the likelihood of categories should be rated according to the scale in Box 6.1 and a clear rationale should be provided for the final value for money category selected.

**Box 6.2: Example of a table summarising confidence in the VfM category of a proposal**

<b>Category</b>	<b><i>Low</i></b>	<b><i>Medium</i></b>	<b><i>High</i></b>	<b><i>Very High</i></b>
Likelihood	<i>Very Unlikely</i>	<i>Unlikely</i>	<i>Likely</i>	<i>Possible</i>

## Reporting Distributional Impacts

6.10 The [distributional impact assessment](#) provides decision-makers with an understanding of how a proposal will affect different groups within society.

6.11 It is an important part of the value for money assessment and outputs should be clearly communicated alongside other value for money considerations. Reporting of distributional impacts should:

- highlight the impacts with the most disproportionate impacts on some groups; and
- identify where any vulnerable group receives disproportionate effects across a range of indicators (as opposed to considering only the impacts in isolation);
- consider distributional impacts in light of the objectives of the proposal. For example, if a proposal focuses on improving access to an employment centre, which groups benefit (or otherwise) from any improved access should be highlighted.

6.12 The methods used to assess distributional impacts are not directly comparable to those used for other impacts on total public value. As a result, the conclusions should be presented alongside the value for money category rather than within it.

## 7. Non-monetised Assessment

- 7.1 In certain cases, it is not possible or proportionate to carry out a full monetised value for money assessment. Instead, a similar, but largely non-monetised assessment may be used to understand the value for money implications.
- 7.2 In such cases, the value for money assessment is primarily used to establish whether or not a proposal represents value for money. This involves assessing whether it is expected to increase public value overall, and whether there may be better ways to achieve the same objectives.

### When is a non-monetised assessment appropriate?

- 7.3 Before undertaking such an assessment, it should be considered whether largely non-monetised analysis is sufficient to inform the decision being taken.
- 7.4 Conducting a non-monetised assessment may have consequences for the degree of confidence officials can have in its conclusions. However, in some cases it may be more useful, informative and credible than conducting a monetised appraisal.
- 7.5 Non-monetised assessments may be appropriate for proposals:
  - at very early stages of approval to develop the option further;
  - involving very small expenditure; or
  - where impacts lack a sufficient evidence base to be monetised.
- 7.6 A judgement is required from the analyst on whether the approach is sufficient. The approach used may be tested by comparing with similar case studies. The judgement should be explained in the Value for Money Statement and discussed in the Analytical Assurance Statement.

### How to undertake a non-monetised assessment

- 7.7 The assessment should consider:
  - how the intervention will deliver the claimed benefits;
  - to what extent the intervention will deliver the claimed benefits;
  - how benefits compare with the costs (perhaps discussing the monetary value we would have to attribute to the benefits for them to outweigh the costs and how reasonable this is);



- alternative proposals to achieve the objective that may represent better value for money; and
  - any assumptions, uncertainty, risks and sensitivities of the evidence.
- 7.8 These considerations lead to a discussion of how economy, efficiency and effectiveness (the ‘three Es’) are achieved, whether the benefits of a proposal exceed its cost (value for money) or whether better alternatives exist.
- 7.9 A logic map may be useful to provide an understanding of how it is believed the intervention will deliver the claimed benefits. This should be framed using the expected inputs, outputs, outcomes and impacts of a proposal together with the ‘three Es’. The structure of an appropriate logic map is given in [Chapter 2](#) of this document.
- 7.10 Logic maps should be conceptually clear, have no missing links, and make explicit any assumptions about the context, causal links and implementation.
- 7.11 The appraisal process may be informed by reference to case studies, national statistics, evaluation evidence, previous monetised appraisals, and relevant academic literature.
- 7.12 The evidence used may include quantitative data sources (e.g. statistical data). The distinction between non-monetised assessments and the standard approach to appraisal is that monetisation of the key impacts has not been undertaken.

## Reporting outcomes of a non-monetised assessment

- 7.13 As non-monetised assessments are primarily used to establish whether or not a proposal is expected to result in an overall increase public value overall, in most cases the value for money category assigned should be either *Economically Positive* or *Economically Negative*. These categories correspond to cases where the benefits were expected to outweigh the costs and vice versa respectively.
- 7.14 These value for money categories should be presented alongside clear statements as to whether alternatives could deliver better value for money.
- 7.15 The use of the more specific categories often requires a large degree of monetisation and understanding of uncertainty and is not generally possible in a non-monetised assessment.
- 7.16 However, in a small number of cases sufficient evidence may be available to suggest that the proposal should be reported as representing a more specific category.
- 7.17 For example, consider a proposal to run an identical service in a more efficient manner. Where there is confidence that the proposal will only produce cost-savings, and that it will not have detrimental impacts to public welfare more broadly, with sufficient evidence it could be reported as “Very High (and Financially Positive) value for money”.

## 8. Analytical Assurance Statements and Value for Money

- 8.1 Any analysis used to inform decision-making within the Department needs to be accompanied by an Analytical Assurance Statement. This ensures decision-makers are aware of the strengths and limitations of the analysis underpinning recommendations.
- 8.2 The Department's Analytical Assurance Framework, [Strength in Numbers](#), provides details about what information should be included in an Analytical Assurance Statement.
- 8.3 Whereas the Value for Money statement focuses on *what* analysis was and was not undertaken, the Analytical Assurance statement is more concerned with broader questions about *how* the analysis was conducted and the associated implications. For example, it considers whether sufficient time and resource was allocated for the analysis, the robustness and appropriateness of the chosen methods and whether under different circumstances different results could be or have been achieved. Above all, it considers whether the analysis and its use are fit-for-purpose for the decision at hand.
- 8.4 The two statements are complementary. Value for money assessments should therefore be undertaken in a way which is fully consistent with Strength in Numbers and the Department's guidance on the [Quality Assurance of Analytical Modelling](#).
- 8.5 As discussed in previous chapters, any risks, sensitivities, and assumptions which affect the expected value of a proposal's benefits or costs should be reported within the Value for Money Statement.
- 8.6 Where these affect the overall quality and reliability of the analysis, they should also be drawn out in the Analytical Assurance Statement and inform the assurance rating.
- 8.7 It is important to note that the Analytical Assurance Statement should cover all analysis used to inform the decision – not just that contained in the Economic Case. It is therefore necessary to consider other analysis included in the Business Case.

## Annex A: Glossary

- A.1 The **use of public resources** includes capital and resource expenditure, stewardship of assets and raising revenue.
- A.2 **Cost-Benefit Analysis (CBA)** is analysis which assesses the value of as many of the costs and benefits of a proposal as feasible, including items for which the market does not provide a satisfactory measure of economic value.
- A.3 **Appraisal** refers to the assessment made before decisions are taken of the economic, social, environmental, public account and distributional impacts that an intervention may have.
- A.4 **The Present Value of Costs (PVC)** is the sum of discounted costs and revenues to the budget available for transport (broad transport budget) over the appraisal period, and gives the value of these impacts in the prices of a given base year.
- A.5 **The Present Value of Benefits (PVB)** is the sum of all discounted benefits and dis-benefits not included in the definition of the PVC over the appraisal period, and gives the value of these impacts in the prices of a given base year.
- A.6 **The Benefit-Cost Ratio (BCR)** is given by  $PVB / PVC$  and indicates how much benefit is obtained for each unit of cost, with a BCR greater than 1 indicating that the benefits outweigh the costs.
- A.7 **The Net Present Public Value (NPPV)** is a measure of the total economic impact of a proposal. It is simply the sum of all benefits and costs.
- A.8 **Distributional Impacts (DIs)** consider the variance of transport intervention impacts across different social groups.
- A.9 **Optimism Bias (OB)** is the demonstrated systematic tendency for appraisers to be over-optimistic about key project parameters, including capital costs, operating costs, works duration and benefits delivery.
- A.10 **A Quantified Risk Assessment (QRA)** allows an expected value (defined as the average of all possible outcomes, taking account of the different probabilities of those outcomes occurring) of the cost of the proposal to be calculated. This expected value should form the 'risk-adjusted' cost estimate.
- A.11 The **Broad Transport Budget** is the public budget available for transport. It includes the budgets of the Department and its Arm's Length Bodies and the transport budgets of Local Authorities.
- A.12 **Benefits management** is a project management discipline that involves the identification, quantification, analysis, planning, tracking, realisation and optimisation of the benefits that a project seeks to deliver. This seeks to ensure that organisations realise the planned benefits from their investments.

A.13 **Evaluation** is a systematic analytical process which examines the effectiveness of a project based on actual results. This can include what difference it made (impact evaluation), whether its benefits justified its costs (economic evaluation) and how it was delivered (process evaluation).

## Annex B: Useful Resources

- B.1 **WebTAG**, the Department's Transport Appraisal Guidance:  
<https://www.gov.uk/guidance/transport-analysis-guidance-webtag>
- B.2 **The Green Book**, HMT's guidance on economic appraisal and evaluation:  
<https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>
- B.3 **Managing Public Money**, HMT's guidance on how to handle public funds with probity and in the public interest:  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/454191/Managing\\_Public\\_Money\\_AA\\_v2\\_-jan15.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/454191/Managing_Public_Money_AA_v2_-jan15.pdf)
- B.4 **The Magenta Book**, HMT guidance on evaluation:  
<https://www.gov.uk/government/publications/the-magenta-book>
- B.5 **Department for Transport Appraisal Tables** (AST, AMCB, TEE etc.):  
<https://www.gov.uk/government/publications/webtag-appraisal-tables>
- B.6 **Strength in Numbers**, the Department's Analytical Assurance Framework:  
<https://www.gov.uk/government/publications/dft-analytical-assurance-framework-strength-in-numbers>
- B.7 **Quality Assurance of Analytical Modelling**, the Department's guidance for quality assuring analytical models:  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/350904/qa-modelling-guidance\\_pdf.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/350904/qa-modelling-guidance_pdf.pdf)
- B.8 **Logic Mapping**, the Department's Hints and Tips Guide:  
<https://www.gov.uk/government/publications/logic-mapping-hints-and-tips-guide>
- B.9 **The Aqua Book**, HMT's guidance on producing quality analysis for Government:  
<https://www.gov.uk/government/publications/the-aqua-book-guidance-on-producing-quality-analysis-for-government>