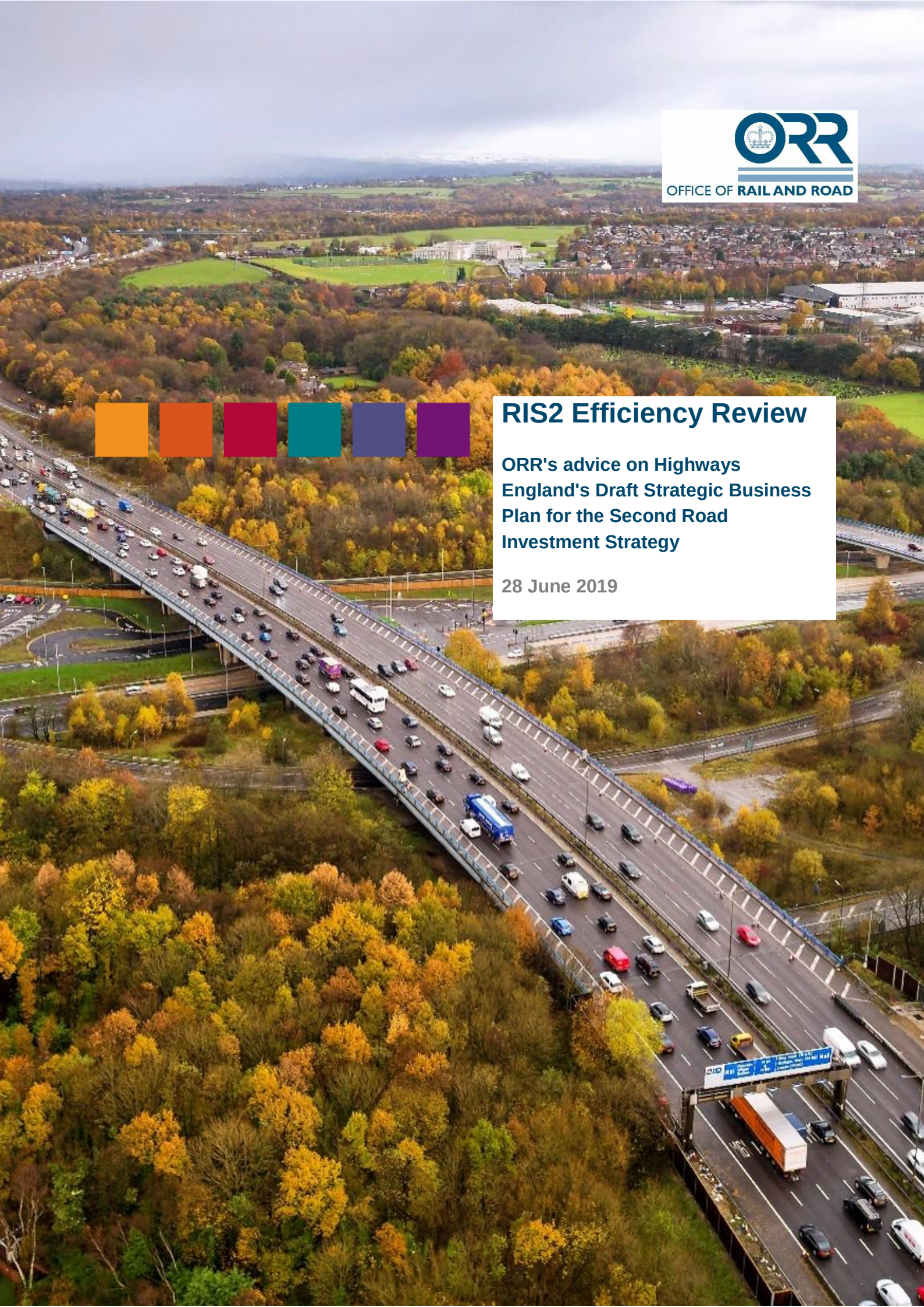


OFFICE OF RAIL AND ROAD

RIS2 Efficiency Review

ORR's advice on Highways England's Draft Strategic Business Plan for the Second Road Investment Strategy

28 June 2019

Contents

Executive summary

This document constitutes our advice to the Secretary of State on Highways England's plans for the second road period from 2020-2025 (RP2).

Context

It is four years since Highways England was created and tasked with delivering the first Road Investment Strategy – a five year package of funding to deliver better outcomes and road improvements for users of, and those impacted by, England's motorways and main A roads.

In that time, it has become a more capable organisation. The company has improved its understanding of the needs of road users, its asset management capability and its ability to plan for efficient delivery. This is reflected in the quality of its Draft Strategic Business Plan for RP2. Highways England recognises that it can continue to improve and that changes delivered so far form part of longer-term transformation plans.

Our efficiency review

We have scrutinised Highways England's Draft Strategic Business Plan through a robust process of detailed review, challenge workshops, written questions / responses, and deep-dive sampling of its plans. We have complemented this with a programme of benchmarking, and by assessing the efficiency improvements the company might realise through increased capability in areas such as procurement, asset management and portfolio management. Our findings from this process are set out below.

Evidence supporting the Draft Strategic Business Plan

The Draft Strategic Business Plan has good supporting evidence in many areas. It represents a step-change in quality compared to plans produced for the first road period. This reflects the company's growing maturity, increasing customer and safety focus, and improving portfolio management capability.

We have seen improvements to Highways England's data during road period 1 (RP1). The review process has highlighted where further data improvements continue to be needed.

The RIS2 portfolio

The proposed portfolio for the second road investment strategy (RIS2) will be challenging to deliver. Investment is higher and the portfolio is more complex. The improvement schemes specified in the first road investment strategy (RIS1) need to be completed, and there is a greater number of larger, more complex schemes specified for RIS2 than have been completed during RP1.

Investment of £25.3bn is an increase of around 30% in real terms over RIS1. Enhancement spending is over 40% higher in real terms, and there is a significant peak of work forecast for 2021-22, driven by completing the tail of RIS1 improvement schemes.

These figures do not include the costs of any investments relating to HS2 or Heathrow expansion, as these are expected to be funded outside of Highways England's core funding. These works could impact the proposed RIS2 investments and performance levels. So it is important to consider how these schemes will affect the RIS2 programme and impact network performance in the finalisation of the package. Just as importantly, there needs to be a formal change control process through which any changes to funding or performance levels relating to external investments can be agreed, and so it is clear what we are holding Highways England to account for delivering.

Efficiency, inflation and risk

There are significant links between efficiency, inflation and risk so it is important that the three are considered together. Highways England has assessed that, including its proposed £935m centrally-held portfolio risk allowance, the portfolio is at an approximately P(50) level – there is around a 50% likelihood that it can be delivered for that cost.

Exclusions from Highways England's analysis suggest that this could be optimistic, and that the contingency allowance is likely to be at the lower end of what is required for the proposed portfolio. Where our review has identified potential cost reductions from alternative efficiency and inflation assumptions we have therefore recommended that they are used to manage risk. A summary of our recommended cost reductions is given below.

Recommended cost reductions from alternative efficiency and inflation assumptions

	Efficiency	Inflation	Total
Renewals	£30m-£40m	£110m	£145m
Enhancements	£70m-£110m	£410m	£505m
Total	£130m	£520m	£650m

In practice this is likely to result in moving funding between spending lines. For example, by reducing the budgets for individual enhancement projects and increasing the centrally-held contingency allowance by an equivalent amount. This should strengthen budgetary discipline and Highways England's ability to manage portfolio-level risks. Should such risks not arise, the contingency funding could be released to deliver additional outputs.

Efficiency

Highways England has acknowledged that continued improvement has the potential to lead to more efficient delivery in the next road period. Its proposed efficiency improvement of around 7.8% is within our expected range. The company proposed a key performance indicator (KPI) that covers only 27% of its proposed efficiency. We disagree with any approach that would lead to us monitoring a small proportion of Highways England's proposed efficiency. We propose that the efficiency KPI captures all efficiency. We will monitor efficiency across all of Highways England's activities, and we will work with the company to develop a proportionate efficiency monitoring approach to achieve this.

As well as the overall level of efficiency, we have scrutinised the underpinning evidence and assumptions. The level of efficiency, and quality of supporting evidence, varied across the Draft Strategic Business Plan. Evidence from our capability reviews suggested that larger efficiency gains could be made for enhancements and some areas of renewals. We propose that additional efficiency improvements in these areas could reduce costs by around £130m, which should be used to reduce the residual renewals risk and increase the centrally-held portfolio risk allowance for enhancements. This would increase total efficiency to 8.3%, still towards the centre of our expected range.

Highways England has delivered more efficiently during RP1. However, better evidence is needed to support reported levels. So the quality of Highways England's efficiency reporting needs to improve in advance of RP2.

Inflation

The majority of Highways England’s proposed inflation assumptions are robust, but those applied to capital works (during RP1) and electricity costs appear high.

Highways England's inflation assumptions in the last two years of RP1 were taken from its RP1 funding model and appear high compared with more recent information. Using more up-to-date outturn and forecast data (consistent with the approach for developing RP2 inflation assumptions) would reduce costs by around £110m for renewals and £410m for enhancements. These amounts should be used to reduce the residual risk in renewals and to increase the centrally-held portfolio risk allowance for enhancements, respectively.

We have not seen a compelling case for separate inflation assumptions to be applied to electricity costs. Applying the inflation rate used for other elements of maintenance would reduce costs by £9.4m.

Risk

We agree with Highways England’s proposals for a centrally-held portfolio risk allowance. Highways England should develop clear rules for how the fund is governed and accessed, including how money is released and utilised if risks do not materialise.

We advise that the formal change control process continues in RP2 as it has played an important role during RP1. There are risks with the portfolio that should be resolved or formally recorded in advance of RP2. This includes, but is not limited to: risks around Tier 1 schemes, and Lower Thames Crossing, in particular; the removal of PF2 private finance; the treatment of unrecoverable VAT; and exclusion of the Historic Rail Estate from the SoFA.

Enhancements

Proposals for the major schemes portfolio help with the deliverability challenge we identified in our Draft RIS advice and largely align with the major schemes in the Draft RIS, albeit with some scheduling changes. The portfolio is more developed and is based on more robust cost estimating than RIS1. We reviewed Highways England's approach to major project cost estimation and found that the company has comprehensive and effective cost estimating processes and procedures, that compare well with other major organisations.

There is a large peak of work in 2021-22 and there are significant delivery risks, including:

- a lack of clarity on private finance;
- the scale of, and potential risks around, Lower Thames Crossing; and
- the number of schemes scheduled to start work in March 2020, particularly those requiring Development Consent Orders.

We advise that the company carries out a quantified assessment of risks to project timescales – and the company should consider whether its current information (such as the CPI / SPI earned value indicators) is capable of providing early-warning on scope and cost problems, and if not develop new indicators to do so.

Operations, maintenance and renewals

Highways England has made a compelling case for funding operations, maintenance and renewals to prevent deterioration of the network. The proposal to do some life-extending renewals now is sensible to help manage a bow-wave of work in future road periods.

The quality of Highways England's data needs improving. In some areas, we have not been able to make like-for-like comparisons across road periods (for example of renewals unit costs or volumes) because of how Highways England has recorded its data. It is important that we have a clear baseline against which we can monitor delivery during RP2 and that data can support comparisons across road periods in the development of future RISs.

Performance specification

We broadly agree with Highways England's proposals for the performance specification, but targets on safety, incident clearance and pavement condition could be more stretching. More specifically:

- We propose a stretching safety target to reduce KSIs by 40% from a 2010-14 baseline by 2025.
- The proposed pavement condition target of 97% is broadly equivalent to meeting 95% in RP1. There is a risk that with the proposed range, 95.5% could effectively become the target and this would represent worsening condition. We advise a target of 97% and that, if there is a range to reflect uncertainty in the new metric, it should be smaller than the proposed 1.5%.
- Delay and particularly journey time reliability are important to users and stakeholders but Highways England only has limited control over them. The proposed metrics are highly correlated and we advise against having both as KPIs.
- There would be merit in including a delay-related KPI (or KPIs) over which Highways England has greater control. We recommend incident clearance. Performance during RP1 suggests Highways England's proposed incident clearance target could be more stretching.
- Agreeing the environmental metrics needs further work – if a scorecard measure is used, we would recommend it having fewer than the eight metrics proposed by DfT.
- We expect more analysis to inform the proposed target for user satisfaction. The profile of the target should reflect the likely impact of the investment profile on user satisfaction.
- We have seen limited evidence of performance and investment being integrated. Highways England's analysis in this area has mostly focused on the links between the investment programme and metrics for delay, safety and network condition.
- Where they can be meaningfully disaggregated, Highways England should report its KPIs regionally.

Next steps

For the Final SBP

We recommend that Highways England re-estimates and reallocates its renewals and enhancements costs in line with our efficiency and inflation recommendations. Cost reductions should be used to reduce the residual renewals risk and to increase the centrally-held portfolio risk allowance, respectively. The company should re-run its quantified cost risk analysis in light of these re-estimated costs and the enlarged portfolio risk allowance. We also recommend that Highways England carries out a quantified assessment of the risks to its project timescales.

There are several outstanding issues to resolve to finalise the performance specification. The company should work with DfT to agree the final set of metrics and challenging target levels, particularly for user satisfaction and the environmental outcome area.

Before the start of road period 2

We recommend that Highways England sets out a clear baseline against which we can monitor delivery during RP2. This should cover enhancements scope, costs and timings, and renewals volumes. The company should also consider whether it needs to develop new indicators to provide early-warning of scope and cost problems across its enhancements portfolio. We will work with the company to develop a clear methodology for efficiency reporting.

During road period 2

We recognise that Highways England is in a process of continuously improving its data. Throughout RP2, we expect Highways England to continue to develop better efficiency reporting; to increase its reporting of regional performance; and to continue to develop new metrics for future road periods that better reflect road user outcomes.

This is just one part of Highways England's continuous improvement. The company should also build on the progress it has already made to develop its customer service capability – for example, showing that it is acting on results from the new Strategic Road User Survey – and how it manages its investment portfolio of enhancements, renewals and designated funds.

1. Introduction

1.1. Under the Infrastructure Act 2015 and section 6.17 of Highways England's Licence, ORR has a role to assess whether the requirements set out in the Draft SBP are "deliverable with the proposed financial resources, and the extent to which the Draft SBP is challenging and deliverable, including with regard to the levels of efficiency the Licence holder proposes to achieve."

1.2. This document sets out ORR's advice to the Secretary of State for Transport following our assessment of the Draft SBP (DSBP) covering the period 2020-21 to 2024-25. It is based on the DSBP provided on 31 January 2019 and updated in Highways England's submission on 28 February 2019.

1.3. At the time of the DSBP several projects were going through the change control process and the milestone dates in the DSBP were based on the assumed outcome of that process. Since, there have been additional changes going through change control. There might be further changes by the time the Final RIS and SBP are published. So it is important to note that, except where stated otherwise, our analysis and advice is based on what was provided in the DSBP.

Structure of this document

1.4. This document is structured as follows:

- section 2 describes the approach we have taken to the efficiency review;
- section 3 assesses the overall strategy for RIS2 and alignment of the DSBP with the Draft RIS;
- section 4 considers the evidence supporting the DSBP;
- section 5 looks at the overall funding levels proposed in the DSBP;
- section 6 considers the inter-linked areas of efficiency, inflation and risk;
- sections 7-9 report on some of the detail from our review for enhancements; operations, maintenance and renewals; and other spending areas, respectively;
- section 10 contains our advice on the performance specification; and
- section 11 summarises next steps.

1.5. At the end of each section we summarise our key recommendations in that area.

2. Our approach to the efficiency review

2.1. In December 2016, we published a document explaining our approach to our role in developing RIS2.[1] This set out that we would take a four stage approach, focused on:

- the capabilities Highways England requires to secure efficiency gains;
- targeted benchmarking studies;
- sampling of expenditure lines in the DSBP; and
- bringing this evidence together to form conclusions.

2.2. The following sections describe each stage in more detail.

Capability reviews

2.3. In 2017 we jointly commissioned with Highways England a set of three reviews assessing Highways England's capability in areas that we expect to be important for delivering efficiency in RP2:

- Portfolio and programme management – the scale of Highways England's capital programme, in terms of the number of projects and total spending, puts pressure on the company's portfolio and project management capability.
- Asset management – Highways England's ability to manage its network at lower whole-life cost is core to its ability to operate efficiently.
- Procurement and contract management – with a significant proportion of its spending delivered through its supply chain, how Highways England manages its contracts and procurement processes will be key to unlocking future value.

2.4. The three studies assessed Highways England's capability in each area at the time of the reviews, improvements that could be made during the remainder of RP1 and during RP2, and efficiencies that might be expected as a result (assuming Highways England meets its KPI target for RIS1).[2] The conclusions of the capability reviews are summarised in the table below. The table treats the potential efficiency improvements from the capability reviews as "end of period" efficiencies and presents equivalent "per year" and "average" efficiencies (to the nearest 0.5%).

[1] ORR's approach to the second Road Investment Strategy, 2016: https://orr.gov.uk/__data/assets/pdf_file/0003/23457/RIS2-approach-document.pdf

[2] The three reviews are available on our website at: https://orr.gov.uk/highways-monitor/publications/orrs-role-in-the-second-road-investment-strategy

Table 2.1 Summary of capability review findings

	Capability review conclusion	Equivalent per year efficiency improvement	Equivalent average efficiency improvement across RP2
Portfolio and programme management	5%-7.5%	1.0%-1.5%	3.0%-4.5%
Asset management	7.5%-15%	1.5%-3.0%	4.5%-8.5%
Procurement and contract management	6%-9%	1.0%-2.0%	3.0%-6.0%

2.5. Highways England has used the capability reviews as it put together the DSBP. For example, the renewals case includes a set of "generic" efficiency improvements for every asset type that are based around the three capabilities. And the "embedded" efficiencies for major projects in the smart motorways (SMP) and regional investment (RIP) programmes are based on new, more-integrated procurement approaches.

Benchmarking

2.6. Over the past four years, we have carried out a targeted programme of benchmarking activities to inform both this review and our wider monitoring activities. This has included comparisons across Highways England's regions, with highway authorities in other countries and companies in other sectors. It has covered elements of both performance and efficiency. Where benchmarking evidence has informed our assessment, we refer to this later in this document. More details of our benchmarking work can be found on our website.[3]

Sample-based review

2.7. When assessing Highways England's DSBP we have reviewed every spending area, and investigated some areas in more detail. Following an initial review of the DSBP we selected a sample of spending lines for more detailed investigation.

2.8. We chose a sample that covered the major spending areas of support, operations, maintenance and renewals. For renewals we focused primarily on the three asset types, pavement, structures and vehicle restraint systems (VRS), with the greatest cost and a life extension element. We also included lighting, so as not to only focus on the largest renewals asset types. The sample was made up of:

[3] https://orr.gov.uk/highways-monitor/publications/benchmarking-highways-englands-performance-and-efficiency

- support – human resources;
- operations – winter fleet replacement (a capital business costs project delivered by the operations directorate);
- maintenance – asset delivery roll-out and maintenance costs; and
- renewals – pavement, structures, VRS and lighting.

2.9. For enhancements, we selected a sample of twelve projects that covered a range of different scheme types, sizes (measured by value) and stages of development (measured by where they were in Highways England's Project Control Framework (PCF) process at the time of selecting the sample):

Table 2.2 Projects included in the enhancements sample review

Project name	Project type	PCF phase	Cost category
M1 junctions 13-16	Smart motorway	Construction	£250-£500m
M3 junctions 9-14	Smart motorway	Development	£100-£250m
M56 junctions 6-8	Smart motorway	Development	£50-£100m
M62 junctions 25-30 ALR retrofit	Smart motorway	Development	£100-£250m
A5036 Access to Port of Liverpool	Online / Offline dualling	Development	£250-£500m
A30 Chiverton to Carland Cross	Online / Offline dualling	Development	£100-£250m
M42 junction 6	Junction improvement	Development	£250-£500m
M25 junction 28 improvement	Junction improvement	Development	£50-£100m
Lower Thames Crossing	Tunnel	Development	£1,000m+
A417 Missing Link at Air Balloon	Online / Offline dualling	Options	£250-£500m
A12 Chelmsford to A120 widening	Online / Offline dualling	Development	£500-£1,000m
A46 Newark Northern Bypass	Online / Offline dualling	Options	£250-£500m

2.10. This stage of the process has been supported by two strands of consultancy work. We commissioned CEPA to support our efficiency review activities. Under this contract, CEPA have supported our sample-based review in all of the areas set out above, as well as on overarching issues including Highways England's inflation assumptions and overall efficiency approach. Because of the significance of enhancements to the DSBP, we also commissioned Nichols to review Highways England's cost estimation processes for major projects. The conclusions of both strands of work have informed this advice, and we will make the consultants' reports available on our website.[4]

Bringing the evidence together

2.11. This document represents the fourth stage of the process – bringing the evidence together to provide advice on the levels of challenge, deliverability and efficiency proposed in Highways England's DSBP.

2.12. The DSBP submissions were supplemented by information provided at four challenge workshops and over [120] requests for additional information. This process worked well. Highways England engaged effectively with us and went to significant lengths to provide the information we needed to complete our review.

2.13. Our assessment has been informed by a range of evidence, including reports from different consultants. This advice represents our balanced view of this evidence. In places it differs from the conclusions of our consultants, for example because of conflicting views on Highways England's inflation assumptions or different approaches to calculating efficiency. Where applicable, we reference the supporting material that has informed our assessment and we will make this available on our website.

[4] https://orr.gov.uk/highways-monitor/publications

3. The strategy for RIS2 and alignment with RIS1

3.1. In October 2018 the Government published its Draft RIS2 (DRIS). The DRIS was a relatively high-level vision, but offered Highways England reasonable line of sight in terms of the Government's long-term ambition for the SRN in England in terms of its role, size and operational priorities. The majority of the enhancements, by number of projects and spend, set out in the DRIS began, or will begin, construction during RP1. RIS2 represents an evolution of RIS1.

3.2. The core DRIS documents, and supporting annexes, also reflected wider priorities in relation to transport infrastructure, including the National Infrastructure Assessment themes of revolutionising road transport; transport for city regions; designing infrastructure; infrastructure to support connected and autonomous vehicles (CAVs); and an overall capital funding envelope for infrastructure.

3.3. The DRIS was consistent with the vision for the SRN set out in RIS1, representing an evolution of Highways England's role.

Consistency of the Draft SBP with Draft RIS2

3.4. The DSBP was broadly consistent with the DRIS. It confirmed the focus on, and priority given to operating, maintaining and renewing the existing network. It included the enhancement priorities that were specified in DRIS annexes. It also set out a performance specification and designated funds covering the same areas as the DRIS.

3.5. However, there were some differences from the DRIS. When Highways England costed the enhancement milestones in the DRIS annexes, it found that costs would exceed the SoFA. So the DSBP proposed an alternative set of milestones, with the start of works on new enhancement projects generally pushed back to later in road period 2 (RP2) than was assumed in the DRIS. The effect of this is shown in figure 3.1.

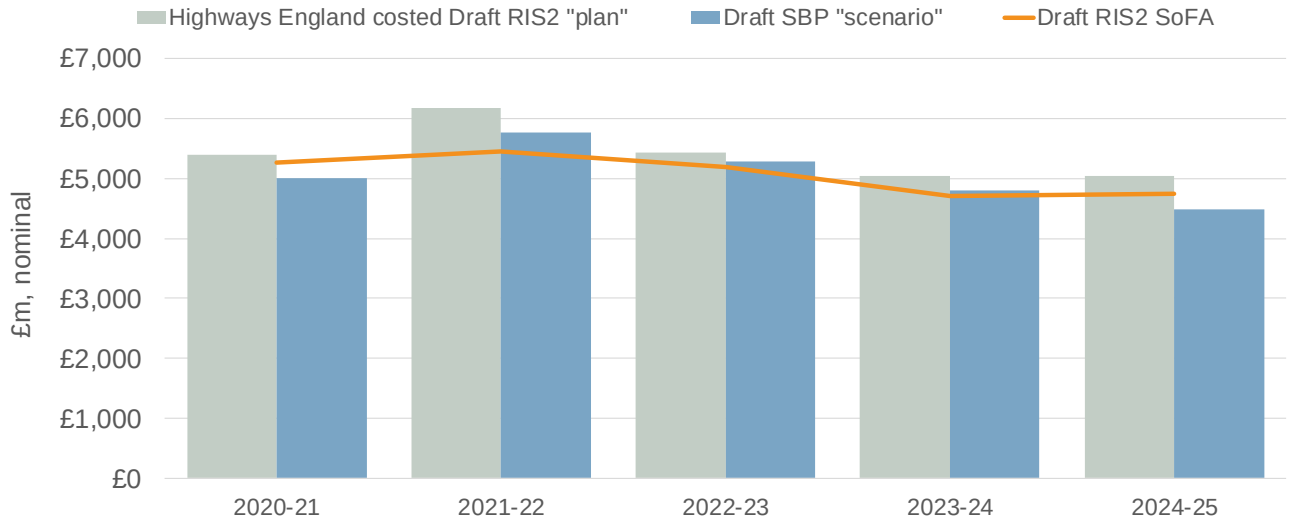
3.6. Compared with the DRIS SoFA, total funding increases more gradually but with a larger peak in 2021-22. Compared with Highways England's costing of the DRIS, the peak in the second year is lower, and the DSBP reduced costs to (almost) within the SoFA.

3.7. It should be noted that Highways England's DSBP had a total funding need of £25.343bn, which exceeded the DRIS SoFA of £25.332bn by £11m.[5] Throughout this document we highlight several areas where costs could be reduced. We recommend

[5] The published DRIS gave a SoFA of £25.3bn (to 1 dp). Supporting material specified £25.332bn.

that these cost reductions are reallocated to increased risk funding. It is also important that Highways England does not enter RP2 with a gap between its funding and expected costs.

Figure 3.1 Proposed funding in the Draft RIS and Draft SBP

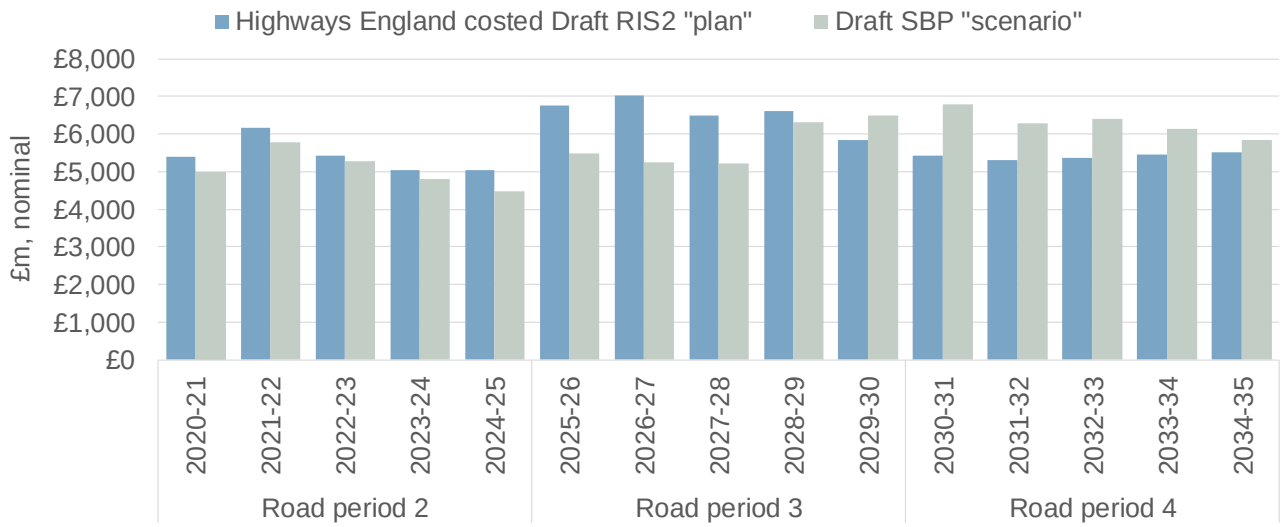


3.8. The full impact of Highways England's re-profiling of enhancement spend cannot be seen by looking only at RP2. Figure 3.2 shows Highways England's indicative profile of the funding that may be needed in RP3 and RP4. These figures should be treated with caution as they have not been through the same cost and efficiency challenge process as the figures for RP2. The chart shows how Highways England's proposals seek to avoid a large step-change in funding at the beginning of RP3, with more funding needed during RP4. The main changes in the DSBP were:

- the removal of RIS1 enhancements (pending change control) that offered poor value for money;
- pushing back the A66 Transpennine, M60 Simister Island and A46 Newark new enhancements to start in 2024-25;
- beginning the second phase of the Manchester North West Quadrant (2028-29) and Ox-Cam (2026-27) projects in RP3; and
- phasing the A303 enhancements to be completed over a longer period to the end of RP4.

3.9. We recommend that DfT reviews these changes and considers whether they are acceptable.

Figure 3.2 Implications of HE proposals on RP3 and RP4



3.10. Our analysis has focused on Highways England's DSBP and predominantly on the challenge and deliverability of what it set out it will deliver during RP2. Highways England's longer-term proposals have created a generally smoother profile of investment, which is likely to be more deliverable. However, it has not eliminated step-changes altogether, with required funding increasing by more than £1bn in 2028-29. It should be noted that figures for RP3 and beyond are indicative, and could be subject to significant further refinement as part of the RIS3 planning process.

3.11. Highways England's proposed performance specification covered the same outcome areas as the DRIS, and contained many of the same metrics specified in the DRIS annexes, but there are some significant differences in which metrics are KPIs, and target levels. We discuss these differences in more detail in section 10. These differences largely reflect Highways England's preference for metrics over which it has greater control. As a consequence, this leads to some metrics that focus more on outputs (or intermediate outcomes), rather than the entire desired outcome as a whole.

Exclusions from the DSBP

3.12. Highways England entered RP1 with several unfunded commitments. Highways England has stated that the enhancements portfolio was over-programmed by £652m.[6] The RIS1 SoFA did not cover delivery of a legacy programme of pinchpoint schemes (£140m) and there is some remaining uncertainty around whether Highways England's funding covered a set of business costs (of around £600m)

[6] Progress with the Road Investment Strategy, NAO, 2017: https://www.nao.org.uk/wp-content/uploads/2017/03/Progress-with-the-Road-Investment-Strategy.pdf

related to delivering its capital portfolio that it identified as being unfunded later in RP1. It is important that this is not repeated in RP2.

3.13. There were some notable exclusions from the SoFA in the DSBP. Most significantly, and consistent with the DRIS, Highways England's proposed funding levels for the Lower Thames Crossing (LTC) and A303 Amesbury to Berwick Down (A303 Stonehenge) projects only cover the elements that were expected to be directly delivered before the withdrawal of PF2 private finance. Removal of PF2 left a gap of potentially more than £3bn (not all of which would be in RP2). Resolving the issue of how these projects will be funded is critical for RIS2.

3.14. Highways England also excluded the costs of the Historic Rail Estate (HRE) and Dartford Crossing freeflow upgrade from the DSBP. It has managed the HRE as a protocol during RP1 and made the case that the £115m required to continue this function in RP2 should come from additional funding, as it does not relate to the SRN and covers Scotland and Wales, as well as England. There are potential savings that could be made from upgrades to Dart Charge freeflow charging, which would require £38m of additional funding. Highways England also collects Dart Charge income, but this is passed to DfT so has not been included in the DSBP.

3.15. The DSBP included specific funding for small capital improvements (the Safety and Congestion fund), capital business costs and RIS3 development activities. Highways England also identified a list of exclusions and headwinds – a mixture of risk and scope items that are not covered by the RP2 SoFA. This demonstrated greater clarity about what is, and what is not, covered by the DSBP, compared to the equivalent stage for RIS1 and the reduced risk of there being unfunded commitments that emerge mid-period.

3.16. One of the additional scope items in the list of exclusions covered investment relating to Heathrow expansion and HS2. Consistent with the DRIS, there was limited direct reference to these projects in the DSBP, as any work on the SRN was expected to be funded outside of the SoFA. We recommend that consideration is given to how these schemes will affect the RIS2 programme and impact network performance in the finalisation of the RIS package. Just as importantly, there needs to be a formal change control process through which any changes to funding or performance levels relating to external investments can be agreed, and so it is clear what we are holding Highways England to account for delivering.

RIS1-RIS2 transition

3.17. The proposed peak of work and spending in 2021-22 is largely driven by the tail of enhancements from RIS1. The number and value of schemes starting construction work in 2019-20 will have a big impact on RIS2. In addition, Highways England has

agreed with DfT to bring forward work and £100m of funding for the LTC and A303 Stonehenge projects, which will affect the funding available in the first year of RP2 (and / or potentially subsequent years if it makes continued use of its flex).

3.18. The enhancement milestones in the DSBP included, or noted, the anticipated impact of 11 projects going through the formal change control process. Since it was submitted, there were six change control requests that would alter the milestone dates in the DSBP, where some change was foreseen in the DSBP. There were also three new requests for change control that were not highlighted in the DSBP. There might be further change between us providing our advice and the beginning of RP2. It is essential that Highways England enters RP2 with a stable baseline against which we can monitor its performance.

Recommendations

We recommend that:

- DfT reviews the proposed changes to timescales for new enhancements and considers whether they are acceptable; and
- consideration is given to how schemes such as HS2 and Heathrow expansion will affect the RIS2 programme and impact network performance in any further schedule refinement.

4. Evidence supporting the DSBP

Quality of engagement

4.1. When we set out our approach to RIS2[7] we said that we would consider how stakeholder engagement has supported the production of the DSBP. To do this we have drawn primarily on the evidence provided by Highways England in Section F of the DSBP (Customer and Stakeholder Engagement).

4.2. Highways England conducted a wide-ranging evidence-gathering exercise with customers and stakeholders to inform the research phase. To support the production of its route strategies, the company launched an online tool through which customers and stakeholders could identify issues, challenges and future opportunities on SRN routes or those connected to them. Highways England also commissioned Transport Focus to carry out interviews with SRN drivers and fleet managers to understand their priorities and experiences of using its roads. Stakeholder engagement also supported the production of The Road to Growth, its strategic economic growth plan, and Connecting the Country, which set out a longer-term view of how the SRN might evolve in the future.

4.3. In the DSBP, the company said it had identified an opportunity to put in place a more robust approach to the development of route strategies in the next road period. It also intends to focus more on reviewing issues on each route and, working with sub-national transport bodies (STBs) and other stakeholders, to develop strategies for each route which are aligned with 5-year road periods. We support any efforts to learn lessons from the current road period and apply them to the development process for RIS3.

4.4. Highways England acknowledged the importance of its relationships with STBs in light of the increased importance of the regional agenda. The DSBP reflected a commitment to working closely with existing STBs and new ones as they are formed.

4.5. As well as setting out its engagement activities, Highways England also attempted to show how the feedback received through the public consultation on the SRN Initial Report – and through other channels – influenced its thinking in the DSBP.

4.6. For example, Highways England said that it is clear that integration continues to be a priority for its stakeholders. This was reflected across a range of feedback. Intermodality was identified as a key priority for STBs, and, along with integration, was an area of focus at the regional RIS events that the company held during the research phase. Highways England said that it was developing an integration

[7] https://orr.gov.uk/__data/assets/pdf_file/0003/23457/RIS2-approach-document.pdf

strategy as part of its response, and that collaboration with partners around the use of and sharing of data will be a key theme within this. We will want to understand more about how this work develops during RP2.

Quality of analysis

4.7. The DSBP was of better quality, and was supported by higher quality evidence, than the equivalent for RIS1. It demonstrated a better understanding of the scope and cost of the enhancement portfolio. This reflects its growing maturity and asset and portfolio management capability, and the improvements to its data that Highways England has made during RP1.

4.8. The DSBP represents an important step on Highways England's journey to being a more mature network manager, not the end of the process. We have found that the quality of supporting evidence varies across the elements of the DSBP. And there are areas where it will be important for Highways England to continue to improve its data during RP2, both so we can effectively monitor its performance and to support the development of future RISs and SBPs.

4.9. Highways England was open and transparent about its supporting analysis. This included providing outputs from its analytical assurance process, which highlighted the limitations of its analysis in some areas.

4.10. Highways England's suite of Regional Traffic Models (RTMs) were at the heart of its analytical platform. These were used to assess the options developed from the route strategies and other sources, representing a significant development in how Highways England analyses portfolios of enhancements together, rather than as individual projects.

4.11. Highways England has also developed a set of outcome models, some of which interact with the RTMs and provide a link between the level of investment and performance. This level of performance modelling was mainly limited to safety and delay-related metrics. Other areas of the performance specification were supported by separate analysis, such as the funding required to achieve no net loss in biodiversity, or with little / no quantitative analysis of the expected impact on performance, such as user satisfaction.

4.12. Highways England has taken a consistent approach for its operations, maintenance and renewals cases, but the quality of underlying evidence varied. The largest asset renewal types (asphalt pavement and structures) were supported by well-established deterioration models to develop the overall size of the renewal programmes. For the smaller asset types, Highways England developed spreadsheet models to support its case. Where it did not have good enough data to do so, for drainage assets,

Highways England recognised this with a reduced funding requirement. Similarly, Highways England's efficiency proposals were underpinned by specific activities for its largest asset renewals – pavement, structures and vehicle restraint systems – but it applied "generic" efficiencies – based on the three areas covered by the capability reviews – to the other asset types.

4.13. The limitations of Highways England's data during RP1, and how it presented the DSBP, mean that it has not been possible to compare renewals unit costs across road periods. We recommend that Highways England develops robust renewals unit costs data (or similar measures of productivity) so that we can effectively monitor its delivery and efficiency during RP2.

4.14. For its operations, maintenance and business costs, Highways England's approach was based around rolling forward RP1 funding levels, adjusting for specific impacts and applying high-level inflation and efficiency assumptions. In the corporate support area, this was supported by a benchmarking exercise that provided additional assurance around the existing level of cost. During RP2, we would expect Highways England to develop similar benchmarks for maintenance and operations costs to inform planning for RP3.

Recommendations

We recommend that:

- Highways England develops robust renewals unit cost data (or similar measures of productivity) so that we can effectively monitor its delivery and efficiency during RP2.

5. Overall funding levels

RIS1 funding pressure

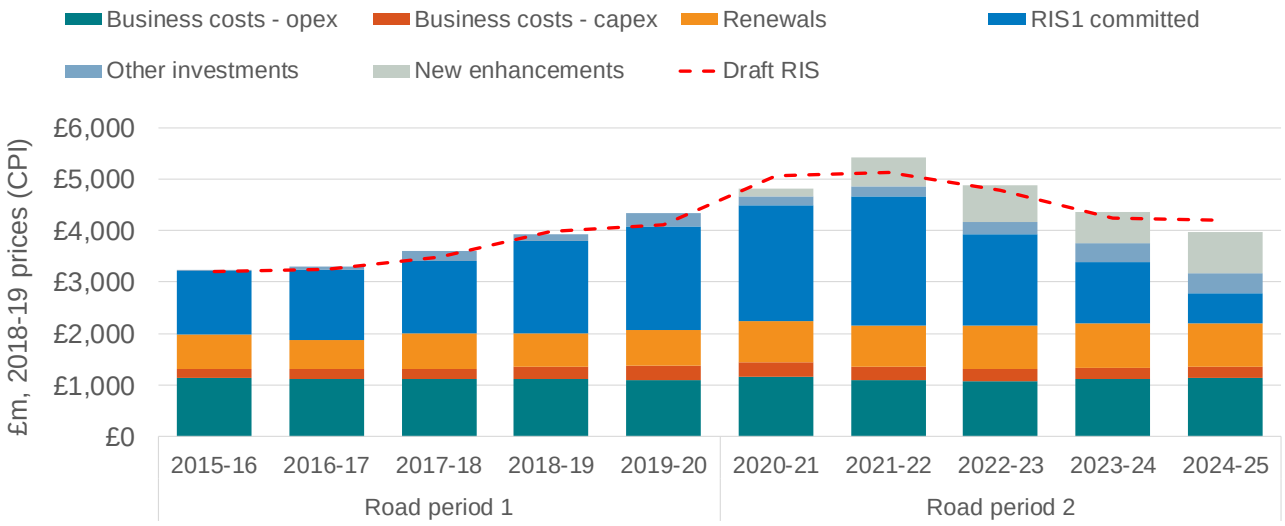
5.1. Throughout RP1 Highways England has managed a funding gap between the SoFA and its forecast costs for the period. The gap has come down to a level that Highways England expects to be able to manage within RP1, without having to use its capital flex to bring forward funding from RP2.

5.2. Since the DSBP submission, Highways England and DfT agreed to use capital flex to bring forward £100m of scope and cost elements relating to the LTC and A303 Stonehenge projects. Highways England also went through change control to change the milestone (start of works) dates for nine projects from those in the DSBP, some of which was envisaged in the DSBP. As these projects were originally planned to start work late in RP1, this was expected to have only a limited impact on overall RP2 funding.

Total expenditure

5.3. Figure 5.1 shows the funding proposed in the DSBP for RP1 and RP2, split between high-level spending "swimlanes". The figure is presented in real terms (in 2018-19 prices), using the OBR's October 2018 CPI forecasts.[8] [9]

Figure 5.1 RP1 and RP2 funding by high level "swimlane"



[8] The DSBP was produced in nominal (current) prices. We have used CPI as a well-recognised measure of headline inflation to present costs in real terms. Our use of CPI does not imply that it should be used in planning assumptions for all spending lines. We recognise that Highways England applied alternative assumptions. So by using CPI there will be some implied "real price effects" in our analysis.

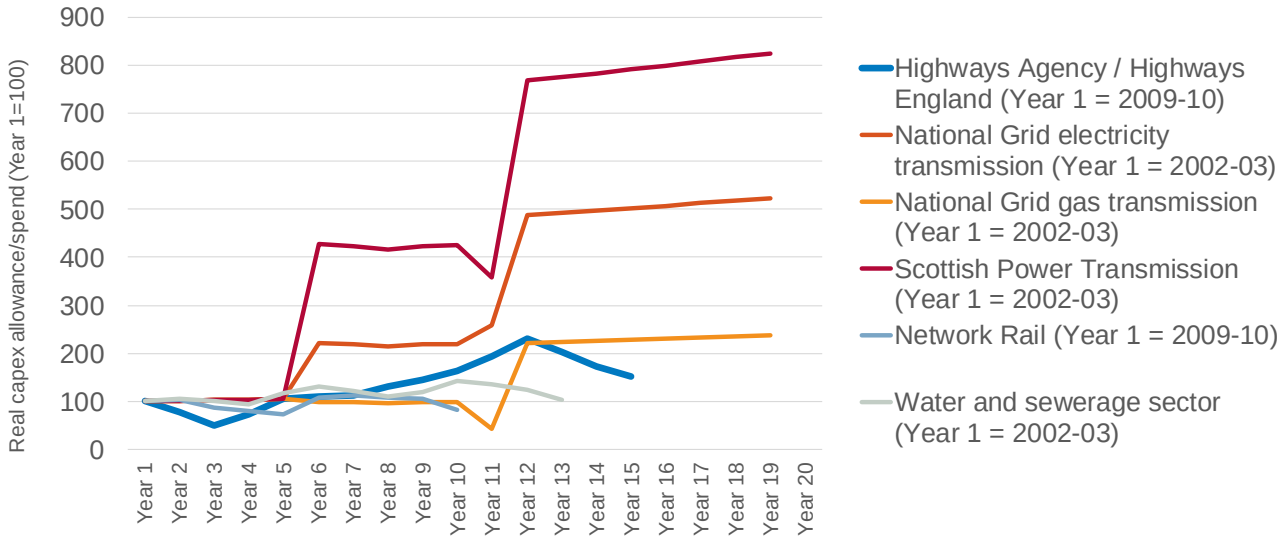
[9] The DSBP submission did not include RP1 figures for all swimlanes or total expenditure. Our estimate for the RIS1 committed swimlane during RP1 is based on Highways England's financial reporting.

5.4. The DSBP set out total expenditure of £25.343bn, a 44% increase on RP1 (31% in real terms).[10] An increase of this scale will be challenging to deliver. The DSBP showed expenditure peaking in 2021-22, driven primarily by the costs of delivering the RIS1 tail and new enhancements. This peak was higher than that in the DRIS, with a less extreme step-change from 2019-20 to 2020-21. However, as noted in section 3, Highways England's costing of the proposals in the DRIS suggested a higher peak in 2021-22 than in the DSBP. The changes it has proposed smooth the profile of spend, as well as bringing it to (nearly) within the SoFA.

5.5. Business costs and renewals combined in the DSBP were relatively stable across RP2 (in real terms), but increased by around 6% in 2020-21. The increase in total funding, and the profile over RP2, was mainly driven by enhancements – RIS1 committed projects (the "RIS1 tail") and new enhancement projects – which increased by 18% in the first year, and by over 40% in RP2 compared with RP1.[11]

5.6. Similarly, opex or resource spending was flat across RP1 and RP2 in the DSBP, but capital spending increased by around 40% (in real terms). Real capital spending in 2021-22 (year 12 in figure 5.2) was forecast to be more than double annual capital spending at the beginning of RP1. This increase is larger than has been seen in the more comparable rail and water sectors and will be challenging to deliver. The sectors that have seen similar, or larger, increases are typically less capital intensive.

Figure 5.2 Increases in capital allowances in other sectors



[10] Based on total RP1 funding of £17.6bn in the 2018-19 Delivery Plan.

[11] Based on our estimated RIS1 committed swimlane during RP1. Using funding for SR10, SR13 and RIS enhancements in the 2018-19 Delivery Plan, enhancement spending in the DSBP increased (in real terms) by 35% in 2020-21 (compared with 2019-20) and 57% in RP2 (compared with RP1).

6. Efficiency, inflation and risk

6.1. There are important links between efficiency, inflation and risk. For example, inflation is a risk for Highways England, particularly as the company is funded in nominal terms. So the inflation allowance in Highways England's cost estimates could be considered part of its wider risk allowances. Similarly, a greater efficiency challenge would increase the risk around delivery, and different inflation assumptions would change the level of efficiency for a fixed level of post-efficient funding.

6.2. Therefore it is important that the three are considered together. We recommend that cost reductions from alternative efficiency or inflation assumptions should be used to fund or reduce risk as there are inherent risks in the programme from its complexity and scale. This could be by either reducing the residual risk that Highways England has identified for the three life extension elements of its renewals case (for example, increasing funding and the planned volumes in those areas), or by increasing the centrally-held portfolio risk allowance.

Efficiency

Efficiency framework

6.3. Highways England identified three categories of efficiency in the DSBP:

- **Embedded efficiency** – activities with a defined scope or output, which were presented as post-efficient costs – £1.6bn efficiency on £20.7bn of post-efficient cost.
- **KPI measured efficiency generated in RP2** – applied to activities where the scope or output cannot be defined with confidence, with the main benefit to come in future road periods – £213m efficiency on £4.6bn of planned spending.
- **Carry-over efficiency** – the effect of efficiency-improving activities undertaken during RP1 that reduce costs in RP2 – £362m efficiency.

6.4. In the DSBP, Highways England proposed that only the KPI measured and carry-over efficiencies would be monitored during RP2. Together, these make up £575m, or 27%, of the total efficiency. We recognise that different approaches to providing evidence of efficiency improvement might be relevant for different areas of spending. But we disagree with any approach that would lead to us monitoring a small proportion of Highways England's proposed efficiency. We consider that we should monitor all of Highways England's efficiency.

6.5. Aside from monitoring, there was another significant difference between Highways England's proposed approach to embedded and KPI measured efficiencies. Embedded efficiencies were subtracted from a pre-efficient level of cost so that each funding line was presented in post-efficient terms. For KPI measured efficiency, the efficiency target was held within each spending line and was expected to deliver additional output or manage risk within that line.

6.6. This clearly makes sense for some areas covered by KPI measured efficiency. For example, the designated funds are hypothecated, so any efficiencies should be held within the funds to deliver additional output. Similarly, most of the new enhancements will start construction late in RP2 so, along with funding for RIS3 development and government priorities, most of the RIS2 funding will be for development work. The effect of efficiencies identified during design and development will reduce the construction costs in future road periods. So it might not be effective to reduce the budgets for the development work in RP2 by the (pro-rata) amount of targeted efficiency.

6.7. The LTC, A303 Stonehenge and A417 'Missing Link' at Air Balloon projects were all included in the KPI measured category but were scheduled to start work in the first two years of RP2. There is an argument that they could be treated more like embedded efficiencies, with the targeted efficiencies removed from project budgets and added to the centrally-held portfolio risk allowance. However, the risks around LTC, in particular, are so large that they dwarf the potential additional portfolio risk allowance. As we note below in the section on risk, we recommend that consideration is given to how best to manage and fund risks for these projects. While it potentially adds complexity to how efficiency is monitored, we are content with the proposed different efficiency treatment of these projects and expect to revisit the detail of how efficiency will be monitored in advance of RP2.

Cost challenge process

6.8. Embedded efficiencies are the difference between Highways England's proposed pre- and post-efficient costs. So an important part of understanding their deliverability and challenge is in testing whether the pre-efficient starting point is credible.

6.9. Throughout the DSBP, Highways England applied a cost challenge process before applying efficiencies. The scale and nature of this challenge varied across different areas of the business with cost challenge typically involving the reduction or deferral of scope, and efficiency focusing on reducing unit costs. In some places the distinction between what has been counted as an efficiency or a cost challenge was not clear, potentially with the result of under-stating the efficiencies.

6.10. Through this process, Highways England provided assurance that its pre-efficient costs were credible and were not padded to inflate the level of proposed embedded efficiency.

Context from government and sector work

6.11. Our advice on Highways England's DSBP draws on a range of evidence. Productivity growth in the construction sector typically runs significantly behind the broader economy. We commissioned a report[12] to look at what opportunities there are to improve this productivity performance and what the potential timeframes might be, to provide context for our assessment of Highways England. The report looked specifically at the opportunities presented by:

- greater modularisation and automation of manufacturing, including off-site assembly;
- enhanced data and information including Building Information Modelling (BIM) and digital design;
- reduced costs of procurement and commercial interfaces through alliancing and enterprise agreements;
- more advanced modelling and understanding of risk and how to manage it; and
- industry skills development.

6.12. The report identified broad consensus that greater modularisation and enhanced digital design have the potential to deliver large efficiency improvements. There was significant variability in the ranges suggested in the literature reviewed, in part because the estimates were largely theoretical rather than empirical. Moving towards greater modularisation is not a quick process and involves start-up costs that may act as a barrier to deployment.

6.13. The report found a general theme that improvements to procurement and commercial interfaces could yield significant efficiency improvements but there were barriers to doing so, including a misalignment of incentives between the contractor and the client.

6.14. The risk sharing arrangements were assessed as needing more work to avoid low levels of innovation from taking place because of worries about exposure. On industry skills development, it was widely recognised that there needs to be large

[12] Review of construction sector productivity work relevant to Highways England's performance and efficiency, CEPA, 2019

scale recruitment of engineers and specialised trades. In the short-term this is being addressed by apprenticeships, but this will need to be sustained and expanded over the medium- to long-term.

6.15. Highways England's proposals in the DSBP reflected many of these themes. For example, it is moving towards alliance and enterprise models for its procurement, particularly of enhancements and hopes to exploit the opportunities presented by greater modularisation and off-site construction.

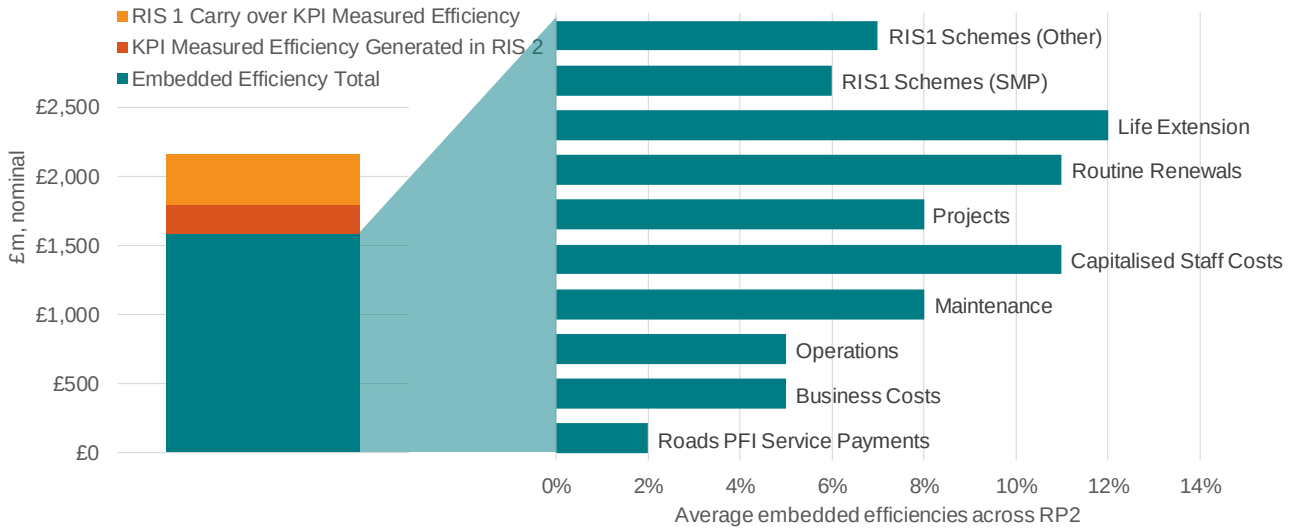
Overall level of efficiency

6.16. The DSBP set out total efficiency of £2.159bn. Our scrutiny of the DSBP uncovered that the pre-efficient costs for maintenance were over-stated by around £12m due to the inclusion of an area that had already transferred to the Asset Delivery model in the calculations. This did not affect the post-efficient funding. This is a relatively small amount in the context of the total proposed efficiency, and reduces it to £2.147bn.

6.17. Against total spending of £25.3bn, the £2.1bn represents an average efficiency improvement of around 7.8% across RP2. This is broadly in line with the conclusions from the capability reviews. Figure 6.1 shows the breakdown by category of efficiency and the average percentage embedded efficiency improvements for high-level spending categories.

6.18. Across these high-level spending categories, the average efficiency improvements range from 2.2% for PFI payments to 12.2% for life extension renewals. Across, and within, these categories there was a varying level of challenge in the DSBP.

Figure 6.1 Structure of efficiency proposals in the DSBP



6.19. We have identified a range of £100m-£150m of additional embedded efficiencies across Highways England's renewals and enhancements, which we discuss in more detail below. We recommend an increased efficiency challenge of £130m that, given the links with risk, should be used to reduce the residual renewals risk or to increase the centrally-held portfolio risk allowance for enhancements.

Table 6.1 Recommended additional embedded efficiencies

	Recommended additional embedded efficiency
Enhancements	**£70m-£110m**
RIP	£45m-£78m
SMP	£22m-£32m
Renewals	**£30m-£40m**
Structures	£12m-£19m
Other assets (including lighting)	£18m-£22m
Total	**£130m**

6.20. There is also potential for a higher efficiency target for Tier 1 enhancements[13]. Under Highways England's proposed approach, higher efficiencies for these projects would not reduce the funding but would help to manage risk within those projects' budgets.

Monitoring efficiency in RP2

6.21. We support the extension of Highways England's efficiency target to include opex or resource spending and we will monitor all efficiencies during RP2. As such, we recommend that the RIS2 efficiency target should cover all of Highways England's proposed efficiencies, not only its proposed KPI measured element.

6.22. We will engage with Highways England on the approach it will take to evidence these efficiencies, and revisions to its Efficiency and Inflation Monitoring Manual (EIMM). We expect this will likely involve a mixture of top-down and bottom-up measures. We do not expect the bottom-up cataloguing of efficiency case studies to be required to evidence efficiencies across all of Highways England's delivery.

6.23. In some areas, particularly renewals, we have not been able to compare volumes or unit costs across road periods, but reductions in unit costs feature prominently in

[13] Projects costing over £500m or that are considered "novel and contentious" that are subject to DfT governance processes.

Highways England's efficiency proposals. So we expect improved unit cost data (or similar productivity metrics) to play an important role in efficiency monitoring.

6.24. We expect to monitor efficiency in aggregate in RP2 – where we make specific recommendations for alternative efficiency assumptions, or comment on data that might be required to evidence efficiencies, this does not mean we plan to monitor efficiency at a more detailed level.

6.25. As well as the £1.2bn capital efficiency target, the efficiency outcome area in RIS1 included a KPI comparing progress against Delivery Plans and the RIS and a suite of supporting PIs. The PIs included cost and schedule performance indicators (CPI and SPI), which measure the performance of schemes in construction. We recommend that these metrics are retained, or improved metrics are developed, as part of the efficiency monitoring for RP2.

Inflation

6.26. Highways England is at risk for inflation because its funding is set in nominal terms. This is different to many regulated sectors where companies' income (or the regulated price they can charge customers) is indexed, providing some protection against volatility in headline inflation. This means that Highways England has to make inflation assumptions at the start of a road period and the allowances based on those assumptions effectively form part of its broader risk allowance.

Table 6.2 Inflation rates applied in the DSBP

	2020-21	2021-22	2022-23	2023-24	2024-25
Operating costs	2.0%	2.0%	2.0%	2.0%	2.0%
Maintenance contracts	2.76%	2.76%	2.76%	2.76%	2.76%
Electricity costs	5.0%	5.0%	5.0%	5.0%	5.0%
Capital works	3.41%	3.75%	4.57%	4.25%	3.53%

6.27. Outturn inflation is highly likely to differ from the forecasts in Highways England's plans. It could benefit from lower than expected inflation, or suffer from higher inflation. As its pre- and post-efficient costs are built on assumed inflation rates, this could confuse reporting of efficiency. As well as having reasonable assumptions in its plans, it is key that Highways England understands how it is affected by outturn

inflation and how this impacts its efficiency reporting. The table above sets out the inflation rates that the company applied to different spending areas in the DSBP.

Opex

6.28. For operations, Highways England applied a 2%, CPI-based forecast, which is consistent with the approach typically taken in other sectors and seems appropriate for these activities.

6.29. For maintenance, Highways England applied a 2.76% inflation assumption, based on its historical inflation rates. Historically, its contracts have included an RPI element, which is typically around 1% above CPI inflation. Given the declassification of RPI as a national statistic, we would expect Highways England to move away from its use over time (especially as it takes more control over its maintenance activities through the Asset Delivery model).

6.30. Maintenance efficiencies were based around avoiding inflation in the first two years, so a lower inflation rate would reduce the efficiencies proposed and have a reduced impact on post-efficient costs. So we are content that the inflation assumptions are appropriate but would expect a move towards more CPI-based indexing over time.

6.31. One exception to this is the treatment of electricity costs, where Highways England proposed a 5% inflation rate. Headline inflation rates, including CPI (and CPIH) include an electricity element with a similar weight to the proportion of electricity costs in Highways England's opex. So it could be argued that applying a higher rate to electricity costs should be offset by a lower rate for other elements of opex. It would also be unusual for a relatively small spending line (£146m) to have a specific inflation assumption in other regulated sectors.

6.32. However, this level of detail appears disproportionate and we recommend applying the same inflation rate to electricity costs as the rest of the maintenance line in which it sits. We estimate that this would reduce the maintenance funding by £9.4m.

Capex

6.33. In line with recommendations from the 2007 Nichols Review[14], and DfT guidance[15], Highways England developed a bespoke capex inflation forecast with an independent provider. This was originally motivated by Highways Agency enhancement projects exceeding their budgets. In the DSBP, Highways England

[14] https://webarchive.nationalarchives.gov.uk/20100202135703/http:/www.dft.gov.uk/pgr/roads/nicholsreport/nicholsreport.pdf

[15] https://www.gov.uk/government/publications/webtag-tag-unit-a1-2-scheme-costs-july-2017

applied the same profile to all of its capital spending, not just enhancements. The inflation profile included a 0.25% "risk premium", to reflect that Highways England carries inflation risk, and was within the range of independent forecasts from other sectors.

6.34. The precise level of the forecasts, and the inclusion of the 0.25% risk premium, are difficult to judge given the uncertainty and volatility in construction sector inflation and lack of precedent, respectively. However, as noted above, whatever level they are at, inflation will almost certainly outturn differently to forecast. So what is most important is that Highways England is able to report on its outturn inflation and its interaction with efficiency during RP2.

6.35. An alternative approach, would be to base assumptions on long-term trends or a CPI-plus (or real price effects) approach, and to capture inflation risk through (higher) risk allowances. For example, if the long-run sectoral average of 2.7% inflation proposed by DfT were applied during RP2, it would reduce capital costs in the DSBP by around £520m (or around £430m if the amount of enhancements spend expected to be contracted by the start of RP2 is taken into account).

6.36. DfT's cost estimation guidance recommends the use of appropriate industry inflation forecasts and our review of Highways England's cost estimation[16] found that Highways England's assumptions are at the mid-point of independent forecasts. There are also potential cost pressures, from increased activity across the wider sector and possible Brexit implications, that mean we might expect a period of above-trend inflation. Therefore, we do not recommend this alternative approach. If such an approach were used, in line with our overall recommendation, we would expect there to be an offsetting increase in risk funding (for renewals, as well as enhancements).

Inflation applied to the end of RP1

6.37. Renewals costs in the DSBP were developed using 2017-18 costs as a base to which inflation assumptions were applied. The capex inflation profile in table 6.2 was applied during RP2, but Highways England also used the RIS1 funding model assumptions of 5% per year for the final two years of RP1.

6.38. Highways England's 2018-19 Efficiency Report showed outturn renewals inflation of 3.5% and information the company provided to support its inflation assumptions showed forecasts below the assumed 5% in 2019-20. Highways England's rationale for using the RIS1 funding model figures was that not doing so would risk re-opening RIS1. We do not agree with this and recommend that the renewals costs are

[16] Assessment of Highways England's cost estimation approach for RIS2, Nichols, 2019.

re-estimated in the Final SBP with the latest available outturn and forecast information, as not doing so risks inflating Highways England's starting costs. Based on the 2018-19 outturn figure of 3.5% and the average RP2 forecast rate of 3.9% in 2019-20, we expect this would reduce renewals costs by around £110m. We recommend that this should be used to reduce the level of residual risk identified in the areas of life extension renewal.

6.39. There is a similar issue for enhancements, although it is more pronounced as the enhancements costs are in a January 2016 base. There is also an additional complication as almost 40% of RP2 enhancements spending was expected to be contracted by the start of RP2, with target costs agreed that limit the scope for applying alternative inflation assumptions. As with renewals, we recommend that the costs are re-estimated with the latest outturn and forecast inflation figures and that any cost reductions are used to increase the centrally-held portfolio risk allowance.

6.40. Based on information Highways England provided on the proportion of its enhancements spend that will already be contracted; outturn inflation reported in its 2018-19 Efficiency Report for 2016-17 to 2018-19; and the RP2 average rate of 3.9% for 2019-20, this would reduce enhancement costs by around £410m. Given the links between inflation and risk, this recommendation should be considered alongside our recommendation (in the section on risk below) that further thought is given to how best to manage the risks to Tier 1 projects, and Lower Thames Crossing in particular.

6.41. If the above changes to RP1 inflation assumptions were made in conjunction with the 2.7% inflation assumption during RP2 proposed by DfT, it would reduce capital costs by almost £1bn, after the proportion of enhancements spend expected to be contracted at the start of RP2 is taken into account. As we note above, we do not recommend this approach to capital inflation.

Risk

Quantified cost risk analysis and contingency funding

6.42. Highways England considered risk across much of its DSBP but its quantitative analysis of risk focused on enhancements. This analysis had two strands to it.

6.43. Firstly, Highways England's cost estimation method for its major enhancement projects included four risk elements (and an inflation allowance). We discuss this approach in more detail in section 7, but it included consideration of both project-specific and portfolio-level risks. The portfolio risks were based on a common set of 21 factors, and the level of portfolio risk typically declines as a project moves through the Project Control Framework (PCF) process.

6.44. The estimation of portfolio risk is not new for RIS2. It has previously been excluded from project budgets or, at least, going into RP1 it was not reported and managed with sufficient transparency for Highways England to manage cost variances when they arose. There was more clarity about the treatment of portfolio risk in the DSBP. The individual enhancement project cost estimates included a portfolio risk allowance. Highways England proposed that this element will be removed from individual projects and centrally held as a £935m portfolio risk allowance.

6.45. Highways England tested the size of this fund through the second strand to its risk analysis – a quantified cost risk analysis (QCRA). The cost estimation for individual projects produced a three-point range, not just a central estimate. The min (P(10)) to max (P(90)) range was applied in a QCRA to produce a distribution of costs for the portfolio. This showed that, when the £935m portfolio risk allowance was included, the portfolio was at an approximately P(50) level – there was an approximately 50% likelihood that it can be delivered for that cost.

6.46. The analysis did not only include the enhancements programme. Other elements of the DSBP were included but their costs were held constant – so that it was only enhancement costs that drove the variation in costs for the DSBP as a whole. Importantly, the costs for the LTC project were also held constant in the QCRA. Excluding portfolio risk, the DSBP contained £2.0bn of funding for the LTC, with a P(10) to P(90) range of £1.5bn-£3.0bn. If the P(90) position were to occur, it would use up all of the proposed centrally-held portfolio risk allowance. This would put a lot of pressure on the rest of the portfolio and Highways England has assumed that, in that situation, additional expenditure would be pushed into future road periods. So we recommend that consideration is given as to how best to manage and fund risks for Tier 1 projects, and Lower Thames Crossing in particular.

6.47. Highways England also carried out a QCRA exercise on a set of additional risks and headwinds that are excluded from the DSBP, with a P(50) position of £1.9bn. The largest items relate to VAT risk.

6.48. We agree with the proposal for a centrally-held portfolio risk allowance in RIS2. With clear rules and governance around it, this approach will provide more transparency than the over-programming approach used during RP1. However, it is key that Highways England develops clear rules and processes for how this fund is accessed, for what purposes and how funds will be dispersed for other purposes if risks do not materialise. This links to the importance of the RIS3 development funding to bring potential new projects to a point where they can start work during RP2 if funding is available.

6.49. The proposed portfolio risk allowance does not replace the need for a formal change control process. This process has played an important role during RP1 and we recommend that it is retained for RP2. There are risks with the portfolio that should be resolved or formally recorded in advance of RP2. This includes, but is not limited to: risks around Tier 1 schemes, and Lower Thames Crossing, in particular; the removal of PF2 private finance; the treatment of unrecoverable VAT; and exclusion of the Historic Rail Estate from the SoFA.

6.50. The exclusions, particularly relating to the LTC, suggested that the P(50) position could be optimistic and the £935m proposed contingency funding is likely to be at the lower end of what is required for the proposed portfolio. As discussed above, there are links between risk, inflation and efficiency – lower inflation assumptions and greater efficiency challenges would, all else being equal, increase risk. Therefore we recommend that cost reductions from alternative inflation assumptions and greater efficiency challenges for enhancements should be used to increase the centrally-held portfolio risk allowance.

6.51. The impact of this on the overall P-level for the portfolio is potentially complex, because of how inflation and efficiency assumptions feed into the cost estimates and QCRA. So we recommend that the QCRA is updated in the Final SBP.

6.52. Highways England's quantified analysis of enhancements risk focused on costs. It is also important to understand the risks to delivery timescales. We expand on this in section 7 and recommend that Highways England carries out a quantified assessment of the risks to project timescales.

Renewals risk

6.53. Renewals costs were held constant in Highways England's QCRA and there was no specific allowance for risk or uncertainty in how Highways England put together its renewals costs. The cost challenge process for renewals either reduced volumes or used alternative (lower cost) interventions. Highways England's approach to risk in this area focused on ensuring that, after this cost challenge, there is a technically acceptable level of risk so that it will be able to maintain its assets to a safe and serviceable level.

6.54. There was greater uncertainty around the three areas of life extension renewals proposed in the DSBP. Reflecting this uncertainty, Highways England identified a residual level of risk for these three asset types, totalling £361m. In the DSBP, Highways England expressed this risk as additional volumes of work, but, given the nature of the uncertainty, it could apply to the cost of undertaking the planned volumes set out in the DSBP.

6.55. As with enhancements, we recommend that cost reductions from lower inflation assumptions and greater efficiency challenges for renewals should be used to reduce this level of residual risk. As there is no specific risk funding for renewals identified in the DSBP, our starting position is that this would effectively mean reallocating more funding to the three areas of life extension renewals, and (given how Highways England has expressed this risk in the DSBP) likely increasing the planned volumes in those areas. However, Highways England may wish to develop an alternative approach to managing renewals risk in the Final SBP and / or RIS2 Delivery Plan.

Brexit

6.56. The DSBP did not specifically identify Brexit as a key risk but there are two key mechanisms that could affect Highways England:

- exchange rate effects that affect the prices Highways England pays for imported or dollar-priced materials; and
- labour restrictions, particularly for semi-skilled workers.

6.57. Both of these mechanisms would ultimately affect the prices Highways England pays and, therefore, the actual inflation it will face during RP2. This emphasises the links between risks and inflation noted above. In its analysis of inflation during RP1, Highways England noted that fluctuations in the dollar-prices of commodities like steel and oil were responsible for low inflation at the beginning of the period, and increases in the last two years.

6.58. The commodity prices varied by significantly more than the size of the sterling depreciation following the EU referendum, highlighting the volatility in these markets and that Brexit is not the only significant risk in this area. So, barring a much larger depreciation than was seen following the referendum, the larger risk appears to be from labour market effects. This could come at the same time as there are growing demands on the wider sector from increased investment in projects like HS2 and Heathrow expansion. So this supports a central inflation forecast in the DSBP above long-term sectoral averages.

Recommendations

We recommend that:

- the RIS2 efficiency target should cover all of Highways England's proposed efficiencies – we will monitor the delivery of all of Highways England's efficiencies;

- a KPI assessing delivery progress against plans and supporting PIs (such as the CPI / SPI metrics reported during RP1) measuring the performance of schemes in construction should be retained as part of the efficiency monitoring for RP2;
- there should be an additional embedded efficiency challenge of £130m;
- electricity costs should be re-estimated with the same inflation assumptions as the rest of the maintenance line in which they sit;
- the proposed profile of capital cost inflation forecasts for RP2 should be retained, but renewals and enhancement costs should be re-estimated with the latest available outturn and forecast inflation information for RP1 – we expect this would reduce renewals costs by around £110m and enhancements costs by around £410m;
- Highways England establishes a centrally-held portfolio risk allowance and develops clear rules for how this is accessed, for what purposes and how funds will be dispersed for other purposes if risks do not materialise;
- the formal change control process should be retained, as it has proved useful during RP1;
- cost reductions from alternative efficiency and inflation assumptions should be used to fund or reduce risk – for enhancements, this would mean increasing the size of the proposed £935m portfolio risk allowance, and for renewals it would likely mean reallocating funding to the three areas of life extension renewals to increase planned volumes (given how residual renewals risk is expressed in the DSBP);
- consideration is given to how to best manage and fund risks for Tier 1 projects, and the Lower Thames Crossing in particular; and
- Highways England should update its quantified cost risk analysis, in light of the recommendations above.

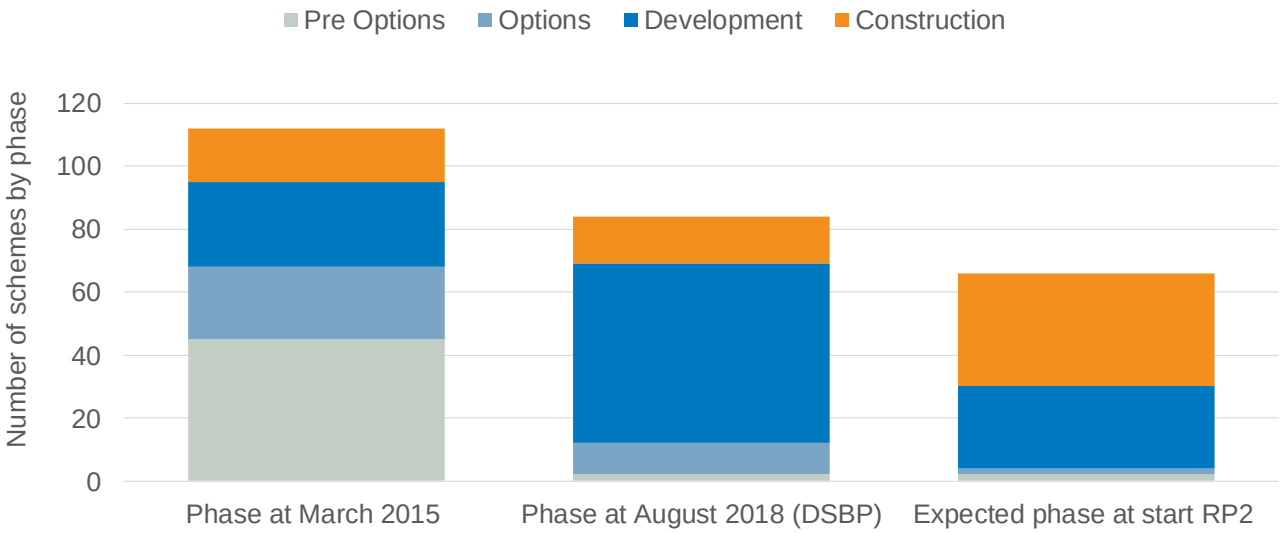
7. Enhancements

7.1. The overall increase, profile and peak of RP2 funding in the DSBP were all driven primarily by enhancements. The improvement schemes specified in RIS1 need to be completed, and there was a greater number of larger, more complex schemes specified for RIS2 than have been completed during RP1. Delivering this more complex portfolio will be challenging. In this section we consider the challenge from two perspectives: the number and timing of major projects, and their costs, funding and efficiency.

Number and timing of major projects

7.2. One of the main challenges during RP1 was the size and relative immaturity of the enhancement programme. Much of the RIS2 programme in the DSBP was dominated by the tail of RIS1 committed projects, so this is now more mature, with better understood costs and scope. This is illustrated in figure 7.1 which shows that, at the start of RP1, 68 of the original 112 RIS1 schemes were in the pre-options or options phases of the Project Control Framework (PCF).

Figure 7.1 Number of projects by PCF phase



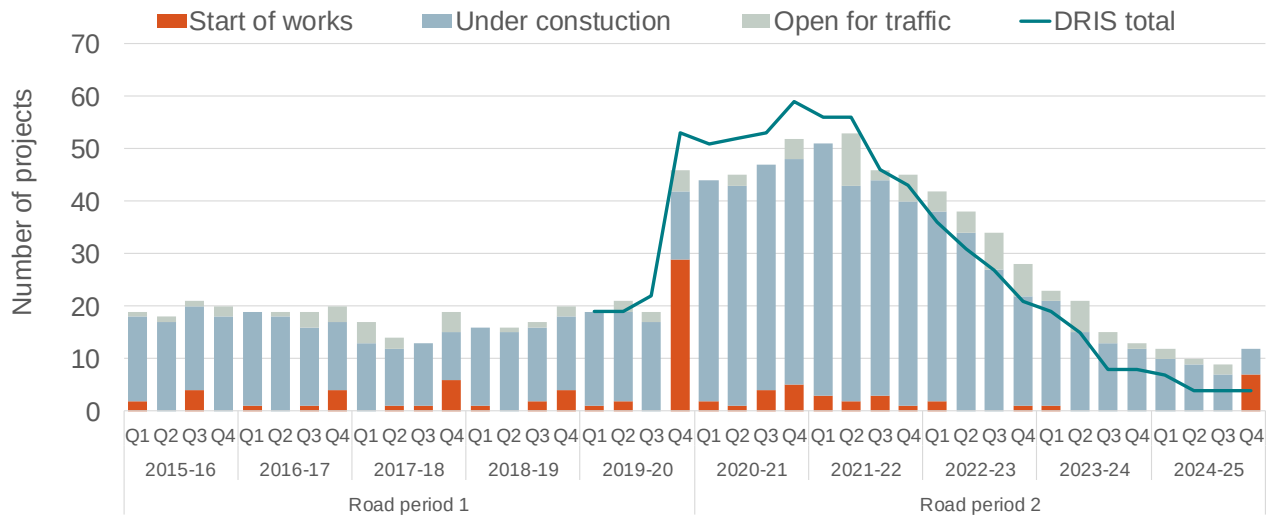
7.3. At the point when the DSBP was prepared (August 2018) this had reduced to 12 of 84 projects, with the majority (57) in the development phase. And at the start of RP2, there were forecast to be only 4 projects in pre-options and options, 26 in development and 36 in construction. These numbers include the new enhancements in the DSBP except for the three additional smart motorway projects.

7.4. There are still risks and unknowns when projects are in the development or construction phases. The precise numbers in each phase is subject to change between now and the Final SBP and this is mainly due to the effect of some projects

going through change control. For example, there are nine projects named in the DSBP that have proposals to change their start of work assumptions being reviewed through the change control process.[17] This means that these schemes will remain in the development stage for a longer period than estimated in the DSBP. However, this does not change the overall conclusion that the portfolio heading into RP2 is better known and understood than at the start of RP1.

7.5. The overall RP2 spending profile in the DSBP was driven primarily by enhancements spending. That, in turn, was mainly driven by the number of major projects in construction, which was scheduled to increase significantly in the last year of RP1. This is clear from figure 7.2, which shows the number of projects in construction in each quarter over RP1 and RP2, as set out in the DSBP. It also compares the DSBP proposals with what was set out in the DRIS. This shows that, relative to the DRIS, Highways England shifted more start of works towards the end of RP2 in the DSBP.

Figure 7.2 Number of projects in construction by quarter during RP1 and RP2



7.6. The company took steps during RP1 to smooth the profile of RIS1 projects. However, the plan in the DSBP to start work on 29 projects in the final quarter of 2019-20 represents a significant challenge for Highways England. For example, the planned (or assumed) length of the development phase required to start construction at this point is shorter for many of these projects than the typical development period duration. It is worth noting that the 2019-20 Delivery Plan is likely to alter this schedule, and may list 21 projects that will start work in the final quarter of 2019-20. This still represents a significant increase compared with typical delivery during RP1. It is likely that there are still risks remaining around Highways England starting work

[17] Including the A5 Towcester Relief Road, which is not named in the DSBP, six projects are being considered as being recorded as missed commitments and four are being considered for a rescheduled start of works in RP2.

on all of these projects to the planned timescales. Any delays to the start of work for these projects could have knock-on effects during RP2, in terms of the planned expenditure profile and enhancement project completion dates.

7.7. Our analysis suggests that 34 of the projects listed in the DSBP require a Development Consent Order (DCO), of which 11 were at risk when the DSBP was prepared (based on an assumed 21-month timescale for the DCO process). Of these 11, 6 were going through the change control process at the time of our advice to alter the start of works date to RP2. And Highways England planned to mitigate the risk to the remaining 5 by:

- attempting to secure a shorter decision period;
- gaining access to land by agreement;
- undertaking critical path works early, at the risk that the work is abortive if the DCO is not granted; and / or
- starting enabling and other works within the highway boundary early, again at risk that this work could prove abortive.

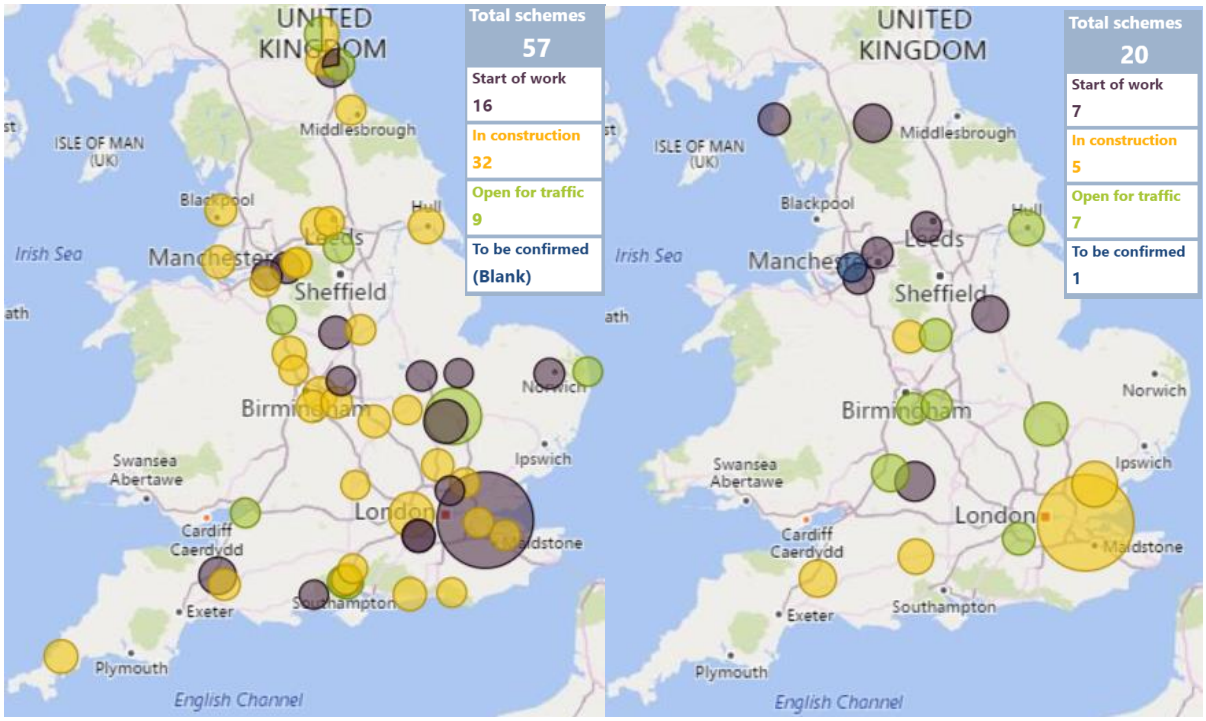
7.8. The milestone dates for some major projects in the DSBP already included the anticipated impact of changes going through the change control process. And there have been additional projects going through change control since the DSBP was submitted. While these projects might have only had a limited amount of spending in RP1 (due to the start of works date being so late in the period), these changes could impact on the profile of spending and funding in RP2.

7.9. Further changes might occur during RP2, and we support the continued use of a change control system similar to that used during RP1. It is important that the Final SBP and / or RIS2 Delivery Plan set out a clear baseline of schedule, cost and scope against which we can monitor delivery during RP2.

7.10. The maps below, in figure 7.3, help show the user impact that the proposed level of investment in the network could have. For example, there are certain corridors, particularly from Birmingham to Manchester, where there will be multiple enhancement projects under construction at the same time at the start of RP2. By the time most of the new enhancements start construction at the end of RP2, there will be fewer projects on the network and so fewer interactions between them.

7.11. While these projects aim to increase capacity and reduce congestion in the longer-term, they will cause user disruption during their construction. It is important that this is reflected in the RIS2 performance specification, and we discuss this in section 10.

Figure 7.3 Projects in construction in the first and last years of RP2



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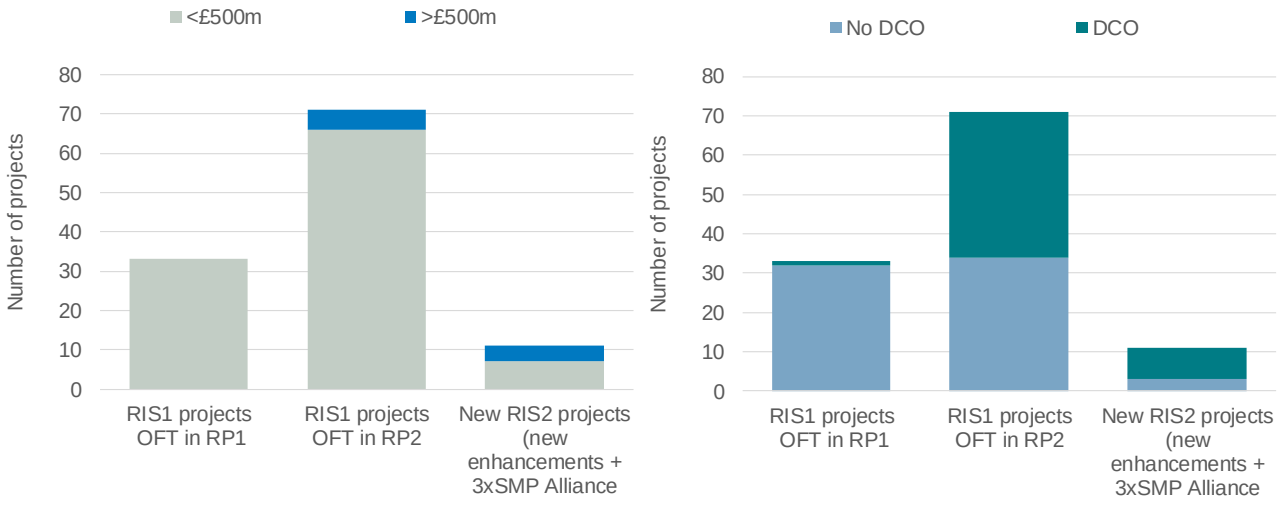
7.12. As well as posing a specific delivery risk, if a project has to go through the DCO process it can also indicate greater project complexity. Similarly, larger, more expensive projects are likely to be more complex. Figure 7.4 shows the number of schemes costing over £500m and those requiring a DCO, split between projects opening for traffic in RP1, RIS1 projects that will open for traffic in RP2, and new RIS2 projects.

Figure 7.4 Projects costing £500m and requiring a Development Consent Order in the RIS1 and RIS2 portfolios



7.13. Both measures show the RIS2 portfolio is more complex than the projects Highways England completed and opened for traffic during RP1. This higher complexity brings challenges that offset some of the increased certainty from having a more mature portfolio. Also, risks materialising on larger projects are likely to have a larger impact on the portfolio. This is particularly acute for a project of the scale of the Lower Thames Crossing. As discussed above, we support Highways England's proposal to establish a centrally-held portfolio risk allowance, to help manage the risks of this more complex portfolio.

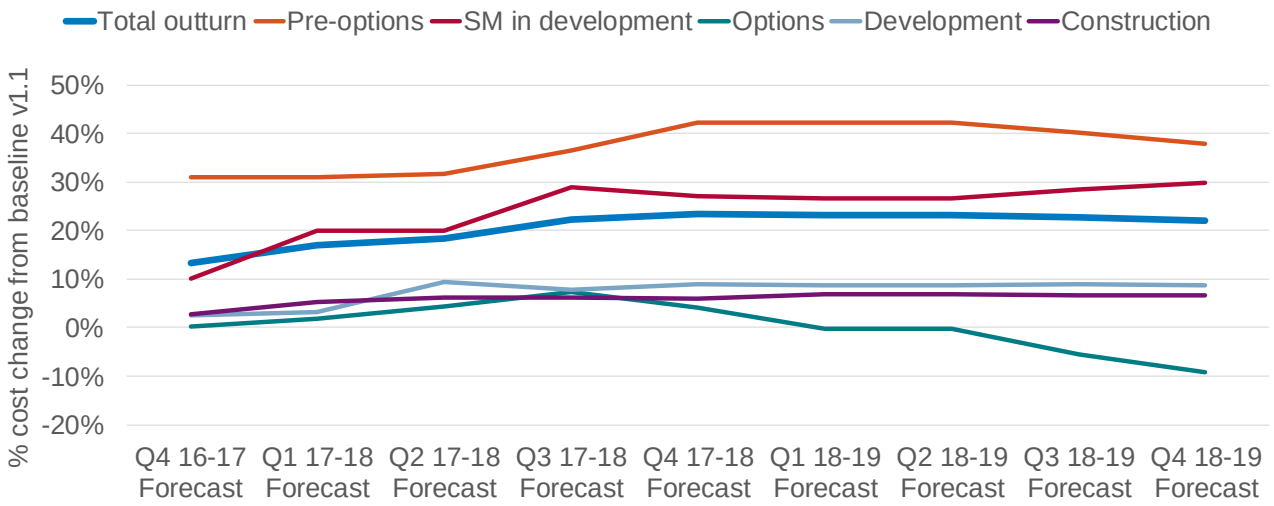
7.14. Given the deliverability risks and challenges we have identified, we recommend that Highways England carries out a quantified assessment of risks to project timescales. The company should also consider whether its current information (such as the CPI / SPI earned value indicators) is capable of providing early-warning on scope and cost problems, and if not develop new indicators to do so.

Costs, funding and efficiency

Cost escalation during RP1

7.15. One of the consequences of the programme immaturity early in RP1 was that costs increased as scope was better understood. Figure 7.5 shows that this cost escalation was particularly large for projects that were in pre-options at the start of RP1 (dominated by the A12-A120 widening and A428 Black Cat projects), and smart motorways that were in development (where three projects – the M62 J20-25, M40/M43 interchange and A1(M) J6-8 – saw particularly large escalations against the baseline). This cost escalation has levelled off in recent quarterly reports, suggesting a more stable entry point for RP2.

Figure 7.5 Escalation in enhancement project costs from the baseline at the start of RP1, by PCF phase at the start of RP1



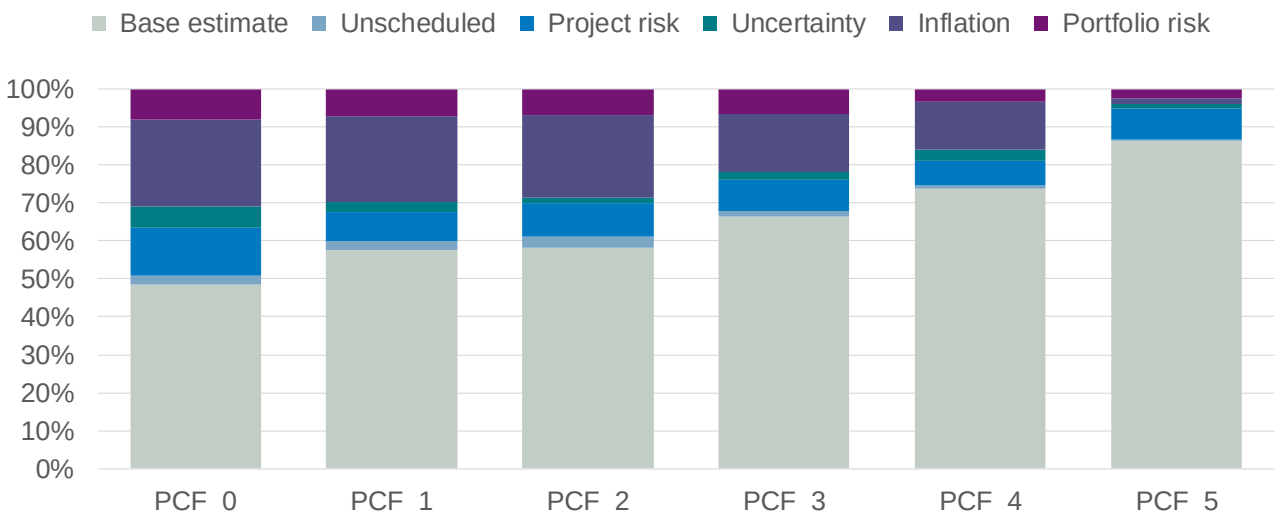
Highways England's major project cost estimation method

7.16. Our review[18] of how Highways England estimates costs for its major projects concluded that the company has comprehensive and effective cost estimating processes and procedures in place, that compare well with other major organisations. During RP1, the company developed a framework of cost models and tools to improve confidence in the accuracy of its estimates.

7.17. Highways England's cost estimates in the DSBP were built up from a base cost (covering both direct and indirect costs), various elements of risk and uncertainty, and inflation. Figure 7.6 shows how these elements evolve, as a proportion of total cost, over a project's lifecycle, based on the sample of projects analysed in our review.

7.18. In line with expectations and best practice (for example, HM Treasury guidance[19]) the risk allowances decrease, and base costs increase, as a proportion of total costs as a project matures and some risks either materialise or fall away. Our review concluded that the risk provisions compare well with other organisations.

Figure 7.6 Elements of enhancement project cost estimates by PCF phase



7.19. Highways England experienced variances in costs across its portfolio during RP1 (for example, as shown in figure 7.5). Our review found that scope changes and external impacts were the major causes of cost variance, not cost estimating inaccuracy.

[18] Assessment of Highways England's cost estimation approach for RIS2, Nichols, 2019.

[19] https://www.gov.uk/government/publications/green-book-supplementary-guidance-valuing-infrastructure-spend/early-financial-cost-estimates-of-infrastructure-programmes-and-projects-and-the-treatment-of-uncertainty-and-risk

Highways England is continuing to develop its cost database and estimating tools to improve the confidence in its estimates.

7.20. As part of our cost estimation review, we compared the costs of a set of RIS1 projects with similar-seeming projects that were considered as part of the RIS2 portfolio. Although there were some large differences in total costs, when compared on a like-for-like basis, there was not evidence of costs increasing systematically over time. This part of our analysis highlighted that:

- scope differences between apparently similar schemes can lead to large differences in costs;
- the effects of inflation are important to consider when comparing project costs across road periods; and
- it is important to consider ranges around early stage cost estimates.

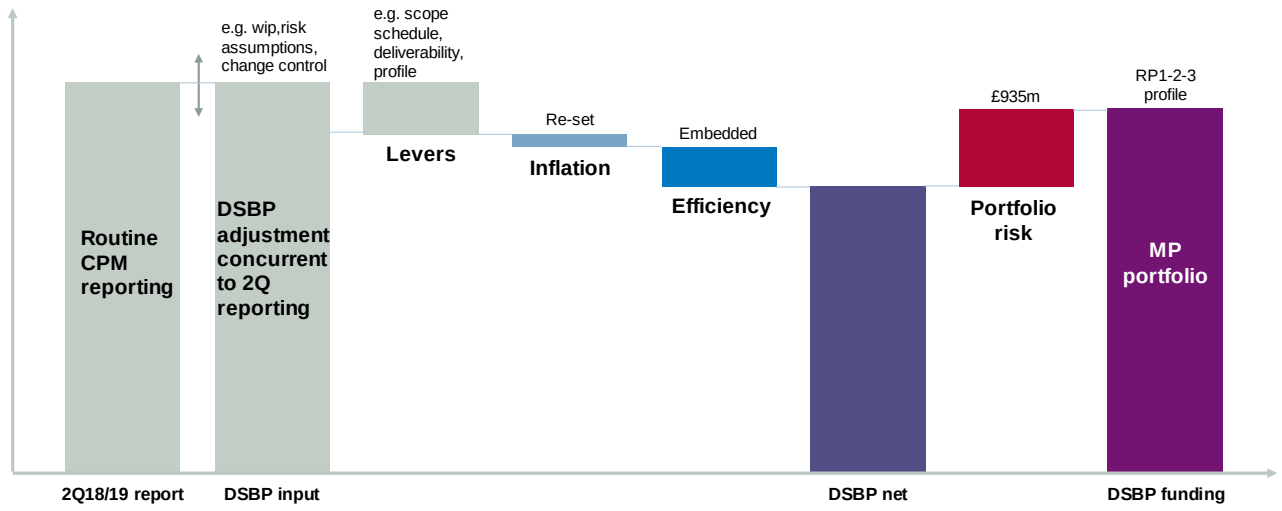
Building individual project costs into a portfolio

7.21. RIS1 was over-programmed – major project costs exceeded the available funding – but this approach was not clearly or explicitly communicated to stakeholders, and nor was the implication that some of the original 112 projects would be deferred or cancelled.

7.22. Highways England took a different approach in the DSBP. Every project in the portfolio was funded, with no over-programming. It proposed that the portfolio risk allowance estimated for each project will be held in a central portfolio risk allowance of £935m. Highways England reports to us on its major project costs on a quarterly basis. The process by which it went from the regularly reported costs to those in the DSBP is shown in figure 7.7.

7.23. The "levers" refer to scheduling or scope changes, which might increase or decrease the total cost of a project, but overall reduced the cost of enhancements during RP2 in the DSBP. In addition, Highways England applied revised (lower, compared with previous plans) inflation forecasts and embedded efficiency assumptions, which reduced the costs of each project and the overall portfolio. The individual cost estimates in the DSBP included the portfolio risk allowance for that project, and the DSBP did not include a separate funding line for portfolio risk. However, in practice the project budgets will not include the allowance and it will be centrally-held in a contingency allowance.

Figure 7.7 Build-up of DSBP portfolio costs from Highways England's routine capital reporting



7.24. The size of the centrally-held portfolio risk allowance was built bottom-up, from the individual portfolio risk allowances for each project. But it was also checked on a top-down basis. A quantified cost risk analysis (QCRA) across the portfolio found that, with the £935m fund included, the portfolio was at a broadly P(50) position. However, it is important to note that there were some significant exclusions from this QCRA exercise which means that the P(50) conclusion could be optimistic.[20] Therefore the £935m could be considered as towards the lower end of the size of contingency funding required.

7.25. This approach also has implications for what should happen if projects drop out of the portfolio. For example, during RP1 some projects were removed from the portfolio on value for money grounds and this risk remains during RP2. Without over-programming, we would expect that if a project is removed from the portfolio, all else being equal, it would be replaced with another project and / or there would be an acceleration of other projects to a similar value. So it is important that Highways England develops a pipeline of schemes with the RIS3 development funding, including accelerating several to the point where work could start during RP2, should the funding become available.

Inflation assumptions applied to the 2017-18 base year

7.26. As discussed above, Highways England applied its RIS1 funding model inflation assumptions to its base costs up to and including 2019-20. We recommend that Highways England re-estimates its enhancement costs with the latest outturn and forecast inflation rates for up to and including 2019-20. We expect this to reduce

[20] Most importantly, the exclusions include the Lower Thames Crossing and risks relating to VAT.

enhancement costs by around £410m, and we recommend that this is put towards increasing the centrally-held portfolio risk allowance.

Enhancements efficiency

7.27. Highways England's overall approach to efficiency is described in more detail in section 6. In the DSBP it proposed three categories of efficiency, all of which are relevant for enhancements:

- carry over efficiency – the realisation of efficiencies in RP2 from actions carried out during RP1 – up to £300m[21];
- newly-generated "KPI measured efficiency" – which applies to Tier 1 and new enhancement projects – £157m; and
- embedded efficiency – efficiencies in the smart motorway and regional investment programmes (SMP and RIP, respectively) primarily from new procurement approaches implemented in RP2 – £573m.

7.28. This totalled around £1bn of enhancements efficiency on post-efficient spending of around £12.3bn during RP2, an efficiency improvement of 7.8% on average across RP2. In the sub-sections below we set out the levels of efficiency for each enhancement programme (RIP, SMP and Tier 1 and new enhancements) and how Highways England expects to deliver them.

7.29. We consider the proposed efficiency improvements in the context of the procurement and portfolio management capability reviews, which are both applicable to enhancements. Taken together, the two reviews suggested there was potential scope for capital cost efficiencies in the range of 6-10% to be realised during RP2. However, we note that there may be some overlap between the areas covered by the capability reviews, so the top end of this range might be very challenging.

Regional investment programme

7.30. Highways England proposed up to £566m of efficiency on its RIP programme, with £446m of this "embedded" and £90m-£120m carried over from RP1. Combined, this made up 8.5% efficiency on £6.1bn of spending in RP2 (in nominal terms). The embedded efficiencies alone represented average efficiency improvements of 6.8% across RP2. This is within, but towards the bottom of, the range of 6%-10% from the relevant capability reviews.

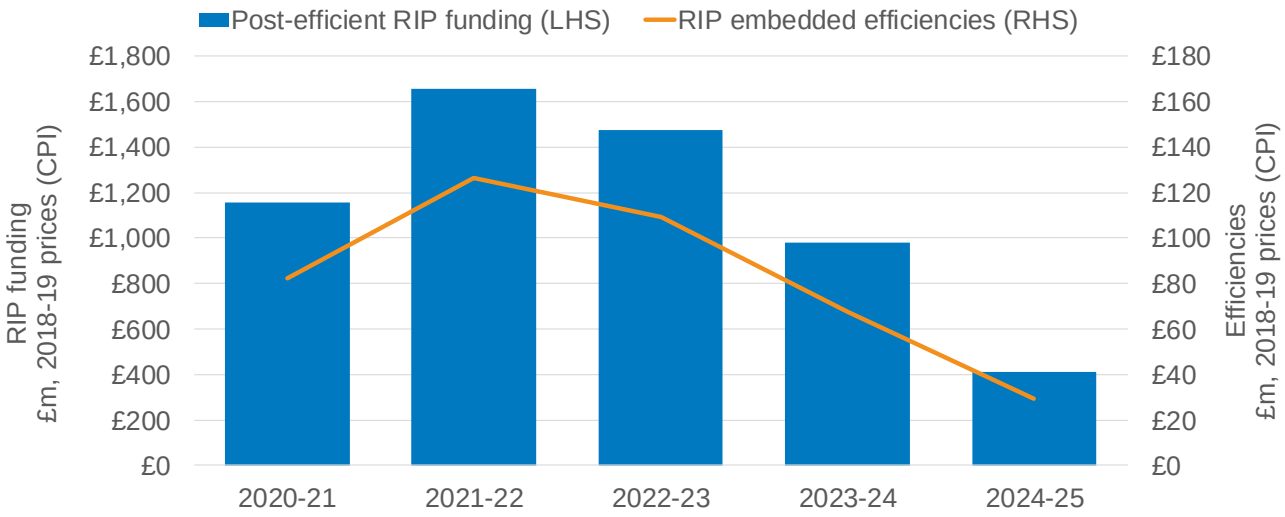
[21] The February update to the DSBP provided ranges for the RIP, CIP and SMP programmes, with NRTS2 also making up £60-£70m of the £362m total target for carry over efficiency.

7.31. The starting costs for RIP projects included a cost challenge and Highways England had taken steps to identify and exploit cost savings in the design and development stages. The main driver for delivering the embedded efficiencies (which are additional to those cost reductions) will be Highways England's Regional Delivery Partnership (RDP) procurement method for the 35 RIP projects that are not already committed through its Collaborative Delivery Framework (CDF) approach.[22]

7.32. This new procurement approach is expected to drive efficiencies by:

- providing significant awards of work upfront, that allow suppliers to exploit economies of scale;
- allocating future work based on performance, incentivising suppliers to demonstrate value and efficiency to win future work; and
- ensuring clear roles and responsibilities through the project lifecycle, including the handover of asset information at project close.

Figure 7.8 Profile of embedded RIP efficiencies



7.33. Figure 7.8 shows the profile of embedded efficiencies and RIP funding (in real terms). The efficiencies follow the overall profile of enhancement spending, consistent with the efficiencies being generated through the delivery of the 35 RIP projects that will use the RDP approach. This implies that Highways England

[22] There are 4 further RIP projects with significant spend (totalling almost £580m) during RP2 which will be delivered through CDF and 19 projects with minimal RP2 spend, for which no embedded efficiencies have been included in the DSBP. The proposed embedded efficiencies represent a 7.5% average efficiency improvement across the period based on the costs of only the 35 RDP projects.

expected to make around 6.8% efficiencies throughout the whole period, rather than efficiency improvements building up through RP2.

7.34. By contrast, Highways England's standard efficiency assumption for its new enhancements in the DSBP was 8.0%, the centre of the range from the capability reviews. We recommend a greater efficiency challenge of 7.5%-8% for RIP projects, an additional £45m-£78m of embedded efficiency, and that this cost reduction is used to increase the portfolio risk allowance.

7.35. In recommending this range, we recognise that around £580m of the RIP programme will be delivered outside of RDP – the main vehicle for delivering efficiencies. If it is not possible to drive any further efficiencies from the projects that will be delivered outside of RDP, two of which have over £200m of spending each planned during RP2, then the top end of our range would equate to an 8.8% average efficiency improvement on the RDP-delivered projects, comfortably within the range from the capability reviews.

Smart motorways programme

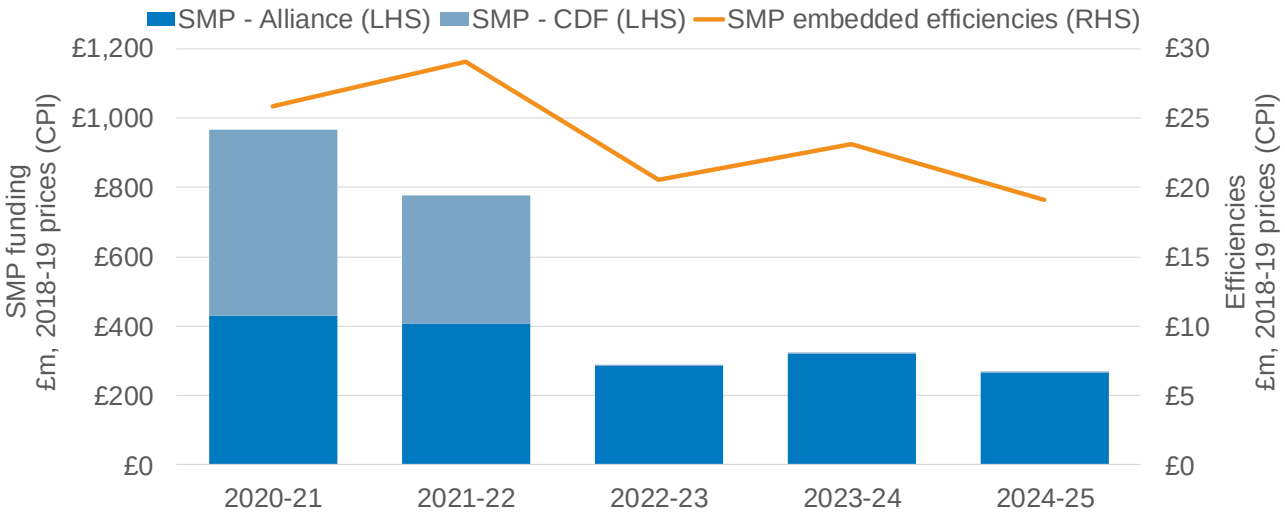
7.36. For smart motorways, Highways England proposed up to around £300m of efficiencies on £2.8bn of post-efficient spending, an average efficiency saving of up to 9.6% across the period. However, the majority of this was from £130m-£170m of carry over efficiency from RP1. The proposed embedded efficiencies were from establishing a new alliance to deliver SMP projects. As with the RIP programme, not all of the RIS2 projects will be delivered through this new procurement route. The proposed £127m of embedded efficiencies represents a 6.4% average efficiency improvement against the SMP Alliance funding, and a 4.3% improvement against total SMP funding.

7.37. The alliance approach is expected to deliver efficiency improvements by:

- automating design (through the rapid design model) to reduce design costs;
- reducing construction time and optimising workforce planning; and
- aligning objectives to reduce duplication of roles and supplier fees.

7.38. Figure 7.9 shows the profile of SMP funding and efficiencies (in real terms). As with the RIP programme, the profile of efficiencies closely follows the profile of (alliance) funding, so the percentage level of efficiency improvement is relatively constant.

Figure 7.9 Profile of embedded SMP efficiencies

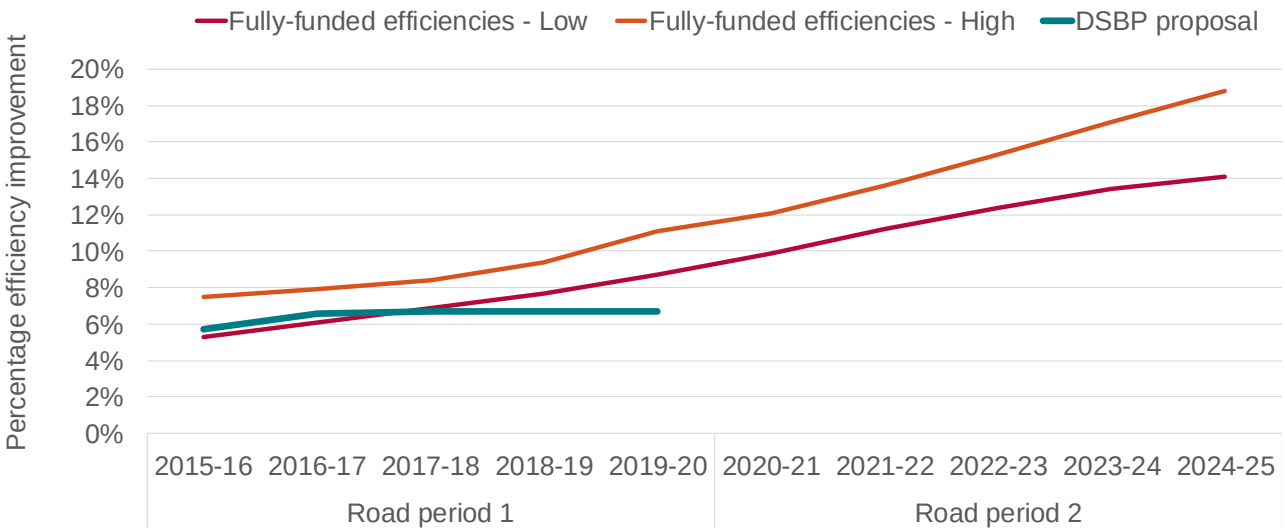


7.39. In the DSBP Highways England stated that the full benefits of the alliance model require an annual delivery programme of around £450m per year. It set out a profile of efficiency improvements that could be delivered with this level of funding. Figure 7.10 compares that profile with the percentage efficiency improvements in the DSBP. In the first two years, when funding is over £400m, the proposed efficiencies are within Highways England's range. But in the second half of RP2 the level of funding drops off and the level of proposed efficiency falls out of the range of potential "fully-funded" efficiencies.

7.40. The profile of potential fully-funded efficiencies is equivalent to 7%-9% on average across RP2. This is within the range from the capability review findings but Highways England's proposed efficiencies of 6.4% are towards the bottom of the end of that range. Highways England's assumptions of essentially no further efficiency improvement in the final three years of the road period does not appear sufficiently challenging.

7.41. We recommend a higher level of embedded efficiency of 7.5%-8%, in the lower half of Highways England's fully-funded profile and more consistent with the capability reviews and Highways England's assumptions for new enhancements. This would reduce costs by £22m-£32m and we recommend that this is used to increase the centrally-held portfolio risk allowance.

Figure 7.10 Potential and proposed SMP Alliance efficiencies



Tier 1 projects and new enhancements

7.42. The Tier 1 and new enhancement projects generally span multiple road periods and Highways England proposed a different approach to reporting their efficiency. Rather than working to a post-efficient cost estimate, there will be an individual efficiency target for each project, supported by an efficiency register. Under this approach efficiencies would be recorded in proportion to total project spend, on a pro-rata basis, as is the case in RP1, and would be used to manage risk. For projects with significant spend in RP3 and beyond, the main benefits will be lower costs in future road periods.

7.43. Table 7.1 shows the planned spending and target efficiency for each of the Tier 1 and new enhancement projects in RP2. Both the RP2 spending and efficiency figures for the A303 Stonehenge and LTC projects are based on the proportion of cost included within the SoFA. If the shortfall in funding from the withdrawal of PF2 private finance is met from an enlarged SoFA, this would increase the absolute amount of efficiency for these projects.

7.44. Highways England's default target in the DSBP was to make 8.0% efficiency improvements, based on those realised for the A14 project and the efficiencies expected from other RIP projects. The exceptions are the A303 and LTC projects, which involve significant tunnelling elements. For these projects, 7.0% efficiencies were applied to link road construction costs, 3.5% to tunnelling and 0% to development, land enabling works and statutory undertakings to give the blended rates in the table below. Highways England applied a lower rate for tunnelling due to the lower potential for modularisation and claimed there is very limited efficiency opportunity on the elements with 0% applied.

Table 7.1 Proposed efficiencies for Tier 1 and new enhancement projects

	RP2 spending £m	RP2 efficiency target £m	RP2 efficiency target %
A14 Cambridge to Huntingdon	£74	£8 (carry over)	n/a
A303 Amesbury to Berwick Down	£251	£7	2.9%
LTC Tunnel and Approach Roads	£2,267	£84	3.7%
A417 Missing Link at Air Balloon	£459	£37	8%
A303 South Petherton to Southfields	£26	£2	8%
Oxford to Cambridge Expressway	£141	£11	8%
A66 Trans Pennine	£105	£8	8%
M60 Simister Island Interchange	£22	£2	8%
A46 Newark Northern Bypass	£44	£4	8%
A595 Whitehaven Bypass	£25	£2	8%

7.45. If the same approach had been applied for the other new enhancements, it would require a greater than 8% improvement on the road construction costs to average 8% efficiency overall. Therefore there appears to be scope for additional challenge in this area. Applying 8% to road costs and 4% to tunnels would increase the LTC and A303 Stonehenge efficiency targets by £13m, while applying the standard 8% target would increase the efficiency targets by £110m.

7.46. Under Highways England's proposed approach, additional KPI measured efficiency would not lead to a cost reduction that could be used to increase the centrally-held portfolio risk allowance. It would increase the targeted efficiency for the projects which, if realised, would increase the headroom for risk funding within each project's budget. Given this different treatment from the embedded efficiency areas, we are not proposing a specific additional efficiency challenge but note that there is scope for additional KPI measured efficiency of between £10m-£110m for Tier 1 enhancements.

Recommendations

We recommend that:

- Highways England carries out a quantified assessment of the risks to project timescales;
- the company considers whether its current information (such as the CPI / SPI earned value indicators) is capable of providing early-warning on scope and cost problems, and if not develop new indicators to do so; and
- DfT considers whether there should be an additional efficiency challenge for Tier 1 projects.

8. Operations, maintenance and renewals

8.1. Highways England has made a compelling case for funding operations, maintenance and renewals. The case to invest in the network to prevent deterioration is robust. The proposal to do some life-extending renewals now is sensible to help manage a bow-wave of work in future Road Periods.

8.2. The quality of Highways England's data needs improving. In some areas, we have not been able to make like-for-like comparisons across Road Periods (for example, renewals unit costs or volumes) because of how Highways England recorded its data. It is important that we have a clear baseline against which we can monitor delivery during RP2 and that data can support comparisons across road periods in the development of future RISs.

Renewals

8.3. Highways England split its case for renewals in the DSBP into nine asset classes:

- pavement;
- structures;
- vehicle (or road) restraint systems (VRS);
- drainage;
- geotechnical;
- lighting;
- tunnel;
- road ancillaries; and
- traffic signals and roadside technology.

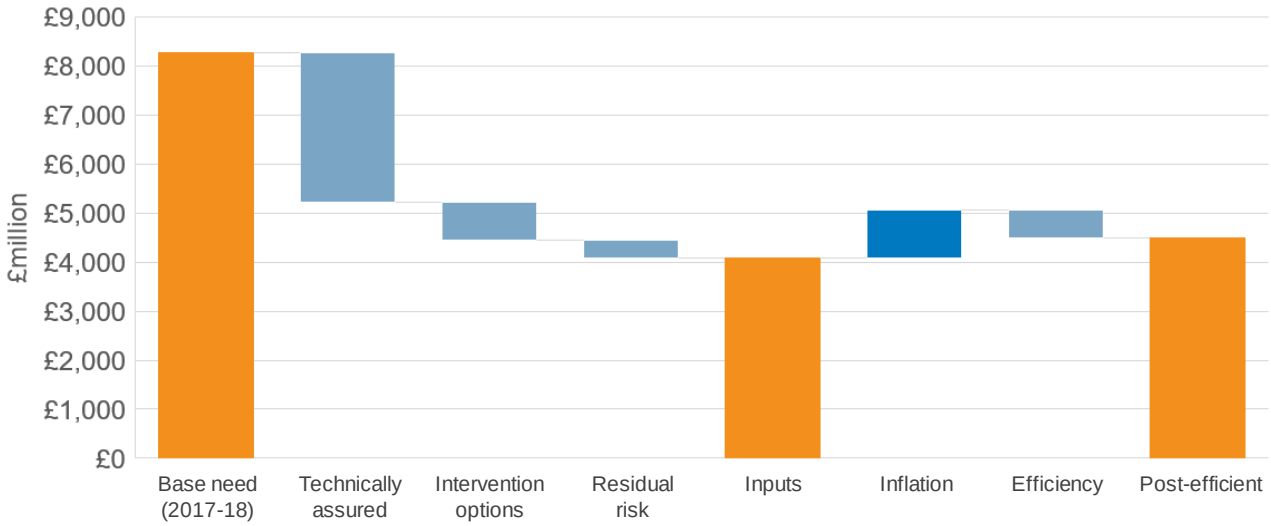
8.4. Across all nine asset types, it took a consistent approach to:

- assess the **baseline level of asset need**, using a range of analytical tools and sources with varying sophistication and costed with 2017-18 base unit costs;
- challenge the volume of work in the baseline to produce a **technically assured** volume;
- consider alternative **intervention options**;

- identify volumes of **residual risk** that are not included in the plan (which totals £360m for the three asset classes with "life extension elements");
- apply **inflation** assumptions; and
- apply an **efficiency** challenge.

8.5. Through this process, shown in figure 8.1, Highways England challenged down its costs before applying an efficiency challenge. And it sought to balance the need to renew assets during RP2, with its available funding, the needs of users, and to create a more sustainable programme for future road periods.

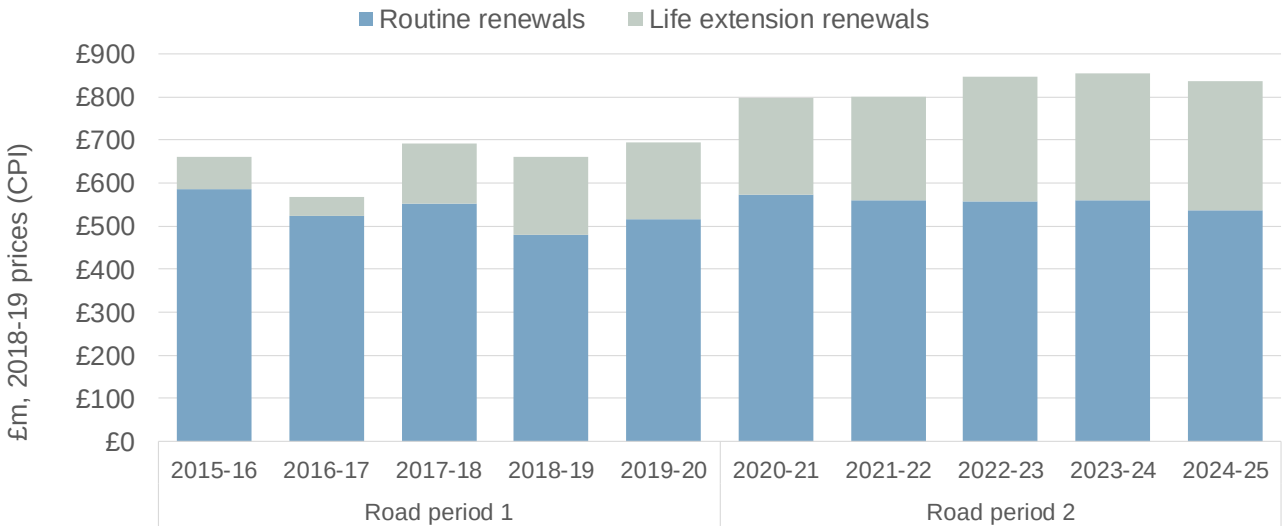
Figure 8.1 Highways England's process for developing renewals costs



8.6. The overall effect of this process is that renewals spending in the DSBP was £4.5bn, 26% higher in real terms in RP2 than in RP1. Figure 8.2 shows that this is mainly because of increases in "life extension" renewals (which increase by 118%) rather than routine renewals (which increase by 5%). Life extension refers to areas where Highways England has identified an above business as usual level of renewals for three asset types:

- concrete pavement;
- large structures renewals; and
- vehicle restraint systems.

Figure 8.2 Funding for routine and life extension renewals in RP1 and RP2



8.7. These three asset types had the largest spend during RP2 in the DSBP, the largest increases in spending from RP1 and the largest proposed efficiency savings. So we focused on these three asset types in our sample review. We also included lighting, so as not to only focus on assets with the largest spend and / or efficiency.

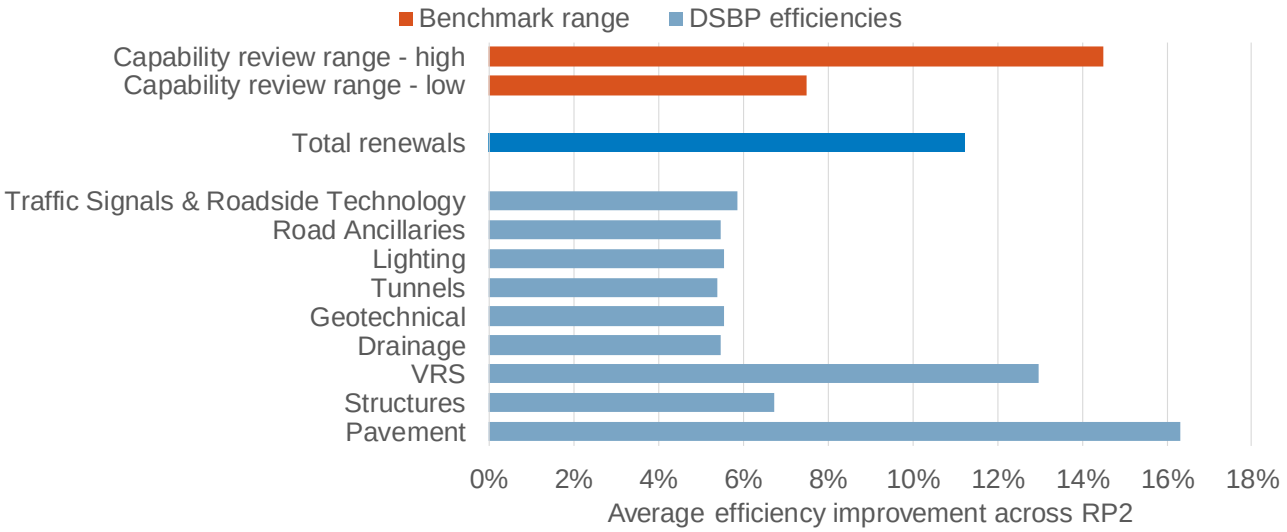
8.8. The DSBP provided costs for each of the nine asset classes across RP1, RP2 and, on an indicative basis, RP3. However, it only included output or volume data for RP2. And the basis on which the DSBP was prepared differed to the level of renewals volume / output data that Highways England reported during RP1. This created challenges in comparing spending levels and unit costs across road periods. While we do not plan to monitor the volumes in the DSBP as individual targets, it emphasises the need for Highways England to continue to improve its data, so that we can effectively monitor delivery. Highways England must set out clear baseline volumes for RP2, that can be compared with equivalent figures for RP1, and report against them during the road period.

Generic and specific efficiencies

8.9. Across all nine asset classes, Highways England identified a set of "generic efficiencies". These were based on the same key areas as the capability reviews. Taken together they summed to an efficiency improvement of around 9.0% by the end of RP2, or around 5.5% on average across the period.

8.10. In addition, Highways England identified specific efficiencies relating to pavement, structures and VRS. In total, this means there was 11.2% of efficiencies for renewals as a whole. Figure 8.3 compares the efficiencies proposed for each asset type against the range of 7.5%-14.5% efficiencies from combining conclusions from the asset management and procurement capability reviews.

Figure 8.3 Proposed renewals efficiencies by asset type



8.11. Efficiencies for renewals as a whole were towards the middle of the capability review range. Given the potential overlap between the capability reviews, this could be challenging. The level of efficiency is largely driven by pavement and VRS renewals. Highways England has set out clearer plans for how it will achieve these efficiencies than in some other areas of the DSBP, which increases our confidence in their delivery.

8.12. Efficiencies for structures and the "generic only" asset types, however, were below the bottom end of the range. We recommend increasing the efficiency challenge across these seven asset types to 7.5%-8% – the bottom of the range from the capability reviews. This would reduce renewals costs by £30m-£40m and increase total renewals efficiency to 11.8%-12.0%.

8.13. We recommend that this cost reduction should be used to reduce Highways England's identified residual renewals risk. Highways England did not propose specific renewals risk funding and its residual renewals risk was expressed as volumes in the DSBP. Therefore, based on the presentation in the DSBP, this would likely mean reallocating funding to the three areas of life extension renewals (and increasing the planned volumes). However, Highways England may wish to develop an alternative approach to managing renewals risk in the Final SBP and / or RIS2 Delivery Plan.

Inflation assumptions applied to the 2017-18 base year

8.14. As discussed above, Highways England applied a rate of 5% inflation in 2018-19 and 2019-20 from the RIS1 funding model. We recommend that Highways England re-estimates its renewals costs, with the latest outturn and forecast inflation rates for 2018-19 and 2019-20. We expect this to reduce renewals costs by around £110m.

As with the increased efficiency challenge discussed above, we recommend that this is put towards reducing the level of residual renewals risk.

Implications for RP3

8.15. The update to the DSBP submitted in February 2019 set out indicative RP3 renewals funding of £6.4bn, within an overall funding requirement of £28.8bn. This represented a nominal increase in renewals funding of around 40% on RP2 levels.

8.16. The more detailed cases for renewing each asset type set out an initial view of need in RP3 – before cost challenge and efficiency were applied – of around £9.2bn. This is more than double the £4.5bn proposed in the DSBP for RP2. However, it is more comparable to the initial need of £8.3bn identified for RP2, than the final funding proposal.

8.17. Both of these sets of figures are indicative. However, it is clear from the DSBP that increased renewals funding is likely to be required in RP3. Patterns of previous investment mean that more asphalt pavement renewal is likely to be required than in RP2, and the programmes of concrete pavement and significant structural renewals will likely increase.

Regional renewals

8.18. Regional benchmarking of renewal spend that both we and Highways England have undertaken during RP1 (with a combination of RP1 and pre-RP1 data) showed that there can be large differences, over time and between regions, in levels of renewal spending. This was attributed to fluctuations in overall spending levels and regional allocations tending to follow historical patterns. Moving away from historical regional allocations, and towards a needs-based approach, is a key aspect to Highways England becoming a more efficient asset manager.

8.19. Highways England built the DSBP as a national plan. The tools it used to support its renewals case use data of the actual condition of assets on the network. Some elements of the case (such as the life extension structures renewals) were built up from a list of specific renewal projects. But these tools were generally used to develop a strategic estimate for the size of the renewals programme required during RP2, rather than identifying the specific assets that require renewal.

8.20. Highways England demonstrated that it is applying a needs-based approach to renewals at the national level in the DSBP. It is important that, as it finalises the SBP and moves into preparing its RIS2 Delivery Plan, Highways England can demonstrate that the regional split in its renewals funding is also needs-based and that its modelled volumes align with workbanks built bottom-up.

Pavement

8.21. Based on the length of the network and average pavement life, in a steady state position Highways England would expect to renew around 2,000 lane kms of pavement per year. However, due to the uneven distribution of when the network was constructed and has been renewed in the past, its actual renewals need fluctuates around this steady state level.

8.22. Highways England established its baseline need for asphalt pavement renewals using its Pavement Investment Tool (PIT). PIT produced a forecast of need based on the modelled deterioration of the network as a series of 100m lengths. Expert judgement is required to turn these short lengths into a deliverable programme. The tool was used to assess the overall need for RIS2, not to identify every specific renewal scheme in that programme, which will be done during RP2 with Highways England's site investigation and programme management methods.

8.23. The output from this process is that Highways England expected to renew around 1,650 lane kms of asphalt pavement per year during RP2 in the DSBP. This is below the steady state amount, due to the higher volumes renewed during the fiscal stimulus of 2014-15 and the earlier years of RP1. However, Highways England's analysis showed that need in RP3 is likely to be above steady state, and the 1,650 lane kms per year during RP2 has been increased from the raw modelled results to smooth volumes between road periods.

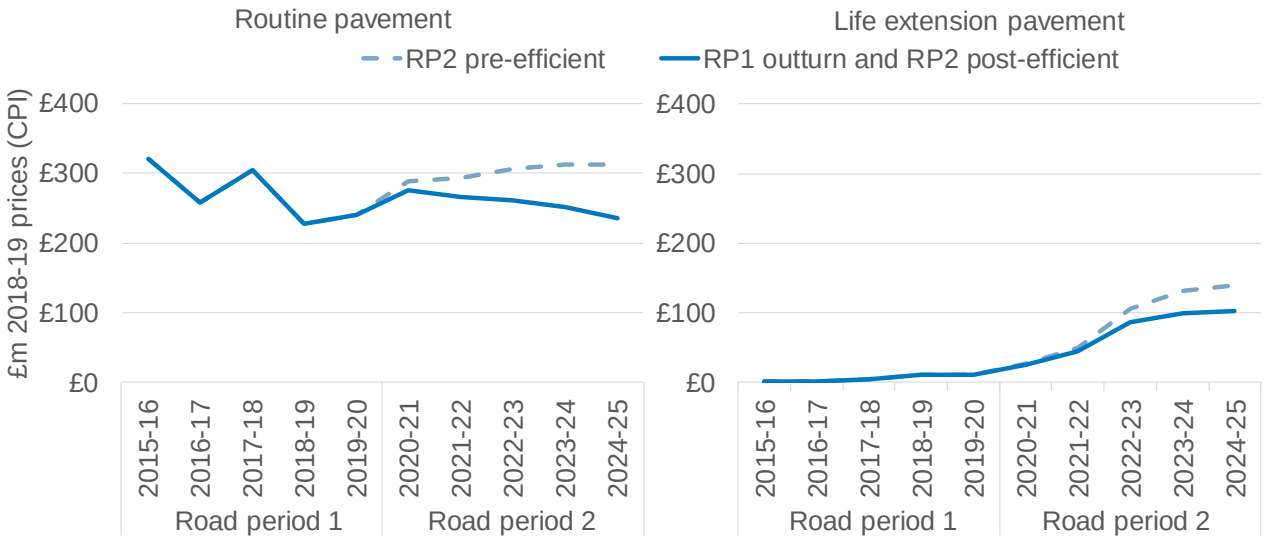
8.24. The SRN also has around 1,000 lane kms of concrete pavement. While this has required relatively little renewal to date, Highways England identified that it is coming towards the end of its life and a large-scale, multi-road period concrete pavement renewal programme is needed. The DSBP proposed £393m (in nominal terms) of funding for both holding works and to begin the process of reconstructing these road surfaces (139 of the 1,000 lane kms).

8.25. The level of need was established using a bespoke, excel-based model that draws from Highways England's HAPMS asset data. The relative lack of previous delivery in this area means there is a larger degree of uncertainty than for asphalt (for example around some cost elements and the triggers for whether holding works or reconstruction are required). So Highways England validated its level of need with an element of engineering judgement and what data were available.

8.26. Figure 8.4 shows the proposed RP1, pre- and post-efficient RP2 pavement renewals funding levels, for asphalt and concrete pavements. As a whole, funding proposed in the DSBP was around 20% higher (in real terms) in RP2, but the proposed funding for asphalt renewals was around 4% lower than RP1, in real terms. The charts show that the proposed embedded efficiencies increased over RP2 (in contrast to

enhancements, which have a much flatter profile). They averaged 15% for asphalt, 21% for concrete and 16% for pavement as a whole, across RP2.

Figure 8.4 Pre- and post-efficient costs for pavement renewals



8.27. These efficiency improvements were higher than the range expected from our capability reviews, and appear challenging. But Highways England identified specific activities to deliver the efficiencies, including innovative materials, methods to increase productivity and continuous programme management improvement. For concrete pavement in particular, there are likely to be large efficiencies available as Highways England has not carried out a significant concrete pavement reconstruction programme before, and will be able to benefit from economies of scale.

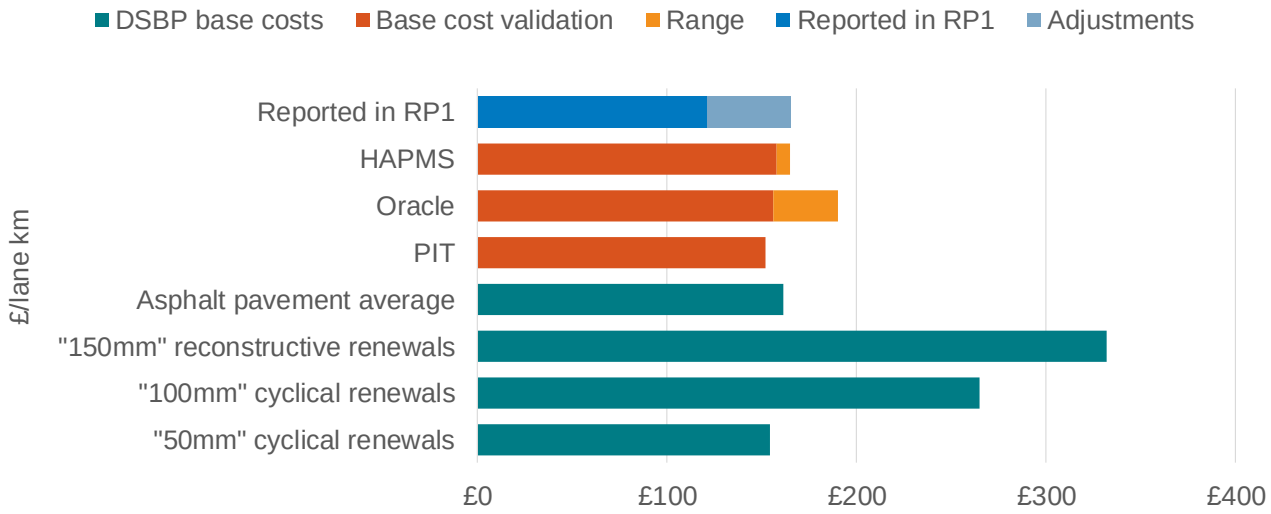
8.28. Particularly for the routine, asphalt pavement renewals, understanding how the pre-efficient costs evolve from RP1 to RP2 is important in understanding the level of efficiency being proposed. The DSBP proposed three levels (or depths) or asphalt intervention. Figure 8.5 compares the average (across these three types of intervention) base (2017-18) cost per lane km in the DSBP with the cost per lane km renewed which we have calculated for 2017-18 from renewals volume data reported during RP1.

8.29. It shows that, before any adjustments, the cost per lane km renewed in the DSBP was over 30% higher than the cost we estimated from information reported during RP1. Highways England provided details of the different data sources it used to validate the DSBP costs (shown in the orange bars in the chart) and identified two causes for the difference between the "observed" 2017-18 costs and those in the DSBP:

- Highways England's financial system (Oracle) records renewal interventions on a predominant intervention type basis, which means that some of the relevant costs are not recorded against "pavement", understating the 2017-18 observed cost by around £6,000 per lane km.[23]

- The average depth of pavement renewals in the first three years of RP1 was 42.5mm. Highways England is proposing to increase this to 53.6mm in RP2, with an associated higher cost per lane km.

Figure 8.5 Costs per lane kilometre of asphalt pavement renewals



8.30. If the cost per lane km is adjusted for the predominant intervention type issue and increases proportionally with depth (shown by the light blue "adjustments" bar in the chart), it increases the observed unit cost for 2017-18 to a similar level to the base cost in the DSBP. Deeper interventions increase the up-front renewal cost but should reduce the number of minor defects and extend the period before renewal is required again. Both of these effects should reduce whole life costs and the disruption to road users when renewal work is carried out.[24] In its "baseline level of need", Highways England planned for a deeper average depth, but reduced this as part of the "intervention options" stage due to affordability pressures.

8.31. This issue highlights how important it is for Highways England to continue improving the data that it reports to us. During RP1 it has reported the volume of lane kms of

[23] Some pavement renewal works support other works, such as resurfacing the pavement as part of a wider structures renewal project. This affects around 15% of pavement renewals and means that some overhead costs are not correctly allocated to pavement. Highways England's estimate of impact on per lane km costs does not account for the possibility that Oracle could also record non-pavement related costs when pavement is the predominant intervention type.

[24] Highways England has provided initial analysis showing a 4% reduction in WLC over a 30-year horizon on the assumption that the deeper renewal increases the average replacement period from 10 to 12 years.

pavement renewed. If this approach were to continue, the company could appear to be delivering the planned volumes and meeting its pavement condition KPI target (which is consistent with those volumes), potentially at a lower unit cost, by undertaking shallower interventions. But this would fail to deliver the whole life cost and user benefits set out in the DSBP.

8.32. We do not intend to treat volumes in the DSBP as targets, and recognise that things will change during RP2. But to effectively monitor delivery, including of the embedded efficiencies, we will likely require a more detailed breakdown of the volumes and unit costs of different depths of pavement renewals.

Structures

8.33. Highways England distinguished between two categories of structures renewals in the DSBP – routine and significant (life extension) structures renewals. The level of need was identified through a mixture of asset condition modelling, specific studies and expert judgement.

8.34. The cyclical element of routine structures renewals was established using Highways England's Structures Investment Tool (SIT). This uses the latest available condition data and applies rules-based deterioration models for individual elements. The model predicts the costs required to maintain the overall stock at a given level of condition. For the DSBP this was used to determine the overall cost of the programme, rather than to identify a specific workbank of structures renewals.

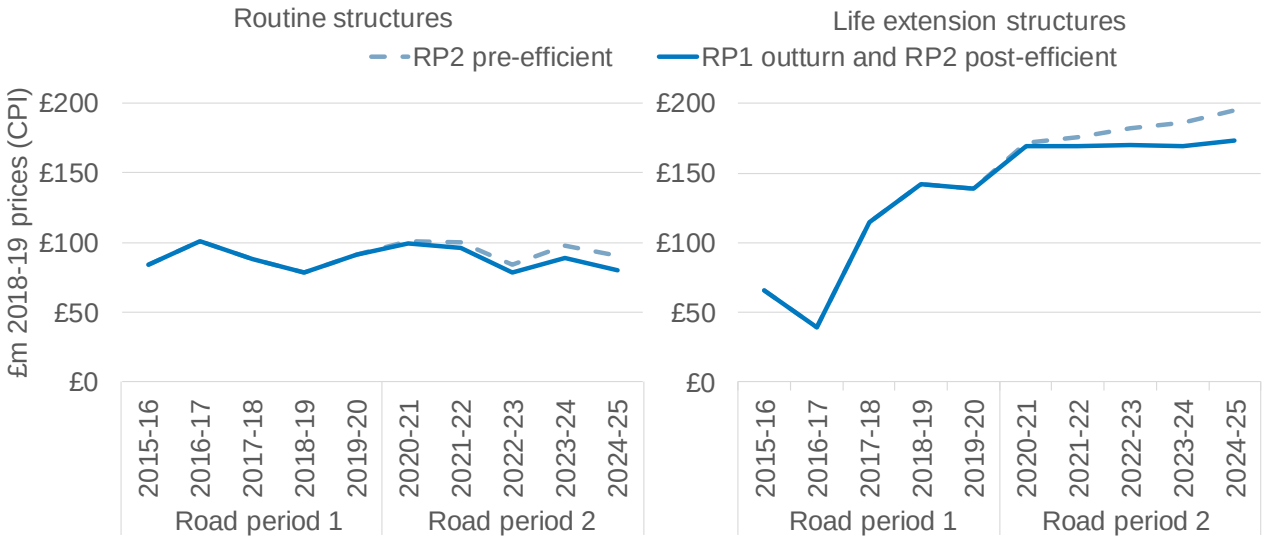
8.35. The routine renewals element included two additional areas beyond that predicted by SIT, which were intended to proactively protect and extend the life of structures. Highways England identified a programme of cathodic protection and detailed surveys to uncover hidden defects across RP2 and RP3, with around £107m allocated to this in the routine renewals category for RP2. This was supported by a bespoke model which, because of the lack of available benchmark data, carries a large degree of uncertainty and requires significant engineering judgement.

8.36. Separately, Highways England also reviewed, through its regions, all structures on the SRN which were known to have a potential safety or functionality risk during RP2. From a long-list of 769, it prioritised around 250 interventions during RP2 with the greatest risk. The company proposed around £880m of funding across the period in its structures life extension funding line for these works. The remaining £40m is for renewals associated with the Severn Crossings.

8.37. Figure 8.6 shows the funding profile for both the routine and significant / life extension structures renewals in RP1 and the pre- and post-efficient funding proposed in RP2. Funding for routine structures renewals was essentially flat (in real

terms) across RP1 and RP2 in the DSBP and the proposed funding for significant structures increased by around 70% (in real terms). As with pavement renewals, the profile of embedded efficiencies was forecast to increase over RP2. And there was around 6.7% of efficiency, on average across RP2, for the routine and significant structures renewals categories combined.

Figure 8.6 Pre- and post-efficient costs for structures renewals



8.38. This is a lower level of efficiency improvement than the company proposed for pavement and VRS, the other largest areas of renewals spend. Highways England's main approach to managing the costs of structures renewals has been to defer work into future road periods, where this represents an acceptable level of risk.

8.39. We accept that structures renewals projects might be more individual and uncertain than for other asset types and that this means it might be overly challenging to deliver similar levels of efficiency improvements. However, the significant increase in spend, and the establishment of what could be thought of as national programmes of significant structures renewals and cathodic protection (within the routine category) should create opportunities for Highways England to deliver more efficiencies beyond the generic improvements that make up the bulk of what is proposed.

8.40. Our assessment of the capability reviews suggests a range of 7.5%-14.5% efficiencies could be achieved in RP2. So we recommend that an efficiency assumption of 7.5%-8% would be reasonable in this area, given the relatively high level of challenge Highways England has set itself for renewals as a whole.

8.41. This would increase the embedded efficiency in this area from £101m to up to £120m (a 19% increase). And, as with other potential savings we have identified, we recommend that this potential £19m of additional efficiency should be used to reduce

the level of residual renewals risk Highways England has identified, for example by increasing the planned volumes of life extension renewals.

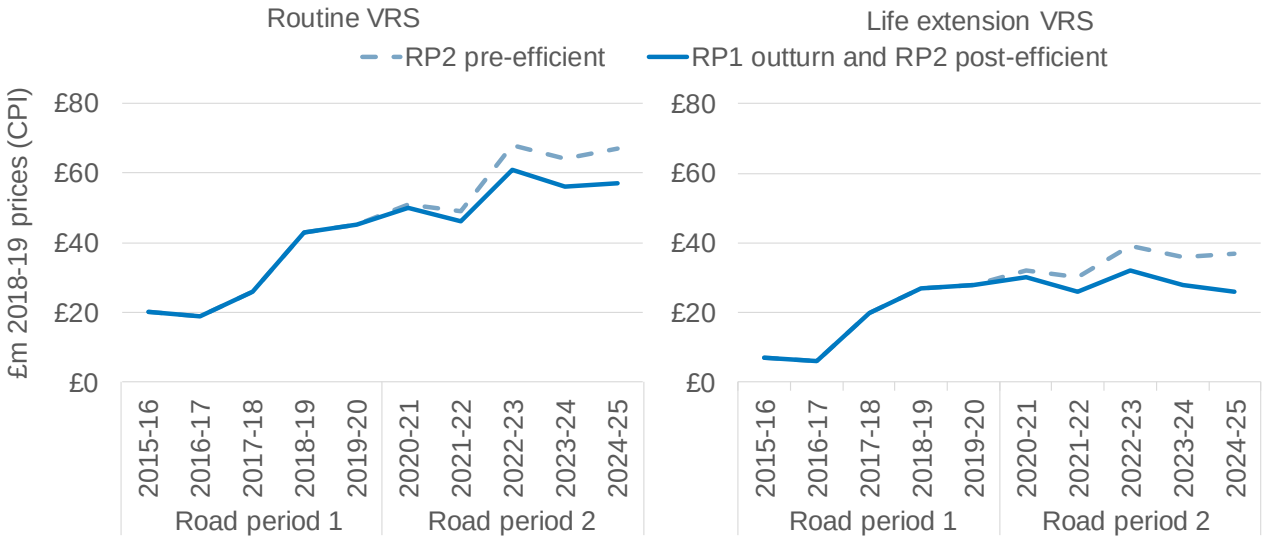
8.42. During RP1, Highways England has reported volumes of specific structures renewals items, such as the number of bridge joints or bearings replaced, or square metres of waterproofing renewed. And it has produced unit costs at a similar level of aggregation. The level of output in the DSBP is at a much higher level of aggregation – the number of interventions – so we have not been able to compare volumes or unit costs across road periods.

8.43. During RP2 it will be important that Highways England reports volumes and unit costs that allow us to monitor effectively how it is delivering against its plans, particularly regarding efficiency improvements and efforts to reduce whole life costs.

Vehicle restraint systems

8.44. VRS assets are the concrete, steel or wire safety barriers in the central reservation or on the verge. As with pavement and structures, Highways England distinguished between two categories of VRS renewal in the DSBP – routine, covering steel and wire barriers; and life extension, covering concrete barriers. Unlike the other asset types with a life extension element, figure 8.7 shows that the DSBP proposed a significant increase in both the routine and life extension categories, relative to RP1.

Figure 8.7 Pre- and post-efficient costs for vehicle restraint system renewals



8.45. Compared with RP1, proposed funding for routine (steel and wire) VRS in the DSBP increased by 77%, and life extension (concrete) VRS increased by 58%, in real terms. The majority (over 90%) of VRS assets are steel and, working with galvanised steel experts, Highways England developed an excel-based deterioration model to establish the initial level of need across the network.

8.46. The typical life of steel VRS is 40-53 years and much of it was installed during the peak of motorway construction in the 1960s and 1970s. Highways England identified that nearly a quarter of its steel VRS is forecast to come to the end of its life during RP2. This bow wave drove the increase in both categories of VRS renewals in RP2.

8.47. Highways England explained that its standards require concrete safety barriers on motorways (or motorway standard roads). Concrete barriers cost over 10 times more than steel and Highways England's analysis showed that the safety benefit of replacing steel with concrete offers marginal value for money at many locations.

8.48. Its baseline level of need, based on the standard, included almost 800km of concrete VRS but this reduced to under 100km in the technically assured volumes, with a corresponding increase in the volumes of steel and wire. In its intervention options, Highways England considered alternative rehabilitation options. These extend the life of VRS but are not ideal from a whole life cost perspective as they require a return intervention within 10 years, but help to manage the costs in RP2. The company also identified a level of residual risk that reflects the uncertainty around the volumes that will be required, given the significantly increased scale of work in this area.

8.49. Table 8.1 shows the volumes through this process from the baseline need, to the final programme (the basis of the proposed funding). This cost challenge reduced the costs from £1.6bn to £414m, before applying inflation and efficiency assumptions.

Table 8.1 Volumes of vehicle restraint system renewals

VRS type	Baseline need	Technically assured	Residual risk	Final volumes
Concrete (km)	784	95	0	95
Steel (km)	1551	2199	-541	1658
Wire (km)	34	76	-19	57
Total (km)	2369	2370	-560	1810

8.50. The DSBP proposed 13% efficiency improvements on average across RP2. This was made up of 9.7% for routine (steel and wire) and 18% for life extension (concrete) VRS renewals. This was towards the top of the range for renewals from the capability reviews and represents a challenging level of efficiency improvement.

8.51. Figure 8.7 shows that spending on VRS renewal increased through RP1. This should help ensure Highways England is well placed to deliver the increased volumes required in RP2. It has identified a range of actions, including creating a national

Concrete Barrier Programme, standardising design and using pre-fabricated components, to deliver the efficiencies.

Lighting

8.52. Compared with the three asset types covered above, the DSBP proposed much lower funding for lighting assets renewal, at £93m, a 6% reduction on RP1 funding in real terms (against CPI). Highways England took the same, structured approach to the lighting case, as for the larger asset types.

8.53. The lighting need was broken down into six component parts:

- removal of lighting assets;
- non-renewal works on lighting assets (which includes replacing lighting with enhanced road markings);
- replacement lighting assets;
- auxiliary lighting asset renewal;
- recabling; and
- accelerated transition to LED.

8.54. Almost 60% of the cost was in the "replacement lighting assets" category.

8.55. The level of need was supported by an excel-based model that brings together inventory and condition data, engineering knowledge (on, for example, triggers for replacement) and cost data. The baseline level of need was challenged, leading to a 19% reduction in costs (before inflation and efficiency are applied). This included reducing the removal of lighting columns (by 20%) and non-renewal works (by 30%), and deferring the transition to LED lighting until RP3.

8.56. Highways England did not identify any specific efficiencies for lighting. The efficiency assumptions were based solely on its generic efficiencies, which added up to around 5.5% efficiency gains across RP2 from improvements in the three areas covered by the capability reviews. This is below the range of efficiency improvements for renewals we identified from the capability reviews.

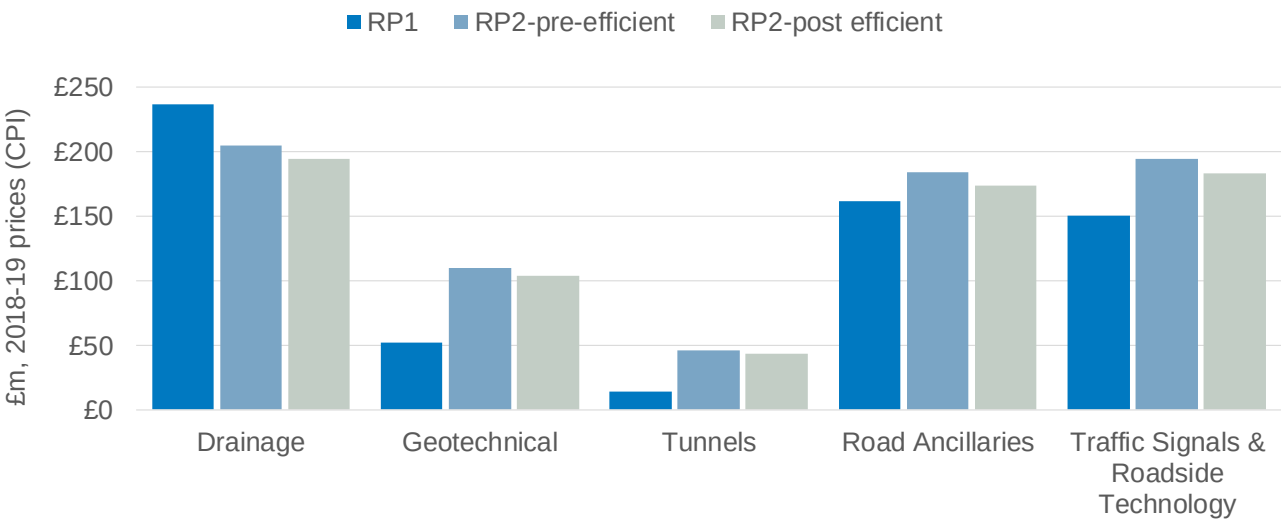
8.57. Therefore, we believe that greater efficiency improvements are possible. Given the relatively high level of efficiency challenge proposed for renewals as a whole, we recommend a 7.5%-8% efficiency assumption across RP2 for lighting renewals – the lower end of the range suggested from the capability reviews. We recommend that

savings from this higher efficiency challenge are used to reduce the residual risk identified for renewals.

Other asset types

8.58. Figure 8.8 compares the RP1 funding, pre- and post-efficient RP2 funding for the remaining five asset types, in real terms. Highways England followed the same process as described above for the four asset types we focused on in our sample review. This resulted in increased proposed funding (relative to RP1, in real terms) for all of the asset types, except drainage.

Figure 8.8 Pre- and post-efficient costs for other asset renewals



8.59. The asset inventory and condition data for drainage is incomplete. This means that Highways England lacked the information required to support a case for proactive renewals to maintain the asset at a certain condition level. So Highways England focused its case for this asset on reactively targeting flooding hotspots and local network deficiencies. This was consistent with its proposed drainage performance measure proposed, and results in reduced funding compared to RP1. Highways England plans to improve the extent of its data, so that a more proactive programme can be in place for RP3.

8.60. One consequence of this approach is that the DSBP did not contain any output or volume data for drainage. Rather, the level of funding was expected to be sufficient to address flooding hotspots and similar issues that arise during RP2 (linked to the proposed performance indicator). This will create a challenge for us to monitor delivery, and efficiency, in this area. So it is important that Highways England can set out its expected outputs in the Final SBP and / or its RIS2 Delivery Plan.

8.61. The company should continue to develop a better understanding of its drainage assets to refine its plans. If this results in a greater need, then Highways England will have the flexibility to re-prioritise funding between asset types during RP2. It would be appropriate for the company to use the cost reductions from our recommended efficiency and inflation assumptions to manage this risk.

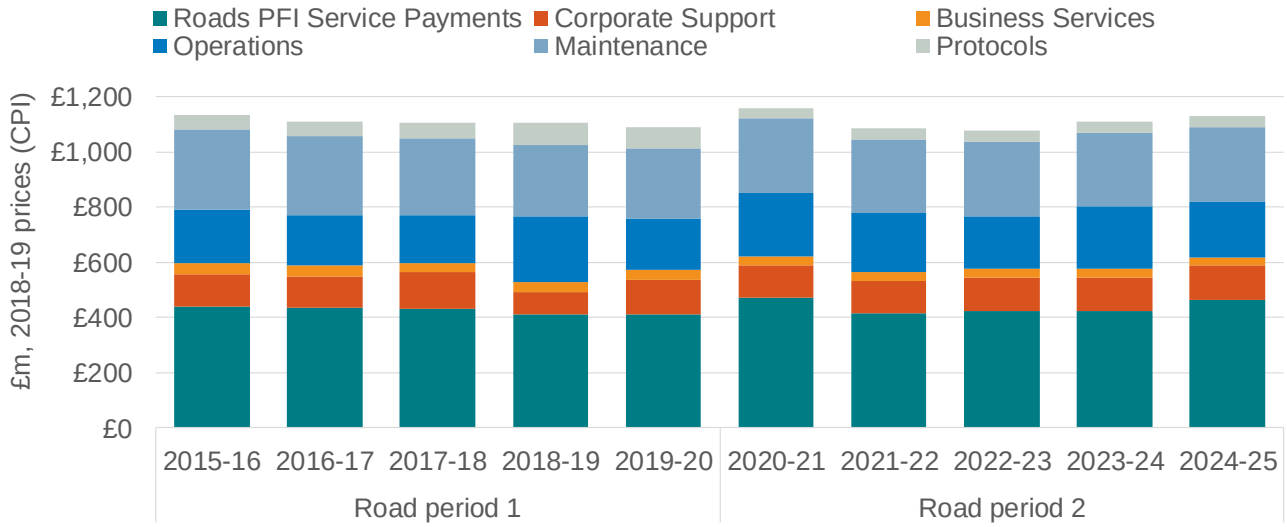
8.62. There is a similar issue for geotechnical assets. The funding in the DSBP represented what was expected to be needed to maintain the RP1 level of condition – around double RP1 funding. This was based on planned volumes and costs from Highways England's Geotechnical Asset Management Plans and the first three years of RP1. It included eight significant renewals (costing over £1m each) that are likely to be needed during RP2. Volumes were not included in the DSBP, due to the varied nature of the work, and as the actual volumes will depend on the outcome of condition surveys during RP2.

8.63. Highways England did not identify any specific efficiencies for these asset types. As with lighting, the efficiency assumptions were based solely on the capability review-based generic efficiencies at 5.5% across RP2. As above, we believe that greater efficiency improvements are possible. Consistent with our recommendations for lighting and structures, we recommend a 7.5%-8% efficiency assumption across RP2 for these asset types renewals – the lower end of the range suggested from the capability reviews. Including lighting, this would reduce costs by £18m-£22m and we recommend that savings from this higher efficiency challenge are used to reduce the residual risk identified for renewals.

Opex

8.64. Before considering the individual swimlanes that make it up, we first look at resource or opex spending as a whole. Figure 8.9 shows proposed opex spending across RP1 and RP2, including a step-up of around 6% from 2019-20 to 2020-21 (in real terms).

Figure 8.9 RP1 and RP2 opex funding by swimlane



8.65. Within this 6% increase, PFI payments in the DSBP increased by 14%, mainly from the contractual structure of the A19 Dishforth to Tyne Tunnel DBFO, and protocol spending reduced by 50%, due to the Severn River Crossings no longer being a protocol and the proposal to remove funding for the Historic Rail Estate from the SoFA. Removing these two items, Highways England's proposed "core" opex increased by 8% in 2020-21 (in real terms).

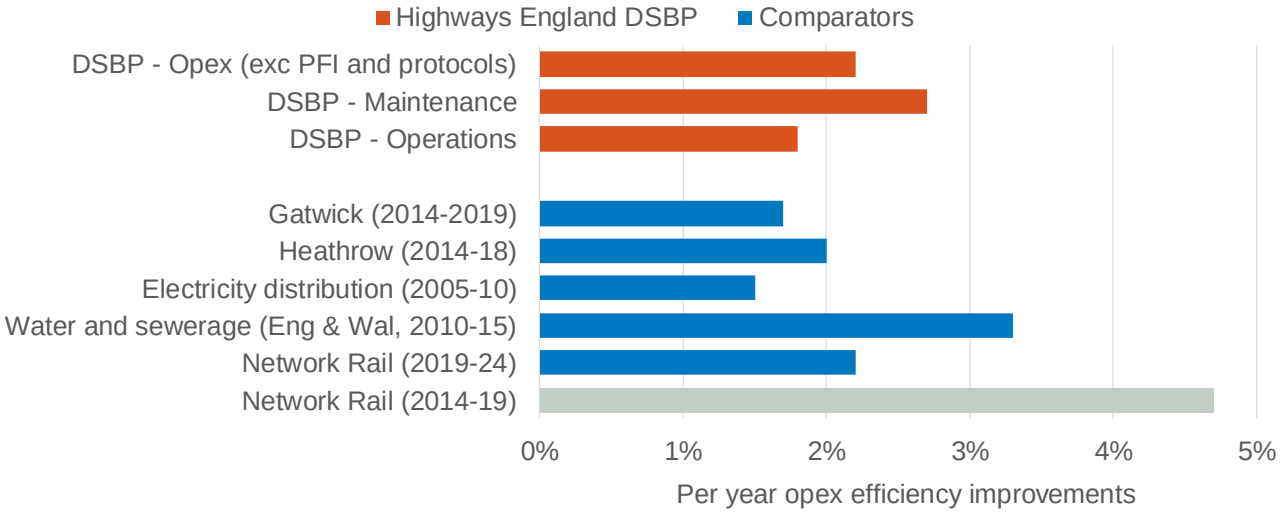
8.66. However, the maintenance line included around £10m per year of costs relating to the Severn River Crossings during RP2, and the operations line was overstated by a re-classification of Operations Directorate funding between opex and capex. Taking these factors into account, Highways England's core opex in the DSBP declined by 2%, on a like-for-like basis, from 2019-20 to 2020-21. Across the period as a whole, proposed opex in the DSBP was 1% lower in RP2 than in RP1 (in real terms).

8.67. We have undertaken two top-down assessments of Highways England's opex efficiency proposals. The first compares the proposed embedded efficiencies with efficiency targets made in regulatory determinations for sectors at a similar stage to Highways England. The second compares the planned evolution of Highways England's opex (on a high-level unit cost basis) with other sectors in early regulatory cycles.

8.68. Both approaches compare Highways England with other infrastructure sectors, such as rail, water and power. There are differences between these sectors, such as public or private ownership, opex composition and the efficiency starting point, which mean they are not perfect benchmarks for Highways England. But, as Highways England acknowledged by comparing opex as a percentage of asset value across similar sectors, such benchmarking exercises can still have value. We have used them as a top-down sense check to complement our bottom-up sample review.

8.69. Figure 8.10 shows the opex efficiency targets set in regulatory determinations in other sectors, and compares them with Highways England's proposed operations, maintenance and total opex (excluding PFI and protocols) embedded efficiencies (converted to an average annual rate, for comparison with the determinations). Highways England's embedded efficiency proposals equate to average annual improvements of 1.8% for operations, 2.7% for maintenance[25] and 2.2% for opex as a whole.

Figure 8.10 Comparison of opex efficiencies with determinations in other sectors



8.70. The overall figure sits within the range of 1.5%-4.7% from the other sectors. Network Rail's target of 4.7% per year opex efficiency improvements for Control Period 5 (CP5, from 2014-2019) is at the top end of this range. Network Rail did not meet its efficiency targets for CP5. Opex efficiency performance has been better than for renewals, but Network Rail only achieved around 1% per year improvements across support, operations and maintenance in the first four years of CP5.[26]

[25] This includes a reduction of around £12m of the embedded efficiency in the original DSBP submission due to the removal of one area where AD has already been rolled-out in the calculations.

[26] Annual efficiency and finance assessment of Network Rail for 2017-18: https://orr.gov.uk/__data/assets/pdf_file/0008/28394/annual-efficiency-and-finance-assessment-2017-18.pdf

8.71. If this is taken into account, then the top-end of the range is from water companies, which had 2.4%-3.3% per year opex targets for the period from 2010-2015. Water would be the only sector included in the analysis with opex efficiencies substantially above those proposed by Highways England. And Highways England's proposals are very similar to Network Rail's opex efficiencies for CP6 (2019-2024).

8.72. This analysis suggests that there would be regulatory precedent for greater opex efficiency challenge. However, any increase would be relatively small and Highways England's overall position of around 2.2% per year improvements is broadly consistent with other determinations.

8.73. The approach set out above compared Highways England's proposed levels of embedded efficiency with recent determinations. Our second approach focuses on the post-efficient funding proposed. We have compared it, on a high-level unit cost basis, with how opex funding evolved in other sectors at a similar stage of maturity. One advantage of this approach is that it does not rely on estimates of pre-efficient costs. But it also has the disadvantage of requiring assumptions about how "output measures" (vehicle and lane kilometres / miles) will evolve over RP2, to calculate high-level unit costs.

8.74. Figure 8.11 shows how Highways England's real opex unit costs have evolved since the 2010 Spending Review (SR10) period and its plans for RP2.[27] It compares the average reduction in Highways England's opex unit costs with the following benchmarks from other sectors[28]:

- CP1: the average annual reduction in the first control period following privatisation;
- Benchmark range – high: the high end of our range for RP2, based on average reductions in companies' performance in the second control period following privatisation; and
- Benchmark range – low: the low end of our range, based on performance in the third control period following privatisation and an estimate of frontier shift productivity improvements using data on the wider economy.

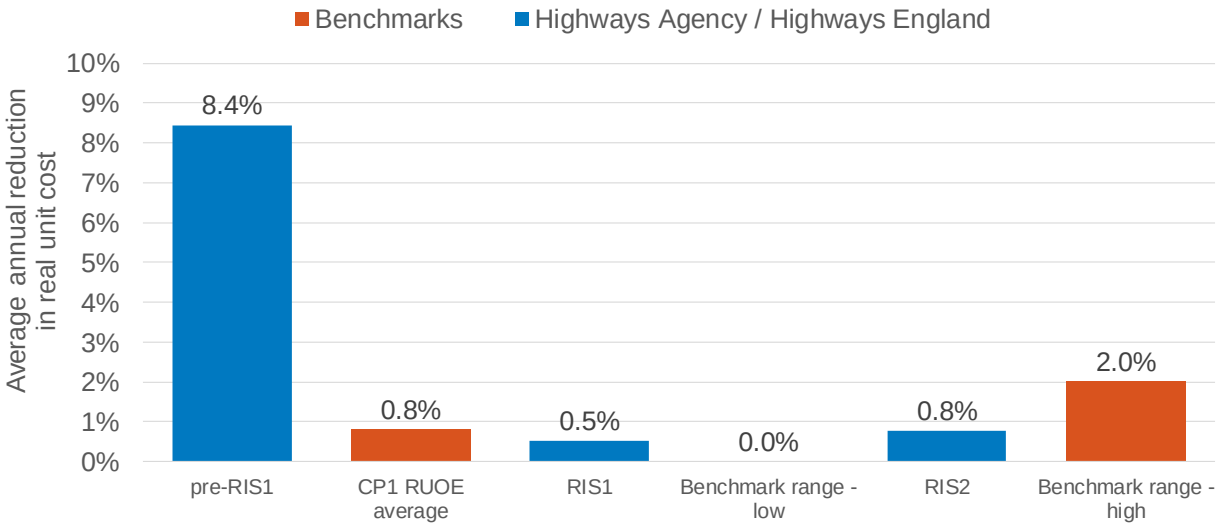
8.75. The analysis that developed these benchmarks was originally undertaken with RPI as the measure of inflation. As we are using CPI, we have converted the benchmarks

[27] The opex costs for RP2 used in the analysis exclude PFI and protocols; have removed SRC maintenance costs for consistency across periods; and are adjusted for the opex-capex re-classification discussed in more detail below. They are not adjusted for our recommended change to electricity inflation assumptions.

[28] Sectors that were included the benchmark range were: rail, water and sewerage (in Eng & Wal and Sco), electricity distribution, electricity transmission and airports.

so that the original range of 1%-3% (against RPI) for RP2 is now 0%-2% in figure 8.11. It is important to consider the high-level nature of this analysis, the differences between sectors, and the uncertainty about the future levels of "output" when interpreting these results.

Figure 8.11 Changes in real unit operating expenditure



8.76. Figure 8.11 shows that in the pre-RIS1 period, Highways England made significant opex reductions, which could affect the scope for further efficiency improvements. During RP1, opex unit cost reductions are similar to, but a little below, the average reductions seen in other sectors. The proposals in the DSBP equate to around a 0.8% per year reduction in real opex unit costs, towards the middle of the 0%-2% range. Highways England's "core" opex costs (excluding PFI payments and protocols) would have to be around 1%, or £30m, lower for an average real unit cost reduction of 1% per year across RP2.

8.77. As with the first piece of analysis, this suggests that Highways England's proposals are broadly in line with other sectors, but that there would be precedent for a relatively small increase in the level of opex efficiency challenge. During RP1, the opex efficiency challenge has been to remain within budgets that imply efficiency improvement, rather than to demonstrate increasing levels of efficiency against a KPI target. For example, during RP1, Highways England capitalised an increasing proportion of its staff costs. This is a legitimate accounting practice and has reduced opex costs, but moving spending from one category to another does not represent an efficiency improvement.

8.78. Our recommendation that all efficiencies, whether capex or opex, should be monitored in RP2 will put increased emphasis on Highways England delivering improved efficiency in this area.

Maintenance

8.79. The DSBP proposed £1.5bn of maintenance funding during RP2, a 3% decline (in real terms) on RP1. This was presented as a single maintenance spending line in the DSBP. The evidence supporting was made up with contributions from a range of directorates. The majority of the spending, including the core maintenance and winter maintenance activities, are delivered by the operations directorate (OD), so we have focused on that area of spend.

8.80. Within the OD-delivered maintenance there were three sources of efficiency improvement:

- avoiding increased costs associated with the continued use of Asset Support Contracts (ASC) by further rolling-out of Asset Delivery (AD);
- a cost challenge to avoid the expected inflation of 2.76% in the first two years of RP1; and
- a 1% per year efficiency target for the final three years of RP1.

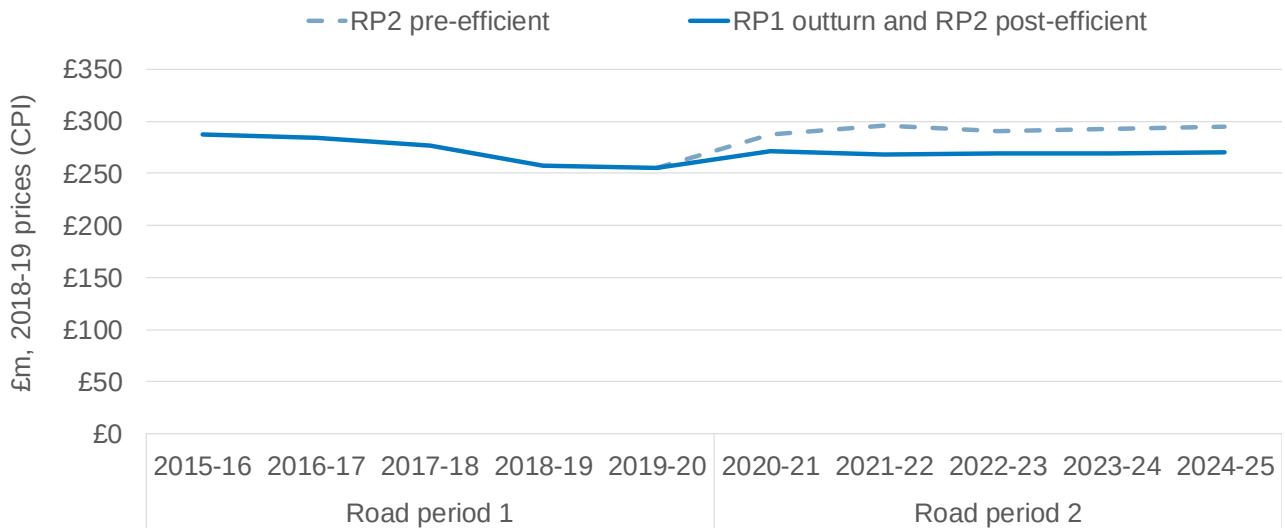
8.81. Figure 8.12 shows the pre- and post-efficient maintenance costs. Unlike the renewal areas, where the embedded efficiency gap between them grows over time, the pre-efficient costs in the DSBP increased significantly in 2020-21, creating a "wedge" of embedded efficiency across the whole of RP2. This was caused by the "ASC uplift" that will be avoided through continuing with AD roll-out. There was also a smaller step-change in both the pre- and post-efficient costs, most of which is caused by maintenance of the Severn River Crossings which have been adopted into the asset base and are no longer being managed under a protocol.

8.82. The ASC uplift was based on evidence that ASC costs would be higher if they were re-tendered. This was applied to seven of Highways England's areas, three where AD has been (or will be) rolled out before the end of RP1 and four where it will be implemented during RP2.[29] The original DSBP submission included an eighth area, where AD was introduced in June 2018, but which Highways England removed from the maintenance efficiency calculations.[30] We recommend that this is reflected in the Final SBP.

[29] Areas 6, 8 and 10 are expected to transfer to AD in 2019. Areas 3, 4, 9 and 12 will transfer during RP2.

[30] This is reflected in the pre-efficient costs in figure 8.12

Figure 8.12 Pre- and post-efficient maintenance costs



8.83. This reduced the level of embedded efficiency from £137m in the DSBP to £125m, but did not affect the proposed post-efficient funding. With this taken into account, the revised embedded efficiency represented an average improvement of 7.9% across RP2, equivalent to around 2.7% per year. This is towards the upper end of the range of opex efficiency targets set by other regulators. The conclusions from the asset management capability review were relevant for (resource) maintenance, as well as (capital) renewals. The wedge shape of the proposed efficiencies means that the final year efficiency of 8.3% is towards the lower end of the 7.5%-15% range from that study.

8.84. The efficiencies are expected to be delivered through the roll-out of the AD model. By taking more direct control of maintenance activities and planning, Highways England expects to be able to reduce layers of management and focus its asset management more on asset condition and customers, leading to reduced maintenance costs and / or better outcomes for users. However, despite AD already having launched in five of Highways England's areas[31], the efficiency assumptions in the DSBP are not supported by evidence of efficiencies that the approach has already delivered.

8.85. The capability reviews and comparison with other sectors suggested there is some scope for additional maintenance efficiency challenge, but this would be relatively small. There are risks to Highways England being able to deliver the proposed level of efficiency improvements, given the reliance on AD and the lack of evidence to date of this approach delivering greater efficiency. By monitoring all efficiency, there will

[31] At the time of the DSBP, AD had been rolled out in Areas 1, 2, 7, 13 and 14. No efficiency (either embedded or carry over) from an avoided ASC uplift has been counted for these five Areas.

be a greater focus on Highways England to demonstrate that it is becoming more efficient in this area. We would not recommend greater efficiency challenge.

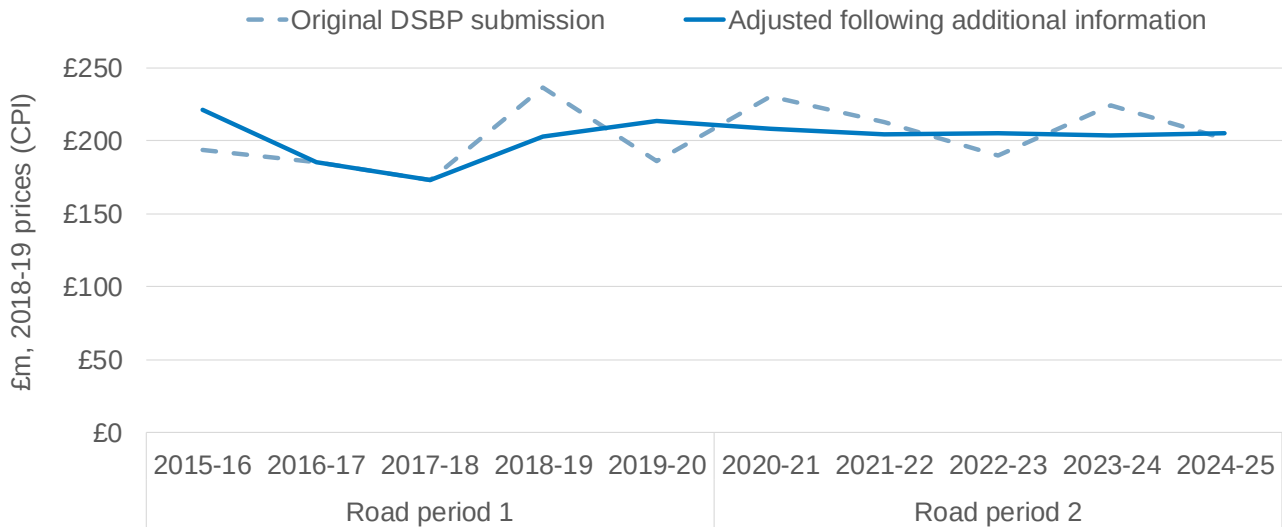
Operations

8.86. As with maintenance, the majority of the operations spending line is delivered by OD, but there are also activities led by other directorates that contributed to the overall operations opex spending line in the DSBP. Also, some of OD's operations activities are capital, and so were recorded under the business capital projects spending line in the DSBP. But the supporting evidence for operations included a mixture of opex and capex activities delivered by OD.

8.87. In our review, we focused on the OD-delivered elements of operations spending. Compared with renewals, for example, the costs were prepared on a roll-forward basis from RP1, with additional allowance for the costs of operating the Severn River Crossings and increasing amounts of all-lane running smart motorways.

8.88. In reconciling the top-level operations costs with the more detailed supporting evidence, we identified that the high-level figures in the DSBP included a re-classification of funding between operations (opex) and business capital (capex). Across RP2 this overstated the operations (opex) costs by £35m, and understated the business capital costs by the same amount. Figure 8.13 shows the effect of correcting for this, which results in a much smoother operations profile. As well as the changes during RP2, it includes adjustments to some of the RP1 figures included in the main DSBP, based on more detailed information provided by Highways England.

Figure 8.13 Impact of adjustments on operations costs

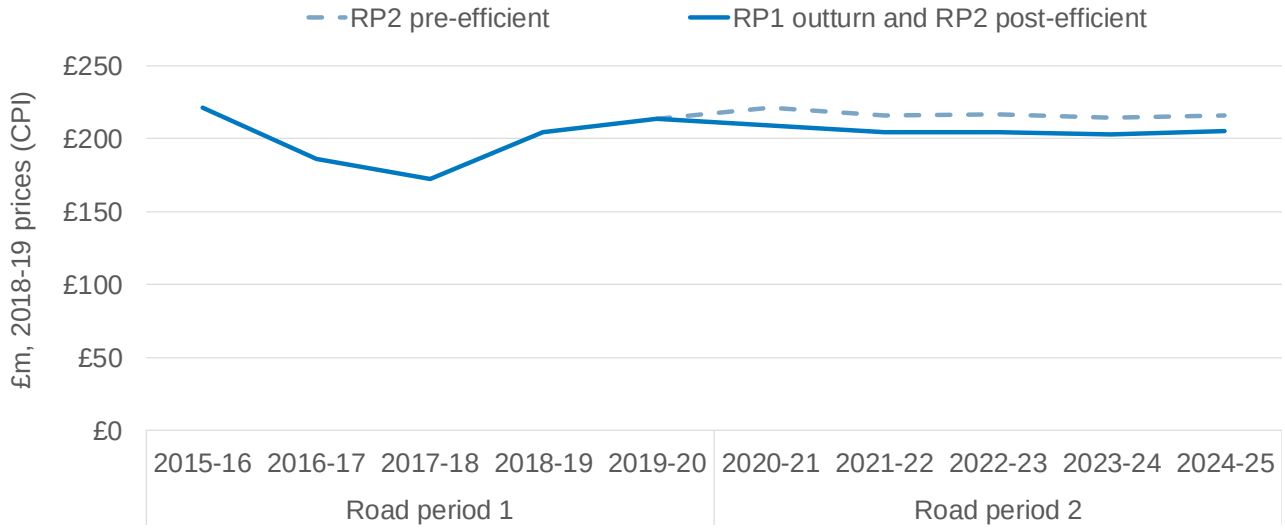


8.89. If it is granted the additional financial flexibility between opex and capex that it is seeking, Highways England would be able to manage this within its funding. It is not

certain that Highways England will receive this additional flexibility. So, even if it is granted, it would be preferable to start from the "correct" position. We recommend that the allocation between opex and capex is corrected in the Final SBP.

8.90. The DSBP proposed £64m of embedded efficiency, a 5.6% improvement on average across RP2 (using the corrected post-efficient figures). Figure 8.14 shows that the proposed operations efficiencies were a constant "wedge" of around £13m per year across RP2. This flat profile resulted from uncertainty around when in the road period and where in the business efficiencies could be achieved. Highways England has said it will re-visit this profile as it develops its plans in more detail.

Figure 8.14 Pre- and post-efficient operations costs



8.91. The correction we applied affects only the OD-delivered aspects of operations opex. Highways England confirmed that it does not affect the total OD-delivered embedded efficiencies proposed for operations and business capital, or the split between them.

8.92. The overall level of efficiency proposed for operations is 5.6% on average across RP2, equivalent to around 1.9% per year. There were varying levels of efficiency in specific elements of the operations plan that we have reviewed. For example, OD had a 1% per year efficiency challenge. The DSBP described some initiatives that could help to deliver these efficiencies, and the calculations include the effect of increased single-crewing helping to offset the additional traffic officer costs associated with all-lane running smart motorways.

8.93. Especially compared with some of the capital elements of the DSBP, Highways England did not have clear plans for how it will deliver these efficiency improvements. Opex efficiencies did not form part of the efficiency KPI for RIS1. So, we would not recommend a greater efficiency challenge, with our focus on ensuring that Highways England can demonstrate improving efficiency in this area.

Recommendations

We recommend that:

- Highways England sets out a clear baseline of renewal volumes that can be compared with equivalent figures for RP1 and we can monitor delivery against during RP2;
- the Final SBP reflects revisions to the pre-efficient costs and embedded efficiencies for maintenance; and
- the allocation between operations (opex) and business capital (capex) is corrected in the Final SBP.

9. Other spending areas

PFI payments

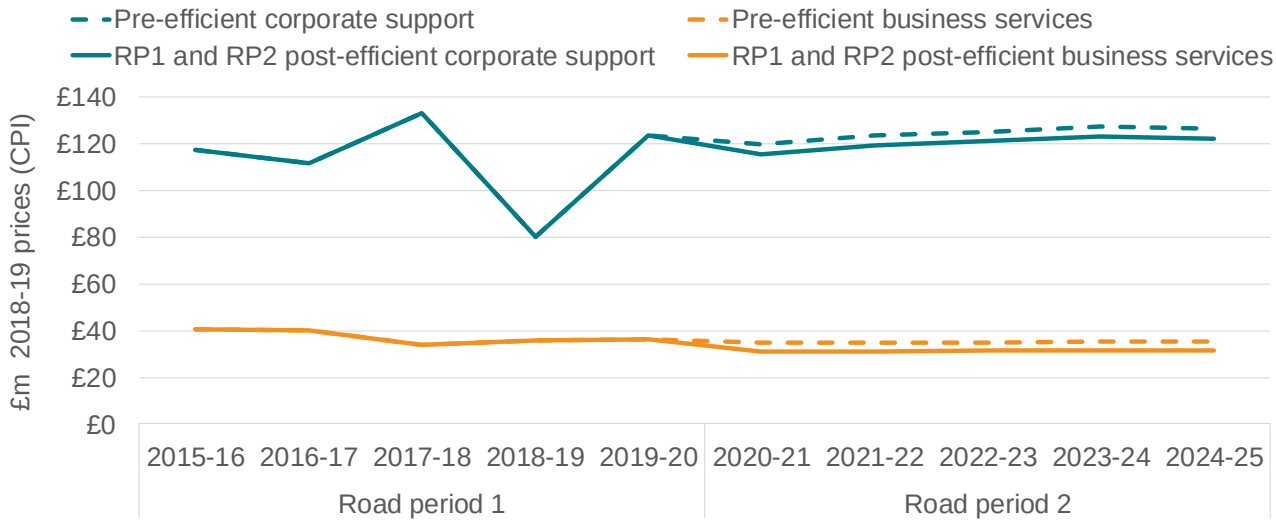
9.1. Highways England's PFI payments line in the DSBP was made up of the service payments to its 11 Design, Build, Finance, Operate (DBFO) contracts, less capital repayment credits and it included £39m in RP2 for management and handback costs to prepare for Highways England beginning to take control of some DBFO areas in RP3. The proposed funding was based on forecast costs for each of the 11 DBFOs, based on the specific contractual arrangements for each. This led to the spike in 2020-21 caused by payments for the A19 Dishforth to Tyne Tunnel DBFO.

9.2. Highways England included £53m of embedded efficiency in this area, from refinancing the M25 DBFO. The M25 contract has the longest remaining term and was structured so that Highways England would take a larger gain from refinancing. The shorter terms and nature of the other contracts mean that Highways England would be unlikely to make meaningful efficiency improvements from refinancing its other DBFOs.

Corporate support and business services

9.3. Figure 9.1 shows the RP1 and RP2 pre- and post-efficient costs for Highways England's corporate support and business services. Together they made up £822m of RP2 funding in the DSBP, a 1% increase (in real terms) on RP1. Highways England's plans included £42m of embedded efficiency, a 5% improvement on average across RP2.

Figure 9.1 Pre- and post-efficient corporate support and business services costs



9.4. Highways England benchmarked its corporate support services. This compared the size and cost of its corporate functions against a range of comparators from different

sources specific to each service. The broad conclusion of this exercise was that Highways England's corporate services are "right-sized". But it also identified a number of areas for further improvement, particularly around the large proportion of services that are outsourced and the potential to increase automation.

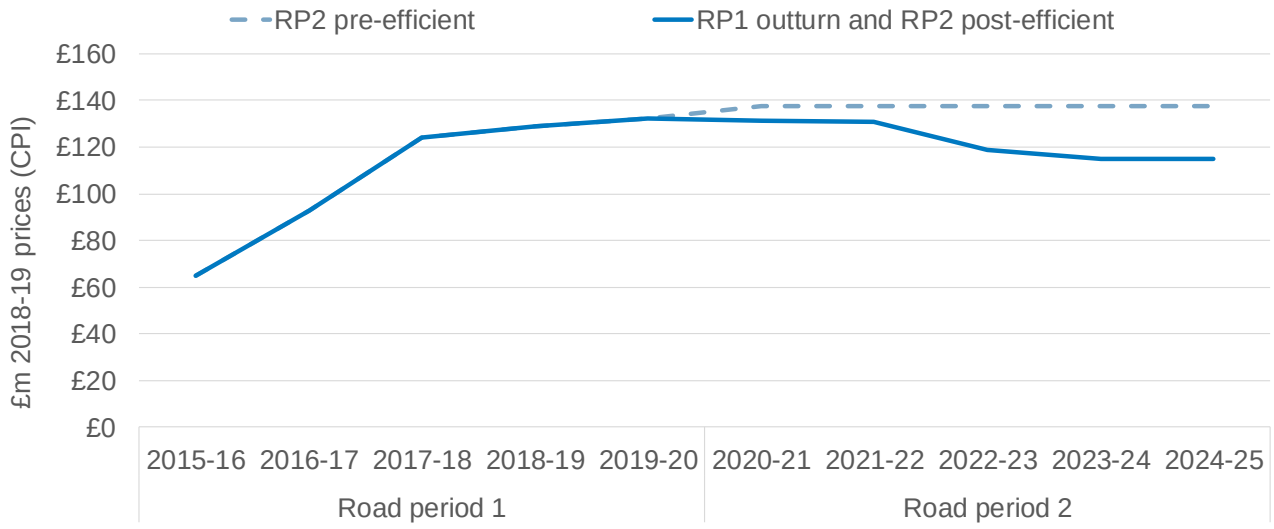
9.5. Highways England acted on these recommendations in its DSBP. There was a clear link from the benchmarking report to the proposed efficiency improvements in its finance, legal and HR services. Our sample review focused on HR and this is discussed further below. The legal and finance efficiencies were based on bringing specialist services in-house. Highways England also proposed efficiencies around its Safety, Engineering and Standards (SES) business services, by holding funding in this area flat as the capital programme it supports increases.

9.6. Our more detailed sample review of HR found that the costs were clearly and transparently built-up and that the identified areas for efficiency improvement were clearly linked to the benchmarking evidence. There was a 16% average efficiency improvement for HR – with a flat profile of £2.6m in each year of RP2. There was not a clear justification for why this was the right amount. But it is a challenging target and Highways England has identified the steps it will take to achieve it.

Capitalised staff costs

9.7. Figure 9.2 shows the trend in capitalised staff costs across RP1 and RP2. These costs increased through RP1 and the £661m proposed funding for RP2 in the DSBP represents a 12% real increase on RP1. However, the costs in the DSBP reduced in real terms across RP2, largely driven by £84m of embedded efficiency improvements, 11% on average across RP2.

Figure 9.2 Pre- and post-efficient capitalised staff costs

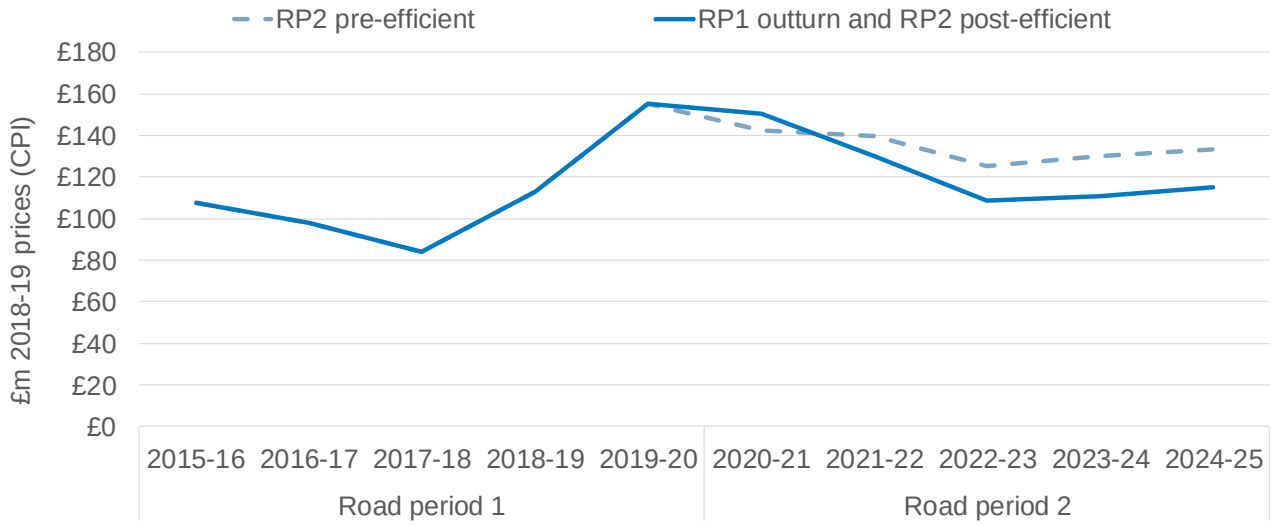


9.8. The costs were developed on a roll-forward basis. The efficiencies in the DSBP increased towards the end of RP2, when the changing mix of projects in the portfolio presents an opportunity for Highways England to adapt its operating models. The 11% efficiency improvement appears challenging. Highways England identified the broad opportunity for efficiencies in this area, but not the detail of how it expects to deliver them.

Business capital projects

9.9. The DSBP proposed £665m for business capital projects in RP2, a 10% real increase on RP1. The post-efficient figures in the DSBP included £62m of embedded efficiency, 8.5% on average across RP2.

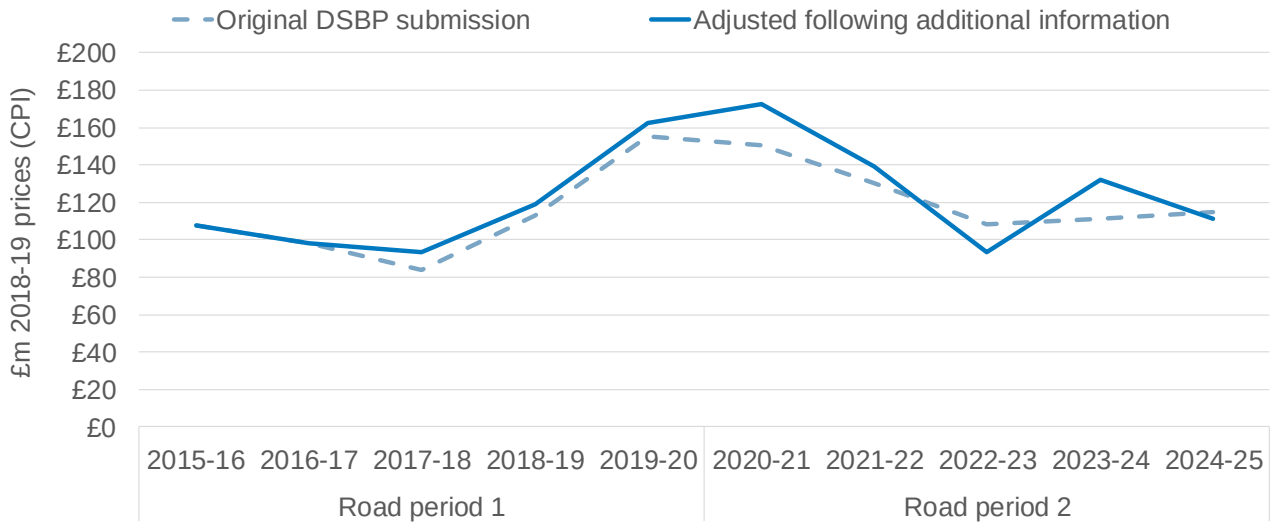
Figure 9.3 Pre- and post-efficient business capital project costs



9.10. This spending line included projects from across Highways England's directorates, with most of the funding for OD and IT. As discussed above, there was a re-classification of opex and capex funding within OD, which increased the business capital funding by £35m. Figure 9.4 shows the effect of this on the profile of RP2 funding (and revisions to the RP1 numbers in the original DSBP submission). When this is taken into account, the funding increases to £700m, a 12% real increase on RP1, and the efficiencies were an 8.1% average improvement across RP2.

9.11. Our sample review focused on the OD-led winter fleet replacement project. This project had £59m of RP2 funding in the DSBP to complete the replacement of Highways England's fleet of 437 gritters. There was £14m of efficiency proposed for the project, a 19% improvement. Highways England also identified £18m of cost challenge before the efficiency improvements were applied.

Figure 9.4 Impact of adjustments on business capital projects costs



9.12. The differentiation between what constituted cost challenge and efficiency was not particularly clear. The project is split across two phases, with the first phase beginning in RP1. For phase 2, the project team initially proposed a higher per vehicle rate, to meet additional operational requirements. The cost challenge was for phase 2 to deliver the same per vehicle rate (in real terms) as phase 1. The additional requirements (relating to increases in network extent and shorter run times) also meant more vehicles could be required. The efficiency challenge is based around replacing the fleet on a like-for-like basis, with no increase in vehicle numbers.

9.13. These two categories of challenge could easily have been reversed, with managing the vehicle numbers treated as a cost challenge and reductions in the unit rate as an efficiency. Regardless of how they were classified, this project provides evidence of a good level of challenge. However, Highways England did not provide specific plans for how the efficiencies will be achieved. As noted above, Brexit has not been included as a key headwind by Highways England, but it was noted as a specific risk for this project as there are currently no UK suppliers of this specialist equipment. So, while the efficiencies are challenging, there are risks to their delivery.

9.14. Highways England also provided evidence of a strong cost challenge for its IT capital projects, particularly in scaling back its data vision strategy, revising the scope of its 5G activities, and improving the profiling of its asset replacement cycles. IT capital projects made up almost 35% of the business capital projects costs in the DSBP, and had 7.4% efficiency improvements (after cost challenge), in line with the spending line as a whole.

RIS3 development

9.15. The DSBP proposed £295m of funding for a range of RIS3 development activities. This included developing a pipeline of at least 15 major projects that could be delivered in RP3, including five that will be developed to PCF stage 5. This is particularly important given the proposed approach to managing risk through the centrally-held portfolio risk allowance, as these projects could potentially be brought forward to start work in RP2 if risks do not materialise or other projects drop out of the portfolio.

9.16. Highways England provided a list of potential candidate schemes, and the expected development costs for each, based on costs for previous projects, totalling £205m. It also identified the following additional funding needs to prepare for RP3:

- New studies and PCF0 development (£15m) – a mixture of thematic and geographical studies to identify potential future improvements to the SRN.
- Existing Strategic Studies (£15m) – development of the A303 and Manchester North West Quadrant schemes was separately identified as a government priority. This funding was to progress options for the remaining three studies (M25 South West Quadrant, A1 East of England and trans-Pennine) through the PCF process.
- Route strategies (£10m) – to undertake more extensive assessments and engagement with stakeholders (including STBs) for the next generation of route strategies.
- RIS preparation (£15m) – to develop the specialist modelling and analytical capability to prepare for RIS3.
- Development of additional priorities (£30-£50m) – flexible funding so that Highways England can respond to emerging priorities during RP2.

9.17. Highways England targeted £24m of efficiency from this funding line. This was 8.0% of the proposed funding, consistent with the target for new enhancements. These efficiencies would be from reductions in the total outturn costs of the projects being developed with the RIS3 development funding. So the benefits would be felt through lower costs in RP3 (and beyond), rather than during RP2. The level of efficiency claimed during RP2 would be on an earned value basis – pro-rata with the proportion of total cost that is spent during RP2.

Designated funds

9.18. The DSBP proposed £710m covering three designated funds:

- Environment and Wellbeing (£325m);
- Users and Communities (£169m); and
- Innovation and Modernisation (£216m).

9.19. The funding levels above were indicative, based on mapping the RIS1 funds to the RIS2 proposals and might change as Highways England's plans develop. Also, in contrast to RIS1, Highways England proposed that funding between the funds should be flexible during RP2. Given the challenges Highways England faced spending some of its designated funding in the early years of RP1, this appears a sensible proposal. But DfT may want to consider how this fits with its policy objectives.

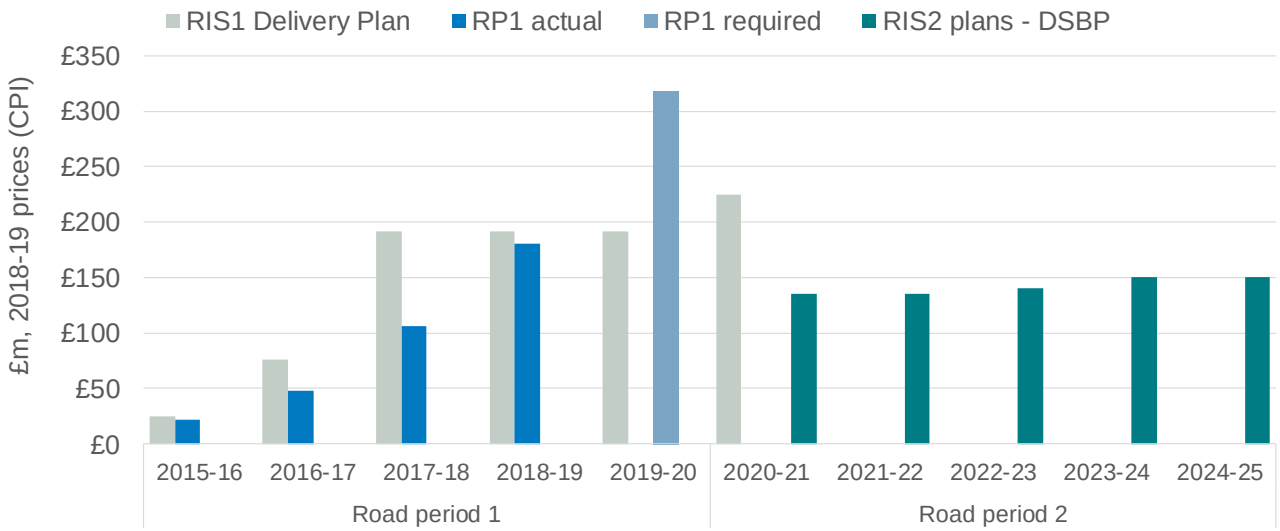
9.20. Highways England's proposed funding in the DSBP represented a 4% reduction on RP1 (in real terms, based on the RP1 profile in the DSBP). The £135m proposed for the first year of RP2 is also £90m less than the £225m envisaged for designated funds in 2020-21 in RIS1. Note that these figures are potentially complicated by Highways England's proposed Safety & Congestion fund (referred to as local capital in the DRIS), which might have some overlap in scope with the RIS1 cycling, safety and integration fund.

9.21. Figure 9.5 shows that in the early years of RP1 Highways England struggled to spend its designated funds in line with its plans. It successfully ramped-up delivery in 2018-19, spending more than in the first three years combined, but a further increase to over £300m is required in 2019-20 to meet its RP1 commitments.

9.22. The DSBP set out more stable funding levels for RP2 at £135m-£150m per year. While the categorisation of the funds has changed, they cover broadly the same activities and Highways England reported in the DSBP having a pipeline of projects requiring funding of over £300m. Coupled with the proposal to have more flexibility between funds, the proposed levels appear deliverable.

9.23. Highways England proposed £25m (3.5% efficiency) of KPI measured efficiency on its three designated funds. As it is in the KPI measured category, this has not reduced the overall funding level but efficiencies will be either retained within the designated funds to deliver more output, or will reduce costs in future road periods (which could be particularly applicable to the Innovation and Modernisation fund).

Figure 9.5 Planned and outturn designated fund spending in RP1 and RP2



Safety and Congestion fund

9.24. The DSBP also included a £140m Safety and Congestion fund, similar to the £150m for local capital envisaged in the DRIS. This would fund small (typically up to £10m but potentially up to £20m) capital improvements to relieve congestion and improve safety outcomes.

9.25. Highways England identified this funding as important to delivering its "minimum" level of safety improvements. And small, targeted improvements like those planned to be delivered with this funding are often expected to deliver high value for money. However, Highways England's evaluation of its National Pinch Point programme found that similar projects were not delivering the expected journey time benefits.[32] This was because benefits during peak periods were offset by worsening journey times during inter-peak and off-peak periods. It is important that Highways England learns from this in how it designs schemes during RP2.

9.26. Similar to the designated funds, Highways England proposed 3.5% KPI measured efficiency for this fund - £5m across RP2. These efficiencies would be retained within the fund to deliver additional outputs. If the 8% efficiency figure used for major enhancements were applied, it would increase the KPI measured efficiency to £11m, but we are not recommending this additional challenge.

32 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/791450/National_PP_Programme_Meta_Final_draft.pdf

10. Performance specification

10.1. An effective performance specification should focus on outcomes, be capable of being influenced by Highways England and should have a manageable number of top-level Key Performance Indicators (KPIs). The metrics chosen should be clearly understood by and matter to users, stakeholders and funders, and be capable of being meaningfully monitored.

10.2. We recognise that there will be trade-offs in the performance specification, and Highways England will need to think carefully about balancing its competing requirements. Similarly, with some of the metrics not having a long time series of data, care needs to be taken in setting targets.

10.3. All of Highways England's proposed metrics and targets were at a national level. Our joint research with Transport Focus highlighted that users would attach more value to regional targets, as they are likely to better reflect their experience of the network and the ability to compare across regions could help drive improved performance. Other stakeholders, such as STBs, would also benefit from regional disaggregation through a better understanding of performance in their areas. We are not recommending a move to regional targets now, but we do recommend that, where they can be meaningfully disaggregated, all KPIs should be reported on a regional basis.

10.4. The sections below provide our view of the various metrics proposed in the DSBP, and the alternative position set out by DfT, focusing predominantly on the KPIs.

Improving safety for all

10.5. Highways England's proposed KPI for this outcome area was a reduction in the number of people killed or seriously injured (KSI) on the SRN. This is essentially the same metric used during RP1. However, setting an appropriate target for this metric has been complicated by the progressive movement of police forces to the new CRASH reporting system[33], which re-categorises some injuries as serious that were previously categorised as slight. This has increased the reported number of KSIs.

10.6. Highways England proposed a "minimum" target (less than 1,590 KSIs by 2025) based on its core forecast of the impact of its proposed investments in the DSBP, and a "stretch" target (less than 1,450 KSIs) based on extrapolating the trajectory needed to meet the RIS1 target.

10.7. We recognise that Highways England's "minimum" target is analytically robust, linking performance in RIS2 to available resources. We consider that it would be

[33] CRASH – Collision Recording And SHaring

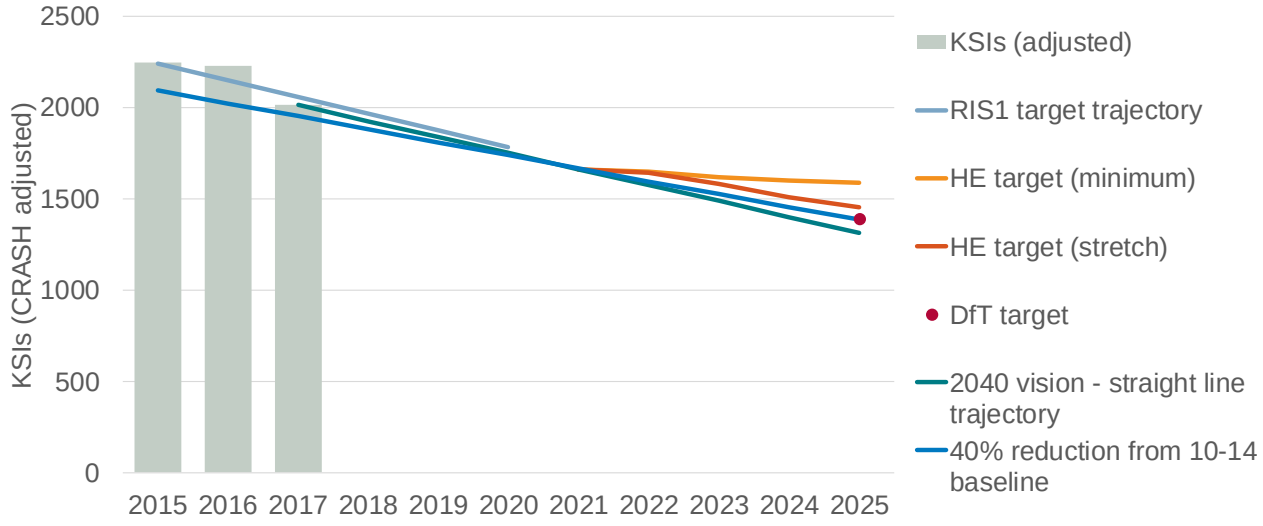
helpful to formally reference this target in the final performance specification, as it provides useful context for our monitoring in this area.

10.8. However, we believe that a single target is preferable as setting multiple targets would make it unclear to stakeholders at what level of performance we would raise concerns with Highways England. Officially referencing the minimum level of performance in the final performance specification (but not publicly setting it as a target) could be helpful by providing clearer context to our monitoring.

10.9. DfT proposed a target of less than 1,393 KSIs. This is 4% (57 KSIs) more stretching than Highways England's stretch target and is based on rolling forward the original target level from RIS1.

10.10. When considering what the "right" level of target should be, it is helpful to consider the gradient of trajectory required to get from the latest (2017) performance towards the zero harm aspiration in 2040. The target need not be on a straight line towards zero in 2040, as it is reasonable to expect that advances in vehicle technology will result in more rapid safety improvements (and therefore more pronounced drops in KSIs) as we get closer to 2040. However, for the 2040 vision to retain credibility, we would expect interim targets to come close to the 2040 trajectory. Highways England's stretch and DfT's target appear to pass this test – both are above the straight line trajectory to zero in 2040, but are close enough to the line to reflect this level of long-term ambition.

Figure 10.1 Road safety targets



10.11. However, we believe that the method for setting a RIS2 target can be improved by taking a more analytical approach. Rather than rolling forward the target from RIS1 (as is the case for DfT's proposed target), we recommend that the target methodology is rolled-forward from RIS1. This would involve setting the baseline as

the average number of KSIs in 2010-2014 (2,305 KSIs), with a target to reduce this by 40% by 2025 (1,383 KSIs). One key advantage of this over the alternatives is that it provides a way to revise the KPI target mid-road period. This may prove useful as KSI data may be revised during RP2 as more police forces take up the CRASH reporting system. We support the proposal to continue to disaggregate KSI reporting by vulnerable user groups to maintain a focus on their safety.

Providing fast and reliable journeys

10.12. There is a range of potential metrics in this outcome area. These can be broadly thought of in two categories: metrics that reflect the outcome as a whole and are influenced by external factors; and metrics that reflect more partial, or intermediate, outcomes and are more within Highways England's control. Highways England's proposals in the DSBP represented an evolution of the RIS1 performance specification, with improved incident clearance and network availability KPIs. Both of these metrics fall in the more controllable, intermediate outcome category.

10.13. This is an important outcome area for road users and stakeholders. For example, our joint research with Transport Focus found that this was the top priority outcome area for most stakeholders.[34] It is important that this is reflected with metrics that reflect the overall outcome. So we recommend the performance specification should have a balance of more controllable and more outcome-focused KPIs for this outcome area.

Incident clearance time

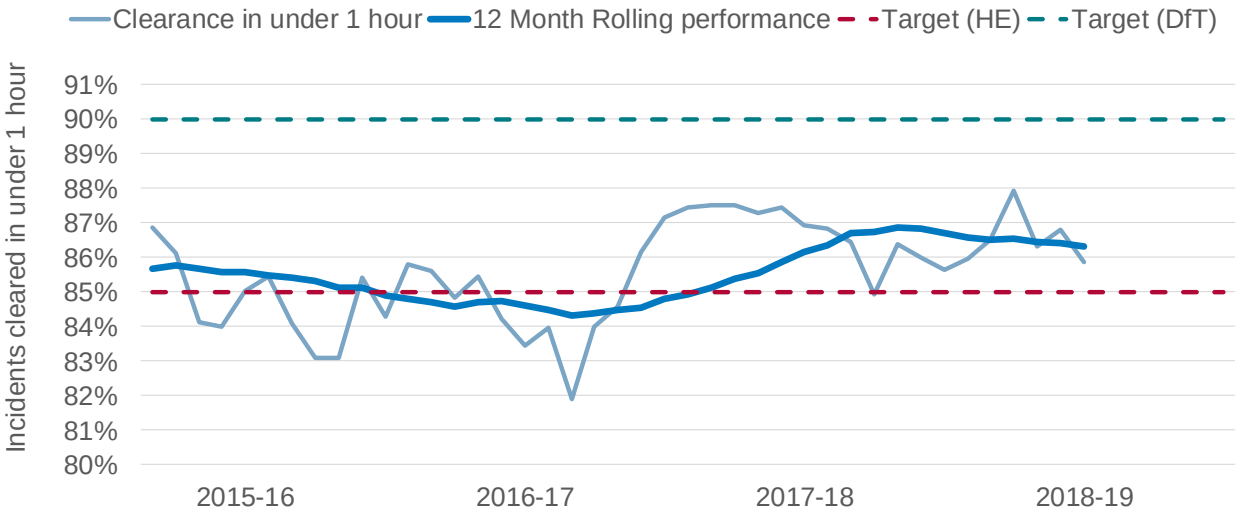
10.14. Highways England has extended the incident clearance metric from RIS1 to cover 24 hours (the RIS1 metric only covers 6am-10pm). This makes it more challenging, with performance during RP1 around 1% lower under this metric than the RIS1 version. Highways England proposed this as a RIS2 KPI in the DSBP with an 85% target (equivalent to an 86% target in RIS1). DfT proposed this as a PI (but with a 90% target). Performance against the new metric is presented in figure 10.2 below.

10.15. This metric does not cover the APTR network and we understand concerns that, by focusing on clearing incidents in one hour, the metric may not incentivise quicker responses to incidents which are significantly above or below this threshold. However, Highways England:

[34] https://orr.gov.uk/__data/assets/pdf_file/0015/40533/measuring-highways-englands-performance-2020-25-the-road-user-view.pdf

- was clear that this metric has been effective in driving traffic officer performance in RP1, by providing a clear link between operational staff and KPI performance;
- presented analysis that shows there is no unintended consequence associated with the one hour target; and
- could mitigate potential risks by reporting more disaggregated clearance data.

Figure 10.2 Incident clearance performance (on the proposed RIS2 metric)



10.16. We agree that this metric is useful in targeting something that Highways England has direct control over, and therefore support its use as a KPI in RIS2. In terms of the target level, past performance suggests that the balance of challenging but deliverable may be found somewhere between 85% and 90%.

10.17. There are no performance forecasts to inform the target level. The impact of factors such as increased traffic and smart motorway roll-out are uncertain as they could affect both the types of incidents and speed with which traffic officers are able to clear them. Therefore our assessment of what would constitute a challenging and deliverable target is based primarily on Highways England's RP1 performance.

10.18. This suggests that a target of 87% would be challenging and achievable. The new metric introduces some uncertainty, so we recommend that the target is initially set at 86%, increasing to 87% in year 2 or 3 of RP2.

Network availability

10.19. This metric is an improved version of the RIS1 network availability metric, updated to take account of reduced speed limits and narrow lanes in roadworks. Highways England was still developing the metric during our review. As such, there is no

historical performance data to present, and no possibility to comment on what target level would be stretching and deliverable.

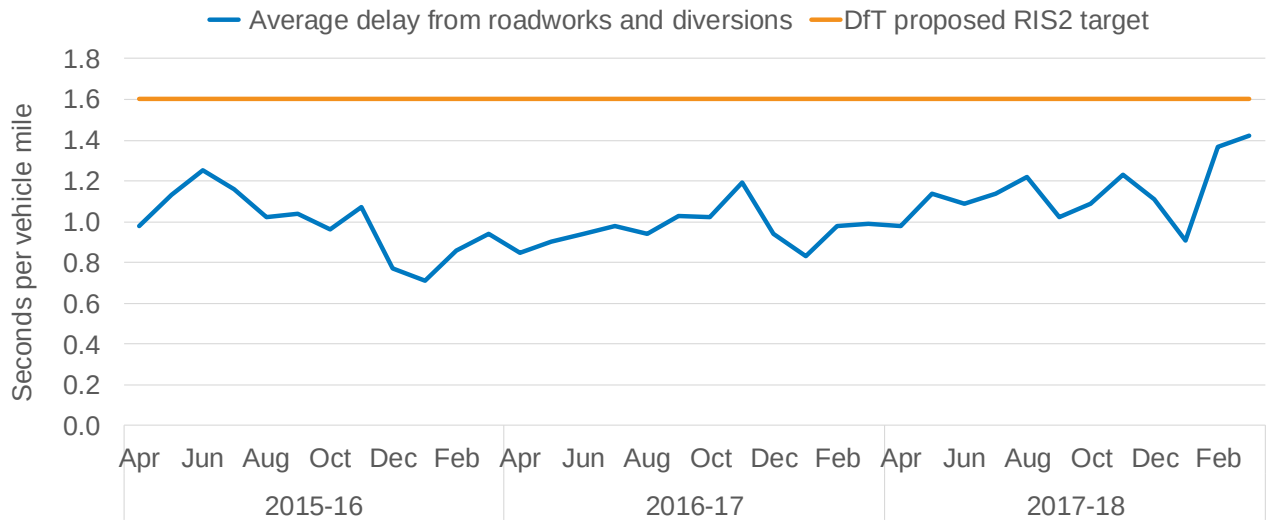
10.20. Ideally we would prefer a metric that better captures the overall desired outcome of better management of roadworks and less delay for users, such as delay in roadworks. However, as discussed below, that metric only captures roadworks delay per vehicle mile travelled on the whole network, rather than by travel through roadworks, which means that it closely reflects the overall level of roadworks, rather than the effectiveness of their management. So we recommend that the improved network availability metric should be considered as a KPI for RIS2.

10.21. Highways England has comfortably met its network availability target during RP1. This may be because the target was set at a level based on the highest volume of investment at the end of RP1. So, if a target is set for this metric as a KPI, consideration should be given as to whether it is preferable to have a single target across the whole road period, or a target profile that reflects the expected investment profile.

Delay in roadworks

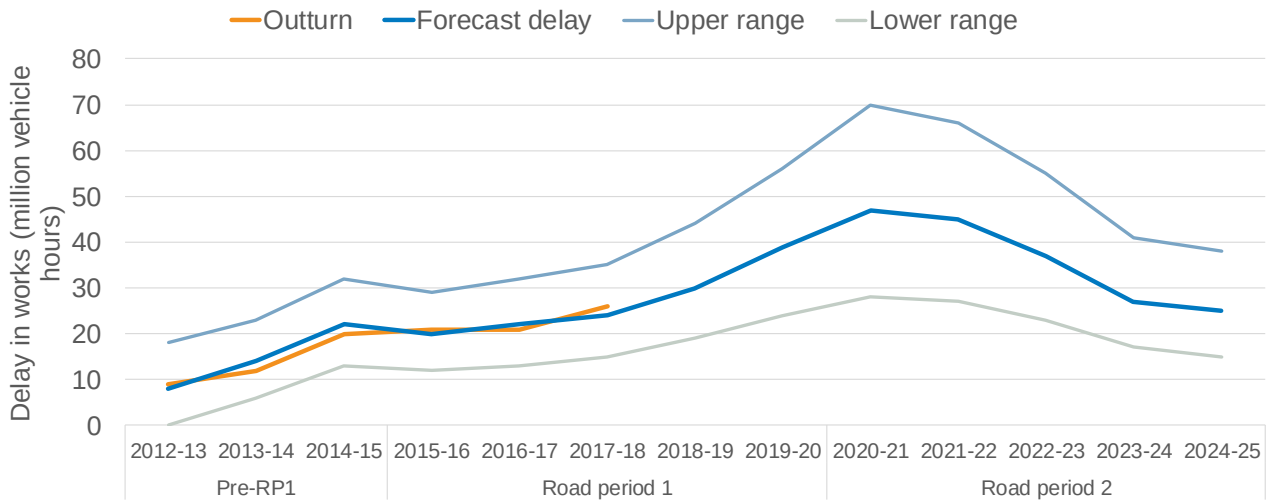
10.22. DfT proposed that this newly developed metric should be included as a KPI with a target of 1.6 seconds delay per vehicle mile. Highways England, however, considered it unsuitable as a RIS2 KPI in the DSBP. This is due to difficulties in forecasting performance, and the impact of external factors beyond Highways England's control which limit the company's ability to influence performance. Historical performance is shown in figure 10.3, with forecasts for RIS2 (presented in millions of vehicle hours delayed) shown in figure 10.4.

Figure 10.3 Delay in roadworks during RP1



10.23. Road users identified this metric as one which should have a target attached (in research conducted by ORR and Transport Focus[35]). We do not believe that a limited ability to forecast performance is in itself a good enough reason to discount this as a KPI. However, the current proposed metric captures the average level of delay from roadworks per vehicle mile travelled on the SRN as a whole, rather than by travel through roadworks. This means that its level reflects the volume of roadworks on the network, rather than the effectiveness of their management.

Figure 10.4 Forecast delay in roadworks during RP2



10.24. We recommend that this metric is included as a PI in RIS2. It should be further developed to measure delay in roadworks per unit of travel through roadworks, so that it can be included for consideration as a more outcome-focused KPI in RIS3.

Average delay and journey time reliability

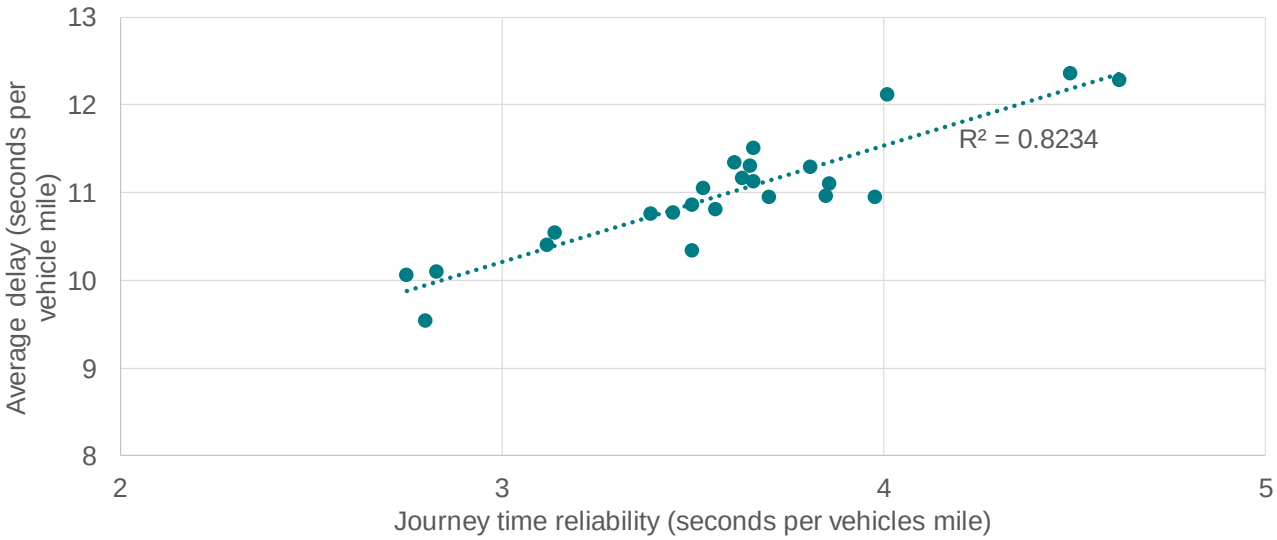
10.25. DfT proposed that both average delay and journey time reliability should be KPIs, with associated targets. Highways England proposed that both should be untargeted PIs, due to its limited control over the metrics.

10.26. As noted above, these metrics are important to users and stakeholders. So it is important that the RIS2 performance specification includes an outcome-focused KPI that reflects this user priority. However, figure 10.5 shows that the two metrics are highly correlated. While we might expect there to be a bigger difference between average delay and the variability of travel times, in practice, with how the proposed metrics are constructed, they appear to be closely related. We support inclusion of one of these metrics as a KPI, but we recommend against having both as KPIs.

[35] https://orr.gov.uk/__data/assets/pdf_file/0015/40533/measuring-highways-englands-performance-2020-25-the-road-user-view.pdf

10.27. There are pros and cons to both metrics. Average delay captures the whole of the outcome of interest but is less controllable by Highways England as a large proportion of average delay is driven by traffic levels. Journey time reliability arguably reflects factors that are more within Highways England's control – including how quickly it clears incidents and how effectively it manages roadworks – but this is a subset of the overall outcome and those specific factors can be captured through more output-focused metrics.

Figure 10.5 Correlation between average delay and journey time reliability metrics



Average delay

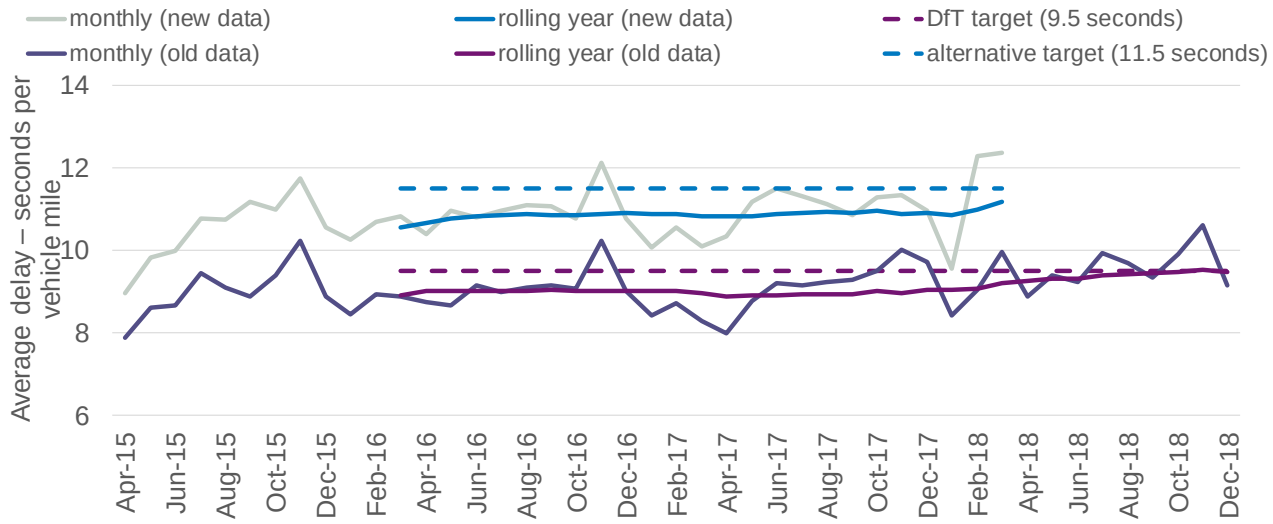
10.28. DfT proposed a target of 9.5 seconds of delay per vehicle mile. This appears to have come from taking the current level of performance and setting that as a ceiling for RIS2. However, it does not appear to take account of the fact that, in RP2, Highways England will be moving to a new supplier of delay information. This new data will increase the measure of average delay by almost 2 seconds per vehicle mile (as shown in figure 10.6). So a more appropriate target level based on this approach may be around 11.5 seconds per vehicle mile.

10.29. If this level of target was set, we consider that this would represent a considerable stretch for Highways England, and may not be deliverable. Traffic on the network is at record levels and continuing to grow. DfT's road traffic forecasts suggest that traffic on the SRN will increase by 5% between 2020 and 2025.[36] In addition, there is expected to be a significant increase in the volume of roadworks on the network during RIS2 as the RIS1 enhancements tail is delivered. Offsetting this, enhancement projects will complete during RP2 and should reduce delay. If average delay is chosen as a KPI, we recommend that further work is undertaken to set a

[36] https://www.gov.uk/government/publications/road-traffic-forecasts-2018

challenging and deliverable target which reflects the impact of the new data provider, traffic growth, the increase in the volume of roadworks and completing schemes.

Figure 10.6 Average delay during RP1 with different data sources

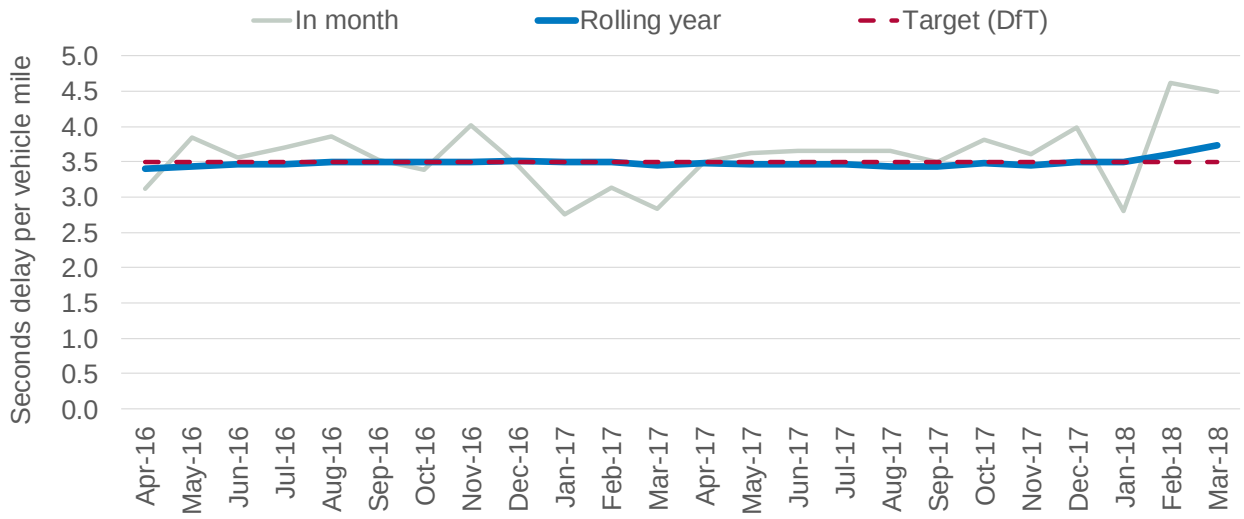


10.30. We also support Highways England's proposed inclusion of disaggregations of average delay, such as delay on gateway routes and smart motorways, as PIs in the performance specification.

Journey time reliability

10.31. DfT proposed a target of 3.5 seconds per vehicle mile. Similar to average delay, from figure 10.7 this appears to be based on performance during RP1 and, for the same reasons, this may not be deliverable due to the effects of the new data supplier, traffic growth and increased investment. Figure 10.7 only covers the period to March 2018. More data is required, covering performance in 2018-19 and, ideally, forecasts of performance in RP2 before proposing any target for this measure. As with average delay, if this metric is chosen as a KPI, the target level should be set to reflect the most recently available data and forecasts.

Figure 10.7 Journey time reliability



A well maintained and resilient network

Pavement condition

10.32. Highways England has developed a new metric to measure pavement condition on the SRN. In our recent research with Transport Focus, road users and stakeholders identified this as a metric that should be targeted.[37] Highways England also proposed a PI measuring ride quality, which we support as it provides a more customer-focused metric to complement the KPI.

10.33. The new metric differs from the RIS1 pavement condition KPI as it will:

- cover all lanes, rather than just lane one – improving reported condition by around 1%;
- use the CRASH model and site investigations to assess skid resistance – improving reported condition by around 1.4%;
- apply a lower trigger for investigation (level 3 rather than 3a) – reducing reported condition by around 2.5%, and
- take data in 100m, rather than 10m, slices – reducing reported condition by around 0.3%.

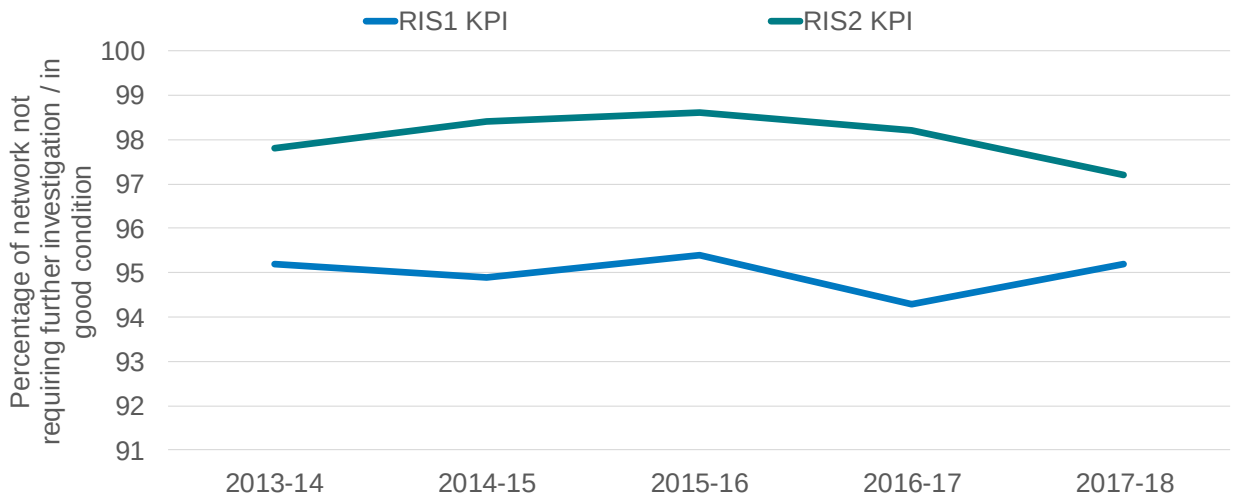
10.34. The impacts described above are the effect of undoing each change in the new metric. They interact so that the total impact is not equal to the individual effects.

[37] https://orr.gov.uk/__data/assets/pdf_file/0015/40533/measuring-highways-englands-performance-2020-25-the-road-user-view.pdf

Taken together, the net effect is that 95% under the RIS1 KPI equates to around 97% for the new metric.

10.35. Highways England's modelling suggested that there is a 1.5% uncertainty range around the 97% level – the company proposed a 95.5%-97% target range. This analysis was based on one year of data. Subsequently, Highways England estimated the RIS2 metric for a five-year period from 2013-14. The RIS1 and RIS2 metrics over this period are shown in figure 10.8. The variation in the difference is broadly comparable with a 1.5% uncertainty range.[38] However, the average difference over this (relatively short) time-series is 3% and the new metric would have been at least 2% above the RIS1 metric in each year.

Figure 10.8 Pavement condition from 2013-14 to 2017-18 under the RIS1 and RIS2 metrics



10.36. Therefore, while we accept that a 97% target is broadly equivalent to the 95% RIS1 target based on Highways England's more detailed modelling, there is a risk that 95.5% on the new metric could represent worse condition than the 95% RIS1 target. Also, the lower end of the range could become the de facto target, and this lower condition would be inconsistent with Highways England's proposed renewals funding.

10.37. DfT proposed a 93.5%-95% "state of good repair" target, informed by comparison with TfL's target to have 90-95% of their carriageway in a state of good repair. Although there are similarities, the SRN is not directly comparable to TfL's network, for example:

[38] The standard deviation of the difference between metrics is 0.75%, meaning a 1.5% range would be equivalent to two standard deviations.

- the SRN is characterised by having free flow high-speed roads, mainly motorways and A-roads, compared with TfL signal controlled lower speed roads;
- the condition of local road networks is affected much more by 3rd party works on the public highway, including statutory undertakers, than the SRN; and
- the metrics used to measure condition on the SRN and local roads are different.

10.38. We consider that, based on Highways England's modelling, the 97% target for the RIS2 pavement KPI is roughly equivalent to the 95% target for the RIS1 pavement KPI. The increase in the target level reflects changes to the metric, not a higher level of condition. Given the proposed renewals funding and that Highways England is now focusing on delivering "do-something" solutions rather than "do-minimum" (the approach used in RP1)[39], we recommend a 97% target. If there is a range or degree of tolerance to reflect uncertainty as Highways England transitions to a new metric, we recommend that it is smaller than the proposed 1.5%.

Other performance indicators

10.39. There were two areas where Highways England's proposed PIs differed substantially from those proposed by DfT: drainage condition and roadside technology availability. So we briefly discuss Highways England's and DfT's proposed metrics in the remainder of this sub-section.

Drainage condition

10.40. There were two PIs relating to drainage assets in RIS1, covering the extent of asset inventory and condition data. In the DSBP, Highways England proposed a metric measuring the number of mitigations to flooding hotspots and priority culverts. A backward-looking and entirely output-focused metric like this does not provide any information on asset condition or the effectiveness of Highways England's maintenance and renewal activities.

10.41. DfT proposed an alternative metric, based on the number and severity of flooding hotspots on the network. After the DSBP was submitted, Highways England also proposed an alternative resilience-based metric. This would be our preference as it provides a more forward-looking view of how Highways England is managing the assets. We recommend that Highways England and DfT agree the detail of how the resilience metric will be calculated. We also recommend that Highways England continues to report on the coverage of its condition data for drainage assets.

[39] As set out in its draft pavement asset group strategy.

Roadside technology

10.42. During RP1, Highways England has reported a PI measuring technology availability – the percentage of technology that is functioning correctly. For RP2, it has proposed a similar metric, with improvements to how MIDAS[40] loops are treated and with some high performing asset types removed as they are managed in other contractual performance regimes.

10.43. DfT proposed an alternative metric, based on asset age. However, there is not a clear link between asset age and availability or failure and Highways England's current maintenance strategy is to fix on failure. Coupled with quality issues around the asset age data, we recommend that asset availability should be used as a PI in this area to provide a backwards-looking indication of how assets have performed. In addition, we recommend that Highways England develops a more leading indicator (for inclusion by year 2 or 3 of RP2), such as the proportion of assets with IP compatibility, that creates better line-of-sight between asset need, investment, and a positive impact on road user journeys.

Being environmentally responsible

10.44. As with the other outcome areas, Highways England's proposed environmental KPIs represented an evolution on the RIS1 performance specification. It proposed KPIs for biodiversity and noise, with a suite of PIs covering carbon emissions, cultural heritage, water quality and litter, and a commitment to develop landscape and natural capital metrics.

Biodiversity

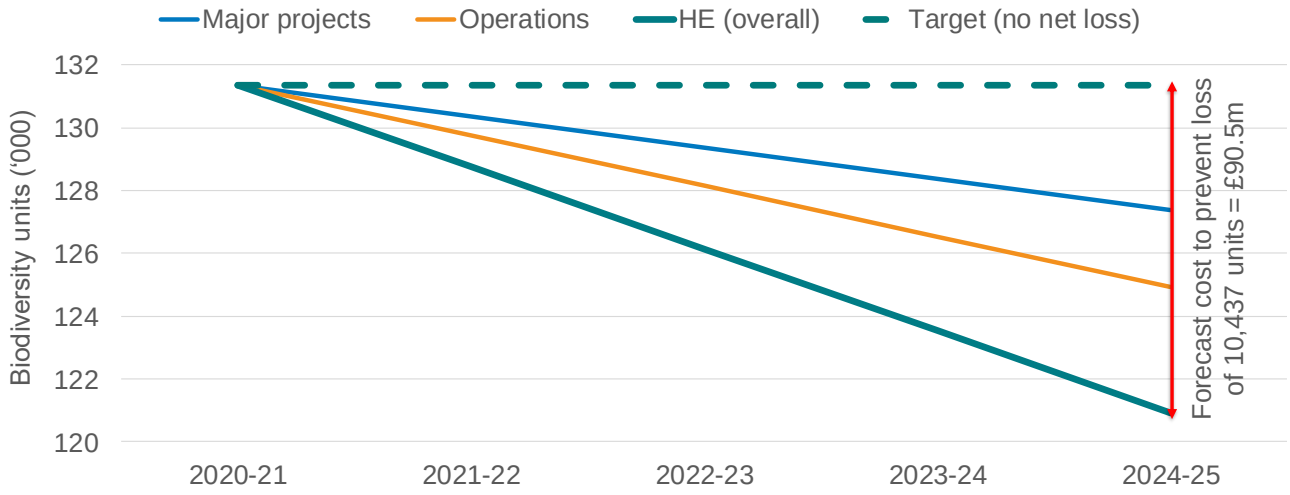
10.45. The proposed biodiversity KPI built on work undertaken during RIS1 to develop a new metric, which was supported by stakeholders such as Natural England. Highways England’s proposed target is for no net loss of biodiversity during RP2. Highways England calculated an 8% net loss of biodiversity in RIS2 under a do-nothing scenario. Its modelling suggested that it can mitigate this loss through funding for biodiversity in RIS2 of £90.5m. This level of ambition is in line with commitments made in RIS1.

10.46. However, our discussions with environmental stakeholders suggest that best practice is moving towards delivering net biodiversity gains. Using the assumptions above of an almost 8% loss in biodiversity being mitigated by an investment of £90.5m, it might be possible to infer that additional funding of approximately £11m could lead to a small biodiversity gain of around 1%. We recognise that it is difficult to

[40] MIDAS – Motorway Incident Detection and Automatic Signalling

factor in biodiversity gains to schemes which have already started, or are due to begin soon. However, DfT may wish to consider asking Highways England to review the possibility of delivering biodiversity gains in projects due to start later in RIS2, and the funding that this would require, to support a more ambitious target.

Figure 10.9 Projected biodiversity loss in a "do nothing" scenario



Noise

10.47. The RIS1 noise KPI targeted the mitigation of noise important areas (NIAs). For RIS2, Highways England has proposed a target of mitigating at least 5,100 households. This was calculated by taking the average cost of mitigating a household in 2017 (£5,000), and then applying inflation and an optimism bias uplift of 44%. Assuming £45.5m of designated funding for noise improvements in RIS2, Highways England estimated it could benefit around 5,100 households in RIS2.

10.48. While the Green Book recommends the use of optimism bias to help produce realistic cost estimates, its application in this context is questionable. Firstly, the rate used (44%) is the top end of the range for standard civil engineering projects, which are likely much more complex than the envisaged noise insulation programme. Secondly, Highways England delivered a very similar programme in RP1 and so should have greater certainty around the costs. Also, we have not investigated in detail the inflation assumptions used, but it is likely that the RIS1 funding model rate of 5% in 2018-19 and 2019-20 has been applied (as for other capital areas).

10.49. Therefore the proposed number of households mitigated does not look challenging for the proposed funding. We are not proposing a specific alternative target, but we recommend that it is set with a much lower (and potentially zero) rate of optimism bias and with inflation assumptions consistent with our recommendations elsewhere (to use the latest available outturn and forecast data). For example, we estimate that

with our recommended capital inflation forecasts and a zero rate of optimism bias, over 7,500 households could receive noise mitigation with £45.5m of funding.

10.50. Highways England also planned to mitigate noise for 22,000 properties through its renewals programme.[41] DfT combined the two sources of mitigation together in its proposed target of 28,000-34,000. Our review of Highways England's use of ring-fenced funds in RP1 found that the noise KPI was effective in incentivising the delivery of a noise insulation scheme through the designated fund. DfT should consider the risk that a noise target based largely on resurfacing could reduce the effectiveness of delivery through the ring-fenced funds.

Scorecard metrics and performance indicators

10.51. DfT proposed an environmental scorecard metric as the KPI in this area. It was made up of eight separate targeted metrics that, when combined, produce an overall red-amber-green rating covering the company's environmental performance.

10.52. We support including environmental measures which go beyond just noise and biodiversity in RIS2. However, there are risks that a composite or scorecard comprised of eight metrics could result in unintended consequences by spreading the company's focus too broadly. If a scorecard or composite metric is proposed, we recommend that it should concentrate on a smaller number of metrics that: are of equal importance to government; are able to be influenced by Highways England; reflect user and stakeholder priorities; and are supported by robust data. Remaining environmental metrics could be monitored as PIs or using other means, such as through the licence or other requirements in the RIS.

10.53. We would assess the individual metrics in a scorecard consistently with how we monitor the wider performance specification. If a scorecard or composite metric is proposed, we recommend that DfT and Highways England work to agree the target levels and clear rules for how overall performance should be assessed before the finalisation of the RIS and SBP.

10.54. In the rest of this section we briefly discuss the remaining metrics, which Highways England proposed as PIs and DfT proposed as targeted metrics forming part of a scorecard.

Highways England (corporate) carbon

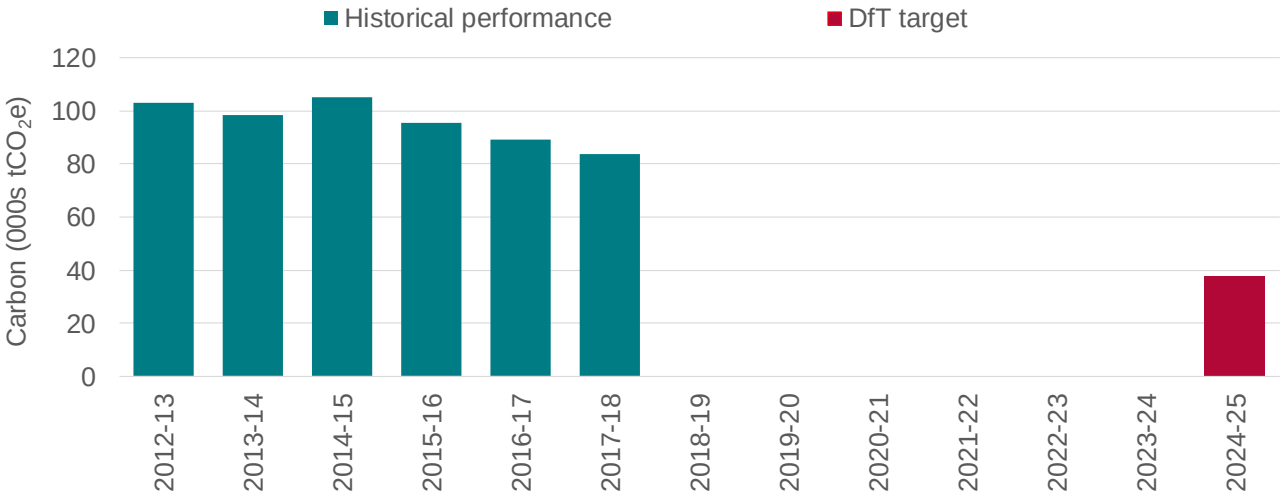
10.55. DfT proposed a target of between 35,000 and 40,000 tonnes of CO_2 equivalent from the company's corporate activities by the end of RIS2. This would be a reduction of over 50% from the latest available data for 2017-18. Highways England

[41] Setting Road Period 2 Performance Expectations, August 2018

did not provide any modelling to show expected progress in RIS2, so it is difficult to assess the deliverability of this target. Reductions in corporate carbon are closely linked to government-wide objectives for this area.[42]

10.56. DfT should consider if Highways England's licence or delivery plan should include commitments to deliver carbon reductions in line with the Greening Government Commitments, instead of including this as a targeted metric in the performance specification.

Figure 10.10 Corporate carbon



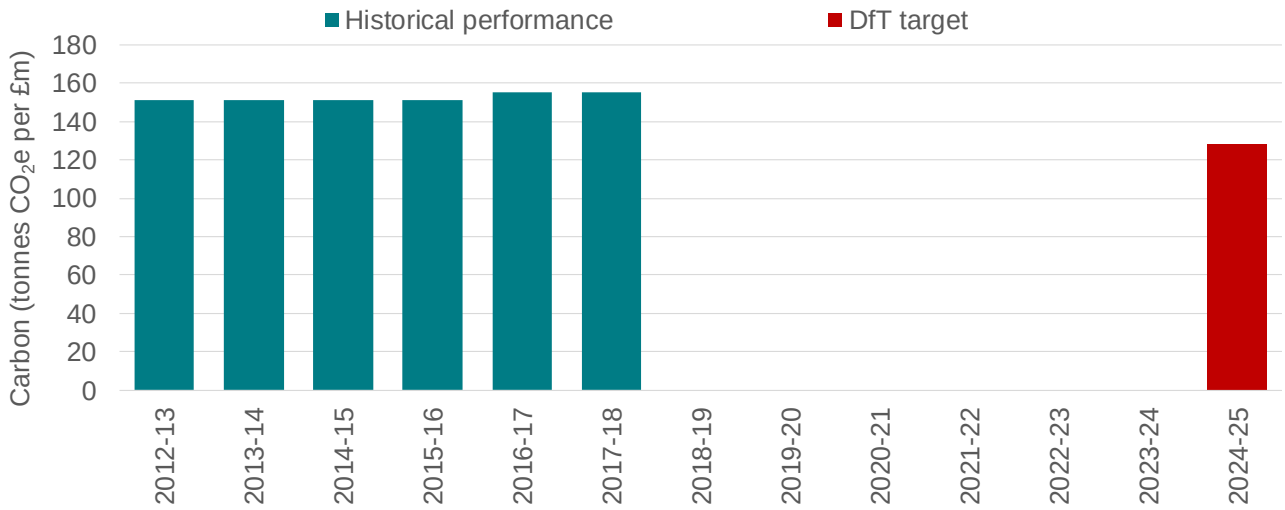
Supply chain carbon

10.57. DfT proposed a target of between 116 and 140 tonnes of CO_2 equivalent per £m for the company's supply chain by the end of RIS2. This would be a reduction of around 20% from the latest available data for 2017-18.

10.58. The lack of reliable historical data against which to set a baseline presents a key challenge in setting a robust target. Highways England had low confidence in its reported performance for previous years. It is undertaking work to improve the quality of these estimates, but until this is resolved there is a risk around setting a KPI which is based on unreliable data.

[42] For example, Greening Government Commitments: https://www.gov.uk/government/collections/greening-government-commitments

Figure 10.11 Supply chain carbon



Air quality

10.59. Highways England and DfT proposed different metrics for monitoring air quality on the SRN. DfT's proposed metric was to increase the proportion of Highways England's ultra-low emission vehicle (ULEV) fleet and the proportion of its ULEV fleet meeting the latest emissions standards each year. Highways England did not provide historical, or modelled, data for RIS2 for this metric, so it is difficult to comment on the deliverability of this target. The metric itself has the advantage of being largely within Highways England's control. However, the relative impact of Highways England's fleet on air quality issues associated with the SRN is small, so that DfT may wish to consider whether this is an appropriate KPI measure. A commitment for Highways England to invest in low emission vehicles could potentially be included in RIS2.

10.60. Highways England proposed a PI around mitigating the links on the SRN which are in exceedance of air quality standards. This is a measure that focuses on the key issues relating to air quality on the SRN. We support this metric being included as a PI or KPI.

Cultural heritage

10.61. DfT proposed a target that the cultural heritage score at the end of RIS2 is no lower than at the end of RIS1. There is no historical performance to report against this metric. There is also a high level of uncertainty around the data that will be used to measure this metric. For these reasons it may not be appropriate to include this metric as a KPI.

Litter

10.62. DfT proposed a target around ensuring a certain proportion of places meet an acceptable standard for litter. The actual level of the target cannot be set until more

information relating to the baseline is available. Until then, we cannot comment on the deliverability of this target. More generally, designing a metric that is compatible with the Litter Code of Practice should be the focus.

Water quality

10.63. DfT proposed a target around the reduction in the length of watercourse affected by different categories of outfall by the end of RIS2. Highways England was still calculating this measure, and historical performance during RP1, during our review. The actual level of the target cannot be set until this information is available. Until then, we cannot comment on the deliverability of this target.

Other PIs

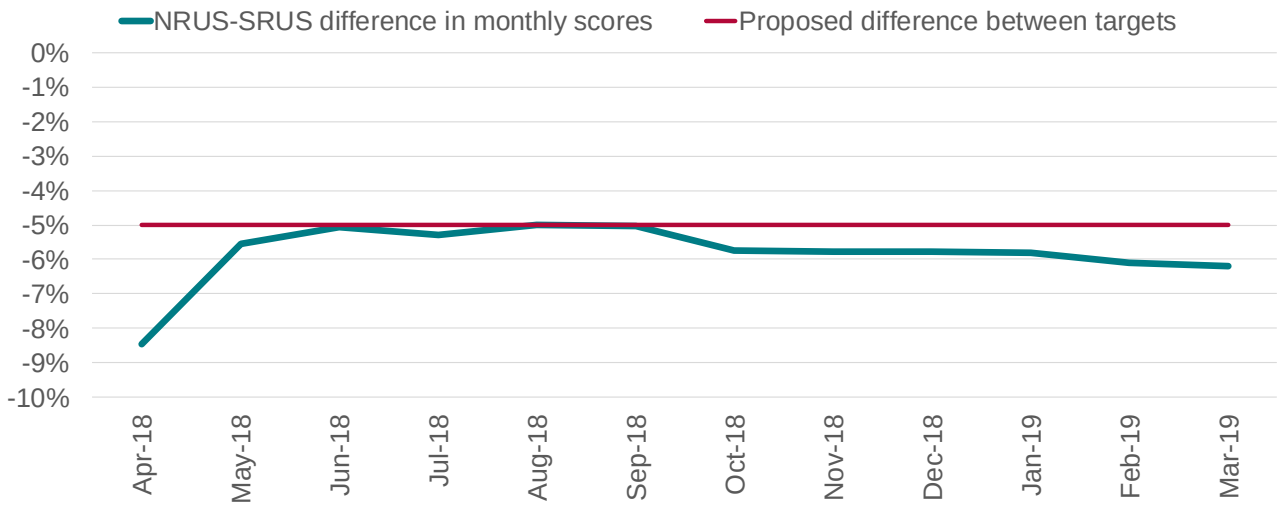
10.64. Highways England also proposed PIs associated with SRN user carbon emissions. There is not yet any historical data available for this measure, but as an untargeted PI, there are no issues concerning deliverability and we support including it in the performance specification.

Meeting the needs of customers

User satisfaction

10.65. Highways England proposed that satisfaction measured by the new Strategic Roads User Survey (SRUS) will form the KPI in this outcome area, replacing the National Road Users' Satisfaction Survey (NRUSS) measure from RIS1. Given the limited SRUS data available at the time of the DSBP, it suggested that a target level should be set once a full year of data is available.

Figure 10.12 Difference between NRUSS and SRUS user satisfaction measures during 2018-19



10.66. Figure 10.12 shows the difference between overall satisfaction from NRUSS and SRUS on a cumulative basis through 2018-19. DfT proposed an 85% target, 5% lower than the NRUSS-based RIS1 target. At the time of the DSBP in August 2018, there was around a 5% difference between the metrics. This widened to 6% by the end of 2018-19. An 85% target appears broadly comparable to the current 90% NRUSS target and, as Highways England has not been able to meet the NRUSS target during RP1, it is likely to be challenging to achieve.

10.67. This analysis is very simple. The surveys, and the questions in them that form the basis of the KPI metric, are different. So what drives satisfaction in the two metrics could be different. For example, the NRUSS score is taken from five components, with no explicit weights applied:

- journey time;
- roadworks management;
- general upkeep;
- signage; and
- safety.

10.68. The SRUS score is from an overall satisfaction question, with the factors affecting overall satisfaction potentially being an implicit weighting of the factors in NRUSS, a subset of them, or completely different.

10.69. Our initial analysis (based on breaking the data into regional, monthly results) found that journey time appears to be the strongest driver of satisfaction in SRUS. This could have implications for the levers Highways England can use to affect the satisfaction metric, and what a challenging but deliverable target would be. Also, Highways England's forecasts of the various delay metrics showed delays worsening early in RP2, linked to the peak in investment. So there would likely be merit in having a target profile which recognises that. For example, the target could be 82% in the first two years of RP2 (based on 2018-19 performance) before increasing to 85% by the end of RP2.

10.70. Our analysis is based on aggregations of the SRUS data accessed through Transport Focus' data portal. It could be improved upon – to give a better understanding of the drivers of satisfaction in SRUS and the links with NRUSS – through analysis of more granular, respondent-level data.

10.71. An 85% SRUS target is broadly equivalent to the 90% NRUSS target based on current information. We recommend a joint programme of analysis to improve

understanding of what drives SRUS, its links with NRUSS, what a challenging and deliverable target would be, and what profile a target should have.

Roadworks information accuracy

10.72. Highways England proposed a KPI measuring the accuracy of its roadworks information, to complement the user satisfaction KPI. This is consistent with findings from our joint research with Transport Focus. Generally, metrics about communicating information to drivers were seen as a high priority and this metric was specifically identified as one that should be targeted.[43] We support the inclusion of additional PIs and commitments in the performance specification that measure the quality of information Highways England provides to its users and stakeholders.

10.73. The proposed metric measures the percentage of planned roadworks that lead to full carriageway closures that are correctly published in the week before. Highways England proposed a target of 90% by 2025 in the DSBP.

10.74. Highways England was only able to provide very limited information on performance against this metric. From September to November 2018, performance averaged 55% based on unvalidated data and Highways England was unable to provide modelled or forecast performance data.

10.75. Given what we know about current performance, a 90% target level appears challenging. But the proposal that this would be achieved at the end of RP2 lacks sufficient ambition. DfT proposed a target level of 95% across the whole of RP2, which appears very challenging in the early years given Highways England's current performance.

10.76. As the metric is still being developed and there is a lack of data, it is difficult to judge what the appropriate target should be. Given current performance, we recommend there should be an upward trajectory in the target throughout RP2. The starting point should be informed by the most robust available baseline data. In the absence of reliable forecasts from Highways England, the trajectory should then follow a straight line to a target of 90% or 95% in 2024-25. Without more robust data from Highways England, it is difficult to advise on the exact level of the final target.

10.77. Highways England monitors the accuracy of its roadworks information one day in advance. Through our user satisfaction monitoring, we have seen more data relating to this metric. There would be merit in including the one-day metric as a PI to

[43] https://orr.gov.uk/__data/assets/pdf_file/0015/40533/measuring-highways-englands-performance-2020-25-the-road-user-view.pdf

complement the seven-day KPI. There would also be merit in developing the KPI metric during RP2 to be on a rolling basis, rather than as a view of the week ahead.

Recommendations

We recommend that:

- where they can be meaningfully disaggregated, KPIs should be reported on a regional basis;

Improving safety for all

- the target-setting approach for road safety should be rolled-forward from RIS1 – a 40% reduction on a 2010-14 baseline would result in a target of fewer than 1,383 KSIs by 2025;

Providing fast and reliable journeys

- there should be a balance of KPIs in the providing fast and reliable journeys outcome area, that includes measures of overall outcomes and factors that are more directly within Highways England's control;
- only one of the proposed average delay and journey time reliability metrics should be included as a KPI – further work is required to set a challenging and deliverable target for either;
- incident clearance should be included as a KPI with an initial target of clearing 86% of incidents within one hour, increasing to 87% in year 2 or 3 of RP2;
- the network availability metric should be considered as a KPI, if three are required for this outcome area – the delay in roadworks metric should be included as a PI and further developed to reflect delay per mile (or hour) travelled through roadworks;

A well maintained and resilient network

- the target for the new pavement condition network should be 97%;
- if a range is required to reflect uncertainty in this new metric, it should be smaller than the proposed 1.5%;
- Highways England and DfT should agree the details of a resilience-based drainage metric, and Highways England should continue to report on the coverage of its drainage assets condition data;

- roadside technology asset availability should be used as a PI to provide a backwards-looking indication of how assets have performed, and Highways England should develop a more leading indicator during RP2;

Being environmentally responsible

- if a composite or scorecard environmental metric is preferred, it should focus on a smaller number of metrics that are: of equal importance to government; able to be influenced by Highways England; reflect user and stakeholder priorities; and supported by robust data;
- DfT and Highways England work to agree target levels and clear rules for how assessing performance in a composite or scorecard metric, should one be preferred;
- the target for the number of households that will receive noise mitigation should be re-estimated with lower (or zero) optimism bias;
- DfT considers the risk that including renewals-related mitigations in the noise target could reduce the effectiveness of a system that incentivised delivery through designated funds in RP1;

Meeting the needs of customers

- there should be a joint programme of analysis to improve understanding of what drives SRUS satisfaction, links with NRUSS, what a challenging and deliverable target should be, and what profile a target should have; and
- there should be an upward trajectory across RP2 for the roadworks information accuracy target, towards a target of 90%-95% by 2025.

11. Next steps

For the Final SBP

11.1. We recommend that Highways England re-estimates and reallocates its renewals and enhancements costs in line with our efficiency and inflation recommendations. Cost reductions should be used to reduce the residual renewals risk and to increase the centrally-held portfolio risk allowance, respectively. The company should re-run its quantified cost risk analysis in light of these re-estimated costs and the enlarged portfolio risk allowance. We also recommend that Highways England carries out a quantified assessment of the risks to its project timescales.

11.2. There are several outstanding issues to resolve to finalise the performance specification. The company should work with DfT to agree the final set of metrics and challenging target levels, particularly for user satisfaction and the environmental outcome area.

Before the start of road period 2

11.3. We recommend that Highways England sets out a clear baseline against which we can monitor delivery during RP2. This should cover enhancements scope, costs and timings, and renewals volumes. The company should also consider whether it needs to develop new indicators to provide early-warning of scope and cost problems across its enhancements portfolio. We will work with the company to develop a clear methodology for efficiency reporting.

During road period 2

11.4. We recognise that Highways England is in a process of continuously improving its data. Throughout RP2, we expect Highways England to continue to develop better efficiency reporting; to increase its reporting of regional performance; and to continue to develop new metrics for future road periods that better reflect road user outcomes.

11.5. This is just one part of Highways England's continuous improvement. The company should also build on the progress it has already made to develop its customer service capability – for example, showing that it is acting on results from the new Strategic Road User Survey – and how it manages its investment portfolio of enhancements, renewals and designated funds.

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