



Review of Highways England's Maintenance and Renewals Delivery

**Key Findings &
Recommendations**

Office of Rail and Road

March 2017



Contents

Summary of key findings	iii
1. Introduction	1
1.1 Purpose of this report	1
2. Maintaining Highways England's Network	1
2.1 Routine Maintenance and Capital Renewals	1
2.2 Highways England's Licence and Road Investment Strategy	2
3. Findings and Recommendations	3
3.1 Maintaining the Strategic Road Network	3
3.2 Presentation of the findings	3
3.3 Requirements and commitments	3
3.4 Governance and assurance	7
3.5 Programme management	8
3.6 Scheme development and delivery	11
3.7 Information, systems and tools	12
4. Conclusions	14



Summary of key findings

1. KPMG has been appointed by the Office of Rail and Road (ORR) to undertake this Deep Dive review into Highways England's delivery of routine maintenance and capital renewals. The objectives of this review are to determine whether Highways England manages its assets:
 - **safely** for road users;
 - **robustly** and in a way which will deliver the requirements for the road period;
 - **sustainably** in a way which, if continued, would continue to deliver the requirements in the long-term; and
 - **efficiently** to minimise cost over the long-term by delivering the right interventions, at the right level of quality, at the right cost and at the right time.
2. Highways England and ORR have worked jointly in the delivery of this review which provides a series of findings and 11 recommendations for the consideration of both parties. These findings are summarised below.

Key Findings

Safety

3. Highways England's Licence requires it to protect and improve the safety of the network. Routine maintenance activities are undertaken by Highways England's service providers for its Asset Support and Managing Agent contracts. A key responsibility of these contracts is to keep the network safe. This objective is met through the respective contractual and operational requirements, while minimising the impact of road works on road users. The service providers have a well-developed knowledge of the network and understanding of the need to maintain safety for road users, whilst delivering maintenance in an environment that protects the safety of its workforce.
4. Renewal schemes are also developed to maintain the safety, as well as the integrity and availability of the network, and undertaken to minimise the impact on road users. Urgent repairs to maintain asset safety are also undertaken through the renewals programme. These urgent repairs carry a high priority and can be unpredictable in nature, sometimes leading to reprogramming by Highways England's regions.

Robustness

5. Highways England reports its performance in keeping the network in good condition through Key Performance Indicator (KPI) 8. In its Delivery Plan 2015/16, Highways England has set out volumes of planned renewal activity. In 2015/16, ORR reported variations to the delivery of renewal volumes and, in February 2017, reported that KPI 8 had fallen below its target. The approach adopted by Highways England to meet the requirements has been inherited from its predecessor, Highways Agency. Renewals are developed based on information and data that is used by the service providers to identify maintenance need for the asset in accordance with its design standards. Based on this review there is no direct alignment between the requirements of KPI 8, or the Delivery Plan, and the development and delivery of its regional and area programmes.
6. Highways England has a five-year programme for each region setting out its renewal volumes for pavement and structures, which is reviewed on an annual basis. Variations have occurred to this programme for a number of reasons:
 - Changes and re-allocation in capital renewal budgets have impacted on the annual programme for each region which has led to reprogramming and delivery of schemes later than planned. This has impacted on the robustness of the reported renewal volumes;
 - Reduction in annual regional budgets has, in some cases, resulted in options being adopted to maintain safety and condition but not necessarily to deliver more expensive

- but sustainable solutions that would represent better long term whole life cost value;
 - Highways England only reports renewals when complete which, in some cases, has led to late reporting when renewal activities are scheduled towards the end of the financial year; and
 - The need for urgent and unforeseen maintenance of assets to preserve their safety and integrity may result in reprogramming and variations to renewal volumes.
7. Highways England's investment decisions and reporting rely on accurate, robust and repeatable data and information. Highways England's processes for collecting data for pavements and structures are assured centrally. The Value Management process is used to assure the development of renewals based on the interpretation of this information. This does not cover all schemes. The service providers self-assure their input to the maintenance and renewals process and reporting in general. In its own deep dive into renewals, Highways England has reported some variance in the data used for reporting due in part to errors and missing data. Highways England undertakes assurance in many different ways but the independence and degree of control of this assurance is limited. Strong governance is important in providing a robust and controlled renewal programme.

Sustainability

8. Highways England has £3.7bn in its Statement of Funds Available (SoFA) for all renewals during Road Period 1. Each region has an indicative five-year budget total, but actual budgets are still confirmed annually. Despite this five-year settlement, Highways England plans its renewals to meet annual budget targets. Variations and availability of in-year funding therefore have a major impact on decision-making. In 2015/16 there were reductions in regional renewals budgets due to reallocation of funding to a number of extraordinary schemes. This resulted in re-programming by the regions to meet reduced budgets. In some cases this resulted in less sustainable solutions being chosen. Annual budgets can therefore act as a constraint to delivering a more sustainable approach for all renewals based on whole life costing.
9. Highways England has developed Lifecycle Asset Management Plans for its Asset Delivery areas. These have been developed based on whole life approaches and provide an opportunity to deliver a more sustainable approach to planning renewals in the long term, if extended to all areas.

Efficiency

10. Maintenance needs for Highways England's assets are determined by its service providers through the long-established Value Management process and approved by Highways England. These are developed into an annual programme of renewals based on the most efficient method of delivery. At a programme level, this results in a 'bottom-up' approach to efficiency which combines renewals into a single scheme thus reducing the cost of traffic management and impact on road users. It should be recognised that this approach may reduce costs but may not necessarily deliver the asset intervention at the optimum time and provide the most efficient use of resources at an asset level. This highlights the challenge Highways England has in delivering competing objectives. Other efficiencies include cost savings through value engineering schemes and adopting good asset management practice such as preventative maintenance.

Conclusions

11. Highways England's approach to maintaining a safe network in good condition has not been impacted by the change from the Highways Agency. There has generally been continuity with contracts, and key individuals within the supply chain, which has provided an element of stability. Its overall approach to identifying maintenance need and delivering renewals is based on good practice approaches inherited from Highways Agency. This legacy approach depends heavily on its service providers to provide the information for routine maintenance and renewals, although the final investment decisions are taken by Highways England. Highways England's transition to the Asset Delivery model will provide it with a greater degree of control in selecting and prioritising both routine maintenance and capital renewals. However Highways England's capability to implement this model has not been considered as part of this review.

12. Highways England also has a number of initiatives in place that will improve its approach to renewals. In particular this includes a more comprehensive approach to asset management and the overall management of the Operation Directorate's capital renewals portfolio. It is important that Highways England continues to build on these initiatives and in particular provides a more robust approach to its planning, budgeting, identification, delivery and assurance of renewals.



1. Introduction

1.1 Purpose of this report

1.1.1 KPMG has been appointed by the Office of Rail and Road (ORR) to undertake this review into the delivery of routine maintenance and capital renewals by Highways England. It provides a series of findings and 11 recommendations for the consideration of both Highways England and ORR. The objectives of the review have been to determine whether Highways England manages its assets:

- **safely** for road users;
- **robustly** and in a way which will deliver the requirements for the road period;
- **sustainably** in a way which, if continued, would continue to deliver the requirements in the long-term; and
- **efficiently** to minimise cost over the long-term by delivering the right interventions, at the right level of quality, at the right cost and at the right time.

1.1.2 In total 18 schemes have been reviewed from three separate maintenance areas in three different regions, as well as extensive stakeholder interviews with Highways England's directorates. It has considered the end to end processes and enabling information and systems used for the development and delivery of routine maintenance and capital renewals. This has included the impact of planning on key outputs such as 'Keeping the Network in Good Condition' (KPI 8) and Highways England's Delivery Plan. It considers pavement and structures assets only and is primarily focused on the first year of the roads period 2015/16. Where appropriate, however, this review has also considered activities in 2016/17.

2. Maintaining Highways England's Network

2.1 Routine Maintenance and Capital Renewals

2.1.1 Routine maintenance and capital renewals are the responsibility of Highways England's Operations Directorate (OD). OD has a regional structure and each region comprises separate areas with their own contracts and respective service providers. Indicative capital renewals budgets are set for five years for each region based on the £3.7bn total budget for the first Road Period set out in the Statement of Funds Available (SoFA). The funding allocation for routine maintenance is identified in the separate funding line 'Resource Maintenance' in the SoFA.

2.1.2 Funding is allocated by OD to its regions through its central Operations Renewals Portfolio Office. Each region is responsible for the allocation of routine maintenance and capital funding to its areas. OD is supported by the Professional and Technical Solutions Directorate (PTS) in developing standards for maintenance, collecting data and technical assurance. The current approach adopted by Highways England has a relatively high degree of regional autonomy.

2.1.3 Maintenance is undertaken by Highways England and its supply chain through a number of different contractual arrangements. These include Asset Delivery contracts (ADs), Asset Support Contracts (ASCs) and Managing Agent Contracts

(MACs). Both the ASCs and MACs are legacy contracts from Highways Agency. These are being replaced by the AD contract model which has already been adopted in Area 7. Highways England also has a number of Design Build Finance and Operate (DBFO) contracts in place including the M25. This review has focused on the ASC and the MAC models only, as the AD model is not fully embedded and the DBFO model is funded through private finance arrangements.

2.2 Highways England's Licence and Road Investment Strategy

2.2.1 Highways England has a number of requirements and commitments with regards to routine maintenance and capital renewals. These are described below:

Highways England's Licence

2.2.2 Highways England's Licence, issued by the Department for Transport sets out the framework for its role as a highway, traffic and street authority for the strategic road network in England. A number of these requirements are part of its statutory duties as a highway authority, other requirements more directly linked to its delivery of maintenance and renewals include:

- ensuring the maintenance, resilience, renewal, and replacement of the network;
- protecting and improving the safety of the network;
- maintaining high quality asset information;
- adopting a whole-life cost approach to asset management; and
- demonstrating value for money.

Road Investment Strategy

2.2.3 The Road Investment Strategy (RIS) and SoFA set out the details of the capital investment that Highways England must deliver over the first road period (April 2015 to March 2020), as well as the routine maintenance budget. As described above, Highways England has been provided with funding of £3.7bn to deliver its programme of capital renewals, to ensure the Strategic Road Network is maintained in a safe and serviceable condition. Highways England sets out its high level plans for delivery of its programme and associated costs in its Delivery Plans.

2.2.4 The principal requirement related to asset condition is Key Performance Indicator 8 (KPI 8) 'Keeping the Network in good condition'. The target for KPI 8 has been set at 'maintaining 95% of the network in good condition'. The measure is based on the Network Pavement Condition (NPC) indicator previously developed by the Highways Agency.

2.2.5 The performance of structures is measured and reported by Highways England through three Performance Indicators (PIs) related to inventory and condition. This includes one measure specifically related to the criticality of structural condition. There are no targets associated with these indicators and they are based largely on measures previously used by the Highways Agency.

Delivery Plan

2.2.6 The measures and the outputs for renewals for 2015/16 are set out in Highways England's Delivery Plan 2015-2020. Highways England publishes updates to its Delivery Plan on an annual basis. ORR accept that the plan may change throughout the RIS period but monitor progress against its delivery.

3. Findings and Recommendations

3.1 Maintaining the Strategic Road Network

3.1.1 Highways England is an organisation that is committed to meet the maintenance needs of the network in accordance with its Licence. It achieves this through balancing the maintenance needs for its assets within an annual budget constraint, in line with its operational requirements and design standards. It has an established supply chain with a well-developed knowledge and understanding of the network. This relationship between Highways England and its supply chain has to date underpinned the delivery of routine maintenance and capital renewals on the network.

3.2 Presentation of the findings

3.2.1 This review has identified a number of findings together with a series of recommendations. These have been grouped as follows and are set out in the following sections.

- Requirements and commitments;
- Governance and assurance;
- Programme management;
- Scheme development and delivery; and
- Information, systems and tools.

3.3 Requirements and commitments

Line of sight

- 3.3.1 Highways England does not have a documented process that provides a clear line of sight between either the renewal volumes in its Delivery Plan or KPIs (including KPI 8) to its scheme delivery. It has developed its approach to the identification and development of renewals primarily on the maintenance need of the asset. It does not test the impact of its pavement renewal decisions on KPI 8 in advance, as part of its scheme decision-making process. It may benefit from doing so in order to determine in advance whether the target will be met.
- 3.3.2 The Value Management guidance sets out the approach to prioritising maintenance need for both pavements and structures. For pavements this is determined based on safety, by assessing the extent to which the defects pose a risk to road users, value for money, based on a whole life cost analysis and sustainability. For structures a risk-based approach to prioritisation is used. Intervention is triggered through the thresholds in the Design Manual for Roads and Bridges (DMRB), comprising Highways England's design standards. The priorities for pavement and structures are considered separately.
- 3.3.3 The approach is similar to that adopted previously by the Highways Agency. The impact on other KPIs are not considered directly during the identification of maintenance needs, although minimising the impact on road users is considered along with maximising safety.
- 3.3.4 Although identifying renewals based on maintenance need is good practice, it is also important that due consideration is given to how the requirements of the RIS are

being met and, where these cannot be met, the reasons are clearly identified and justified.

Pavement performance

3.3.5 As described above, KPI 8 is the measure of pavement condition in the RIS. The road pavement has the highest asset value and the highest level of funding for any asset. It is therefore appropriate that pavement condition is measured as part of the eight key performance indicators in the RIS.

3.3.6 KPI 8 measures pavement condition through a combination of skidding resistance collected by SCRIM¹, and ride quality and rutting collected by TRACS². Both SCRIM and TRACS are machine surveys, carried out at traffic-speed that are specified, procured and managed by PTS. Other highway authorities in the UK also use SCRIM. However, unlike Highways England, these highway authorities do not have performance targets for pavement condition.

3.3.7 KPI 8 uses data from lane one at present, as this is the most heavily trafficked lane. It does not report the pavement condition of the DBFO network (which represent approximately 15% of Highways England's network) as this is measured as part of those contracts. The reported value of KPI 8 is impacted by pavement renewals to lane one only and therefore cannot be considered as a representative measure of pavement renewals across the network as a whole. There are therefore limitations to its usefulness in reporting performance of the network that include the following:

- It reports investigatory level only, further investigation is therefore required before maintenance need can be confirmed;
- Where renewals outside of lane one are undertaken, improvement in surface condition is not reported but is recorded in the Highways Agency pavement management system (HAPMS);
- Pavement investigatory levels at wet skidding sites, that may lead to accidents are not reported separately;
- The underlying structural condition of the pavement is not currently reported, although it is measured through the use of the Traffic Speed Deflectometer³. This data could support whole life cost decision making for pavements once data repeatability is more evident; and
- There is a lag from when pavement condition is measured to when renewals are undertaken, which can be up to three years. The pavement condition may deteriorate in the meantime, leading to requirements for further pavement investigation and more costly renewals.

3.3.8 Despite these limitations, it is clear from this review that Highways England is committed to delivering renewals in a way that meets maintenance need and not just its reporting requirements. Although ORR reported in February 2017 that Highways England had not met this 95% target for KPI 8, Highways England has since developed a recovery plan to meet this target. In doing so it is important that Highways England meets this target through a sustainable approach to developing renewals.

¹ The Sideway-Force Coefficient Routine Investigation Machine (SCRIM) applies a freely rotating wheel, at an angle of 20° to the direction of travel, to the wetted road surface under a known load to obtain a measure of wet-road skidding resistance at survey speeds of up to 85 km/h.

² TRAFFICspeed Condition Survey (TRACS) vehicles are equipped with lasers, video image collection and inertia measurement apparatus to enable assessment road surface condition at variable speeds of up to 100 km/h.

³ The Traffic Speed Deflectometer (TSD) is capable of assessing the structural condition of asphalt road pavements at speeds up to 80km/h using contactless Doppler laser technology.

Structures performance

- 3.3.9 There are three Performance Indicators (PIs) for structures that measure inventory and condition. These include critical and average structural condition. The critical measure is designed to ensure that the safety and integrity of the structure is reported and maintained. These are well established indicators previously used by the Highways Agency and other highway authorities in the UK. The structures PI has not, however, been a primary consideration in developing structures renewals. These indicators are currently being reviewed by PTS, with new indicators in the process of being proposed. At present there are no targets planned for these new indicators.

Recommendation – Measuring and reporting pavement and structures performance

1. Highways England should consider developing an approach to reporting the performance of its assets that demonstrates a clearer link between maintenance need of its assets, its performance measures and renewal decisions. This approach should demonstrate that maintenance is being managed efficiently and investment decisions are sustainable.
2. Highways England should consider reviewing its approach to achieving KPI 8, including predicting the impact that its programming decisions will have on KPI 8.
3. Highways England should consider reporting separate performance measures where there is an impact on safety related to asset condition.

Renewal volumes

- 3.3.10 The renewal volumes in Highways England's Delivery Plans should represent a robust and efficient plan to deliver renewals. The renewal volumes developed by Highways England for its five-year plan were based on the best-available information of maintenance need provided by the regions at the time. These have been captured in its Delivery Plans for 2015/16 and 2016/17. To date achieving the renewal volumes described in these plans has not been a driver for renewal decisions or the development of regional and area programmes, reasonable alignment between both would however be expected.
- 3.3.11 In-year variations in capital allocations in 2015/16 arising from a number of extraordinary schemes including Oldbury Viaduct and others, as well as changes to capitalisation rules, led to a change in the regional programme. This impacted the renewal volumes in the delivery plans. These variations were reported by ORR in its Annual Assessment of Highways England's Performance April 2015 – March 2016, where it was concluded that improved planning and assurance over delivery was required.
- 3.3.12 Planned renewal volumes are recorded as part of the scheme development process and reported through Highway England's finance system. These represent a high level summary of activity only but should also form the basis of an efficient plan. They do not, however, reflect the complexity of the network or the types of renewal that may be selected to provide more innovative, efficient or sustainable solutions. For example waterproofing a large viaduct would be far more costly and complex than waterproofing a single span bridge on a rural trunk road. The cost of treatments achieving the same renewal volume can therefore vary significantly. The renewal volumes are therefore not robust enough to necessarily represent the most efficient and sustainable way to maintain the network. Not all critical activities are recorded in the Delivery Plan, for example the Thaumaside programme in Area 2 which, if not

delivered, would present significant risk to the integrity of the structures on the network is not recorded. For these reasons ORR monitors renewals volumes but does not hold Highways England to account for their delivery.

- 3.3.13 Highways England has a number of renewal measures in its Delivery Plans, other than those related to pavements and structures, such as white lining and drainage. Some of these measures are secondary and arise as a consequence of renewals. These activities do not generally drive renewal decisions to meet maintenance need. The changes and re-programming of renewals had a knock-on effect on these in 2015/16, creating further variation in the reported renewal volumes. At present, therefore, the renewal volumes adopted in the Delivery Plan may not represent a reasonable baseline for pavements and structures.
- 3.3.14 Renewal volumes and costs are reported through Highways England's finance system and are only claimed when the schemes are completed, as this is the date when the benefit of the renewal is provided to the road user. This has resulted in renewals almost complete in one financial year being reported in the next. This approach is in-line with Highways England's accountancy policy but can result in significant variations in the delivered volumes reported.
- 3.3.15 Equally the measures themselves may not represent whether renewals are undertaken to meet maintenance need in the most efficient and sustainable way. More robust long-term programmes are therefore required. As part of its overall asset management system, Highways England is developing Lifecycle Asset Management Plans (LAMPs)⁴ for each area as it transitions to the Asset Delivery contract models. In principle, these LAMPs have been based on the lowest whole life cost approach and set out the most efficient and sustainable approach to maintaining the network.

Recommendation – Measuring renewal volumes

4. Highways England should consider developing a more robust approach to measuring renewal volumes. This could include using its Lifecycle Asset Management Plans to reflect the lowest whole life cost treatments to achieve its long term asset need. This could form the basis for future road investment strategies and demonstrate an efficient and sustainable way to deliver renewals.

Maintenance and Renewal Policies

- 3.3.16 Highways England is guided by its maintenance policies in its Asset Management Operational Requirements (AMOR), which applies to its Asset Support Contracts, and its design standards in the DMRB. These set out its approach to data collection, routine maintenance, scheme development and design.
- 3.3.17 Highways England is in the process of developing an Asset Management Strategy⁵ as part of its overall asset management system. This strategy will be supported by a Strategic Asset Management Plan (SAMP) and Asset Specific Operating Principles (ASOPs).

⁴ Lifecycle Asset Management Plans (LAMPs) detail the specific interventions required to maintain the asset portfolio to the required levels taking into account the whole life costs. The LAMPs are a combination of future renewal plans and current maintenance interventions (such as inspections) and are based on an Operational Area.

⁵ The Asset Management Strategy or Strategic Asset Management Plan (SAMP) is the central reference point for the asset management framework/system and details how Highways England will satisfy its asset management requirements through specific asset management processes and activities.

- 3.3.18 Some good practice infrastructure organisations set out approaches to maintenance and renewals in maintenance policies. At present Highways England does not have explicit policies for key renewal activities, such as whole life costing. Adopting such policies could enable Highways England to set out its approach to maintaining the network in a more efficient and sustainable way.

Recommendation – Maintenance and Renewal policies

5. Highways England should consider the benefits of developing policies for its maintenance and renewals that demonstrate how it will maintain the network in an efficient and sustainable way, aligned to its asset management principles.

3.4 Governance and assurance

- 3.4.1 As set out in the OD Portfolio Control Framework (PCF), Highways England's service providers undertake the identification, development and delivery of renewals. This includes pricing schemes. Renewal decisions are approved by the regions based on: the accuracy and reliability of asset data, its interpretation and the costs provided by their service providers. Anecdotally, this is an approach that has worked but is not necessarily one which provides Highways England with total control.
- 3.4.2 In the ASC contract the risk of maintaining a safe network through routine maintenance activities, such as pothole repairs, lies with the service provider. This approach provides a high degree of cost certainty for routine maintenance through fixed monthly payments to the service provider. These contracts are self-certifying and, although Highways England does undertake audits of its service providers, they are primarily focused on contract compliance. Other strategic road authorities such as Transport Scotland have third party financial and technical audits, as do other asset owners, primarily to verify that the information used in decision-making and reporting is appropriate.
- 3.4.3 In-line with Highways England's design standards, PTS provides technical assurance of options and design solutions for renewals, which is more rigorous for structures than for pavements because of the greater risk associated with structures. There is, however, no clear accountability for assuring the end to end process for renewals and the quality of information used.
- 3.4.4 Highways England, in its own deep dive into variations of cost and renewal outputs delivered in 2015/16, reported issues with the quality of data entered into its finance system and with updating asset information on completion of works. This review has also identified similar issues.
- 3.4.5 Based on this evidence and good practice, Highways England may benefit from a more rigorous approach to assurance of its contracts. This will ensure that the quality and completeness of information used to identify and manage maintenance and renewals is appropriate for the purpose it is intended. It will also support the development of a robust and controlled renewals programme.

Recommendation – Assurance of maintenance and renewals

6. Highways England should consider the benefits of clear accountability for assurance of maintenance and renewals. In doing so it should consider the potential benefits of an independent assurance process to satisfy itself that its requirements, performance, data, risk and costs are being reported appropriately, both by itself and its service providers.

Strategic planning

- 3.4.6 Highways England prioritises maintenance and renewal need for pavements and structures through its Value Management process. Value management is a 'bottom-up' process where each region determines its own priorities for renewals based on its annual budget. Each region had its Regional Promise (now Regional Target) which sets out its objectives for the year. Budgets have been allocated to the regions and areas largely on size and complexity of the network. Asset performance and risk are not prioritised centrally or as part of a longer term strategic planning process. There is no mechanism in place to compare and prioritise performance across regions or asset types, for example between pavements and structures. Such an approach would ensure that investment decisions are made in those areas that are going to provide greatest benefit through optimising performance, risk and cost.
- 3.4.7 Other asset owners determine capital funding requirements through a strategic planning framework which provides a 'top down' view of funding requirements to balance performance, cost and risk. Such a framework would enable Highways England to determine how its capital renewals would contribute the delivery of its targets. Highways England has developed its SAMP which, though not been yet fully implemented, could go some way to supporting this approach along with the more 'bottom up' approach developed through the LAMPs.

Recommendation – Strategic planning framework

7. Highways England should consider developing a strategic planning framework to enable a 'top-down' approach to prioritising its capital funding for renewals. This would enable it to determine capital funding based on performance, risk and cost and support investment decisions to meet its KPIs.

3.5 Programme management

Road Investment Period five-year renewal plan

- 3.5.1 Highways England has a five-year programme defined in its regional workbooks along with budget allocations and renewals volumes for pavement and structures. This has been developed by its regions and co-ordinated by its central Operations Renewals Portfolio Office based on the PCF. From this review it has been apparent that, although this framework is only guidance, the regions have adopted it on the whole with some minor variations. However, the basis on which the renewal volumes have been developed does appear to vary between regions.
- 3.5.2 Highways England has implemented the Programme Investment Toolkit (PIT), which is a commercial software solution with the functionality to support programming decision making for pavement renewals. However it has not used its PIT to develop and prioritise its programmes, but instead has used it as a tool for their assurance. In a similar way it is developing a tool to support programme decision making for

structures, referred to as the Structures Investment Toolkit (SIT). This is currently under development and therefore has not been used to inform its regional programmes.

- 3.5.3 Highways England has also developed LAMPs for its maintenance areas that are in the process of transitioning to Asset Delivery contracts. LAMPs have been developed to varying extents and have used PIT and the national Highways Maintenance Efficiency Programme (HMEP) Toolkit⁶. These have been developed as ‘bottom-up’ plans for each area. The LAMPs could provide a basis for a consistent approach to long term planning and the opportunity to develop a baseline programme for renewals. SIT has not yet been used to inform the LAMPs.
- 3.5.4 Highways England is in the process of developing an Asset Management Strategy or ‘SAMP’ to provide a framework for prioritising investment decisions across the network. This, together with the more detailed LAMPs, could provide a baseline programme for pavements and structures that can be used for RIS2.

Impact from in-year variations to budgets

- 3.5.5 In 2015/16 there were significant reductions in capital budget allocations to the regions that occurred late in the year. This was due to a requirement to fund the renewal components of extraordinary schemes that came into the programme that year such as Oldbury Viaduct and M3 Smart motorway pavement renewals. These are extreme examples of variations to programmes that will occur throughout the RIS period for a variety of reasons, including:
- Urgent works where a renewal is the best option to maintain safety; and
 - Late identification of underspend in programmes releasing additional funding for schemes.
- 3.5.6 In-year variations to capital budgets have an impact on how programmes are managed and renewals prioritised. In particular, this review has found examples of this resulting in the scope of renewals changing, for example ‘Do-Something’⁷ options being replaced by lower cost ‘Do-Minimum’ options. This occurred as it had not been possible to defer some activity into the following year to provide a more sustainable solution because of the poor asset condition and the requirement to maintain safety.
- 3.5.7 Late in 2016/17, additional capital funding has been allocated to some regions. This has provided the opportunity to deliver additional schemes in the last quarter of this year. In order to accommodate this additional funding service providers adopt a practice where they have additional schemes ‘on the shelf’ that have already been through the Value Management process. Delivery of these ‘on the shelf’ schemes late in the year may lead to a more ‘back-ended’ expenditure profile and similar issues to those identified in 2015/16.
- 3.5.8 Highways England’s annual budget is a constraint on how renewal decisions are made and programmes developed. It ‘veers and hauls’ between its regional programmes and other capital expenditure to ensure that its annual budget targets are met, as there is limited flexibility to move funds across financial years. This has the following impacts:

⁶ The Highways Maintenance Efficiency Programme (HMEP) is a sector-led transformation initiative aiming to maximise returns from investment and deliver efficiencies in highway maintenance services.

⁷ As part of the Value Management process, Do-Minimum and D-Something options are identified. The Do-Something option represents the preferred maintenance intervention while the Do-Minimum option represents the minimum intervention needed to maintain the safety of the network if the Do-Something option cannot be funded. Typically, the Do-Something options will be a better whole-life solution

- Funding is not always spent in the most efficient and sustainable way as whole life cost decisions cannot always be made. Instead decisions are made based on the availability of funding which may mean 'Do-Minimum' options are selected;
 - In some cases, renewal volumes can change as programmes change to meet the budget constraints;
 - Scheme delivery becomes 'back-ended' as schemes are re-programmed resulting in an increase in schemes being delivered in the last quarter, compared to the original profile;
 - There is greater risk to delivery of time, quality and cost in the last quarter because of winter working; and
 - Renewals have also been reported late, running into the following financial year because of financial reporting requirements which record completion when the benefit is provided to the road user.
- 3.5.9 Highways England has the facility to flex its funds by 10% annually either way. This facility has been designed to accommodate overspend and to ensure it does not lose a portion of its capital allocation because of the requirement to spend existing budget in-year. Notification to use the flex facility needs to be provided by September of the current financial year, in accordance with the Treasury timetable.
- 3.5.10 As a consequence of Highway England's ageing and complex network and large capital programme, there will always be some degree of unforeseen circumstance that will require variations to its budget allocations and a degree of re-programming. As Highways England matures it will be better positioned to manage these in-year budget variations.

Programme efficiency

- 3.5.11 Maintenance needs are identified by service providers through the established Value Management process and approved by Highways England. These are developed into schemes and programmes of work in the most efficient way. At a programme level this includes combining renewals such as: replacing filter drains as part of a pavement scheme, undertaking resurfacing as part of a scheme to replace bridge joints or delivering renewal schemes at the same time as adjacent improvement works. This approach maximises the opportunity each lane closure provides reducing the overall cost of the combined schemes, as well as the impact on road users. It should be recognised whilst this approach may reduce cost and user delays it may not result in the optimum time for the intervention.
- 3.5.12 Efficiencies are captured 'bottom-up' by each region through an efficiency tracker, which records individual efficiencies at scheme level. Other than combining schemes, efficiencies claimed include: cost savings through value engineering and adopting good asset management practice, such as preventative maintenance. The ASC contracts have efficiency targets built in where the service provider should achieve 10% savings year-on-year. In practice the maintenance areas find efficiencies as described or through innovation such as in-situ pavement recycling. All efficiencies associated with renewals are assured centrally by Highways England as part of its responsibility to report efficiency.
- 3.5.13 Annual budgets are allocated net of efficiency as part of the SoFA settlement. In reality Highways England's approach results in any cost reductions generated through efficiency being re-invested into the annual programmes, with the net result of more works being delivered for the same budget.

Risk management

- 3.5.14 The risk of managing the network has been passed by Highways England to its ASC service providers, who take responsibility for making risk based decisions on routine maintenance, in order to maintain a safe network. This includes setting their own response times for safety defects. However, this risk for decision making will pass back to Highways England under the AD contract model.
- 3.5.15 Developing costs for renewals is the responsibility of the service providers including identifying, assessing and pricing of the risk for each scheme. Although the scheme appraisal record (SAR), which forms part of the Value Management process, includes standard figures for optimism bias, the way risk is allocated for renewals varies with risk being priced both as part of and out with target costs. Furthermore, evidence was found that some service providers report risk-adjusted outputs to monitor the effect of risk on renewal volumes. Where the allocated risk has been has not been utilised, it can lead to an in-year variation in the scheme and therefore programme outturn costs.

Recommendation – Managing the impact of annual budget variations

8. Highways England should consider adopting an approach to portfolio management that would minimise the impact of variations in the annual budget and provide greater certainty for in-year renewal programmes. This could include providing greater flexibility to manage variations to ensure robust programming.

3.6 Scheme development and delivery

Scheme prioritisation

- 3.6.1 Highways England does not have a national prioritised programme of renewal schemes. Each region makes investment decisions for renewals on an annual basis and prioritises these decisions using its Value Management process. Value Management is a ‘bottom-up’ approach to the prioritisation of maintenance needs for renewals. Pavements and structures have their own separate Value Management procedures, which have been used successfully for many years. This process is the starting point for the development of its annual programme. Highways England does not have a process to prioritise between structures and pavements. It has however undertaken work in considering interventions based on criticality and performance, which has to date has not been included in the Value Management process.
- 3.6.2 The Value Management process is a multi-criteria approach to prioritising maintenance need for renewals. Maintenance need is determined based on thresholds described in the design standards. There may be opportunities to consider preventative maintenance on some assets, particularly thin surface courses where early intervention could prevent more costly treatments in the future. This has the potential to enable the development of more sustainable programmes and a more pro-active approach to undertaking maintenance treatments.
- 3.6.3 This current approach does not identify which investment decisions are more efficient and sustainable at an asset level or network level with the least impact on resources. Therefore when programmes change as a consequence of budget decisions, it cannot easily compare maintenance need between regions and between asset types from a ‘top-down’ strategic perspective. Many of these decisions are based on local knowledge and experience rather than the understanding of the impact on KPIs.

Urgent works

- 3.6.4 One of the key challenges for each contract is to determine what activities and scope of work should be undertaken as part of routine maintenance. From this review it has been generally identified that only reactive maintenance works that immediately impact safety such as pothole and small patching works are undertaken. Larger patching schemes become capital renewals and go into the annual programme.
- 3.6.5 This means that schemes that are urgent need to be added to the capital programme and funding found within year, at the expense of another scheme. Because of the nature of these schemes they can become urgent and are referred to as 'emergency schemes'. These schemes may not always go through a formal Value Management process.

Do-minimum schemes

- 3.6.6 There are a number of reasons for variations to an annual programme of works identified in this review. Generally, these variations have been managed through reducing the scope of works for pavement renewals, as these schemes are more flexible in terms of design and construction compared to structures schemes. The result is that the scope of pavements schemes is sometimes be reduced. This sometimes leads to 'Do-Minimum' solutions being selected for pavement renewals to maintain minimum service levels and keep the network safe. This is sometimes at the expense of more efficient and sustainable approaches.
- 3.6.7 Where 'Do-Minimum' schemes were identified as the solution to keep the network safe and serviceable, there was evidence that, in some cases, delivery had been delayed by up to three years. There is a risk that the assets have often deteriorated significantly by the time that maintenance is finally undertaken, resulting in variations during the delivery phase.

Recommendation – Prioritisation of maintenance needs

9. Highways England should consider reviewing its Value Management process to include options for preventative maintenance that are more resource efficient and demonstrate long-term value for money.

3.7 Information, systems and tools

- 3.7.1 Highways England and its service providers manage a significant amount of data to support maintenance and renewal activities. This includes collecting and interpreting asset inventory and condition data to support renewal decisions as well as reporting performance in a variety of areas. Indeed, the need for good quality information underpins many of the recommendations within this review.

Network-wide condition surveys

- 3.7.2 Highways England's supply chain identifies pavement and structures renewals based on the maintenance need of the asset, and the requirements of its design standards. Asset need is identified from inventory and network wide condition data. For pavements, condition data is collected by Highways England annually through TSD, TRACS and SCRIM at a network level. This data is held in HAPMS and made available to service providers for identification and development of renewals. There is an independent accreditation process for survey providers for SCRIM and TRACS. In 2015/16 Highways England changed its survey contractor for its SCRIM survey. Problems were experienced with the new contract arrangement and its

access to Highways England's IT systems. This caused a delay in the availability of data to the service providers, which resulted in a delay in identifying sites at risk of skidding accident and the required planned maintenance. It also impacted on reporting of KPI 8.

- 3.7.3 Collection and reporting of information and data for structures is the responsibility of the service providers. Principal Inspections to assess the condition of structures are normally undertaken every six years. The use of risk based inspections are more limited. General inspections are undertaken every two years for all structures. Inspection reports are held in Highways England's structure management system (SMIS). Testing results from special inspections are also held in SMIS. Information from inspections and testing is used by the service providers to identify maintenance need. PTS has a process in place to assure the outputs from the surveys and has also, along with other highway authorities, developed a bridge inspection competency framework which it is in the process of implementing.
- 3.7.4 For both pavements and structures, it is the responsibility of the service providers to maintain accurate inventory data, including updating once works are completed.

Recommendation – Consistency of network wide asset data

10. Highways England should consider putting risk management plans in place to manage the impact of changes to its approach to collecting or analysing network wide asset condition data and incorporate the lessons learnt from the transition to the new SCRIM contractor.

Scheme-specific surveys

- 3.7.5 Where maintenance needs are identified through network surveys these surveys are often supplemented by scheme-specific or secondary surveys. The purpose of these surveys is to identify the causes of asset deterioration and defects in more detail and support the Value Management process.
- 3.7.6 For pavements these include coring, visual inspection and other machine surveys such as falling weight deflectometer. Additional testing for structures also includes cores and concrete testing, normally carried out as part of special inspections. These additional surveys and testing are the responsibility of the service providers and are important in developing the scheme options including the assurance and management of the records. This is the information and data that supports scheme design is not generally under the central management and control of Highways England. It is often retained by the service providers without being loaded into Highways England's central system. Equally the capability to retain and access this information centrally does not always exist.

Recommendation – Management and accessibility of additional asset data

11. Highways England's service providers undertake work and secondary surveys for scheme development and design. Highways England should ensure that this data is managed centrally and that it is assured and accessible to support decision making through the asset lifecycle.

4. Conclusions

- 4.1.1 Highways England is committed to meeting the requirements of its licence and the need to maintain a safe network in good condition. This is currently achieved through meeting the maintenance needs of pavements and structures in accordance with its operational requirements and design standards. This approach maintains safety with the objective of minimising the impact of roadworks on road users by combining renewal schemes.
- 4.1.2 It has a well-established supply chain who share the same commitments and have a well-developed knowledge and understanding of the network. This relationship between Highways England and its supply chain has, to date, underpinned the delivery of routine maintenance and capital renewals. This approach depends heavily on its supply chain to provide and assess the information for maintenance and renewals, although the final investment decisions are always made by Highways England. Highways England's gradual transition to the Asset Delivery model will provide it with a higher degree of control for selecting and prioritising both maintenance and renewals as it will undertake the assessment of the information to develop renewals itself.
- 4.1.3 The overall approach to maintenance and renewals has not been impacted by the change from Highways Agency to Highways England and there has generally been continuity of service providers, which has provided an element of stability. Its approach to identifying the maintenance need of its assets and undertaking renewals is based on good practice.
- 4.1.4 Given that the processes adopted by Highways England for maintenance and renewals have largely been inherited from Highways Agency, there is little evidence that these activities are fully aligned with the reporting requirements of the RIS, Performance Specification or the renewal volumes in its Delivery Plan.
- 4.1.5 In addition, the role of the regions in developing their programmes from a regional perspective means that there are limited opportunities to respond to and manage the impact of change from a strategic network-wide perspective through balancing performance, risk and cost.
- 4.1.6 Highways England recognises the challenges of delivering the requirements of the RIS and has a number of initiatives in place that will improve its approach to maintenance and renewals, bringing it in-line with good practice adopted by other asset owners. In particular this includes a more comprehensive approach to asset management and the overall management of the Operations Renewals Portfolio Office.
- 4.1.7 It is important that Highways England continues to build on these initiatives and in particular provides greater certainty in its planning, budgeting, identification, delivery and assurance of capital renewals.

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Produced by CREATE. | CRT078149C | March 2017

