



Department  
for Transport

# Road Investment Strategy: Economic analysis of the investment plan

March 2015

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# 1. Introduction

## Purpose of this document

- 1.1** All investment decisions within the Department for Transport are based on the submission of a robust business case. A Transport Business Case<sup>1</sup> is split into five separate sections which show whether the proposed investment is:
- supported by a robust case for change that fits with wider public policy objectives – the ‘strategic case’;
  - demonstrates value for money – the ‘economic case’;
  - is commercially viable – the ‘commercial case’;
  - is financially affordable – the ‘financial case’; and
  - is achievable – the ‘management case’.
- 1.2** Demonstrating value for money in spending public money is particularly important given the tightness of public finances. The purpose of this document is to outline the economic analysis that underlies the Road Investment Strategy (RIS) and to show what this means for the expected value for money of the package as a whole.
- 1.3** The strategic case for the Roads Investment Strategy, how much it will cost, how it will be delivered and performance management arrangements are set out at <https://www.gov.uk/government/collections/road-investment-strategy> . These are not covered in this document.

## Road Investment Strategy context

- 1.4** This document presents economic analysis of the Investment Plan announced as part of the RIS. The first RIS was announced on 1st December 2014 and set out how £15.2bn of capital funding on the Strategic Road Network will be allocated between 2015/16 and 2020/21. The Strategy comprises:
- an overview with a summary of the RIS and its impact
  - a long-term vision for the strategic road network, outlining how we will create smooth, smart and sustainable roads
  - a multi-year investment plan that will be used to improve the network and create better roads for users

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<sup>1</sup> Further guidance on Transport Business Cases can be found at [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/85930/dft-transport-business-case.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/85930/dft-transport-business-case.pdf)

- challenging high-level objectives for the first roads period 2015 to 2021
- 1.5** The documents comprising the RIS, available online, are an Overview document, a Strategic Vision, an Investment Plan, and a Performance Specification. These documents set out the specific details about the investments in the strategy.

## Analysis conducted

- 1.6** This document presents the results of an array of economic analysis that was undertaken and brought together in defining the RIS Investment Plan.
- 1.7** The Investment Plan includes spending of the following types:
- Major Schemes which had already been announced in Spending Review 13 and before and included in the then current Strategic Road Network Major Schemes Programme
  - A number of new Major Scheme proposals as a result of:
    - Six feasibility studies identifying potential solutions to address particular hotspots on the network
    - The Highways Agency's Route Strategy investment planning process to identify solutions to problems across the network
  - Spending on small scale schemes and supporting wider objectives through ring-fenced funds to address particular issues on the existing road network.
  - Renewals and maintenance to support the delivery of a safe and reliable network
  - Traffic officer service and network management
- 1.8** In order to analyse this range of spending, we have brought together a variety of analysis to understand the value for money of investment in the RIS. The case for investment in existing and new major schemes has been drawn from the appraisal of these schemes. These appraisals are at varied stages of development; some have scheme specific transport modelling whereas others have come from a prioritisation process.
- 1.9** We have also used the Department's National Transport Model to assess the costs and benefits of the major schemes included in the investment package. Separate analysis has been carried out for:
- Those road schemes that will be in construction by April 2015 (the base case).
  - Additional road schemes announced in SR13 and other commitments (Existing Commitments). This is on top of those schemes included in the base case.

- The full RIS package including both existing commitments and the additional road schemes which have been announced as part of the RIS.<sup>2</sup>
- 1.10** Bespoke analysis has been used to understand the value of investment in smaller schemes, capital renewals and maintenance, and the provision of traffic officer and network management functions.
- 1.11** All the schemes included in the Investment Plan will be subject to further development and economic analysis as they progress through the Department's Transport Business Case process, including continued assessment of alternatives. As part of the reforms establishing Highways England, the governance framework will ensure that the company must continue to assess schemes against the Department's Transport Appraisal Guidance and Value for Money criteria.
- 1.12** The remainder of this document summarises the evidence and analysis of Major Schemes; Capital renewals and maintenance; smaller schemes and ring-fenced funds; and Network Management including the Traffic Officer Service.

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<sup>2</sup> Some small schemes which did not impact on road capacity and are therefore difficult to model with the NTM were excluded from the analysis.



## 2. Major scheme analysis

### Introduction

**2.1** This section summarises analysis of the major scheme proposals included in the RIS. A major scheme covers improvements to the trunk road and motorway network that are estimated to cost £10m or more. Major scheme proposals within the RIS originate from three sources:

- Proposals already in the Major Schemes Programme. These 25 proposals were announced at Spending Round 2013 or before.
- Proposals made following six Feasibility Studies examining issues on specific parts of the strategic road network.
- Proposals made as a result of the network wide Route-Strategy process conducted by the Highways Agency.

**2.2** The following section summarises the analysis and evidence available for all of these schemes, recognising the different stages of their development. Much of the evidence for the schemes that have been previously announced has already been published. Evidence supporting the new proposals is being published alongside this document. Supplementary analysis from the NTM to appraise the package as a whole and which supports the economic analysis of the RIS is included in the sections below.

**2.3** All analysis in this section is undertaken following standard appraisal practice and is in line with the Department's WebTAG guidance.

### Proposals already in the Major Schemes Programme

**2.4** There are 25 major schemes included in the RIS which were announced at Spending Round 2013 or before (and which are not already under construction). For these schemes specific transport modelling exists although it is at different stages of development. These transport models can be used to quantify and value the changes in road capacity on journey times, emissions and, in some cases, the reliability of the road network. These are often referred to as 'monetised' impacts as evidence and appraisal guidance allows the impacts to be expressed in a monetary form.

**2.5** The table below summarises for these schemes the costs and benefits which have been monetised. The results indicate that the Benefit-Cost Ratio (BCR) for the package of schemes is 4.5. That is we expect the benefits to be worth £4.50 for every £1 spent, representing 'very high'

value for money (VfM).<sup>3</sup> Smart motorways account for the majority of these road improvements and typically offer better value for money than other scheme categories.

**Table 2-1: Summary of Benefit-Cost Ratios for proposals with scheme specific economic modelling<sup>4</sup>**

Scheme type	Number of schemes	Total present value benefits	Total present value costs	Net present value	Benefit -Cost ratio
Smart motorways	15	£16.3bn	£2.8bn	£13.4bn	5.7
Junction improvements	6	£2.1bn	£0.5bn	£1.7bn	4.4
Bypasses and link roads	2	£2.4bn	£1.2bn	£1.2bn	2.0
Road widening and other online improvements	2	£0.8bn	£0.2bn	£0.6bn	4.2
<b>Total</b>	<b>25</b>	<b>£21.7bn</b>	<b>£4.8bn</b>	<b>£16.9bn</b>	<b>4.5</b>

**2.6** Figure 2.1 below shows a breakdown of all 25 proposals. Four of these include an assessment of the benefits that may come from improvements in reliability. The figure also shows the stage of development of the proposal within the Highways Agency's construction scheme approvals process:

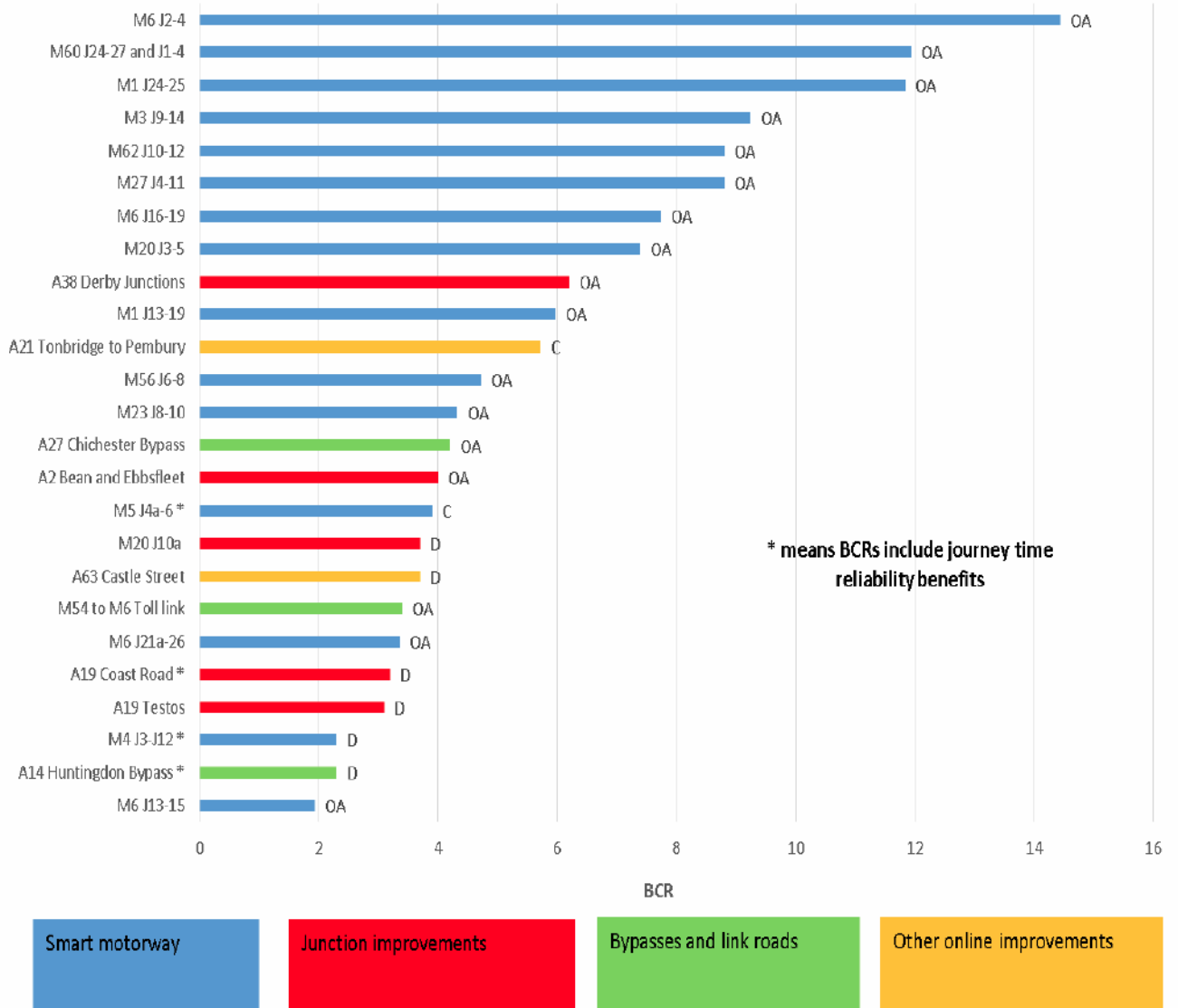
- Seeking funding for option assessment (OA)
- Seeking funding for development of the preferred option (D), or,
- Seeking funding for construction (C).

<sup>3</sup> DfT classifies any investment as having very high VfM if the Benefit Cost Ratio (BCR) is greater than 4.0, high VfM if the BCR is between 2.0 and 4.0 and medium VfM if the BCR is between 1.5 and 2.0. Low VfM is represented by a BCR between 1.0 and 1.5 and poor VfM occurs if the BCR is less than 1.0. For projects with a very high and high VfM classification there is a very strong investment case.

<sup>4</sup> All benefits and costs are presented in 2010 prices, discounted to 2010, and cover appraisal periods of 60 years from respective scheme opening dates. Table 2-1 only includes monetised benefits for which values are included in the Department's Transport Appraisal Guidance.



**Figure 2.1: Benefit-Cost Ratios (BCRs) for proposals with scheme specific economic modelling**

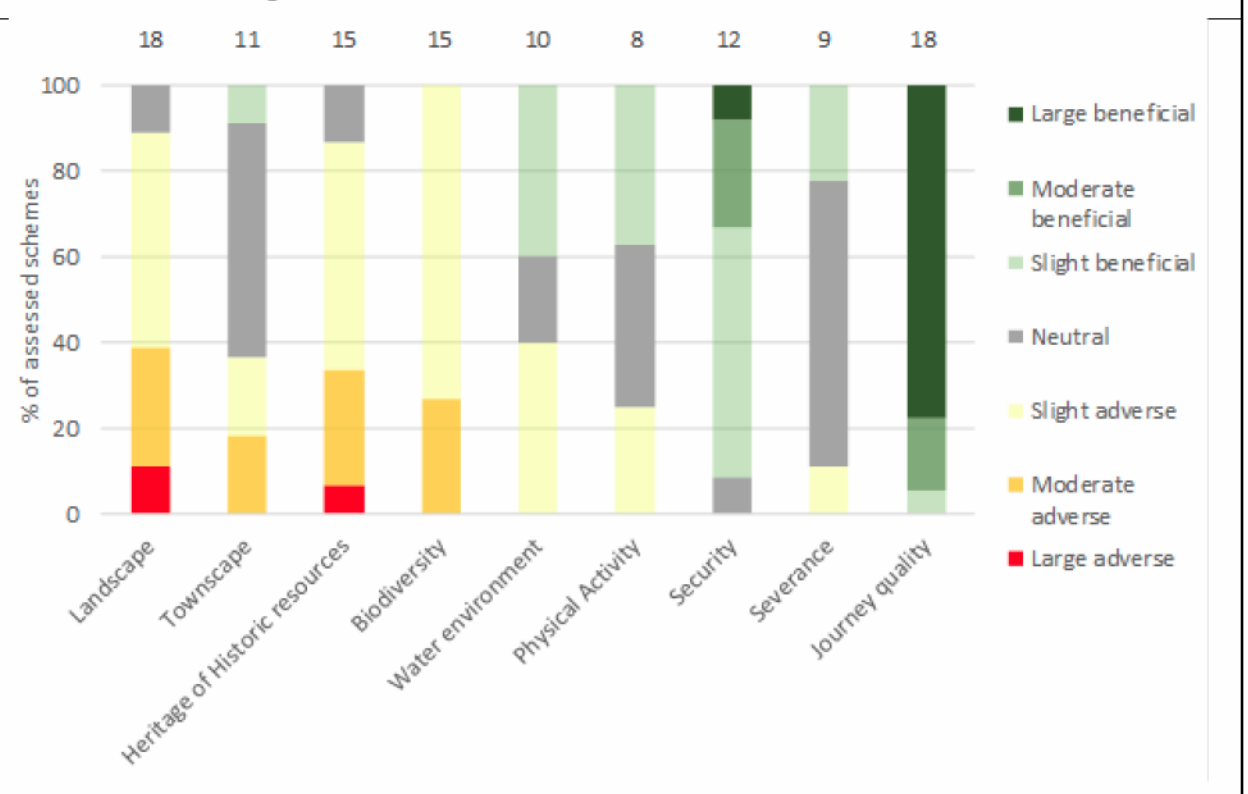


**2.7** Whilst the appraisal process allows some impacts to be expressed in monetary terms, this is not possible for all impacts. These 'non-monetised' impacts can be significant. The Department's Value for Money (VfM) process is designed to ensure these impacts are taken into account. Figure 2.2 shows a summary of these impacts for those schemes where an assessment of non-monetised impacts has been completed. This chart provides an indication of the potential impacts, though it should be noted that the assessment in some cases has not yet been completed. The figures above each of the columns represents the number of schemes for which each of the impacts have been assessed.

**2.8** The chart indicates that around 20-40% of the schemes are currently assessed to have moderate or large adverse impacts on landscape, biodiversity and heritage, but that the majority of schemes are expected

to improve journey quality and security for road users. Further scheme development may identify ways to mitigate the adverse impacts identified.

**Figure 2.2: Summary of non-monetised impacts for proposals with scheme specific economic modelling**



**2.9** Taking into account both monetised and non-monetised impacts of the 25 major schemes we assess that:

- 12-17 schemes are likely to be ‘very high’ value for money;
- 7-12 schemes are likely to be ‘high’ value for money; and
- 1 scheme is likely to be ‘medium’ value for money.

**2.10** The above figures present the central estimates for the BCRs for each of these schemes. Sensitivity analysis for some specific schemes under alternative traffic growth assumptions suggest that BCRs may be around plus or minus 25% in the high and low traffic growth scenarios respectively.

**2.11** Many of the assessments are at an early stage and will continue to be developed throughout the scheme development process. These may reduce or increase the costs and benefits, and so change the BCR estimates, for a number of reasons:

- Many schemes do not currently include an assessment of the dis-benefit to road users from delays due to construction works. These

costs can range widely; current estimates suggest a typical range of under 1% of total transport economic efficiency benefits to up to 6%<sup>5</sup>. Around 80% of the strategic network is due to be resurfaced over the RIS period and it is planned that enhancements will be undertaken at the same time as the resurfacing to limit the aggregate delays to road users. This may reduce the additional congestion resulting just from the work on enhancements.

- Currently 16 of the 25 schemes have not been appraised using variable demand transport models, meaning that they do not take into account all the traffic likely to be generated by the increased capacity (although most take into account reassignment from other routes). Whether this will impact on the value for money of schemes is uncertain and will need to be considered as the schemes develop. Evaluation of past schemes found that this generated (induced) traffic was only significant in just over 10% of schemes<sup>6</sup>.
- Journey reliability benefits have only been assessed for 4 of the 25 schemes. This is generally a very significant benefit of road improvements. As many of the schemes are smart motorways, this will be particularly conservative as part of smart motorways benefits will sometimes involve reducing speeds to improve reliability through variable speed management.
- In a similar way wider economic benefits have not been included, such as agglomeration benefits from bringing businesses closer together and generating economies of scale or investment benefits from making areas more attractive to foreign investment.
- Scheme costs may change over time, particularly for early-stage projects. Recent cost estimates by the Highways Agency have a generally good track record reflecting a cautious approach in the use of contingency and risks. However future costs will depend on efficiencies resulting from the new road delivery model but possibly offset by wider construction cost inflation pressures. This could increase or reduce the BCR estimate.
- Further monetisation of some of the environmental impacts would be likely to reduce the BCRs. A further factor which could influence impacts is the use of a new design panel for sensitive major schemes and a greater commitment to the landscape and aesthetic impact of schemes and tighter environmental standards. This may reduce the environmental impacts, but might have some impact on scheme costs. It will also raise some challenges around monetisation for these factors.

**2.12** The appraisal for these schemes will continue to be updated as the schemes develop. It is possible that some of these major schemes will as a result of further analysis of the economic, strategic and delivery cases be found to not be justified. In which case they would not be

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<sup>5</sup> This is a typical range. There are some non-standard schemes which fall outside this range, such as the M4 J3-12 where delays due to construction are estimated to have costs of over 35% of the travel time savings.

<sup>6</sup> See <http://assets.highways.gov.uk/our-road-network/pope/major-schemes/pope-meta-2013-final-report.pdf>

pursued and Highways England would have to explore other means of tackling the identified problems.

## The Case for Further Investment

- 2.13** The RIS has announced work is to be progressed on 127 schemes, representing an investment of £9.4bn up to 2020/21. The schemes were identified through:
- Six feasibility studies undertaken by the Department for Transport to look at problems and identify potential solutions to tackle some of the most notorious and long-standing road hot spots in the country. These six studies were:
    - the A303/A30/A358 corridor
    - the A1 North of Newcastle
    - the A1 Newcastle-Gateshead Western Bypass
    - the A27 corridor
    - Trans-Pennine routes
    - the A47/A12 corridor
  - The Highways Agency's Route-Strategy investment planning process to study problems across the network and identify potential solutions.
- 2.14** Summary reports and the technical analysis for each of the six feasibility studies has been published separately by the Department. A set of evidence reports for the Route-Strategy process were published in April 2014 and the final Route Strategies are to be shortly.
- 2.15** All of the schemes are at early stage of development, with appraisals being undertaken using existing transport models (where they exist) and other readily available information. In the case of the Route-Strategy process, the Department's Early Assessment and Sifting Tool has been used to support option development. The level of analysis is appropriate and proportionate given the stage in the scheme lifecycle, but will continue to be refined throughout the scheme development process.
- 2.16** The available evidence suggests that the majority of schemes (or where appropriate packages of schemes) in the RIS represent high or very high VfM. All schemes were assessed as at least medium VfM<sup>7</sup>. Some elements of the packages (particularly around the A303/A30/A358) would be lower VfM if considered as standalone schemes. Here synergies between the schemes mean that the benefits of the package are likely to be greater than the sum of the parts.

## Assessing the RIS as a Package

- 2.17** We have used the Department's National Transport Model (NTM) to further assess the packages of schemes in the RIS.

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<sup>7</sup> The VfM category is uncertain for three schemes - most notably the tunnelling of the A303 at Stonehenge - due to the complexity of the schemes or the stage of the appraisal. For the Stonehenge tunnel a key issue is how to value the heritage impact of taking away the existing road and restoring the landscape within the World Heritage Site.



- 2.18** The NTM is a strategic model which allows us to model traffic across the whole of the GB road network. The purpose of this programme level test is to understand the overall costs and benefits that would not be fully picked up by local level appraisal. For example the extent to which enhancements to one part of the network have impacts on road use elsewhere and how they affect choice of route, destination or mode of travel and the consequences for journey times.
- 2.19** The NTM allows a consistent, national-scale, assessment of the impacts of major strategic interventions or packages of investment, capturing network wide effects which local models cannot. The strategic nature of the model means it is not designed to undertake appraisal of specific schemes or geographical areas; and it cannot assess the impact of schemes which do not directly enhance capacity. As such it does not include some junction improvements, and interventions such as climbing lanes and some technology schemes cannot be captured in the NTM.
- 2.20** The strategic nature and differences in modelling approach mean the results are not directly comparable with appraisal of specific road schemes, but can be used to support the evidence that has been published on those schemes and, when considered alongside individual scheme appraisal, can give us confidence that we have considered both local and network wide impacts.
- 2.21** The NTM produces forecasts of a number of metrics including traffic levels, congestion, journey times and emissions. Three sets of schemes were modelled using assumptions which are consistent with Scenario 1 of the Road Traffic Forecasts 2015 (RTF15), with sensitivity tests using the low growth scenario (Scenario 1 Low) and the outputs used to estimate the incremental costs, benefits and BCR of the package over the base case (in line with standard Webtag appraisal guidance):
- A base case with road schemes that will be in construction by April 2015
  - With additional road schemes announced in SR13 and other commitments (Existing Commitments). This is on top of those schemes included in the base case.
  - The full RIS package including both existing commitments and the additional road schemes which have been announced as part of the RIS.<sup>8</sup>
- 2.22** The use of a base case is consistent with standard appraisal practice, providing a reference point to compare against. Traffic growth in this baseline forecast is slightly lower than those published in RTF15, with higher congestion on the SRN. This reflects the lower capacity of the SRN without the RIS schemes, which have been included in RTF15 as these have been announced and represent national policy. The modelling of both existing commitments and the full RIS package means we can use the results to consider not only the potential benefits of the

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<sup>8</sup> Some small schemes which did not impact on road capacity and are therefore difficult to model with the NTM were excluded from the analysis.

overall RIS, but also the value added by the new schemes announced in the RIS.

- 2.23** It should be noted that the analysis reported here was completed prior to the final decisions package of schemes. During the finalisation stage some minor changes occurred to the scope of one scheme and the timing of 5 more. This means the modelled package differs slightly from the final package of schemes, although we do not anticipate these will have a significant impact on the overall value for money reported here.

**Table 3.1: NTM estimates of costs and benefits for RIS investment packages (£m)**

<b>Analysis of Monetised Costs and Benefits</b>	<b>Existing Commitments</b>	<b>Full RIS Package*</b>	<b>Incremental Impact</b>
<b>Benefits to Business Users</b>	15,763	22,646	6,883
<b>Benefits to Commuters</b>	3,251	4,972	1,721
<b>Benefits to Other Road Users</b>	8,124	13,020	4,895
<b>Greenhouse Gases (CO2)</b>	-718	-758	-40
<b>Local Air Quality (NoX and PM10)</b>	-22	-23	-1
<b>Accidents</b>	-263	-386	-123
<b>Noise</b>	-23	-31	-8
<b>Wider Public Finances (Indirect Tax Revenues)</b>	829	902	73
<b>Present Value Benefits (PVB)</b>	26,940	40,342	13,401
<b>Present Value Costs (PVC)</b>	4,593	8,757	4,164
<b>Net Present Value (NPV)</b>	22,348	31,585	9,237
<b>Benefit Cost Ratio (BCR)</b>	5.9	4.6	3.2
* Some small schemes which did not impact on road capacity and are therefore difficult to model with the NTM were excluded from the analysis.			

- 2.24** Overall the RIS is forecast to deliver benefits to businesses, commuters and other road users worth over £40bn. Much of this comes from a 1.9% reduction in time lost due to congestion across the road network. On average the RIS is forecast to provide benefits worth £4.60 for every £1 invested.
- 2.25** The reduction in congestion is likely to result in some increase in traffic (induced demand) as people take advantage of reductions in the cost of travel; switching from other modes, changing their trip frequency or patterns, or undertaking new trips. The NTM forecasts that the impact of



the RIS package is to increase traffic by 1.3bn vehicle km in 2040 (around 0.19% across the SRN).

- 2.26** The level of induced traffic is likely to be highly scheme specific. For example induced demand is more likely to occur on highly congested sections of the network near to urban areas, while the Highways Agency's Post Opening Project Evaluation<sup>9</sup> suggests bypasses have in the past seen the most occurrences of induced traffic.
- 2.27** The NTM is not designed to model scheme specific impacts. Nor is it designed to take account of land use changes (which may explain some of the POPE results for bypass schemes). The impact of induced traffic on individual schemes may be higher or lower than those implied across the network. However the small overall increase in traffic is in line with the overall finding of the POPE analysis which suggests only 12% of schemes evaluated had evidence of induced demand impacts.
- 2.28** The forecast increase in traffic also drives a slight increase in carbon emissions; adding around 0.1 - 0.2% to forecast emissions in 2040, which is equivalent to a cost of £760m across the appraisal period. This will be much smaller than the reduction in carbon emissions from the support for low emission vehicles, with the additional funding of £500m provided as part of the roads funding originally announced in the 2013 spending round
- 2.29** There will also be some small disbenefits to landscapes, townscapes and heritage, biodiversity and water environments from major projects. The RIS seeks to address these through the establishment of several ring-fenced funds (for example for the environment and air quality) which will be used to improve impacts. These are discussed later in section 4 on ring-fenced funds.
- 2.30** The additional schemes announced as part of the RIS are expected to contribute almost one third of the benefits of the RIS investment plan, adding over £13.4bn in benefits, with an average return of around £3.20 per £1 invested. This represents a strong BCR given that the most urgent problems or more straightforward solutions are likely to have already been addressed in the existing package of 25 committed schemes.
- 2.31** Further benefits are likely to come from improvements in reliability across the network and improved productivity as a result of improved connectivity and agglomeration. A high level assessment has been made of these impacts using evidence from the NTM, as well as an assessment of the damage that these schemes might do to the landscape that they run through. Given the strategic nature of the NTM this part of the analysis should be considered a high level assessment. The detailed local modelling and analysis of schemes will provide a more robust treatment of the specific issues. The results of this analysis are set out in the table below.

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<sup>9</sup> See <http://assets.highways.gov.uk/our-road-network/pope/major-schemes/pope-meta-2013-final-report.pdf>

<b>Analysis of Monetised Costs and Benefits</b>	<b>Existing Commitments</b>	<b>Full RIS Package*</b>	<b>Incremental Impact</b>
<b>Initial Present Value Benefits (PVB)</b>	26,940	40,342	13,401
<b>Present Value Costs (PVC)</b>	4,593	8,757	4,164
<b>Adjusted BCR Factors</b>			
<b>Journey Reliability</b>	11,492	15,460	4,148
<b>Wider Economic Impacts</b>	3,427	5,655	2,228
<b>Landscape</b>	-210	-339	-128
<b>Adjusted PVB</b>	41,648	61,298	19,650
<b>Adjusted BCR</b>	9.1	7.0	4.7
* Some small schemes which did not impact on road capacity and are therefore difficult to model with the NTM were excluded from the analysis.			

- 2.32** The assessment suggests that overall these impacts are likely to further strengthen the case for the investment, with improved reliability (£15.5bn) and productivity enhancements to the wider economy (£5.7bn) increasing the benefit by almost one third.
- 2.33** This is a very simple assessment of the potential reliability and wider economic impacts, applying simple uplifts to other benefits in the model. It does not, for example, take account of the likely higher reliability benefits associated with smart motorways where speed (journey time improvements) may be reduced to ensure a safer and more reliable outcome. Given the number of smart motorways in the RIS, this may mean the reliability estimate is cautious. More detailed local modelling and analysis of these schemes will provide further evidence on these impacts.
- 2.34** Whilst this high level assessment does not include all of the 'non-monetised' impacts which are important for the VfM process, with an indicative return on investment as high as £7 for every £1 spent, the analysis provides confidence that overall the RIS is likely to offer high or very high VfM.
- 2.35** The forecasts and appraisal outlined here is consistent with Scenario 1 of the RTF15, which represents a mid-range forecast of traffic growth. However, as set out in the RTF15, there is uncertainty around future transport trends. This is driven by uncertainty around:
- Growth in key drivers of demand, such as population and income;
  - The link between these drivers and future demand, including between income and car ownership and patterns of trip making in the future;
  - Variation in mode share and competition between modes.

- 2.36** The first two of these are likely to be most significant. Policies to promote public transport, together with significant investment in rail infrastructure, High Speed 2 and cycling may result in mode shift away from roads. However public transport modes make up a relatively small proportion of total trips - and even an increase on these modes is unlikely to result in significant changes in road traffic at aggregate level. Alternatives may be more or less significant for specific road schemes.
- 2.37** The RTF15 does consider the first two of these uncertainties in more detail. A low growth version of Scenario 1 considers the impact of lower GDP growth and higher fuel price growth. This has been used as a sensitivity test for the RIS package. With lower traffic growth, the benefits of the RIS package will decline, with the initial BCR falling from 4.6 to 3.6. A second sensitivity test capped demand growth at 2040 (rather than extrapolating beyond this). The BCR in this test fell from 4.6 to 3.4.
- 2.38** The RTF15 also considers uncertainty around the relationship with car ownership and trip patterns over time. The latter is particularly important. Trips rates have been falling in some categories (and increasing in others) over recent years. The reasons for this, and whether the trend will continue is unclear. However to provide some indication of the potential impacts the RTF15 includes a scenario (Scenario 3) which extrapolates these recent trends into the future. Compared to the low growth scenario, traffic growth in this Scenario 3 is slightly lower overall, but is higher on the SRN. Congestion in the peak periods falls, but grows at other times reflecting changes in the type of traffic across the network. Higher traffic growth across the SRN is likely to enhance the case for investment, while lower peak congestion levels may weaken it offsetting the additional growth in traffic. The department is intending to do further work on trip rates this year and will include this in future analysis of the RIS package as it continues to review the case for investment.

## Conclusions for Major Schemes

- 2.39** BCRs from modelling based on individual schemes suggest a strong economic case for the Roads Investment Package. This is backed-up by modelling from the NTM which shows a BCR of 4.6 or £4.60 for every £ spent when major schemes are taken together. There are some uncertainties around the analysis which may impact on the BCR. However based on the analysis conducted it is unlikely that these will impact on the conclusions drawn about the VfM of the major schemes. The Department for Transport will continue to review the case for investing in major schemes as they are developed and further work will be done on the modelling of costs and benefits.



# 3. Capital Renewals, Network Management and Traffic Officer Service

## Capital Renewals

- 3.1** The RIS also includes a capital renewal budget throughout the RIS period. This budget covers five types of renewal:
- **Renewal of roads:** A continuous programme of asset replacement to ensure carriageway sections and other roadside assets are replaced towards the end of their operational life before degradation becomes a significant risk to safety and continued operation.
  - **Renewal of structures:** The replacement of structural 'components / whole asset replacement' on structures such as bridges, culverts and tunnels, either as they reach the end of life or have been damaged or require upgrading for technical/ health and safety reasons.
  - **Renewal of technology:** This relatively small programme provides for the replacement of roadside technology equipment such as variable message signs, emergency roadside telephones and safety related queue detection technology.
  - **Renewal of winter maintenance asset:** During periods of severe winter weather the Highways Agency provides a comprehensive winter service to treat the road network. The Agency owns a fleet of specialist winter service vehicles (gritters) which are based at 94 depots located near to the SRN.
  - **National Road Resurfacing Programme:** As a result of an exceptional known situation regarding a wide-scale age related road surfacing deterioration a separate 'one-off' additional resurfacing programme is required.
- 3.2** Failure to renew the highway infrastructure would lead to a deterioration in the network with an increasing risk of partial carriageway closures or even closure of complete links.
- 3.3** The loss of both capacity and connectivity would have significant impacts on trips on the SRN. Analysis using the Highways Agency's Delay Cost Model suggests the BCR of avoiding partial closures would be between 5.3 to nearly 80 depending on the level of traffic on a link. Based on the average traffic flows for carriageways across the SRN, this would suggest an indicative average BCR of around 13.

- 3.4** The complete closure of a link would be far more significant. Analysis suggests that for an individual link the BCR could be as much as 100 times that of a partial closure. Whilst this analysis cannot be generalised to the network as a whole (as we do not know how many failures of this type would be likely were the carriageway allowed to deteriorate significantly), it demonstrates the significant value offered by renewal spending.

## Network Management and Traffic Officer Service

- 3.5** The Highways Agency has carried out work to produce an outline assessment which looked at a range of options for developing existing functions, from providing only statutory provision, to the status quo, to an enhanced service. This was done as part of an overall approach to ensuring the continuation of the service and helping to demonstrate the value added and benefits associated with the service.
- 3.6** The options were developed by considering three principle dimensions:
- Service coverage of the SRN (e.g. Smart motorways, conventional motorways, expressways, other trunk roads);
  - Level of cost efficiencies;
  - Level of service - it is possible to provide a different level of service to sections of the SRN eg full service at all times.
- 3.7** There is a potential to generate cost efficiencies in the Highways Agency Customer Operations by upgrading control room systems to enable traffic signs and signals to be operated from any Regional Control Centre. This would contribute to more efficient deployment of traffic officers.
- 3.8** Savings from the developments can then be redeployed to key points on the network increasing the level of Traffic Officer Service coverage. This would contribute to incidents being cleared more quickly thereby reducing levels of incident related congestion.
- 3.9** The economic assessment has looked at quantifying a number of impacts linked to service coverage of the SRN, level of service and better targeting. These include changes in journey time reliability, incidents on the network and clear-up times for incidents which occur.
- 3.10** The analysis suggests that cost efficiencies in Highways Agency's operations combined with improved deployment of traffic officers funded through efficiencies will lead to increased journey time reliability, fewer incidents on the network and quicker clear-up times with high value for money being secured over subsequent RIS periods. Furthermore because of upfront investment costs needed to achieve efficiencies VfM will actually rise over time.
- 3.11** In addition there are a number of other benefits that the assessment identifies, which it was not possible to quantify but which support the

approach being taken in the RIS. The most significant comes from the operation of smart motorways. Whilst it is not possible to allocate operational costs to individual smart motorway upgrades, Traffic Officers and Network Management capabilities are required to realise the benefits of all of the smart motorway proposals. Indeed without operational capability that is provided smart motorways could not be operated. Other benefits include detecting asset defects earlier, improving employee and contractor safety and provision of real time data to road users.

- 3.12** The quantitative and qualitative analysis undertaken in the economic assessment of Highways Agency's Network Management and Traffic Officer Service presents a strong argument for the continued operation of the traffic officer service.



## 4. Smaller schemes and ring-fenced funds

- 4.1** There are many large scale investments outlined in the RIS to deliver major enhancements to the SRN. However there are many cases where smaller scale changes can unlock particular constraints or provide significant benefits to a variety of stakeholders, not just the users of the network.
- 4.2** The Highways Agency have had a programme of small scale schemes for a number of years to address particular local issues. The RIS builds on this approach to create a set of ring-fenced funds that recognise the impact the network has on a variety of stakeholders, not just users of the network.
- 4.3** These ring-fenced funds will ensure that spending delivers benefits that are important to customers and communities which are beyond the core focus of a safe, reliable network. These funds will be used to target specific areas including environment, safety, cycling, innovation, air quality and growth and housing.
- 4.4** The RIS does not explicitly identify the specific smaller scale interventions that will be employed. These will be developed as tailored interventions as the RIS package is rolled out and will be targeted on areas with the most pressing problems. Many of the interventions will be novel and will serve as exemplars for future ring fenced projects.
- 4.5** The degree to which different types of impacts have been quantified varies. For example:
- Fulfilling the RIS target of reducing the number of people severely affected by noise on the SRN by 250,000 using the Environment Fund will have significant benefits to those affected. The benefits of schemes to preserve and enhance landscape and protect biodiversity are harder to quantify, but are likely to offer significant benefits in specific locations;
  - Evidence shows that cycling and road safety schemes can deliver very high benefit cost ratios (the Cycling Demonstration Towns programme BCRs ranged between 4.7 and 6.1).<sup>10</sup>

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<sup>10</sup> See para 3.3 of [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/348943/vfm-assessment-of-cycling-grants.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/348943/vfm-assessment-of-cycling-grants.pdf)

- The development of novel and innovative technologies has the potential to transform the way we travel on the roads realising very large benefits;
  - Poor air quality is associated with 29,000 early deaths each year in the UK at a cost to the economy of around £16bn. Emissions of pollutants from the strategic road network are a significant contributor. The UK is not meeting EU air quality standards and could face significant fines. Working with local government in some of the areas with the poorest air quality will deliver significant quantifiable public health benefits, as well as enabling road schemes to proceed;
  - The Growth and Housing Fund will supplement existing large scale roads investments and local developer contributions where there is a potential to unlock local growth.
- 4.6** Allocation of funds to different schemes requires an approach to assessing the VfM of those schemes. Many of the benefits covered by ring-fenced grants have not been quantified in the past and ways of making comparative assessments will need to be developed.
- 4.7** There will be further work addressing VfM as part of the work on prioritisation frameworks for the individual funds. Over the RIS period Highways England will have responsibility for identifying potential future schemes across the ring fenced funds. It will ensure the VfM of all the spending in these areas, and will agree the methods to do so with the Department.
- 4.8** Over time the impact of these different schemes will increase as we find out what works best to tackle each of the areas for which funding has been made available.