Preparing for RIS3: Renewals Planning

Task 2 – Review of the effectiveness of the current performance and efficiency monitoring framework with respect to a whole life cost approach

Final Report

Project Ref: ORR CT 21-11 Task 2

Client: Office of Rail and Road

Prepared by Elliott Asset Management Ltd *Registered in England and Wales No. 10748779*

Title:	Whole Life Cost performance and efficiency framework effectiveness review	**Reference:**	ORR CT 21-11_RIS3 Renewals Planning_Task 2_FINAL REPORT v4 CLEAN.docx
Date:	29/03/2022	**Version:**	Final
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Acronyms

A to O			P to W	
AMMA	Asset management maturity assessment		**PEAT**	Performance Evaluation and Appraisal Tool
AMTP	Asset Management Transformation Programme		**PI**	Performance Indicator
CIPFA	Chartered Institute of Public Finance and Accountancy		**RIS3**	Road Investment Strategy 3 (2025-2030)
DfT	Department for Transport		**RP**	Road Period
dSBP	Draft Strategic Business Plan		**SBP**	Strategic Business Plan
EIMM	Efficiency and Inflation Monitoring Manual		**SES**	Safety, Engineering and Standards (SES)
HMT	HM Treasury		**SoFA**	Statement of Funds Available
HS1	High Speed Rail 1		**SRN**	Strategic Road Network
KPI	Key Performance Indicator		**TAG**	Transport
LHA	Local Highway Authority		**WICS**	Water Industry Commission Scotland (WICS)
ODI	Outcome Delivery Incentives		**WLC**	Whole Life Cost
ORR	Office of Rail and Road		**UKPNS**	UK Power Network Services
			UKRLG	UK Roads Liaison Group
			UKWIR	UK Water Industry Research

Glossary of terms

Licence – Highways England: Licence[1]

RIS setting – the process by which the Department for Transport (DfT), National Highways, the Office for Rail and Road (ORR) and Transport Focus develop and agree the five-year Strategic Vision, Performance Specification, Investment Plan and Statement of Funds Available (SoFA). Relevant to this project this includes the five-year renewals programme and budget. The process is set out in DfT's 2021 *Planning ahead for the Strategic Road Network*[2]

Whole life cost – the cost of the asset over its lifetime. There are a number of ways of defining the cost categories to be included.

Renewals – capital funded planned interventions to existing assets to extend their lives. Split into two categories: cyclic and major (or life-extension) renewals.

Life extension renewals – targeted asset renewals programmes to address 'bow waves' of asset need. In RIS2 programmes were developed for concrete roads, structures and safety barriers.

Economic and Social Cost and Value definitions:

- **Private** – only the costs and benefits arising directly to National Highways and/or direct stakeholders are considered in the analysis.
- **Wider stakeholder** – the costs and benefits for the group of direct and indirect National Highways stakeholders should be considered. For example, the costs for road users (such as

[1] Highways England: licence (publishing.service.gov.uk)
[2] Planning ahead for the strategic road network: developing the third road investment strategy (publishing.service.gov.uk)

vehicle wear and tear or operational costs) of different asset interventions. Or the benefits of schemes accruing to neighbours and/or stakeholders using land around the SRN.

- **Societal** – the broadest approach where factors such as carbon reduction, social interaction, mobility, and economic development are considered.

Executive Summary

Context & purpose

Renewals is a large item of spend within the National Highways budget - £5.8bn for Road Period 2 (RP2) and includes planned asset interventions. It is also a key strategic element in keeping the Strategic Road Network (SRN) in the condition necessary to deliver the broad range of commitments in the RIS and under the Licence for users and the wider stakeholders.

This report looks at one aspect of the RIS3 planning process and is concerned with **the way in which National Highways' performance and efficiency is monitored and assessed and whether this creates the right incentives for National Highways to adopt a whole-life cost (WLC) approach to maintaining the SRN.**

A key piece of context is that a WLC approach is required by the Licence but is not **explicitly** measured as part of the performance specification. This is in keeping with the focus of the performance specification on the 'what' and the Licence on the 'how'. So the question then is whether there might be tensions or perverse incentives to develop and deliver a WLC approach.

WLC is always seen as an important outcome to strive for in regulated utilities and goes hand in hand with a mature asset management approach. To some extent this is self-evident – by definition we should always produce the desired outputs with the minimum resources over the longer-term. As a government funded company this is especially important in terms of value for money for Treasury and the taxpayer.

Defining WLC and the current approach

WLC is not an outcome of itself but a critical means or philosophy even of how asset management improvement outcomes should be achieved. WLC is a product of rigorous and deliberate assessment of different scenarios where the various factors of interest have been quantified and explicitly compared.

As an explicit term WLC it is not in common usage outside the technical disciplines of asset management and regulatory economics. But the concept is well recognised and is typically referred to as part of asset stewardship or 'the interests of current and future customers'.

WLC is of particular importance to National Highways given the history of its predecessor organisation (e.g. Highways Agency) with single-year funding and the long-lived strategically important nature of the asset base. This explains the inclusion into the Licence which is unique amongst regulatory sectors.

There are a range of approaches to define WLC and many sectors have moved to a wider interpretation of WLC benefits and costs in line with wider policy debates. It seems likely that this will continue to evolve given the focus on (for example) environmental and net-zero outcomes. The experience of the Water Industry Commission for Scotland (WICS) for example shows the potentially far-reaching impact of this and the need for wider dialogue to tease out the best way of trading-off the many factors of interest.

National Highways RIS3 whole life cost approach

The framework model for WLC used in this review is one that National Highways – or any organisation – will need to include the following components to achieve good WLC decision-making:

- **Strategic focus** – there needs to be a senior and high-level commitment that identifies WLC as an area of priority.
- **Organisational capabilities** – people with the right skills need to be in place, and the organisational structure (strategy, asset and operations) should facilitate how these individuals work together and how information flows between them.
- **Information / asset knowledge** – these are the core data inputs about the nature of the asset base, its condition, its usage, degradation rates, and other factors such as criticality that will drive decision making. This information is needed for all types of asset interventions (e.g. enhancements and maintenance) even when considering only renewals planning.
- **Modelling tools & techniques** – the means of processing the asset information to enable decision-making. Optimisation decisions can mean balancing between several variables over long timeframes so sophisticated decision support tools can be required.
- **Decision-making** – whether decisions are consistently being made in a way that uses best available information to best secure WLC outcomes. This includes whether the right factors are being considered, whether accurate logic is applied, and whether these decisions are taken by appropriate individuals. A key element is how risk and uncertainty are considered.
- **Planning and delivery implementation** – decisions and renewals approaches must ultimately be translated into actual works. How well planning and delivery is coordinated is in fact a large element of renewal cost over the long-term, so this is of great importance.
- **Continuous improvement cycle** – as with any long-term endeavour, there needs to be an organisational structure that critically reviews and learns from previous approaches, and makes improvements where possible.
- **Incentivisation –** whether the mechanisms in place to actively encourage a WLC approach work as intended, and/or whether other factors or measures constrain the impact of these incentives.

Each of the elements of WLC decision-making are at a relatively early stage of development within National Highways – reflecting the recent transition from an annual cash-budget to the five-yearly RIS budget-setting process, a developing organisation and lower asset management maturity in some asset classes. National Highways has comprehensive and ambitious plans in place to address all the key elements.

Modelling capability seems to be particularly key to the end goals and to foster the discussions around options and this needs to be a focus for National Highways as it prepares its renewals plans for RIS3.

Conclusions & recommendations

National Highways is at a relatively early stage of development in terms of the elements of renewals WLC decision-making. This reflects the recent transition from an annual cash-budget to the RIS budget setting process.

National Highways has comprehensive and ambitious plans in place to address all the key elements of renewals WLC decision-making. Its current approach and commitment to improve it appear to be driven by fundamentals such as the role and requirements as steward of the SRN, rather than explicitly around the Licence Condition. There is not necessarily any conflict between these two factors.

The RIS2 incentive framework doesn't appear to have any major issues or particularly perverse incentives. But there are clearly some impacts of the framework at the margin that don't appear to support WLC decision-making and risk being counterproductive. Particularly given the effort that naturally goes into delivering the KPIs which are the formal means by which National Highways achieves success and is monitored by ORR.

The potential risks to achieving WLC include the efficiency KPI, though it is noted that any downside needs to be weighed against the benefit of the KPI design and whether there are other means of achieving the desired outputs without wholesale change to the KPI framework.

Our recommendations for ORR suggest ways in which the incentive framework could continue to be improved and better incorporate WLC decision-making, both in terms of the nature of framework itself, and the means by which ORR monitors National Highways. WLC is likely to become increasingly important for infrastructure companies, along with an expansion in the number of factors to be considered – for example Carbon impacts. It is therefore important that ORR continues to review and update its monitoring approach.

Our recommendations for ORR cover four areas: the definition of WLC, how it undertakes its monitoring activity, development of ORR capability, and some wider suggestions for enablers.

WLC Definition

Recommendation 1: ORR should engage with National Highways and DfT to review the how WLC is interpreted in practice. There are two key aims:

- A *common* interpretation is needed so that it is clear how compliance with Licence Condition is to be interpreted and evidenced during the RIS setting process; and
- A wider definition should be considered so that the Licence Condition is consistent with the strategic direction of National Highways and the targets that it has already set for itself such as net zero.

If there is an opportunity to review the wording of the Licence condition with National Highways and DfT then we recommend that the above suggestions should be considered.

Monitoring

Recommendation 2: While a new KPI is not necessary, it is in keeping with the fundamental importance of a WLC approach to achieving the strategic aims of National Highways that monitoring this is given more focus by ORR. ORR should implement this via a number of complementary actions:

2a. As a matter of process, ORR should formally engage with National Highways on a regular basis to discuss how compliance with the Licence Condition is interpreted and how compliance is evidenced. This should draw on the internal National Highways licence compliance process.

2b. Given National Highways has already committed to a substantial and comprehensive plan to improve its WLC approach capabilities, ORR should continue to monitor whether these plans are being implemented – subject of course to any appropriate change control. This includes:

- Whether National Highways is meeting its Asset Management Transformation Programme (AMTP) targets and outcomes (subject to appropriate change control)
- Are they meeting their renewals investment planning maturity road map milestones including the stage gateway acceptance criteria?
- Is renewals investment planning maturity improving over time?

- Does renewals investment planning reflect an appropriate WLC modelling approach and set out options to be evaluated? ORR should be clear about the scenarios that it would expect to see modelled – for example different funding availability over time. This needs to take account of the views of stakeholders through Transport Focus.

2c. ORR should also monitor a range of asset health measures for the SRN, paying particular attention to the trend in such measures over time, rather than the particular value of the measure at a point in time. These measures would usefully include, but not be limited to, the following:

- Similar to the 'Composite Sustainability Index' developed by Network Rail
- Monitoring whether National Highways is delivering the planned renewals or has a good WLC approach basis for varying its plans. We understand that separate discussions are ongoing between ORR and National Highways about how to best capture this reporting.
- Any other balanced scorecard approach that might be developed by National Highways.

Capability

Recommendation 3: ORR should enhance its capability to undertake the above monitoring and understand the implications of wider definitions of WLC decision-making that cover societal outcomes. A member of the ORR team should be given responsibility for leading on this area – and given the lack of current resource and such a role, consideration should be given to creating a role within the team.

Recommendation 4: ORR should continue to engage with other infrastructure regulators during RIS2 and as part of the RIS3 setting process to understand their future intent with WLC and society commitments and to understand the impacts of their WLC approaches.

Enablers / wider recommendations

Recommendation 5: ORR should discuss with DfT and National Highways the granularity of evidence required during the RIS setting process and provide guidance about the ORR expectations for RIS3 so that:

- During the RIS3 setting, National Highways provides case studies and scenario modelling for a range of WLC options and outcomes. This needs to be provided in a sequential approach that engages ORR and takes them through the process so that ORR has opportunity for early comment and guidance
- The assessment of WLC scenarios should be part of the ORR efficiency review

Recommendation 6: ORR should contribute to future reviews of the KPIs to consider whether there can be an increased emphasis on longer-term outcomes rather than the shorter five-year horizon. In particular, the efficiency KPI should encourage a focus on the use of resources over the longer term, and methods to allow re-allocation of between funding categories where this can be justified on a WLC approach basis. While this is difficult to do, options such as using a 'percentage' efficiency target rather than a cash amount should be explored. Further, ORR should work with National Highways to explore and quantify the impact of other KPIs such as Network Availability and Pavement Condition in terms of whether they undermine a WLC approach.

1 Overview and context

Renewals is a large item of spend within the National Highways budget - £5.8bn for Road Period 2 (RP2) and includes planned asset interventions. It is also a key strategic element in keeping the Strategic Road Network (SRN) in the condition necessary to deliver the broad range of commitments in the RIS and under the Licence for users and the wider stakeholders. Important decisions must be made about where best to allocate available renewals funding, and to evaluate other necessary renewals such as life-extension works.

As ORR starts to prepare for its input to, and role in relation to Road Investment Strategy 3 (RIS3) which will take effect from 1 April 2025, it is important that it helps create a supportive framework to encourage a long-term approach to renewals planning. This is one that recognises Whole-Life Cost (WLC) in decision-making.

This report is part of a wider project that also looks at the closely related topic of National Highways' asset management maturity in renewals planning – how you might measure that and what ORR should focus on in the lead-up to RIS3.

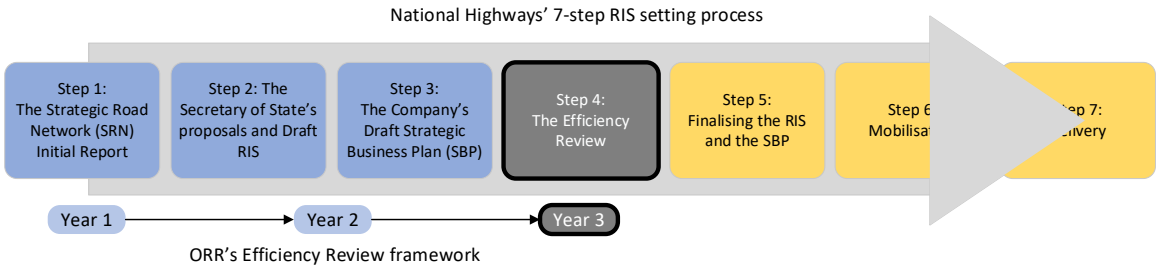
1.1 Purpose

ORR is the Highways Monitor established under the *Infrastructure Act 2015* as part of the reform of the then Highways Agency (the process known as 'roads reform'). As well as providing advice to DfT and National Highways as part of setting each five-year Road Investment Strategy (RIS), ORR has ongoing monitoring and enforcement responsibilities. ORR holds National Highways to account against:

- The RIS, including the framework of Key Performance Indicators (KPIs), Performance Indicators (PI) and wider performance framework. This includes a range of specific measures and schemes to be delivered / started during the five-year road period.
- A broader set of behaviours and requirements set out in the National Highways Licence[3]. In the main, these focus on **how** National Highways should undertake its tasks rather than explicit outputs / outcomes.

Licence Conditions are common across regulated utilities as they provide a **purposive** approach to regulation and allow for the principles set out to be applied on a case-by-case basis. They are therefore highly flexible. In general, the challenge for regulators and policy-makers can be a difficulty in categorically demonstrating that the Licence Conditions are being met – or to describe exactly what is meant by the specific requirements given they will be interpreted on a case-by-case basis.

As part of its preparation for the RIS3 workstream, ORR is investigating several areas of interest, and looking for advice about how it should best prepare itself for its role. This fits within the broader RIS setting process set out in the diagram below.



[3] See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/431389/strategic-highways-licence.pdf

This report looks at one aspect of the RIS3 planning process and is concerned with **the way in which National Highways' performance and efficiency is monitored and assessed and whether this creates the right incentives for National Highways to adopt a whole-life cost approach to maintaining the SRN.**

A key piece of context is that a WLC approach is required by the Licence but is not **explicitly** measured as part of the performance specification. This is in keeping with the focus of the performance specification on the 'what' and the Licence on the 'how'. So the question then is whether there might be tensions or perverse incentives to develop and deliver a WLC approach. For completeness, the two Licence Conditions relevant to WLC are set out below.

> *5.11 In complying with 5.9 and 5.10* [keeping of asset information and development of asset management plans]*, the Licence holder should adopt a long-term approach to asset management consistent with ISO 55000 standards.*
>
> *5.12 In complying with 4.2(d)* [achieving efficiency & value for money]*, the Licence holder must:*
>
> *a. Adopt a Whole-life cost approach to managing its assets;*
>
> *b. When presented with a significant choice between bearing short-term costs and increasing long-term costs, appraise the different options in line with relevant government policy and guidance to determine which represents the best overall value for money;*
>
> *c. Ensure that it has in place robust internal arrangements to achieve, and to demonstrate how it has achieved, value for money;*
>
> *d. Have due regard to circumstances in which it may be appropriate to carry out additional work as part of proposals where these can reduce or eliminate long-term costs or disruption to the network.*

The above clauses establish a clear requirement for National Highways to:

- First, be able to undertake calculations to compare different approaches and options; and
- Secondly, make decisions based on a range of factors of interest – including the guidance given by Government about priorities.

This is a subject of inherent interest and so it is timely to consider how best ORR prepares for its RIS3 role. There are also some specific drivers for this project:

- A recent ORR review[4] of the implications of the Life Extension Renewals programme highlighted the challenges National Highways faces when balancing whole life cost considerations against affordability considerations when deciding on its approach to renewals (for example when choosing between life extension and replacement of assets).
- As one of the RIS2 performance measurements, the 'achieving real efficiency' KPI is specified as a cash target across the Road Period (RP). This provides a major focus for National Highways in reducing the cost of doing business. In theory this might incentivise National Highways to deliver renewals with a short-term focus to make immediate cash savings. This is particularly true where the current primary approach to evidencing efficiency in RIS2 relies on 'embedded efficiency' associated with the delivery of renewal volumes.
- Another question to consider – again this is an in-principle observation that needs to be tested in practice – is that other performance metrics such as asset condition or lane

[4] Longer-term implications of Highways England's Road Period 2 delivery - Planning and early delivery of life extension renewals (orr.gov.uk)

availability are also short-term in nature and might not sufficiently counter-balance any focus on short-term savings as a result of the efficiency metric.

1.2 Importance of achieving WLC

WLC is always seen as an important outcome to strive for in regulated utilities. To some extent this is self-evident – by definition we should always produce the desired outputs with the minimum resources over the longer-term. As a government funded company this is especially important in terms of value for money for Treasury and the taxpayer

There are some especially relevant features of renewals within the English highways sector that make WLC of particular strategic importance:

- Prior to the roads reform, the highways sector has had a history of short-term / single-year cash funding which prevented long-term planning or sustainable supply chain management in the upkeep of the UK roads network. It is recognised that this ends up being more expensive in the longer-term and contributes to lower quality outputs. It was hence a key driver of the reforms to the Highways Agency.
- Renewal spend is a significant budget item. This means that both efficiency and effectiveness are important. Making efficiencies frees up cash which can be used for other goals. And achieving effective use of the budget is how to deliver the National Highways goals.
- Further, renewal spend is fundamental to keeping the SRN in the condition that delivers outputs to stakeholders and users so improving how well it is done helps deliver better outcomes. This is particularly relevant as there is an accumulated historical under-spend on the SRN.
- Renewals by its nature is a 'lumpy' spend annually and can vary significantly between the five-year RPs. A WLC approach helps to predict renewals spend more accurately, which in turn helps inform the longer-term budgetary requirements.
- Five-year price controls delivered through the RIS do at least address some of the limitations of year-by-year funding, but still raise challenges about how best to deliver the right outcomes for users. These are the sorts of decisions that are made organically within a competitive market environment, but for a government owned company like National Highways these inevitably have to be set on a 'top-down' basis and involve trade-offs between users and funders in the context of broader policy goals.
- Related, there are investment planning decisions to be made about where to allocate finite resource to undertake renewals – particularly in the near-term against a backdrop of historical underspend and an ageing infrastructure. This is both in terms of what amount of renewals is required across what asset classes, and how best to extend the life of assets that cannot be fully renewed in the short-term.
- Experience in other sectors and emerging Government priorities means that what might be included within WLC is evolving. For example, the importance of Carbon and net-zero targets have the potential for significant changes to what is seen to be an optimal renewal approach.

In short, there are many reasons why adopting a WLC approach demands attention and is a good strategic monitoring objective for ORR. It is also seen as critical to the evolution of the highways sector, not only the SRN. And while it isn't an output in itself, it strongly influences how the outputs and outcomes of interest in achieving the Licence conditions are achieved.

1.3 Our approach

We have used a combination of desk-top research and stakeholder engagement with National Highways and other regulated industries as well as drawing on the knowledge and professional judgement of the project team. We have sought to both understand the current WLC activities and approach of National Highways, as well as their future plans given the focus of this project is on what ORR should usefully do as the highways monitor in coming years. We have reviewed practice in other sectors to assess what useful lessons might be learned.

The remainder of this report is structured as follows:

- **Section 2** considers the definition and meaning of WLC. We look at the possible breadth of options and what the practical implications are. This is critical to the RIS3 renewals planning approach as it defines what National Highways is trying to achieve.
- **Section 3** highlights the various components of good WLC decision-making. We consider each in turn – assessing the current National Highways approach to WLC and its future plans, along-side potential learnings from other sectors. We also consider the role of the performance specification and other elements of the monitoring framework.
- **Section 4** draws on the analysis and information in previous sections to develop Findings and consequently Recommendations for ORR in their RIS3 setting role as highways monitor.

2 Defining and using WLC

This section considers how WLC fits within the wider concept of asset management, the elements that can be included within the analysis, National Highways' current approach, and how that compares to the experience in other sectors.

2.1 WLC as part of an asset management approach

WLC is a subset of good asset management maturity. The definition of good asset management by the Institute of Asset Management UK is as follows:

> *Asset management involves the balancing of costs, opportunities and risks against the desired performance of assets to achieve an organisation's objectives.*[5]
>
> *Asset management also enables an organisation to examine the need for and performance of assets and asset systems at different levels. Additionally, it enables the application of analytical approaches towards managing an asset over the different stages of its life cycle (which can start with the conception of the need for the asset, through to its disposal, and includes the managing of any potential post disposal liabilities).*
>
> *Asset management is the art and science of making the right decisions and optimising the delivery of value.* ***A common objective is to minimise the whole life cost of assets*** *but there may be other critical factors such as risk or business continuity to be considered objectively in this decision making.*
>
> *ISO 55000 International standards provide a global consensus on asset management and what it can do to increase value generated by all organisations. ISO 55000 gives the following definition of asset management:*
>
> *"the coordinated activity of an organisation to realize value from assets."*

This definition references the minimum whole life cost as an objective function – it is a way of making decisions. Of course there are many other inputs to allow this approach to be put in place – such as the outputs or value that is desired to be delivered by the assets.

It is also clear that the pursuit of a WLC approach is a long-term endeavour. This is inherent in the definition of an asset, and the reason why asset management has become an important discipline.

National Highways reflects this definition in its own asset management framework. This is shown in the following extract from the National Highways Asset Management Policy and Asset Management Strategy[6]. It highlights WLC principles (both the right time of intervention and that whole-life analysis needs to be undertaken) but also that these are in order to deliver the customer service requirements and have to be sympathetic to wider organisational context.

[5] See: https://theiam.org/what-is-asset-management/

[6] Both documents available at: https://www.gov.uk/government/publications/highways-england-asset-management

There are two main reasons why WLC is used in utility sectors such as the SRN, which goes to the discussion in section 1.2 about why a WLC approach is important:

- It minimises the resources required and long-term demands on the public purse; and
- It provides signals about the long-term asset needs which encourage proper planning and in turn enables fiscal responsibility for both the Government and the publicly funded entity.

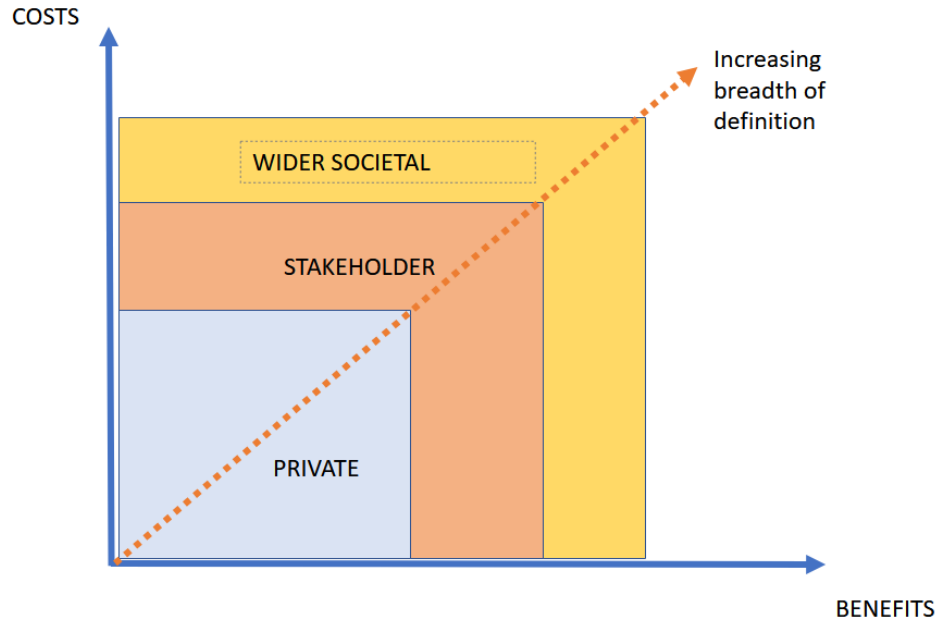
Good analysis underpins the production of useful and compelling business cases. As well as for funders, this would allow the trade-offs to be clear and for wider stakeholders to provide any input as relevant about how to assess the trade-offs. Ultimately this allows decisions to be made transparently and explicitly, rather than by stealth or inadvertently.

2.2 WLC definition

If the concept of WLC is about balancing costs incurred with value attained over the long-term, then the next step is to consider how narrowly or widely 'cost' and 'value' can be defined.

The following chart shows a simplified conception of three levels:

- **Private / Organisational** – only the costs and benefits arising directly to National Highways and/or direct stakeholders are considered in the analysis.
- **Wider stakeholder** – the costs and benefits for the group of direct and indirect National Highways stakeholders should be considered. For example, the costs for road users (such as vehicle wear and tear or operational costs) of different asset interventions. Or the benefits of schemes accruing to neighbours and/or stakeholders using land around the SRN.
- **Societal** – the broadest approach where factors such as carbon reduction, social interaction, mobility, and economic development are considered.



The choice of approach that a monitored government company such as National Highways takes can have profound implications for decision-making. For example, looking solely at private costs could suggest for example longer road-closures to reduce the costs of renewals – whereas considering the cost of disruption on road-users tends to suggest the opposite.

In practice it is unlikely that parties will adopt a definition which strictly aligns with the three levels set out here – it will be some sort of hybrid. The purpose is to show that as a 'wider' definition is adopted then it will increasingly move beyond considering only the private costs and benefits.

A final point is that as the definition gets broader, then it is inevitably more difficult to quantify all the benefits and costs and be able to devise a methodology to compare them. For example, what is the relative weight given to reducing the cost of renewals (to the benefit of National Highways and taxpayers) vs disruption to current road users. This is inherent within the Government evaluation and decision-making frameworks such as Transport Appraisal Guidance (TAG).

2.3 Current National Highways WLC approach

In its role as Asset Steward, the principles of taking into account the longer-term impacts of decisions are well recognised across National Highways. This includes impacts on cost as well as the impacts on current vs future road users. This is described in a variety of ways, for example: 'long-term sustainability' which also includes the useful concept of how well the supply chain works. This makes sense given the drivers of the reform of the Highways Agency and the importance of securing a stable and efficient long-term supply chain.

It is noted that 'whole-life cost' analysis is of itself a fairly specialised term used mainly by regulatory or asset management professionals. This is no problem – it merely requires that parties have a common understanding of the discussion points.

National Highways has developed an asset management taxonomy that has been agreed collectively within the business:

- **Whole Life Cost (WLC)** is the direct costs of creating, maintaining and renewing an asset over 60 years discounted in accordance with the HMT Green Book. This represents the Total

Cost of Ownership measured over 60 years. For DfT this will provide consistency with the approach currently accepted by ORR, which aligns with the approach adopted by Network Rail. Whilst this is currently used mainly at a scheme level, it can also be adapted to be used at a network level (e.g. summing WLC for every asset / scheme would give a network level WLC estimate).

- **Whole Life Benefit / Dis-benefit** – This refers to the impacts of our interventions (e.g. delay, carbon) over 60 years discounted in accordance with the HMT Green Book. The analysis is supported by the WebTag approach and applied in tools such as PEAT.
- **Value for Money** is determined by the combination of Whole Life Costs and Whole Life Benefits / dis-benefits

This is a helpful starting point and the inclusion of 'benefits and disbenefits' go to the need and purpose of asset management in balancing costs and the value of intervention. However, it gives limited guidance about how narrowly or broadly the benefits and disbenefits (or costs) should be considered.

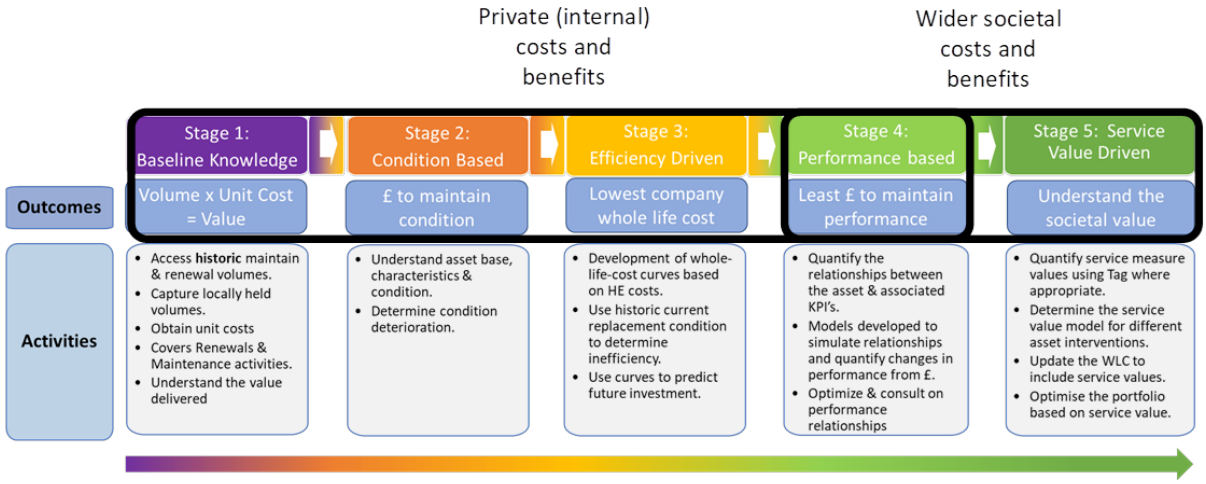
Active consideration is already being given by National Highways to interpreting WLC in a broader sense, along with assessing the impacts of doing so. For example, given commitments to net zero targets and the general direction of policy, there is recognition that Carbon impacts will need at some point in the future to be factored into WLC analysis.

Currently, National Highways predominantly has a focus on the private / organisational costs and benefit to its renewal operations, though with some specific exceptions it is looking at both wider stakeholder (e.g. noise) and wider societal (e.g. safety) where specifically directed to do so. The consideration of delay in the phasing and scheduling of work is carried out post-RIS setting and on a scheme-by-scheme basis.

This is at an early stage of consideration. There are several challenges such as the value to place on carbon, and how this is done to achieve overall business-wide targets. It also poses potentially big questions about the technology being used. For example, concrete vehicle restraints are seen to be better WLC options than steel, but both are relatively carbon intensive so further calculations are required to assess this – particularly where there are currently limited alternative technologies.

And more generally National Highways is planning for substantial improvement in its WLC approach in coming years – this is a significant part of the current Asset Management Transformation Programme, which is described in more detail in section 3 below.

National Highways has also developed a Renewals Investment Planning Maturity Model roadmap (shown below) to provide the sequential activities required to improve maturity in developing its renewals plans. This has five stages of maturity starting with a baseline knowledge of all asset classes (Stage 1) through to driving efficiency and developing a lowest company WLC cost (Stage 3) and ending with a service value driven approach to understand the societal value of its asset interventions (Stage 5). As well as the increasing sophistication of the underlying analysis, greater maturity also involves factoring a wider range of societal costs and benefits.



National Highways' 5-stage asset management maturity model

When assessed against the three-level value model in section 2.2, Stages 1 to 3 are representative of the improvement in private (internal) costs and benefits whereas Stages 4 and 5 are representative of the wider societal costs and benefits.

2.4 Wider industry experience & evolution of WLC

National Highways is unique in that WLC is explicitly included within its Licence. However, all sectors refer to equivalent concepts like 'long-term asset stewardship' or 'balancing the needs of current and future customers' or 'efficiency into the long-term'. Typically these concepts form part of either the statutory duties of the regulator and/or are defined in more detail as part of the five-year regulatory reviews.

For example, in relation to rail, the ORR statutory duties include a range of factors around competition in the provision of rail services, and the following:

> *contribute to the achievement of sustainable development; and*
>
> *promote efficiency and economy on the part of persons providing railway services.*

The importance of WLC is seen in the detail of the approach Network Rail (and other parties) have in constructing its Strategic Business Plan, particularly in relation to how it prepares its asset management plans. It is not explicitly part of the Network Rail Licence – though again the Licence is broadly used to make sure that Network Rail acts to make the rail industry work in a joined-up manner, with the detail of cost incentivisation dealt with as part of the detail of the Periodic Review.

In the gas and electricity sector, Ofgem's statutory duties include to: *promote efficiency and economy on the part of those licensed under the relevant Act and the efficient use of gas conveyed through pipes and electricity conveyed by distribution systems or transmission systems*. This doesn't explicitly mention WLC concepts, and it is not a requirement within the licences for various parties in the sector – but in practice is taken to imply that, in terms of the regulatory requirements set out in the five-yearly reviews.

The Water Industry Commission Scotland (WICS) provides an interesting example of how it has adjusted its approach to be more long-term in nature. It notes that the 'traditional' regulatory model was successful in driving down costs but that this meant a lesser focus on long-term planning and long-term costs. The recent settlement (for the period 2021-27) addressed the issue of a significant

increase in rates for customers to pay for a renewal backlog and increasing environmental commitments including achieving net zero targets.

The WICS statutory duties do not explicitly reference WLC but do mention a need to provide for both present and future customers which effectively gets at some of the same issues – again without being prescriptive about what is included in the definition of costs and benefits. The impact of adopting this wider definition is clear in terms of the different modelling that WICS and Scottish Water have been required to do, and the increase in costs.

WICS has also deliberately changed its regulatory model to make the workings more transparent, and to build an ethical and trust-based relationship between itself and Scottish Water. It sees this as critical in achieving the dialogue with customers and stakeholders that underpin the complex considerations of balancing different costs and benefits in the longer-term.

The breadth of the approach adopted by WICS can be illustrated with the following extract taken from the Final Determination for 2021-27:

> *CLARIFICATION OF THE RING-FENCED FUND*
>
> *Our draft determination proposed that there should be a ring-fenced fund of £133m (now finalised as £132m) to enable Scottish Water to evidence where it has incurred additional costs in selecting an option that has a higher NPV than the lowest financial cost option, after allowing for externalities such as carbon, natural and social capital. Following the draft determination, it became clear that it would be helpful to clarify further the nature and purpose of the fund. Our discussions with SEPA confirmed that the fund's objective (that decisions should consider all relevant capitals – such as natural, social and financial capitals) is aligned with SEPA's 'One Planet Prosperity' strategy. Indeed, the primary aim of the ring-fenced fund is to provide a further incentive for Scottish Water's asset managers to make the paradigm shift towards making the best decisions for One Planet Prosperity over the long term.*
>
> *Both SEPA and the Commission recognise that delivering Scotland's water sector vision and Scottish Water's Strategic Plan will require Scottish Water to make informed, effective and evidenced decisions on their investment choices. These decisions must consistently strike the right balance for a flourishing Scotland, by considering environmental, social and financial costs and benefits – ultimately through full and well-evidenced quantification. We expect Scottish Water to demonstrate its progress in this area well before we publish our methodology for the next Strategic Review of Charges.*

A case study for the water sector and how it has developed its asset management approach is in **Annex A**.

Nonregulated related sectors such as local highway authorities (LHAs) offer another perspective on WLC. English LHAs are required to follow UKRLG's Well Managed Highway Infrastructure Code of Practice[7] and develop asset management plans that *'…take whole life costs into consideration when assessing options for maintenance, new and improved highway schemes'*. LHAs are also required to calculate the gross and depreciated value of their assets using the CIPFA Code of Practice on the Highways Network Asset[8]. This is used by some authorities as a proxy for long-term asset health.

[7] UKRLG's Well Managed Highway Infrastructure Code of Practice 31891 tso DfT wm highways (ciht.org.uk)
[8] Code of Practice on the Highways Network Asset 2016 Edition Online | CIPFA

2.5 Concluding remarks

WLC is not an outcome of itself but a critical means or philosophy even of how asset management improvement outcomes should be achieved. WLC goes to some rigorous and deliberate assessment of different scenarios where the various factors of interest have been quantified and explicitly compared.

As an explicit term it is not in common usage outside the technical disciplines of asset management and regulatory economics. But the concept is well recognised and is typically referred to as part of asset stewardship or 'the interests of current and future customers'.

WLC is of particular importance to National Highways given the history of its predecessor organisation (e.g. Highways Agency) with single-year funding and the long-lived strategically important nature of asset base. This perhaps explains the inclusion into the Licence which is unique amongst regulatory sectors.

There is a range of approaches in defining WLC and many sectors have moved to a wider interpretation of WLC benefits and costs in line with wider policy debates. It seems likely that this will continue to evolve given a focus on (for example) environmental and net-zero outcomes. The experience of WICS shows the potentially far-reaching impact of this and the need for wider dialogue to tease out the best way of trading-off the many factors of interest.

A case study for the water sector and how it has developed its asset management approach is in **Annex A**.

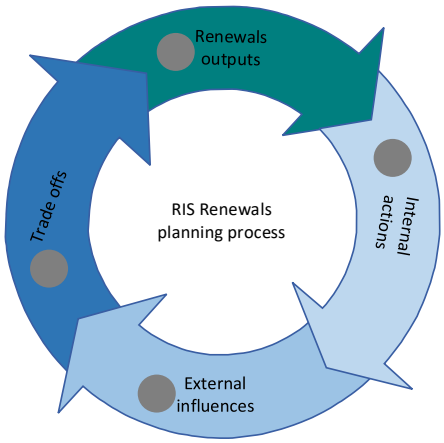
As National Highways develops its WLC approach towards incorporating wider societal values a maturing sequence of technical and economic activities such as considering the role of customers and portfolio testing of for example deliverability, climate change, resilience and decarbonisation will be required. This provides a useful framework for National Highways to assure progress and for ORR to monitor.

3 National Highways RIS3 whole life cost approach

3.1 Overview

Renewal planning decisions are the result of a corporate decision-making process and several internal and external drivers. Not all drivers will be within National Highways control. The RIS3 renewals planning process therefore needs to consider both internal and external influences as well as trade-offs to derive renewal outputs which can then be considered in a business case.

This section examines the key elements of the renewals planning process and assesses whether they are being done in a manner consistent with good WLC practice.



A complete assessment of the WLC approach requires an understanding of the range of factors that influence the outcomes of the renewals planning process. We have set out a number of the key factors in the following table – highlighting both those that are intended to be good incentives, and those that are in the nature of external 'shocks'.

1 – Internal actions	2 – External influences	3 – Trade-offs	4 – Renewals outputs
Strategic focus and asset management strategy and plans	Highways Licence and broader Government strategic objectives	Capex v Opex and Renewals v Maintenance	Renewals business case
Organisational and renewals capability and capacity	RIS strategic objectives and Performance Specification	Asset management maturity v investment & resourcing requirements	Renewals delivery framework
Information and asset knowledge	ORR monitoring framework	Procurement framework incentives v risk transfer	Renewals outputs and trend analysis
WLC definition and approach	Transport Focus priorities	Realising scheme value early vs disruption to motorists	Renewals assurance
Asset models and deterioration tools	Budget constraints	Inter-generational customer outlooks	
Renewals planning and delivery	Supply chain capability and capacity	Direct vs indirect / wider societal costs	
	Big shocks e.g. Covid pandemics or technology disrupters		

The assessment of WLC is complicated because many of these factors are inter-dependent, and many of them are in fact endogenously determined through the operation of the system. Many of the incentives or performance specification are explicitly designed to influence the internal approach of National Highways. But then some are 'exogenous' to the system – such as level of funding available, the supply chain environment (to some extent) or other shocks like coronavirus that National Highways has to deal with.

The final complication is that WLC involves optimisation over the long-term. Any decision, however, has to be made at a point in time and whether it is 'good' or not means whether it is accurately processing the available information in a robust and insightful way. It does not guarantee an optimal ex-post outcome as some of the inputs and drivers will inevitably change over time. This requirement to make good decisions that consistently lead to good outcomes over the course of 30+ years is in turn a challenge for the approach to WLC.

The assessment of National Highways' approach reflects the additional analysis / information undertaken as part of Part 1 of this study. Part 1 looks at the related, but wider, question of the asset management maturity that National Highways exhibits in undertaking renewals investment planning.

3.2 Framework for WLC analysis

Our framework model for WLC is one that National Highways – or any organisation – will need to include the following components to achieve good WLC decision-making:

- **Strategic focus** – there needs to be a senior and high-level commitment that identifies WLC as an area of priority
- **Organisational capabilities** – people with the right skills need to be in place, and the organisational structure should facilitate how these individuals work together and how information flows between them
- **Information / asset knowledge** – these are the core data inputs about the nature of the asset base, its condition, its usage, degradation rates, and other factors such as criticality that will drive decision making. This information is needed for all types of asset interventions (e.g. enhancements and maintenance) even when considering only renewals planning
- **Modelling tools & techniques** – the means of processing the asset information to enable decision-making. Optimisation decisions can mean balancing between a number of variables over long timeframes so sophisticated tools can be required
- **Decision-making** – whether decisions are consistently being made in a way that uses best available information to best secure WLC outcomes. This includes whether the right factors are being considered, whether accurate logic is applied, and whether these decisions are taken by appropriate individuals. A key element is how risk and uncertainty are considered
- **Planning and delivery implementation** – decisions and renewals approaches must ultimately be translated into actual works. How well planning and delivery is coordinated is in fact a large element of renewal cost over the long-term, so this is of great importance
- **Continuous improvement cycle** – as with any long-term endeavour, there needs to be an organisational structure that critically reviews and learns from previous approaches, and makes improvements where possible
- **Incentivisation –** whether the mechanisms in place to actively encourage a WLC approach work as intended, and/or whether other factors or measures constrain the impact of these incentives.

The remainder of this section considers each of these 8 factors in turn. For each one, we assess:

- National Highways' current approach;
- What National Highways is planning to do;
- How the various internal and external factors explain this performance, with particular emphasis on the KPIs and performance specification; and
- Experience and insights from other sectors.

The section concludes with some summary remarks and findings.

3.3 Determinants of renewals WLC planning

Strategic focus

This extract from National Highways' Asset Management Strategy shows the line of sight and document hierarchy.

It is clear that WLC has top-level buy-in and focus within National Highways. A longer-term focus was one of the key elements of reform to the then Highways Agency in 2014 – to be facilitated by five-year funding and related arrangements.

Key documents like the Strategic Business Plan, RIS2, and the Delivery Plan all mention the need for long-term sustainability, looking after the asset as a whole, and a different approach to renewals planning to deliver better services and reduced disruption to users. The Strategic Business Plan (2020-25)[9] sets out the following:

"We are improving the way we manage asset renewals, taking a planned, longer-term view. Over the next five years, we will need to substantially increase investment across three areas: concrete roads, safety barriers and our largest structures. As these complex assets near the end of their life, we have been looking at requirements for the coming and future road periods. This will allow us to smooth out peaks in spending, ensuring our network remains safe."

We have found significant evidence that the approach is embedded into the range of documents and activities within National Highways. For example:

- The Asset Class Strategies explicitly reference the Licence Condition as one of the motivating factors.

[9] p28, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/912576/strategic-business-plan-2020-25.pdf

- An entire Asset Management Transformation Programme has been established and resourced to deliver against a need for improving long-term asset stewardship. This is described in more detail below but represents a comprehensive commitment from senior management of National Highways.
- National Highways has an internal licence compliance process that is reported to the Board and highlights the importance of the conditions around WLC and sets out actions / evidence that need to be undertaken for National Highways to comply with the licence.

The Efficiency and Inflation Monitoring Manual (EIMM)[10] is an important document setting out National Highways' commitment to how it collects data to underpin achievement of the efficiency metric. The EIMM explicitly sets out the possibility of how to claim efficiency which is related to WLC benefits. However, there are inherent challenges about measuring efficiency in a long-term context. In particular:

- The definition of outputs that underpin the Embedded efficiency approach for RP2 is defined in terms of schemes either starting or completing in RP2 rather than the long-term outcomes. Similarly, there are no explicit long-term measures for renewals per se – and the KPIs that could be seen as a proxy such as pavement condition are a snapshot in time and reasonably short-term in nature. It is noted that such measures could be used as part of a trend analysis to provide insight into longer-term points of interest.
- The portfolio risk pot does not cover the shortfall identified in the dSBP for a fully funded renewals programme. Therefore, risks arising in these areas can only be managed by reprioritisation of work or scope change. This needs to be taken into account when considering efficiency in these programmes. This clearly makes sense as an approach, but it adds to the difficulty of untangling what is efficiency vs what is a materialised risk or re-prioritisation.
- While the evidence for renewals efficiency set out in section 5.3.3 includes *"Demonstrating appropriate asset stewardship"* this is not explicitly defined though could be expected to be consistent with the definitions and references in other strategic documents
- There is limited discussion of the ability to move funding between pots where this is of long-term WLC benefit. In practice, this does happen, but to a relatively minor extent due to the limitations on how the pots of RIS funding are set.

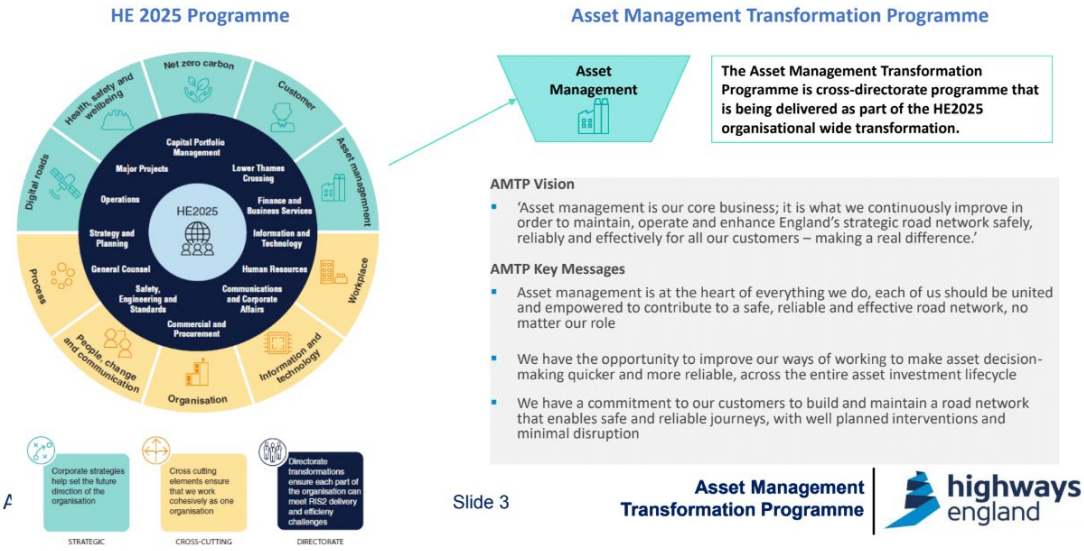
Organisational capability

National Highways is only 18 months into its second five-year Road Period and is still adjusting culturally away from having year-to-year budgets. This is a major undertaking – both the cultural shift and the associated changes to corporate structures and capabilities required. Creating the right roles and responsibilities and then filling them with the right candidates simply cannot happen quickly – particularly given the SRN still needs to run.

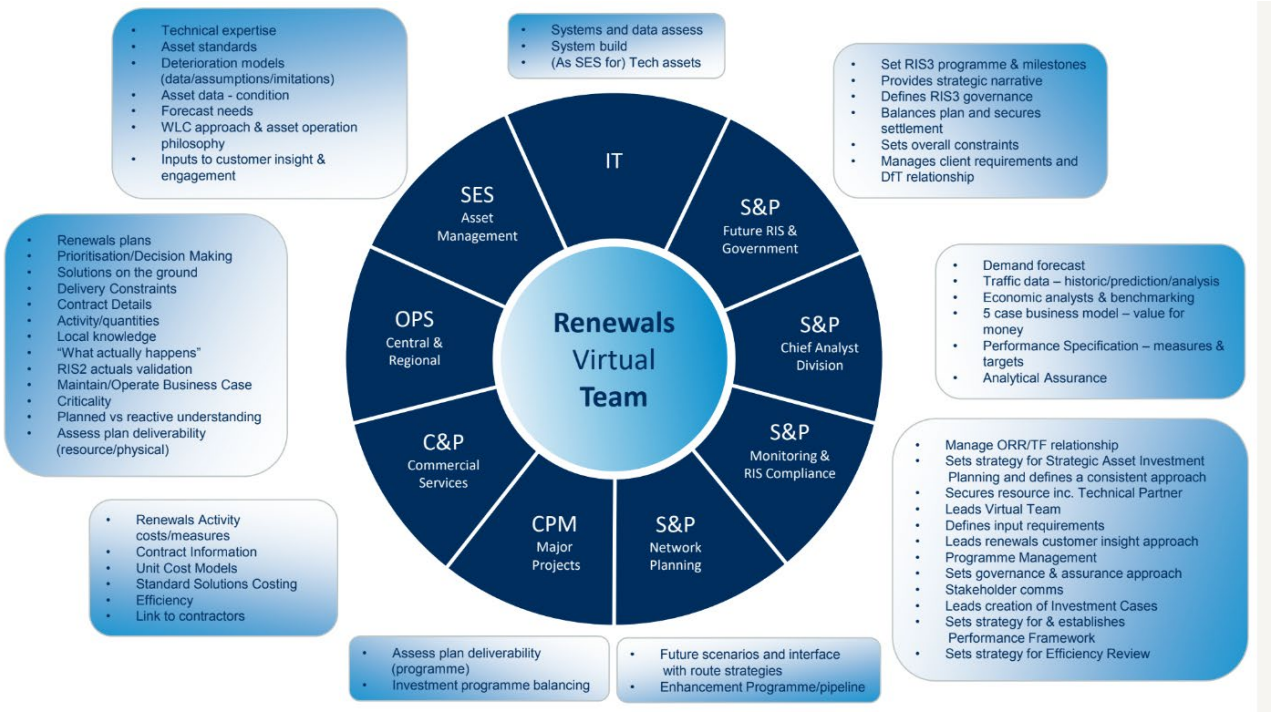
National Highways recognises this challenge and is – through various initiatives and transformation programmes – building capability for the future. The other part of this overall project (Task 1) will examine in more detail the capabilities of National Highways as they relate to renewals investment planning maturity.

[10] https://nationalhighways.co.uk/media/fwsffepn/eimm-version-10-1-final_cover-align-with-dp.pdf

The Asset Management Transformation Programme (AMTP) summarised in the chart below – which is an ambitious and far-reaching element of the overall HE2025 Programme, has the potential to add to the organisational capability.



The AMTP is reinforced by the creation of the Virtual Team structure to develop the investment case for RIS3 renewals which supports the future achievement of the WLC capabilities. This structure is shown below. In principle this is a comprehensive and well-designed approach to the task and allows for taking account of all the relevant factors and draws on the wide range of expertise. Clearly it is too early to tell how well this is working in practice and this will be an area of interest for National Highways, ORR and all stakeholders.



Information / asset knowledge

As with organisational capability, National Highways has embarked on the process of identifying the information that it needs and a strategy for how to deliver it. This is a key part of the AMTP and within this are three themes of improving data, information and knowledge. The evidence we have seen reflect excellent ambition as well as a reasonable base to build on reflecting a lot of previous work to develop asset registers and associated condition information.

The AMTP transformation covers both an asset data strategy – what information is required, and an asset systems strategy – how are these data captured and stored in a helpful and intuitive format.

National Highways recognises that it currently still has some work to do to achieve a better data set, but the Transformation Programme is a robust approach to delivering what is required. Significant decisions are required as part of the detailed implementation programme about the prioritisation of information and which asset classes are most important.

There are also decisions about what information National Highways needs to retain as the ultimate asset steward, and what needs to be sourced from various contractor arrangements and partnerships. National Highways is already working with contractors to better understand cost information at a more granular level for example, to populate models that compare options.

Modelling tools & techniques

More than any of the other elements, this is one that has a significant impact on driving WLC decision-making in practice. It starts with a culture of wanting to robustly and transparently document the various options, and to understand and compare the WLC impacts.

The tools and techniques need to be able to use the available information to optimise against the variables of interest (including the definition of cost and benefit), and to present the results in an intuitive and powerful way.

WLC modelling should allow for the creation of scenarios around important aspects – for example available budgets in the short and long-term, and for uncertainty around costing and other variables.

Care needs to be taken that tools are not built with spurious accuracy or that look pretty but reflect quite basic analysis.

Currently National Highways has a limited suite of tools and techniques to generate WLC options. Allied to a lack of data and a cultural overhang of not being able to look at the longer-term implications but more to spend for the next year on what might otherwise fail – this is an area for significant improvement. This can be seen in the basic analysis presented to ORR as part of the National Highways response to a regulatory escalator query around the decision-making underpinning what surfacing depth to use in its pavement renewal assumptions for RIS2. It was also highlighted in the previous ORR commission around life-extension works which was one of the motivations for this assignment.

One of the major changes envisaged by the AMTP is the development of tools that will allow scenario analysis, particularly around what optimal interventions look like under different budget constraints. It is also intended to build a picture of the implications of different interventions for the performance metrics and specification. This is to be welcomed as it would allow some insights into the trade-offs between the performance metrics and further evidence around whether some are in direct conflict with others.

Information availability is clearly important – you can't make good decisions without the right information / data. But the tools are more important – as even without full information it is possible to use assumptions and proxy data to investigate a range of possible scenarios.

In the first instance, it is important to build a habit of comparative analysis – setting out the options and a means of evaluating the best approach. As well as the need to continue to develop internal capability, it also appears that the RIS processes to-date have not had a strong emphasis on a bottom-up comparison of options. Budgets and approaches appear to have been more top-down looking at funding splits between enhancements and renewals as well as strategic priorities that drive the total RIS funding. There are many reasons why this is a reasonable approach given the challenges and the early stage of development of the process, but it does come at some cost in terms of using detailed modelling to inform the overall budget.

This can be contrasted with the transparent and detailed WICS approach which detailed the rationale for increased bills across the 2021-27 – largely that if action wasn't taken then there would be even higher costs in the future and services quality and asset resilience would likely suffer.

The above analysis drew on significant modelling and asset management input to compare and contrast the impacts of different approaches. Scottish Water highlights the ongoing challenge that it must continue to build its capabilities in this area – particularly around how to quantify the new goals that it must consider and translate that to better investment decisions.[11]

Decision-making

To some extent it is arbitrary to separate 'decision-making' from the modelling process. But in reality, the modelling will rarely be definitive in its conclusions, there will be some strategic priorities that cannot be modelled, and it will be different people making the decisions to those undertaking the detailed analysis.

Decisions should be:

- Utilising all available information;
- Transparent and clear;
- Consistent; and
- Addressing uncertainty.

The level of current decision-making sophistication is currently at an early stage for National Highways – as seen in the Asset Class strategies. But the aspirations are high and – as with the other elements – the AMTP sets out an ambitious and comprehensive capability improvement road-map.

It also appears that the structure of the RIS process and the role given to ORR in evaluating efficient costs of delivering the determined programme of work – has not encouraged significant discussion around the options for renewals and/or other categories of spend.

In contrast, HS1 is bound by the terms of its 30-year Concession but does not have a Licence. One of the key requirements of the Concession is the 'General Duty' which is in turn to achieve the 'Asset Stewardship Purpose': *to secure the operation and maintenance, renewal and replacement, and the planning and carrying out of any upgrades of the HS1 railway infrastructure:*

• *In accordance with best practice;*

• *In a timely, efficient and economical manner; and*

[11] https://www.scottishwater.co.uk/-/media/ScottishWater/Document-Hub/Key-Publications/Strategic-Plan/030220StrategicPlanASustainableFutureTogether.pdf

• *Save in the case of the UKPNS assets, as if we were responsible for the stewardship of the HS1 railway infrastructure for 40 years following the date that any such activities are planned or carried out*

In setting out a long-term Concession, one of the clear risks for the Government as the ultimate owner of the HS1 assets, is the condition in which the assets are handed back and whether in the last years of the Concession the assets are allowed to degrade to save money by HS1. The General Duty aims to counter this by including an explicit WLC requirement – including a 40-year framework.

In establishing the renewals costs within a particular five-year regulatory period, HS1 is required to forecast renewal costs over the 40-year period, and then establish the 'annuity' that will smooth out the inevitably lumpy renewal intervention profile. This has several benefits in terms of being clear to customers about the likely profile of spend and the long-term budgetary implications. It allows optioneering and analysis around the best approach in terms of what services the operators need to meet the needs of their own customers.

One of the challenges, however, is the treatment of risk. Given 40 years is a very long-time horizon it is difficult to be certain about many things like the exact degradation of the assets and hence the timing of interventions, and the cost of the renewals work. The cost is partly driven by the tension between efficiencies over time vs the inherent increase in certain input costs (real increases in wages for staff, cost increase for key inputs like steel); but also the uncertainty around scope and technology of works required so far in advance.

If an early-stage project estimation technique is applied, then a risk weighting of circa 80% might be applied to any initial estimate. However this is not necessarily in the interest of customers now. These are good examples of the inevitable tensions that arise in addressing long-term decisions and will need to be addressed by National Highways.

Planning & delivery implementation

There are several challenges for National Highways in organising its supply chain in a manner consistent with WLC decision-making.

The first is to make the costs of delivery over time more transparent in WLC calculations and to continue to evolve the approach. This goes to the information available and sophistication of modelling techniques, as covered in earlier sections.

Secondly, the arrangements with the supply chain need to be updated to reflect a long-term focus. This is consistent with moves by National Highways toward enterprise partnership arrangements but can be difficult to accurately incentivise. There may be delays as existing contract terms need to be completed before new terms can be established.

Thirdly, the impact of KPIs such as Network Availability may be unhelpful to longer-term decisions. It is hard to quantify the impact as there is a lack of modelling capability to show the long-term costs of different options. This will be an area of interest into the future as the modelling capabilities improve and there is an ability to model different scenarios and potential impacts on the suite of KPIs, PIs and other metrics of interest. We have not seen any evidence that the Network Availability KPI causes distortions or perverse incentives.

Fourthly, there is a limited ability to adjust the approach after the RIS has been set and during the road period. For example where additional capex now might be significantly better from a WLC perspective because of future Opex or other savings.

Finally, it is difficult to get a break-down in practice of supply chain costs and/or out-turn costs compared to the original estimate. The embedded efficiency approach contributes to some degree of opaqueness here – so long as the supplier's estimate is in line with the top-level costs then the

efficiency goals are achieved. However ORR does monitor outputs as part of primary evidence and the secondary evidence that comes from activity metrics and case-studies.

Continuous improvement

One of the difficult challenges for any organisation is to achieve a continuous learning approach, and to somehow review the lessons learned from activities and ensure that there is a process that allows for the review to happen and to capture and disseminate the information in the right way.

It is one of the advantages of the RIS process and associated ORR Highways Monitor role – that progress over time can be tracked and the logic of development checked and improved.

The approach is also clearly embedded within the various Transformation Programmes and the associated virtual teams. Along with the senior leadership involvement, the right structures have been created to give the best chance of success in this area. Clearly this will continue to be monitored and evolved over time.

Incentivisation

We have discussed some of the incentives as part of considering each of the individual elements above. Broadly the incentives act on the process as a whole. Some of the findings about the current and proposed approach include the following:

- With the obvious caveat that we have not undertaken a root and branch study of how corporate incentives translate to individual actions, we have seen no evidence of strongly perverse incentives within the performance specification framework. The drivers of behaviour appear to be largely around looking after strategic highway assets in the best way possible, and a drive to deliver the goals of National Highways. This is entirely consistent with a WLC approach envisaged by the Licence.
- While we have observed no perverse incentives, the design of the efficiency KPI and the use of embedded efficiency is not helpful to WLC outcomes and appears likely to create a focus on the shorter-term rather than support a focus on the longer-term. There is clearly considerable time and effort from National Highways to achieve the KPIs that they are mandated to achieve, and to the extent these are more short-term in nature then this can be expected to influence the National Highways approach. Of course any such downsides need to be weighed against the benefits of the approach and there may be other ways to achieve the benefits without fundamental change to the KPIs.
- Currently, there are no formal scheduled discussions between ORR and National Highways in relation to Licence Condition compliance. ORR tends to rely on self-assurance by National Highways but does not receive copies of the internal National Highways compliance process. This is consistent with the approach in other regulated utilities. In practice, where there are concerns, Licence Conditions are referenced as part of items that may be placed on an escalator register and or to support ORR investigation into areas of interest. This is not necessarily a bad thing – as noted earlier Licence Conditions tend to be broadly defined and tend to come into play if there is an issue – it can be difficult and time consuming to actively 'prove' ongoing compliance. It is understood that ORR will be reviewing its approach to Licence Compliance and how it works with National Highways in this area. As input into this forthcoming review, we would note that for areas of particular interest such as having a WLC approach, the absence of ongoing discussions can cause challenges in terms of:
    - Understanding the definition or meaning attached to the Condition; and

- Whether there is a strong focus by National Highways on this area.

- The operation of the RIS process also appears to reduce an emphasis on WLC optioneering. There appears to be no expectation of comprehensive analysis of different intervention strategies and associated debate about the benefits of each one, and it is not part of the explicit role of the ORR efficiency review to assess the robustness of WLC modelling undertaken by National Highways.

It is a challenge across all regulated sectors to draw the link between current interventions and spend, and the longer-term asset health. In sectors dominated by government owned companies this is to protect tax-payer funding and improve service quality. Where private sector operators are involved, this is more driven by a concern about taking excess profits instead of doing the necessary asset interventions - the long-term impacts can be difficult to spot in the short-term.

In a wider regulated sector context, no single KPI has been devised to capture this impact, so infrastructure managers and regulators have typically used trend analysis to capture the effects. The Composite Sustainability Index developed by ORR and Network Rail is one example that seeks to combine performance across several asset types and shows the percentage change on a rolling-year basis so is attempting to capture the trend analysis point[12].

More generally, WLC decision-making is not incentivised as an output in itself. It is seen as an input and 'check' on whether companies are doing the right things. This can help provide balance to assessment of KPIs or outputs – if the inputs are sound but KPI performance is declining then it might be that there are external factors beyond management control that are responsible.

A rare example is the HS1 Ltd case – where an explicit long-term focus is required – which creates other challenges and difficulties about how this is operationalised in practice.

In the main, regulators and companies tend to use a range of input measures such as asset management maturity and an evaluation of the modelling approach as embedded within the asset management system.

3.4 Conclusions

Each of the elements of WLC decision-making are at a relatively early stage of development in National Highways – reflecting the recent transition from an annual cash-budget to the five-yearly RIS budget-setting process, a developing organisation and lower asset management maturity in some asset classes. National Highways has comprehensive and ambitious plans in place to address all the key elements.

Modelling capability seems to be particularly key to the end goals and to foster the discussions around options and this needs to be a focus for National Highways as it prepares its renewals plans for RIS3.

It is hard to incentivise any of these things individually, though they all come under the auspices of improving asset management maturity. The key then is how the detailed transformation process happens and what is prioritised, and what approach is taken.

National Highways' current approach to WLC and commitment to improve all elements appears to be driven by more fundamental factors like the role and requirements as steward of the SRN, rather than explicitly around the Licence Condition. There is not necessarily any conflict between these two factors.

[12] See the detailed explanation: https://www.orr.gov.uk/sites/default/files/2021-03/measurement-methodologies-of-Infrastructure-asset-health-issue-1.pdf

The current framework doesn't appear to have any major issues or particularly perverse incentives. But clearly some impacts at the margin that don't appear to support WLC decision-making do risk being counterproductive. Particularly given the effort that naturally goes into delivering the KPIs which are the formal means by which National Highways achieves success and is monitored by ORR. This includes the efficiency KPI, though it is noted that any downside needs to be weighed against the benefit of the KPI design and whether there are other means of achieving the desired outputs without wholesale change to the KPI framework.

Of more importance seems to be the absence of any regular and formal dialogue between ORR and National Highways around the WLC Licence Condition and the evidence to support this. And the way the RIS process works in practice does not seem to give significant weight to discussing the WLC consequences of different options for asset interventions. The WICS process shows how this can be better demonstrated.

4 Findings and recommendations

4.1 Findings

We have captured our findings under three headings:

- **High-level WLC definition** – this looks at how WLC is viewed and embedded at the strategic level
- **National Highways WLC approach and planned action** – how National Highways is already undertaking decisions to minimise WLC, and the extent of plans for change into the future
- **Impact of performance specification & Monitoring regime** – the extent to which observed actions can be linked to the performance specification

High-Level WLC Definition

- WLC isn't a term that is in common usage, except perhaps for asset management practitioners, and is not directly a key driver of strategic decision-making.
- Given the wide range of ways in which it can be defined, it is unsurprisingly taken to mean different things to different people
- There is a sense that WLC is used quite broadly – for example in terms of 'long-term asset stewardship' rather than a focus on calculating how asset interventions impact on costs over time and how the costs / impacts of different decisions can be compared
- This includes a concern for long-term sustainability of the supply chain and a degree of consistency in approach to renewals. This is of course one of the key rationales for the establishment of Highways England (as it was then) and the associated changes to industry structure.
- An explicit definition of what is or should be included in 'cost' is not a current point of focus. This contrasts with other industries at a more mature point in their regulatory development where there is an active debate about how cost can go beyond narrow financial measures to incorporate (for example) carbon etc.

National Highways WLC Approach and Planned Actions

- WLC decision making forms part of the wider asset management transformation programme being governed by AM Steering group a subgroup of the exec, led by SES and delivered across the company. It also aligns with Operational Excellence (OE) 2025 and HE2025 which is the internal organisation plan.
- The asset management transformation is an ambitious programme of work with excellent senior buy-in that seeks to fundamentally improve National Highways' asset management maturity / capability.
- A number of positive steps have already been made, including the creation of the virtual teams, and of course the existence of the programme itself
- In keeping with the strategic outlook on WLC, there is limited detail on how WLC is to be defined and embedded in National Highways, but this is to be expected at this stage of the process. An initial taxonomy has been established by National Highways including

benefits/disbenefits and value for money, and an approach for communicating this and using it to develop a WLC approach for each asset class

- We understand that one of the benefits of the proposed transformation will be greater ability to define and test scenarios. The intention is that National Highways might be able to test – for example – the impact of different budget constraints. Also, and this is key to the WLC analysis, that National Highways will be undertaking risk modelling to link asset interventions (inputs) to the suite of outputs into the future, including the KPIs that form the backbone of the performance specification
- To provide more concrete assessment of how National Highways is implementing and delivering WLC decisions, we have sought to create a framework of what 'good' looks like. To start with we define WLC as acting in a way that minimises costs over the long-term and fully understanding the long-term implications of decisions. And more specifically in the case of renewals – renewing assets at the appropriate time/frequency and choosing an approach which minimises cost (subject to other constraints/considerations). This highlights some of the complexities:
    - What is meant by 'appropriate' depends on what the overall objectives are – the right interventions are the ones that best achieve the defined objectives.
    - The definition of these objectives might have many dimensions and are subject to important constraints such as availability (or not) of funding and deliverability.
- To meet this definition, we consider that good WLC decision-making would involve the following:
    - Clear decision-making processes resting on evidence-based analysis. Risk is identified and included as part of the process
    - Understanding of the key inputs to decision making. This will include asset criticality, condition, degradation curves, unit costs, etc.
    - Inputs are processed in a transparent and robust way to inform decision making. The analysis is proportionate and fit-for-purpose: neither too complicated, nor too simple
    - A continuous improvement cycle and feedback loop exists and is actively utilised to drive better decision-making over time and to review what inputs are required
    - There are tailored solutions rather than a one size fits all approach to the network
    - The cost trade-offs explicitly and effectively factor in network access and how to efficiently replace combinations of assets in an overall efficient manner (e.g. avoiding doing three separate projects on the same stretch of road in short succession but combining them). Note this is where the allocative efficiency aspects of asset planning also need the dynamic efficiency from good asset delivery, be that capital or operational interventions
    - Process and outputs can be monitored both quantitatively and qualitatively
    - Facilitating the achievement of efficiency over time. Good WLC decision-making at a point in time does not guarantee efficient outcomes as there are other factors that influence this. However, the intent is that fewer total resources are used over the longer-term and ultimately this is a test of quality of decision-making

Impact of Performance Specification and Monitoring Regime

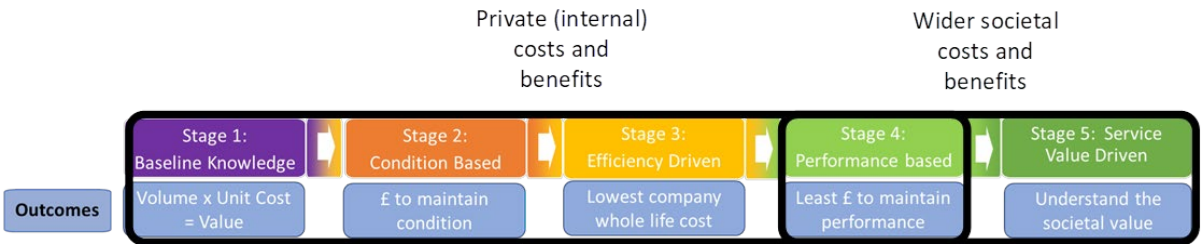
There is no evidence that current arrangements have had perverse incentives on renewals decisions. In principle / theory, it is certainly true that the specification of the efficiency KPI in terms of a five-year cash target could lead to a focus on short-term cost cutting.

However, we have not undertaken a detailed 'root and branch' review of how corporate incentives translate to local action. That is beyond the scope of this exercise.

For example, we understand that the Asset Management Transformation Programme is not driven by an explicit desire to better meet the WLC Licence Condition, but rather by a more fundamental connection with National Highways as an infrastructure delivery organisation managing assets of national importance.

There does not appear to be a 'magic bullet' of a KPI or set of KPIs to be introduced to accurately monitor the quality of WLC decision-making. Assessing the quality of WLC decision making at a point in time is of course complicated because it needs to consider the available information, the long-lived nature of the assets, and the wide range of explanatory factors for out-turn performance and asset condition. For example, Network Rail has developed a 'Composite Sustainability Index' which is intended to be a proxy for longer-term renewals investment decisions. There are pros and cons to this approach and whether it would be beneficial for such a measure in the National Highways context. Local highway authorities (LHAs) are required by DfT to take whole life costs into consideration when assessing options for maintenance, new and improved highway schemes.

Other sectors do monitor a wide range of inputs and outputs, including 'asset management maturity' to provide an insight into the quality of WLC decision-making. In contrast the WLC approach that National Highways is developing has some clarity around the inputs and outcomes of each maturity stage but does not appear to be aligned with an overall asset management maturity objective.



4.2 Recommendations

The following recommendations are addressed to ORR under the four themes of **WLC definition, monitoring, capability and enablers**. The timing of each recommendation should be considered as within the next 12 months unless specifically stated.

WLC Definition

Recommendation 1: ORR should engage with National Highways and DfT to review the how WLC is interpreted in practice. There are two key aims:

- A *common* interpretation is needed so that it is clear how compliance with Licence Condition is to be interpreted and evidenced during the RIS setting process; and
- A wider definition should be considered so that the Licence Condition is consistent with the strategic direction of National Highways and the targets that it has already set for itself such as net zero.

If there is an opportunity to review the wording of the Licence condition with National Highways and DfT then we recommend that the above suggestions should be considered.

As ORR ultimately enforces the Licence Conditions, it has a key role to play in the debate about exactly how wide the WLC definition is. The debate needs to include not only the regulatory perspective, but also to be cognisant of wider Government policy, and the nature of National Highways' commitments. Therefore ORR needs to contribute to the debate rather than unilaterally making a decision.

The corollary is that for the Monitoring framework to work properly, there needs to be a consistent and clearly agreed definition that all parties agree to.

There is a related activity to review whether 'Adopting a Whole-life cost approach to managing its assets' is the most appropriate term to use in engaging relevant stakeholders. While the concept is universally understood, the terminology tends to be used by either asset management or regulatory specialists and hence may be counterproductive. For example, 'long-term asset stewardship' might be more appropriate. This of course is only a starting point for discussion – whatever term is used then it is necessary to define what is meant and outline expectations of what this means in practice.

It is largely a role for DfT, but ORR can also usefully help in checking whether the interpretation of the existing Licence Condition remains appropriate and fit-for-purpose when considering these discussions. It seems likely that the Licence Condition will still work, but what is required is more explanation of the interpretation.

Monitoring

Recommendation 2: While a new KPI is not necessary, it is in keeping with the fundamental importance of a WLC approach to achieving the strategic aims of National Highways that monitoring this is given more focus by ORR. ORR should implement this via a number of complementary actions:

2a. As a matter of process, ORR should formally engage with National Highways on a regular basis to discuss how compliance with the Licence Condition is interpreted and how compliance is evidenced. This should draw on the internal National Highways licence compliance process.

2b. Given National Highways has already committed to a substantial and comprehensive plan to improve its WLC approach capabilities, ORR should continue to monitor whether these plans are being implemented – subject of course to any appropriate change control. This includes:

- Whether National Highways is meeting its Asset Management Transformation Programme (AMTP) targets and outcomes (subject to appropriate change control)
- Are they meeting their renewals investment planning maturity road map milestones including the stage gateway acceptance criteria?
- Is renewals investment planning improving over time?
- Does renewals investment planning reflect an appropriate WLC modelling approach and set out options to be evaluated? ORR should be clear about the scenarios that it would expect to see modelled – for example different funding availability over time. This needs to take account of the views of stakeholders through Transport Focus.

2c. ORR should also monitor a range of asset health measures for the SRN, paying particular attention to the trend in such measures over time, rather than the particular value of the measure at a point in time. These measures would usefully include, but not be limited to, the following:

- Similar to the 'Composite Sustainability Index' developed by Network Rail

- Monitoring whether National Highways is delivering the planned renewals or has a good WLC approach basis for varying its plans. We understand that separate discussions are ongoing between ORR and National Highways about how to best capture this reporting.
- Any other balanced scorecard approach that might be developed by National Highways.

WLC decision-making is extremely important for National Highways to focus on, particularly given a long history of making do with annual budgets, and the cultural change required to take a longer-term view. This importance is reflected in the decision to explicitly include this within the Licence Conditions.

While it is important, WLC is effectively an input and tool into the renewals planning process rather than an output. This means that it would not be appropriate to include a specific KPI, but there should be increased monitoring. Generally there has been limited interaction between ORR and National Highways to-date on this subject, and it should be an area of focus going forward.

It is inherently difficult to undertake an ex-post assessment of WLC decisions. These decisions are taken at a point in time with available information, and the results will not be seen until the longer-term (20-30+ years) at which point there are many factors that might explain the outcome. Therefore ORR should monitor using a range of measures that gauge the quality and extent of inputs to asset management decision-making. The National Highways AMTP is an excellent starting point, as it covers the desired WLC approach as well as many other aspects of asset management.

The AMTP will continue to evolve and become more targeted / specific. ORR should contribute to the discussion by highlighting its own view of the priorities for development – linked to its interpretation of the Licence Condition.

A particular area for improvement within National Highways is in terms of its modelling capability, and this should be monitored via the assessments included in the Asset Class Strategies.

The range of measures set out above need to be taken together and interpreted as a whole. While it is not critical that all measures be used, this will give the best holistic view.

Capability

Recommendation 3: ORR should enhance its capability to undertake the above monitoring and understand the implications of wider definitions of WLC decision-making that cover societal outcomes. A member of the ORR team should be given responsibility for leading on this area – and given the lack of current resource and such a role, consideration should be given to creating a role within the team.

This is a specialist and evolving area, where the Highways Monitor plays a key role in providing independent challenge and monitoring (and if required, enforcement) of the actions taken by National Highways. It is not clear that ORR has a post or the resource to fully cover this area. As with National Highways, ongoing appreciation of WLC principles of all ORR staff is important in achieving good monitoring behaviours.

Recommendation 4: ORR should continue to engage with other infrastructure regulators during RIS2 and as part of the RIS3 setting process to understand their future intent with WLC and society commitments and to understand the impacts of their WLC approaches.

This is broadly part of good regulatory practice, so in a sense it doesn't need a specific recommendation. However, given the importance of this topic and the likelihood that it will quite significantly change behaviours and optimal decision-making, it is important to keep abreast of the

subject matter and continue to learn from other sector experience. This should include other highway authorities within the UK and internationally.

Enablers / wider recommendations

Recommendation 5: ORR should discuss with DfT and National Highways the granularity of evidence required during the RIS setting process and provide guidance about the ORR expectations for RIS3 so that:

- During the RIS3 setting, National Highways provides case studies and scenario modelling for a range of WLC options and outcomes. This needs to be provided in a sequential approach that engages ORR and takes them through the process so that ORR has opportunity for early comment and guidance
- The assessment of WLC scenarios should be part of the ORR efficiency review

This would greatly aid and incentivise the appropriate behaviours from National Highways and assist with the necessary cultural change. It would also help develop the transparent and rigorous options analysis for renewals that is currently missing. This is of particular interest for RIS3 given the likely financial constraints but is more generally applicable as there will always be a different emphasis or emerging issues that need to be addressed. Note that National Highways' RIS3 process and mechanisms for agreeing and provision of information as evidence is already in place and defined. Note also that National Highways will consider WLC alongside affordability and disruption in RIS setting.

Recommendation 6: ORR should contribute to future reviews of the KPIs to consider whether there can be an increased emphasis on longer-term outcomes rather than the shorter five-year horizon. In particular, the efficiency KPI should encourage a focus on the use of resources over the longer term, and methods to allow re-allocation of between funding categories where this can be justified on a WLC approach basis. While this is difficult to do, options such as using a 'percentage' efficiency target rather than a cash amount should be explored. Further, ORR should work with National Highways to explore and quantify the impact of other KPIs such as Network Availability and Pavement Condition in terms of whether they undermine a WLC approach.

We have not seen any evidence of any major perverse incentives within the monitoring / performance specification framework that work to reduce the focus on WLC decision-making. However, the measures are unlikely to **actively incentivise** WLC decision-making. This can be seen in the EIMM framework and the approach to measuring efficiency which seems likely to increase a focus on delivering volumes rather than considering what the best long-term decision might be. Of course these two things are not necessarily different, but currently there is limited ability to evaluate the implications. Whole Life Cost efficiency is clearly stated as a category in Measured Efficiency in the EIMM.

The downsides of these measures should be considered along-side their benefits in any ongoing review by DfT and National Highways. It may be possible that some of the downsides could be addressed without fundamentally changing the performance specification – for example there could be a pot of money to fund 'WLC improvements' if it becomes apparent that a capex investment would be better given longer-term Opex reductions; and/or this could be more widely emphasised and put into practice by National Highways.

The planned development of modelling capability by National Highways and the ability to better understand the trade-offs between achieving KPIs will be important inputs to this analysis. This should also take account of Transport Focus user views.

Annex A – Case-study – water sector England & Wales

Whole life costs came to the fore in the water sector's approach to asset management planning because of fallout from the 1999 price review. The Environmental Audit Committee criticised Ofwat's PR99 approach to assessing capital maintenance investment needs as "not logical or acceptable" and amounted to "intellectual neglect". In response, Ofwat issued its highly influential letter to Managing Directors, MD161(April 2000), where it stated:

> *"Each company needs to demonstrate how the flow of services to customers can be maintained at least cost in terms of both capital maintenance and operating expenditure, recognising the trade off between cost and risk, whilst ensuring compliance with statutory duties. Appraisals of capital maintenance, operating expenditure and risk can be compared using discounted cash flows.*
>
> *All such appraisals would need to be set in the context of the framework of maintaining serviceability to customers. Such an approach should have been used to justify the future levels of capital maintenance included in the [PR99] business plans.*
>
> *It would have been helpful to include commentary on the material elements of the economic appraisals undertaken such as the:*
>
> - *cost of any potential loss of serviceability to customers, including consideration of risk scenarios and their probabilities as well as illustrations of how serviceability to customers would decline, if the activity was not undertaken;*
> - *impact on operating costs of capital maintenance activity, before and after assets are renewed;*
> - *circumstances surrounding the timing of asset replacement;*
> - *impact of obsolescence and new lower cost technology;*
> - *any terminal values and the discount rates assumed."*

MD161 led directly to the sector collaboratively developing these elements into an agreed methodology – UKWIR's 'Common Framework' (2002) and updated 'Framework for Expenditure Decision Making' (2014). Ofwat's subsequent guidance to its Reporters (e.g. for efficiency assessments) and in its Regulatory Accounting Guidelines also explicitly refers to whole life costs in assessing intervention options.

In its PR09 methodology ('Setting price limits for 2010-15: Framework and approach'), Ofwat stated that:

> *"We expect each company to adopt sound practices in long-term asset management planning in line with the… common framework. This requires the use of forward-looking risk-based techniques for asset management planning which rely on the best available data on assets, asset deterioration through time and related service impacts… We expect each company to:*
>
> - *demonstrate that it has considered the probability and service consequences of asset failures;*
> - *use a modelling approach, wherever possible, to reduce sole reliance on expert judgement;*
> - *take account of long-term influences on service and asset performance, such as climate change, making use of the best available evidence;*
> - *consider a wide range of potential interventions to maintain serviceability; and*

- *demonstrate that its analysis takes account of 'whole life costs', including the cost of carbon, and interactions with operating strategies and investments in service improvements."*

UKWIR's 2012 'When to Repair, Refurbish or Replace" (12/RG/05/32) provided a definition as "Whole Life Costing involves looking at all of the costs and benefits over a defined period to work out the overall lifecycle costs of assets, taking into consideration repeat investments, opex implications of capex, etc. Net Present Value calculations are used to assess whole life costs, as it is important to ensure that costs are discounted and summed."

The notion of 'asset stewardship' as a term arose in the early 2000s, again responding to perceived deficits in capital maintenance investment. Originally framed as maintaining asset condition in a stable state, this has morphed over the last 7-8 years into 'asset health'. Halcrow's (2017) Targeted Review of Asset Health, commissioned by Ofwat, notes that "Most companies have working definitions of asset health and some used alternative terms e.g. 'asset stewardship' (Northumbrian Water); 'asset service and reliability' (Yorkshire Water). Asset health is an attribute that is difficult to measure specifically and therefore needs to be inferred from relevant indicators".

'Asset health' has strong similarities to Ofwat's serviceability concept, developed in the late 1990s and through to 2014. Compare Ofwat's 2021Asset Management Maturity Assessment lexicon definition that "Asset health is an indicator of a company's ability to continue to perform its functions for the benefit of customers, the environment and wider society now and in the future." with "'Serviceability' is the capability of a system of assets to deliver a reference level of service to customers and to the environment now and into the future." (Ofwat RD15/06, 2006).

Historically, Ofwat's assessments barred a company whose serviceability status was worse than 'Stable' from being an efficiency benchmark. This is in marked contrast to its PR19 approach where upper quartile targets for performance and costs were assessed separately, a point which was commented on extensively in the CMA referrals process and which Ofwat has acknowledged in its PR24 methodology ("We could be clearer about our expectations for the common performance commitment levels that could be achieved given base costs in advance of the price review.").

Identifying & planning renewals: for nearly two decades, the water sector has applied the 2002 Common Framework and its 2014 update, the Framework for Expenditure Decision Making, as the basis for its identification of risks and interventions, and the development of a plan where interventions are optimised in portfolios. Ofwat's PR09 methodology excerpt above is probably the most succinct summary of the process by which water companies approach their planning, in combination with Ofwat's further requirement in the PR09 methodology that:

> *"A company… should include the value placed by consumers on relevant service attributes, and any associated social and environmental impacts. This methodology encourages a sustainable approach towards maintaining base service."*

The role of wider value in decision making has grown and become better articulated in this same period, with the current 'state of the art' being to apply 6 Capitals-based value frameworks in decision support tools.

Delivering renewals: while planning of expenditure (including renewals) has become reasonably sophisticated in the sector, there is scope to improve the basis for delivery and how this integrates with whole life value-based planning. This was highlighted in Ofwat's 2021 AMMA, notably in the areas of how benefits realisation is largely absent and this being a key enabler of adaptive planning. There is some evidence that the Ofwat ODI incentives regime is having the desired effect of focussing delivery effort on service performance but note that this is considering whole life costs, carbon or value.