

HIGHWAYS ENGLAND AND ORR

Review of Highways England's Ability to
Improve Efficiency from its Asset Management
Capability

Final Report

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EXECUTIVE SUMMARY

As part of the development of the Road Investment Strategy 2 (RIS2) Highways England and the Office of Rail and Road (ORR) have agreed to jointly assess three business process areas to understand potential efficiencies for Highways England during Road Period 2. The identified efficiency areas are:

- 1) Portfolio and programme management;
- 2) Asset Management; and
- 3) Procurement and contract management.

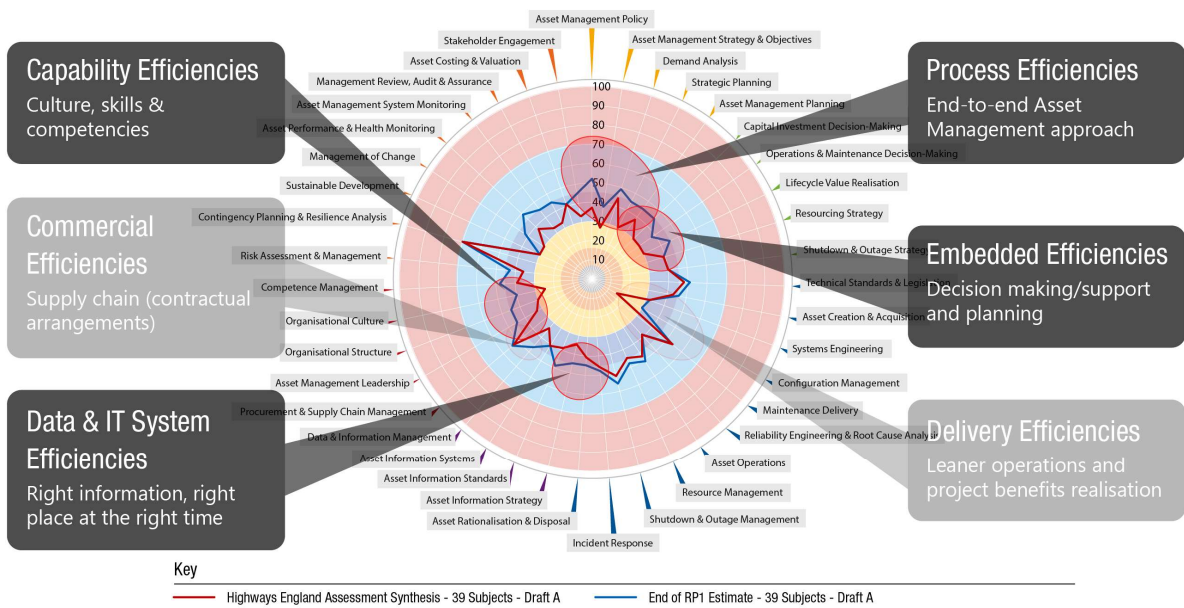
AMCL (Asset Management Consulting Limited) was commissioned to undertake the review of Asset Management efficiencies. There were three main scope elements to the project.

- 1) A synthesis of recent assessments undertaken by other organisations of Highways England's Asset Management capability;
- 2) Establishing an improvement trajectory for Highways England's Asset Management capability to the end of RP2; and
- 3) Estimating the scope for efficiencies resulting from these improvements during RP2.

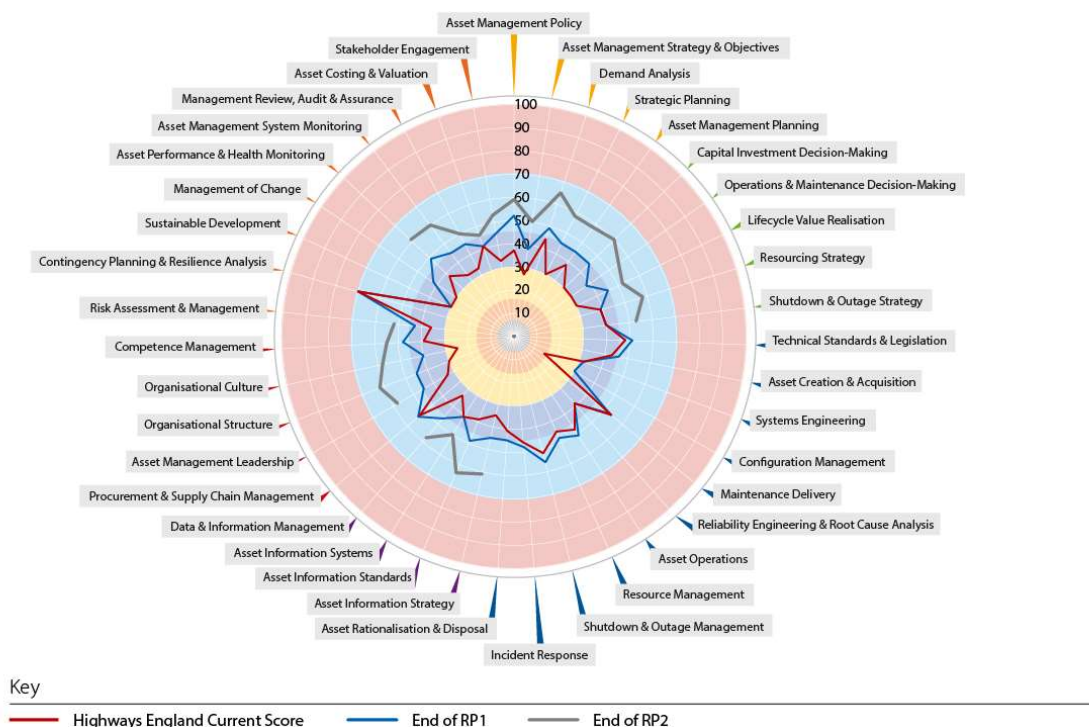
The AMCL Asset Management Excellence Model™ (AMEM) was a central tool in the applied methodology. The AMEM enables organisations to assess their Asset Management capability maturity and benchmark it against world best practice, if required. It is built around the '39 Subjects' which span the range of technical, organisational and human capabilities needed to achieve world-class Asset Management. These subjects are divided into six Groups and are aligned with the second edition of the 'Asset Management Landscape' agreed by the Global Forum for Maintenance & Asset Management (GFMAM). The AMEM tests the existence, completeness, effectiveness and integration of these subjects and is applicable to any asset intensive organisation, including those in highly regulated environments.

The AMEM was used to transpose the results of the third-party reviews of Highways England's Asset Management capability to a common good practice Asset Management capability assessment tool for the synthesis stage. It was also then used to provide a consistent and transparent approach for building on the synthesis to estimate Highways England's position at the end of RP1, define the proposed position at the end of RP2 and the detailed roadmap to underpin this. The following chart shows the results of:

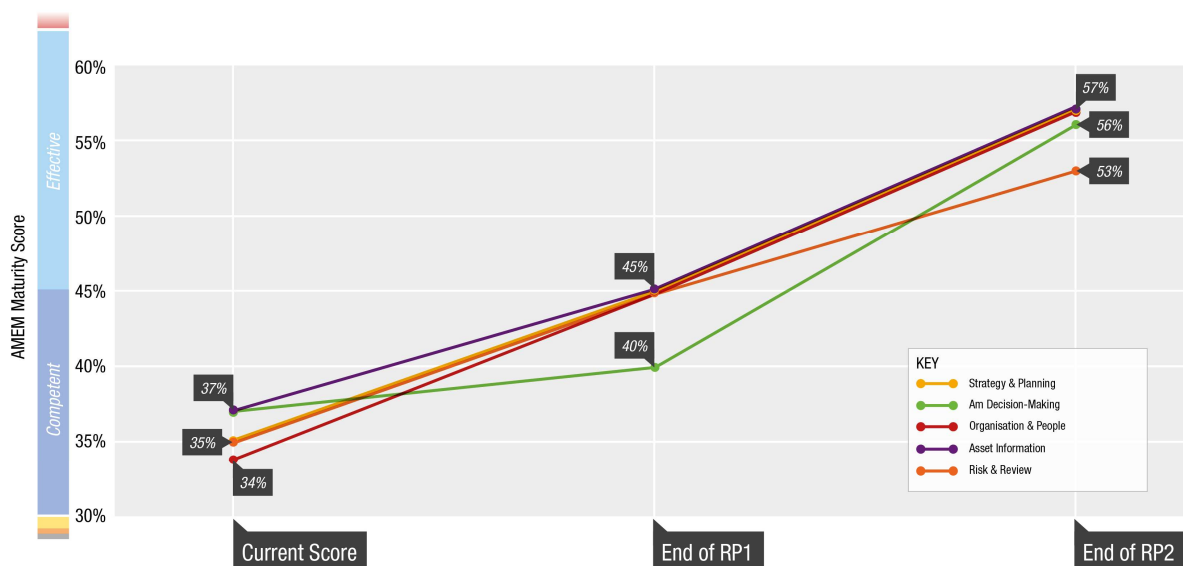
- The synthesis of recent third-party assessments to establish the current position. Shown by the red line, this shows Highways England's current Asset Management maturity to be largely in the 'Competent' maturity band (30%-45%).
- A review of available Highways England plans to estimate the end of RP1 position. Shown by the blue line, this shows an anticipated increase from Highways England's current maturity scores to approximately 40%-45% at the end of RP1.
- Identification of the priority areas (shown in dark grey) for Asset Management efficiency, agreed by Highways England and the ORR, considering the other ongoing reviews.



Based on the prioritised focus, AMCL took a bottom-up approach to establish challenging but realistic proposed Asset Management capability targets for Highways England at the end of RP2 across the relevant sub-set of the 39 Subjects. This was supported by the development of a detailed roadmap based on the typical activities that other asset intensive businesses have undertaken to achieve these capability levels and realise the related benefits. The roadmap therefore contains AMCL’s view on the individual improvement activities required to achieve the proposed end of RP2 position. Note that the provided roadmap is just one potential approach to attaining the proposed position at the end of RP2. Specific improvement requirements will vary based on Highways England’s actual efficiency targets and delivery plans.



The proposed Subject-level scores and targets have also been aggregated and presented as Group-level trajectories for Highways England, as shown below. These show how Highways England's anticipated Asset Management capability maturity develops from the current position, through to the end of RP1 and the end of RP2.

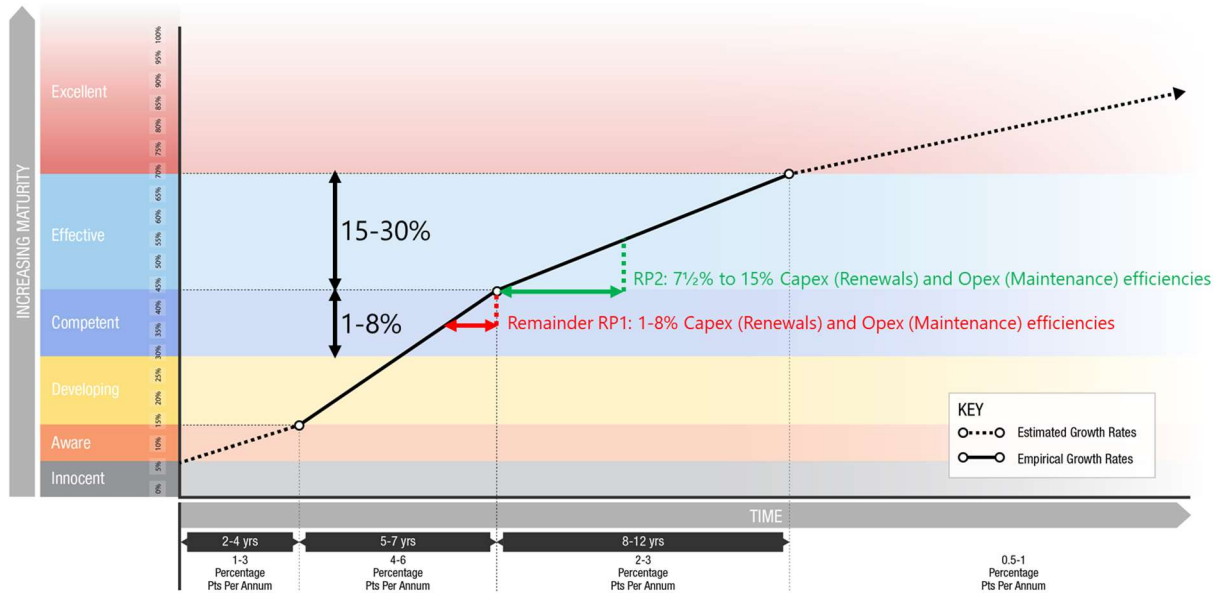


Five of the six Subject Groups are represented. Highways England's trajectories move from a current position of between 34%-37% to between 53%-57% at the end of RP2. This level of improvement is consistent with the rate of change in Asset Management maturity delivered by other global asset intensive businesses. Whilst the absolute score from the maturity percentage scale is not a goal in its own right, these improvements in Asset Management maturity have been used to derive the proposed efficiencies that could be delivered through RP2. These efficiencies are subject to a number of assumptions and known constraints, including Highways England's actual starting point and funding.

The derivation of the proposed efficiencies has been undertaken by examining the benefits achieved by other asset intensive organisations globally and understanding the Asset Management maturity of these organisations that enabled these benefits to be delivered. This was combined with the outputs from a study from the Institute of Asset Management (IAM) which examined the benefits of putting in place an effective Asset Management System. The findings from the IAM study found that organisations delivered benefits of between 1% and 8% of total expenditure from implementing an Asset Management System that is aligned with ISO 55001. This is represented by the black arrow moving through the 'Competent' maturity band on the diagram overleaf. The study of other asset intensive organisations globally found that significantly greater benefits can be delivered through further improvements in maturity by leveraging the Asset Management System to make better Asset Management decisions. This was found to be between 15% and 30% for each of Capex (renewals) and Opex (maintenance) over approximately 5 years. This is represented by the black arrow moving through the 'Effective' maturity band in the diagram below.

Our assessment is that Highways England will have achieved a level of maturity consistent with the top of the 'Competent' band by the end of RP1 and in doing so should deliver the associated benefits, although there may be some lag in evidencing these. We have also assessed that Highways England could achieve a level of maturity consistent with approximately half-way through the 'Effective' band by the end of RP2. The estimated benefits that can be delivered by Highways England in RP2 through better Asset Management decision-making has been taken as 50% of the available benefit across the 'Effective' band, namely 7.5% to 15% of Capex (renewals) and Opex (maintenance). The available

benefit is a relative percentage that has been based on comparator analysis and in absolute terms will vary depending on the available funding at the point these efficiencies are agreed.



It should be noted that there is no definitive way of calculating available efficiencies, but this approach provides a substantive guide, using evidence based efficiency ranges and is consistent with AMCL’s experience worldwide. It should also be noted that Highways England’s starting position on the generic improvement trajectory has been estimated based on the evidence made available.

Based on the findings of this review, AMCL recommends that Highways England, in consultation and agreement where required with the ORR, should:

- 1) Validate the Asset Management capability starting point, improvement trajectories, targets and efficiencies proposed in this report against their own experience, visions and plans for Asset Management capability improvements at Highways England.
- 2) Agree RP2 Asset Management efficiency definitions and targets considering the outputs of this project and the other reviews relating to ‘Portfolio and programme management’ and ‘Procurement and contract management’ to assure no double-counting.
- 3) Define an achievable and realistic delivery programme to implement the Asset Management capability improvements necessary to deliver the agreed efficiencies, including timescales, resources, responsibilities and constraints.
- 4) Set out a sequence of regular Asset Management capability review points, through to the end of RP2, to provide assurance of progress against trajectories and achievement of targets. These reviews should typically be undertaken every one to two years.

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1. BACKGROUND & PURPOSE

1.1 BACKGROUND

Highways England is responsible for operating, maintaining and improving England's strategic road network, comprising 4,400 miles of motorways and main A-roads.

At the time of writing work is underway within Government on the second Road Investment Strategy (RIS2). RIS2 will set out the performance requirements and funding for Highways England during Road Period 2 (RP2), the five-year period from April 2020 to March 2025.

The development of RIS2 requires the coordinated efforts of the Department for Transport, Highways England and the Office of Rail and Road (ORR), with each organisation having responsibility for leading relevant work streams. Highways England is responsible for developing a strategic business plan (SBP) detailing its plans for delivering the performance requirements set out in the Government's draft Road Investment Strategy. ORR is responsible for leading the RIS2 efficiency review, an assessment of the level of efficiency that Highways England proposes to achieve in the SBP.

A core part of the work to develop Highways England's SBP and ORR's RIS2 efficiency review is the assessment of Highways England's ability to make efficiencies from improvements to its core business processes during Road Period 2. Highways England and ORR have agreed to jointly assess three business processes:

- 1) Portfolio and programme management;
- 2) Asset Management; and
- 3) Procurement and contract management.

AMCL (Asset Management Consulting Limited) was commissioned, by both the ORR and Highways England, to complete the review of Asset Management efficiencies.

1.2 OBJECTIVES & SCOPE

The objective of this project was to determine the efficiency improvements that Highways England should be capable of making through improvements to the way that the company manages its assets on the strategic road network during RP2.

There were three main scope elements to this project.

- 1) A synthesis of recent assessments undertaken by other organisations of Highways England's Asset Management capability;
- 2) Establishing an improvement trajectory for Highways England's Asset Management capability to the end of RP2; and,
- 3) Estimating the scope for efficiencies resulting from these improvements during RP2.

1.3 PURPOSE OF DOCUMENT

This document summarises AMCL's approach, findings and recommendations following completion of the ORR and Highways England defined project.

2. METHODOLOGY

2.1 OVERVIEW

The overall methodology for the project is summarised below. Further details of the approach adopted are provided in the relevant sections of this document.

- 1) Project Inception
 - 1.1) Engagement and Preparation
 - 1.2) Mobilisation Workshop
- 2) Synthesis of Recent Assessments of Highways England's Asset Management Capability
 - 2.1) Documentation Review
 - 2.2) Population of AMEM Model (Current Position)
 - 2.3) Clarification and Gap Filling Workshop
- 3) Establishment of Highways England's End of RP1 Asset Management Capability
 - 3.1) Review of Highways England's Existing Road Period 1 (RP1) Improvement Plans
 - 3.2) Clarification and Further Evidence Workshop
 - 3.3) Population of AMEM Model (End of RP1 Position)
- 4) Report on the Synthesis of Assessments, RP1 Improvement Plans and Highways England's Key Capability Improvement Areas
- 5) Proposed Position at End of RP2
 - 5.1) Determining the Desired Status of Asset Management Capability at the End of RP2
 - 5.2) Population of AMEM Model (End of RP2 Position)
 - 5.3) Establishment of Improvement Trajectories
 - 5.4) Development of Detailed Roadmap to achieve End of RP2 Position
- 6) Determine the Scope for Efficiencies from Improvements to Asset Management Capability
 - 6.1) Comparator Benefits Analysis
 - 6.2) Estimation of Asset Management Benefits Scope for Highways England
 - 6.3) Review of Proposed Efficiencies
- 7) Preparation of Report

2.2 CONSTRAINTS

The methodology undertaken was known to be constrained by several key factors:

- The synthesis of assessments was completed using only high-level third-party reports for specific delivery mechanism reviews or ISO55001 assessments, which were between 6 to 18-months old at the time of the synthesis work. See Section 3 for further details.
- AMCL was not commissioned to undertake any form of direct diagnostic of Highways England so our understanding of the organisation was limited to the above reports and further documentation provided.
- Available documentation for Highways England's intent for Asset Management capability improvements during the remainder of RP1 was limited to relatively high-level plans and dashboard reporting of the early stages of implementation at the time of the project.
- Specific time constraints were in place for completion of the project, based on the publication requirements of the ORR.

2.3 AMCL ASSET MANAGEMENT EXCELLENCE MODEL

The AMCL Asset Management Excellence Model™ (AMEM) was a central factor in the applied methodology. It was used to transpose the results of the third-party reviews of Highways England's Asset Management capability to a common good practice Asset Management capability assessment tool for the synthesis stage. It was also then used to provide a consistent and transparent approach for building on the synthesis to estimate Highways England's position at the end of RP1 and define the proposed position at the end of RP2, as well as the roadmap to achieve this.

The AMEM, which is shown in Figure 1, enables organisations to assess their Asset Management capability maturity and benchmark it against world best practice, if required. It is built around the '39 Subjects' which span the range of technical, organisational and human capabilities needed to achieve world-class Asset Management. These subjects are divided into six Groups and are aligned with the second edition of the 'Asset Management Landscape' agreed by the Global Forum for Maintenance & Asset Management (GFMAM). The AMEM tests the existence, completeness, effectiveness and integration of these subjects and is applicable to any asset intensive organisation, including those in highly regulated environments.

Organisations are scored against each of the 39 Subjects using a range of assessment criteria and questions. The scores are presented using the maturity scale shown in Figure 2 which in turn is aligned to the Asset Management maturity scale defined by the Institute of Asset Management. Improvement actions are identified based on the criticality of each subject to the organisation, the current scores for the assessment criteria that make up each subject, and the targets an organisation and its stakeholders wish to set themselves for each subject. AMEM results are used to identify and prioritise improvements based on where an organisation sits relative to world best practice, or defined benchmarks such as ISO 55001.

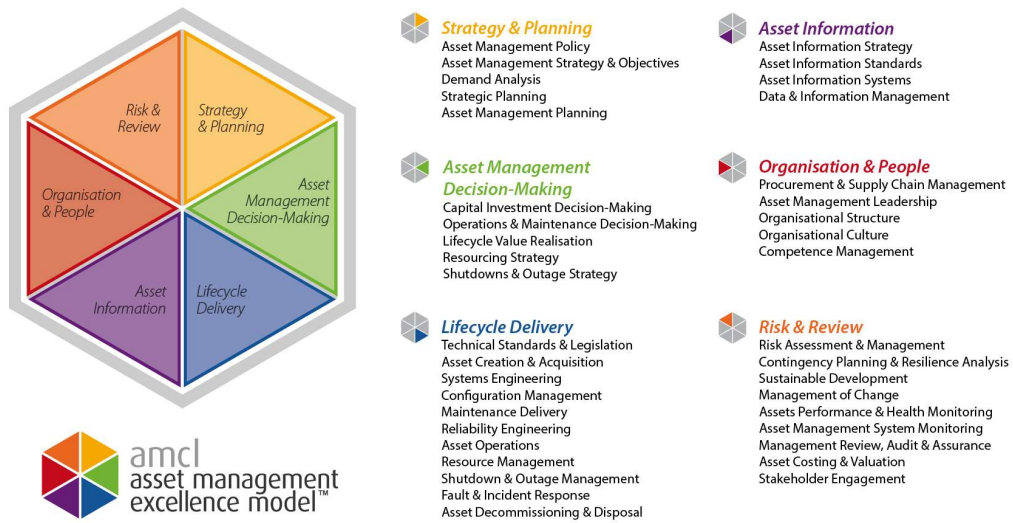
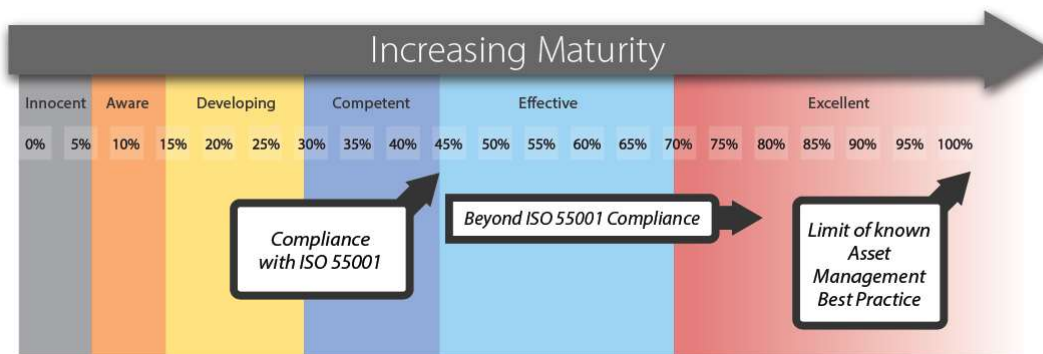


Figure 1 AMEM Groups and the 39 Subjects



The maturity scale has six maturity states as follows:

1	Innocent	The organisation is starting to <i>learn</i> about the importance of Asset Management activities
2	Aware	The organisation is aware of the importance of the Asset Management Activities and has started to <i>apply</i> this knowledge
3	Developing	The organisation is developing its Asset Management Activities and <i>embedding</i> them
4	Competent	The organisation's Asset Management Activities are developed, <i>embedded</i> and are becoming effective
5	Effective	The organisation's Asset Management Activities are fully effective and are being <i>integrated</i> throughout the business
6	Excellent	The organisation's Asset Management Activities are fully <i>integrated</i> and are being continuously improved to deliver <i>optimal</i> whole life value

Figure 2 Asset Management Maturity Scale

These scores are presented in the form of a 'spider chart', which can be formatted by ISO 55001 clause or by AMEM Subject, as shown in Figure 3 and Figure 4 below.

The AMEM contains the results of over 100 assessments of asset intensive organisations carried out globally and this will allow the Asset Management capability of Highways England to be benchmarked against equivalent organisations, if required in the future.

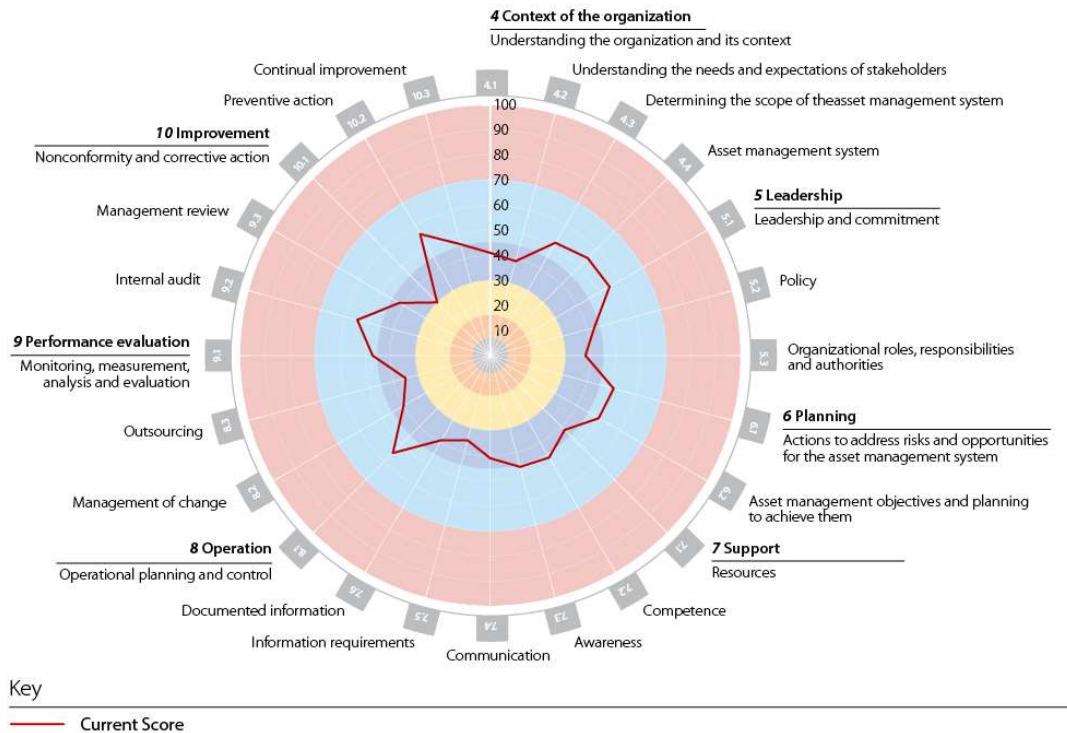


Figure 3 Typical ISO 55001 Assessment Output

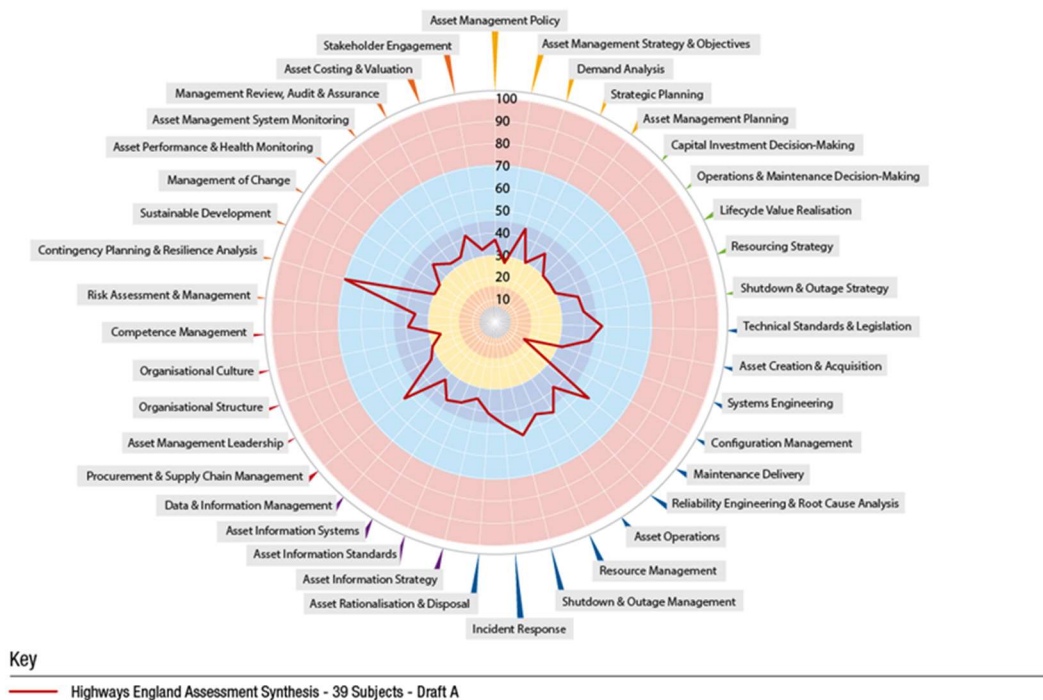


Figure 4 Typical 39 Subjects Assessment Output

3. SYNTHESIS OF RECENT ASSESSMENTS

3.1 APPROACH

AMCL was not remitted to undertake a further assessment of Highways England but to synthesise existing recent assessments to produce a consolidated measure of current Asset Management capability. The synthesis was undertaken using the AMEM and based on AMCL's review of the evidence available. It is considered to represent a high-level view, based on the findings of existing assessments, which is sufficient to support the identification of efficiency options.

The synthesis was created from the following independent third-party reports of recent Asset Management capability assessments of Highways England:

- The latest ISO 55000 review of Highways England's Asset Management capability carried out by Lloyds Register (March 2017);
- The previous ISO 55000 review of Highways England's Asset Management capability carried out by Lloyds Register (April 2016); and
- The in-depth review of Highways England's delivery of maintenance and renewals work carried out by KPMG (March 2017).

The reports above were focused on the ISO 550001 requirements for an Asset Management System and specific maintenance and renewals activities. They did not therefore assess the full scope of Asset Management defined by the internationally recognised 39 Subjects of Asset Management, as developed by the Global Forum for Maintenance and Asset Management (GFMAM) and the Institute of Asset Management (IAM). To complete the high-level synthesis of Highways England's Asset Management capability across the 39 Subjects of Asset Management AMCL undertook three further steps:

- 1) A review of available Highways England Asset Management documentation, such as the Strategic Business Plan, Asset Management Policy and Strategic Asset Management Plan;
- 2) A Clarification and Gap Filling workshop with relevant Highways England representatives, held on 27th July 2017; and
- 3) A review of documentation provided during and post the Clarification and Gap Filling Workshop.

3.2 RESULTS

The following two figures summarise the findings of the synthesis undertaken by AMCL using the evidence outlined above. The outputs are presented against both the Clauses of ISO 55001 (Figure 5), which focuses on the definition and implementation of an Asset Management System, and the 39 Subjects of Asset Management (Figure 6) which provides a broader and deeper view of Asset Management capability. Both outputs are simply different views of the same synthesis data captured in the AMEM to provide a common baseline.

Both outputs show Highways England's current Asset Management maturity to be largely in the 'Competent' maturity band (30%-45%). Some of the specific ISO55001 Clauses or Asset Management Subjects dip into the 'Developing' (15%-30%), or peak into the 'Effective' (45%-70%), maturity bands. In AMCL's experience this is entirely consistent with an asset intensive organisation which has initially

developed and is seeking to effectively implement a continually improving Asset Management System such as Highways England. Nominal compliance of an Asset Management System with the requirements of ISO 55001 is on or above the 45% level in the maturity scale.

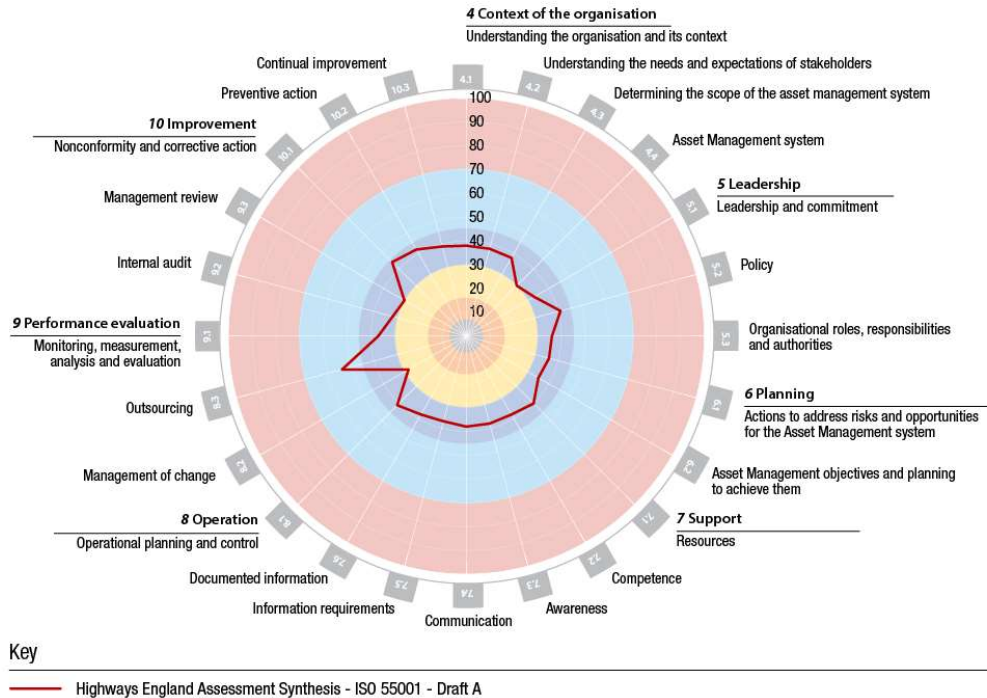


Figure 5 Synthesis of Recent Assessments – ISO55001

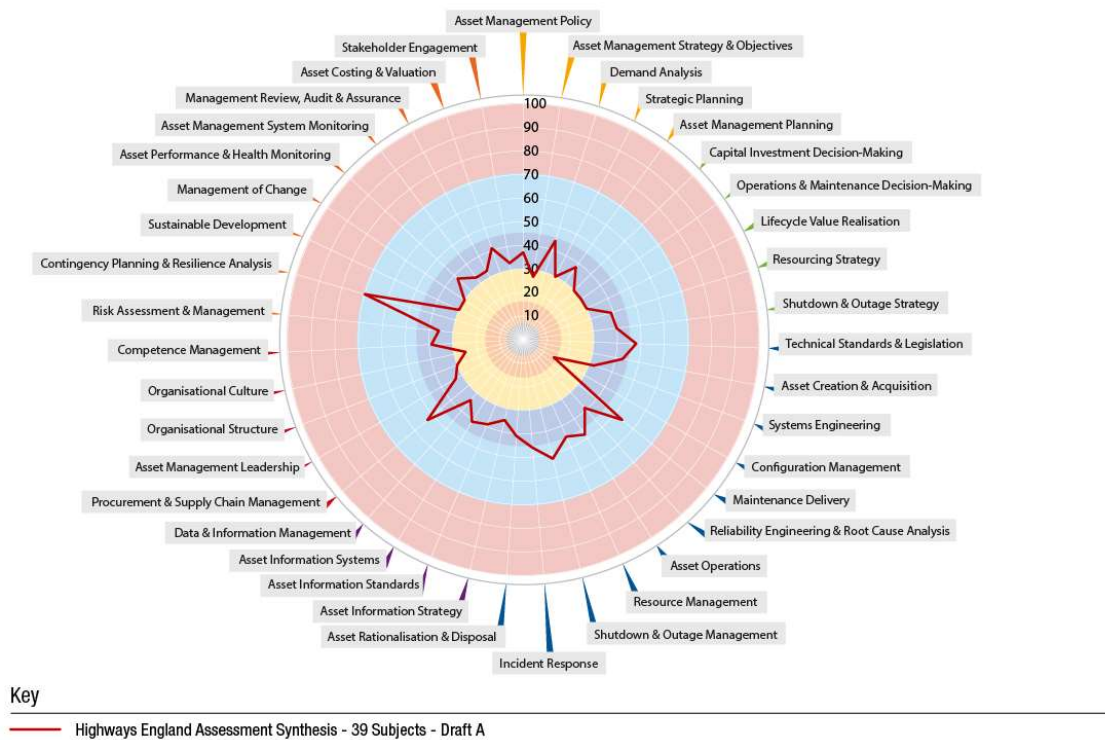


Figure 6 Synthesis of Recent Assessments – 39 Subjects

4. ESTIMATED POSITION AT END OF RP1

4.1 INTRODUCTION

Completion of the synthesis of recent assessments established a high-level view of Highways England's current Asset Management capability. However, the review of potential efficiencies in RP2 needed to take account of the likely Asset Management capability at the end of RP1. As this would be materially influenced by Highways England's ongoing Asset Management improvement initiatives a review was undertaken by AMCL of the available plans and progress to date.

4.2 DOCUMENTATION

AMCL's review to estimate Highways England's Asset Management capability at the end of RP1 focused on the following documents provided by Highways England:

- Asset Management Framework Delivery programme which sets out the short, medium and long-term objectives for Asset Management framework development between March 2016 to March 2020.
- Asset Management Programme Dashboard which provided high-level definition and progress monitoring of specific workstreams.
- Strategic Asset Management Plan which details the current state and target Highways Asset Management processes (HAPs) for Highways England.
- Co-ordinated Data Improvement Plan (CDIP), which is Highways England's overall plans for data improvement across the organisation.
- Asset Information Improvement Plan (AIIP), which sets out the asset information specific plans as part of the wider CDIP.

These documents were supported by the high-level plans in *Highways England 2020: Our Organisational Plan* (June 2017) and two key initiatives in particular:

- The Operational Excellence improvement initiative being defined and driven by the Operational Directorate within Highways England which included multiple elements of Asset Management within its scope; and
- The cross-Directorate Asset Management initiative focused on core Asset Management capability improvements across the organisation.

As each of these key initiatives were at relatively early stages of implementation the level of detailed information available from Highways England within the project timescales was limited. However, core definition of the Operational Excellence programme, structure and scope were provided as well as outline plans for the Asset Management Initiative.

4.3 RESULTS

The final estimate of Highways England's Asset Management capability at the end of RP1 is shown in Figure 7. Key increases in Asset Management capability are notable in the areas of Strategy & Planning (yellow subjects), the first three subjects of Asset Management Decision Making (green subjects), Asset Information (purple subjects), Organisation & People (red subjects) and some subject

in Risk & Review (orange subjects). AMCL considers that Highways England’s plans are well prioritised as these subjects are all key enablers or drivers of potential Asset Management efficiencies in RP2.

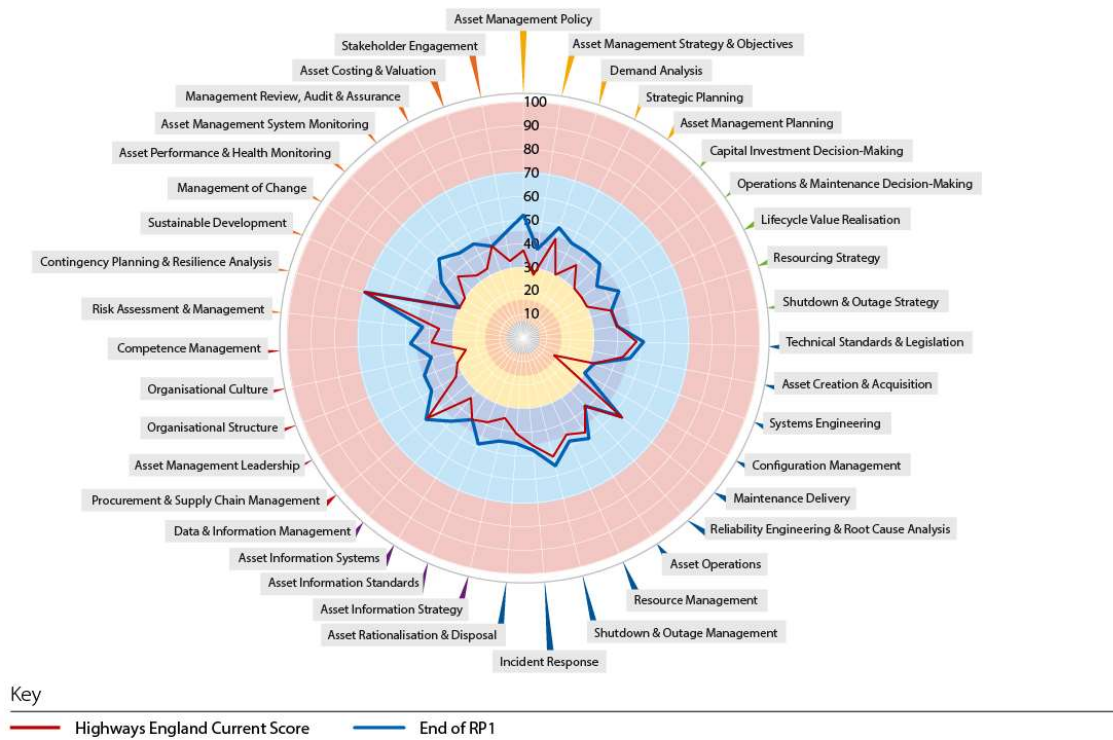


Figure 7 Revised Position at End of RP1 – 39 Subjects

5. KEY CAPABILITY IMPROVEMENT AREAS

Having identified the current and estimated end of RP1 positions for Highways England, AMCL used its increasing understanding of the organisation and its experience with other asset intensive businesses globally to identify key areas for capability improvement to enable efficiency gains during RP2. These are identified in Figure 8.

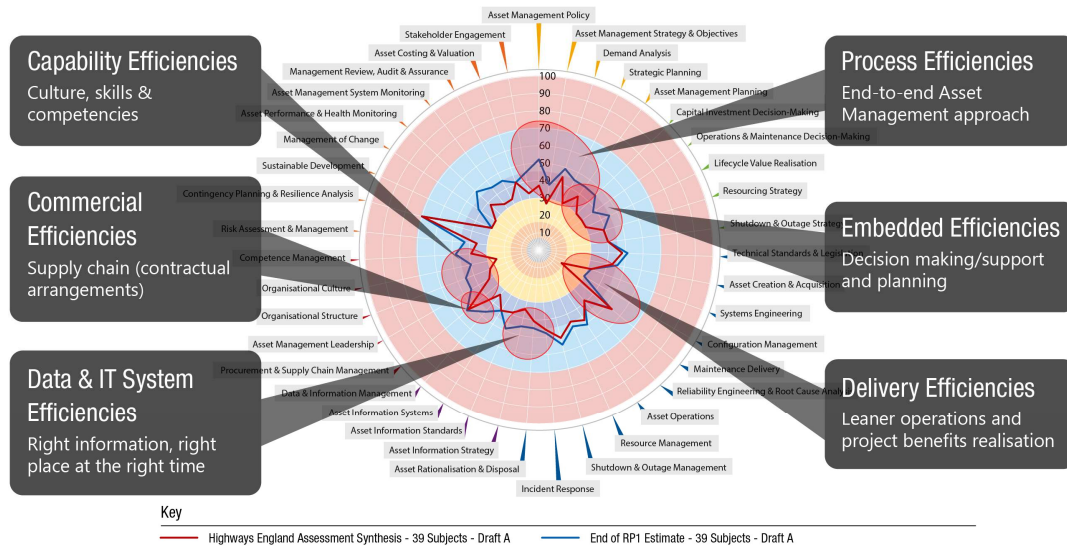


Figure 8 Potential Capability Improvement Areas Linked to Efficiencies

These opportunity areas were reviewed with both Highways England and ORR. Based on the ongoing work with other parties to review efficiency opportunities in Portfolio and Programme Management and Procurement and Contract Management (see Section 1.1) the scope of AMCL’s Asset Management capability and efficiencies review was prioritised as shown and defined by the darker call-out boxes in Figure 9.

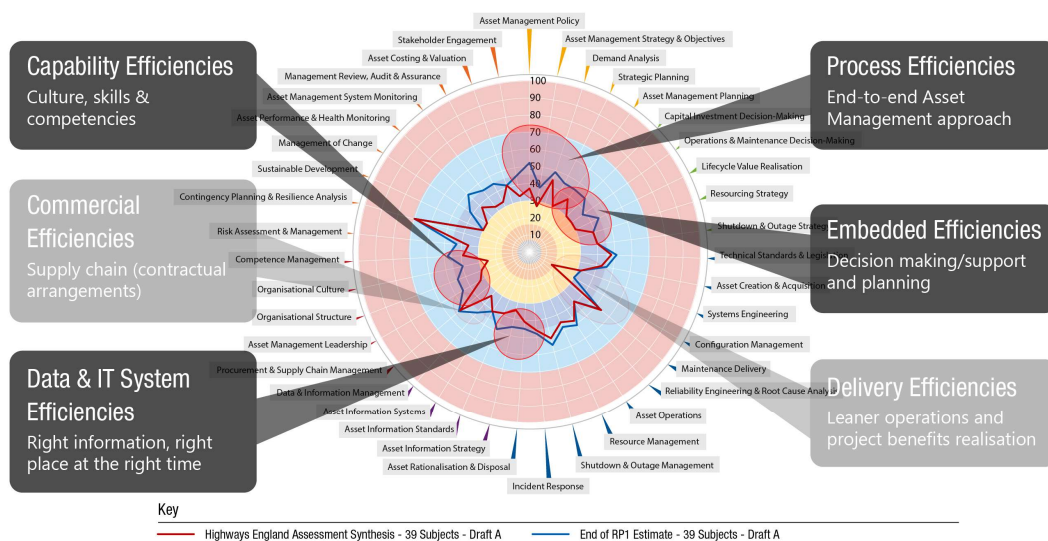


Figure 9 Prioritised Capability Improvement Areas Linked to Efficiencies

6. PROPOSED POSITION AT END OF RP2

6.1 PROPOSED HIGHWAYS ENGLAND END OF RP2 TARGETS

Based on the prioritised focus areas defined in Section 5, AMCL took a bottom-up approach to establish challenging but realistic proposed Asset Management capability targets for Highways England at the end of RP2.

The resulting Subject-by-Subject proposed targets for the end of RP2 are shown in Figure 10. As per Section 5, these results include the prioritised Subjects of Asset Management only, i.e. it does not include Procurement & Supply Chain or any of the Subjects in the Lifecycle Delivery Group.

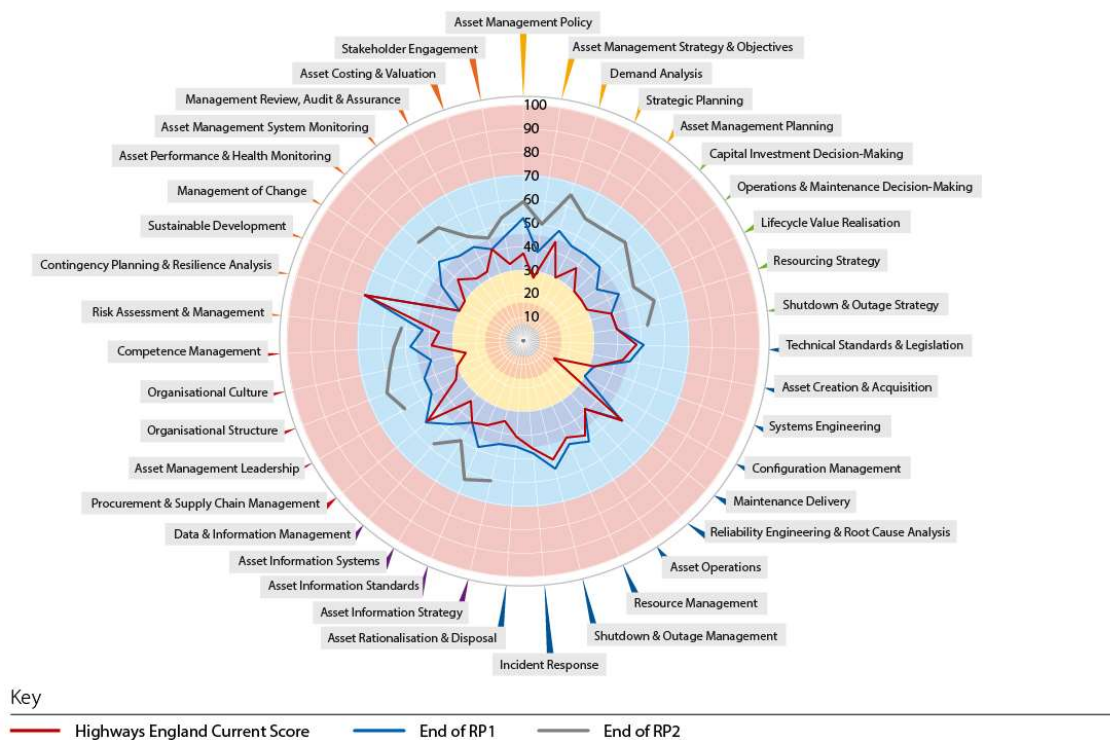


Figure 10 Proposed Highways England End of RP2 Targets

These proposed targets were defined through a full update of the AMEM scores based on several key factors:

- Highways England’s current Asset Management capability;
- Highways England’s estimated Asset Management capability at the end of RP1;
- Highways England’s Asset Management capability ‘momentum’ heading in to RP2 because of the above factors and current improvement plans;
- The timescales available for Highways England to further develop its Asset Management capability, i.e. the 5-years of RP2 to build on the end of RP1 position;

- Highways England’s priorities, as defined in the Highways England 2020: Our Organisational Plan document and the Operational Excellence initiative (see Section 7 for specific mapping of proposed improvements);
- Evidence of where hard efficiencies have been gained by other asset intensive organisations through Asset Management capability improvements and the timescales to achieve these benefits;
- Evidence of the necessary capability improvements to act as ‘enablers’ for hard efficiency gains, such as a clearly defined and embedded Asset Management System and sufficient and well governed asset information;
- AMCL’s experience of putting together improvement plans for comparable organisations, including, in some cases, improvement plans to achieve targets agreed with the relevant regulator; and
- Empirical benchmark evidence of nominal ‘rates of Asset Management capability improvement from AMCL’s global database (trajectories).

6.2 EVIDENCED TRAJECTORY DEVELOPMENT

As shown in Figure 11, AMCL’s analysis identifies that there are different nominal rates of change in Asset Management capability improvement, depending where an organisation is on the maturity scale. The overall picture below follows a classic ‘S-curve’, although there is currently limited empirical evidence at the extremities of the maturity scale. As discussed in Section 3.2, Highways England are largely in the dark blue ‘Competent’ maturity band currently, providing scope for nominal increases in maturity of 4-6% per annum initially. This lowers to 2-3% per annum as the overall maturity increases into the ‘Effective’ maturity band. However, this is intended as a guide only and will vary by organisational context, constraints, starting position and priorities.

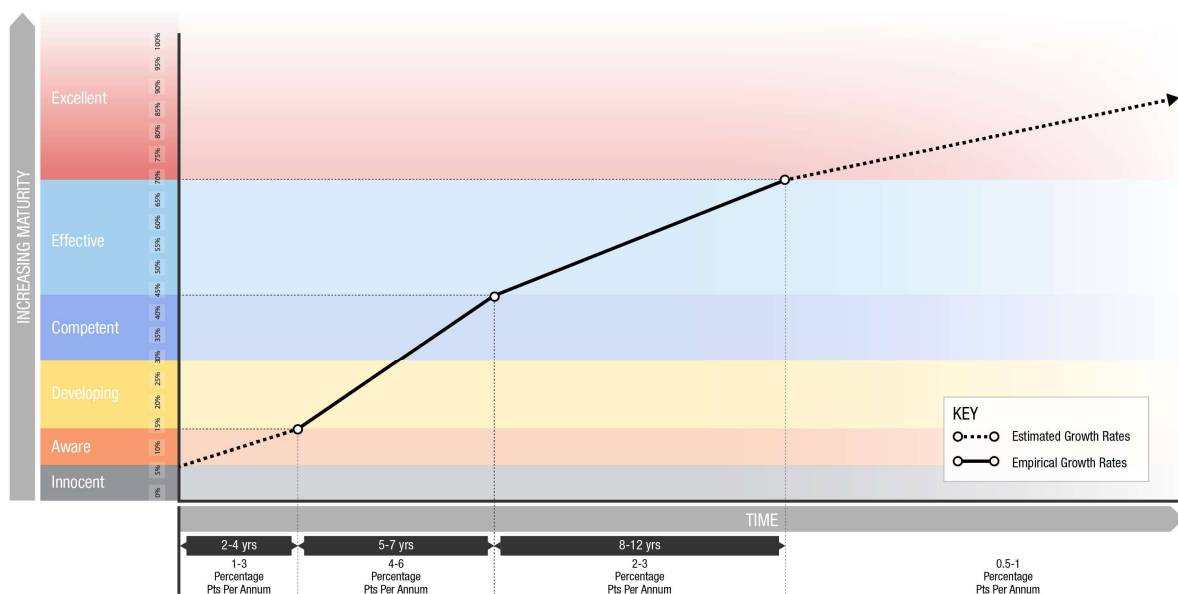


Figure 11 Nominal Asset Management Capability Improvement Trajectory

6.3 PROPOSED HIGHWAYS ENGLAND END OF RP2 TRAJECTORIES

The Subject-level scores and targets have also been aggregated and presented as Group-level trajectories for Highways England which show how Highways England’s anticipated Asset Management capability maturity develops from the current position, through to the end of RP1 and the end of RP2. This was then used to theoretically validate the achievability of the improvements identified against the empirical evidence shown in Figure 11. This breakdown, in this case against the Groups of Asset Management defined in the AMEM, is shown in Figure 12. (Note: as per Section 5 these results include the prioritised Subjects of Asset Management only, i.e. it does not include Procurement & Supply Chain or any of the Subjects in the Lifecycle Delivery Group.)

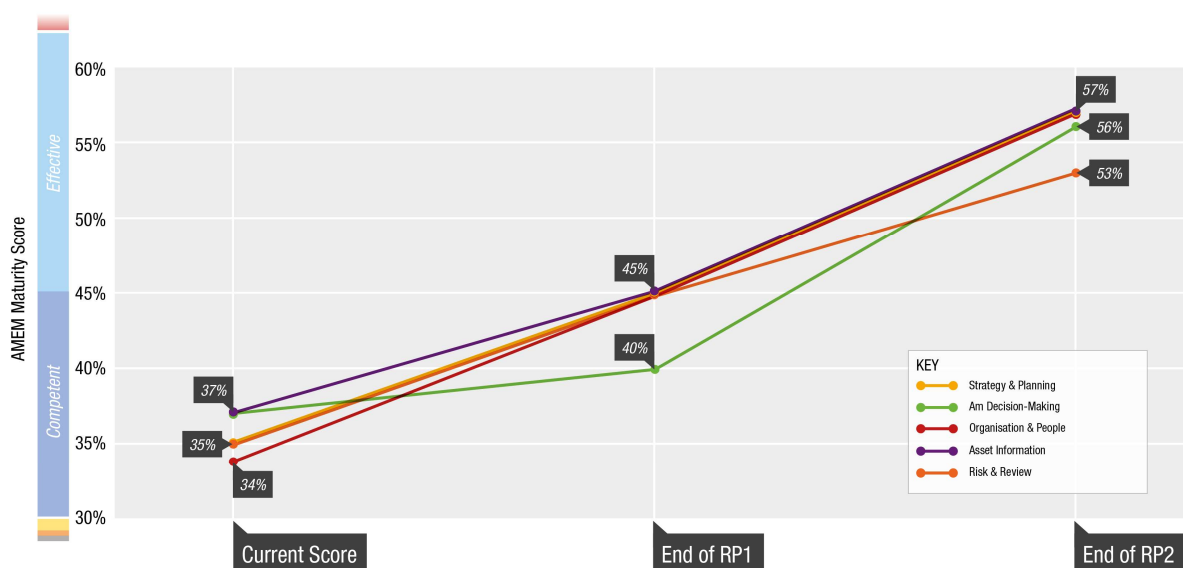


Figure 12 Proposed Highways England End of RP2 Trajectories

The chart shows a general increase of Highways England’s maturity scores from 34%-37% currently to 53%-57% at the end of RP2. This represents an average increase of 2.9% per annum which is well within the improvement rates derived from empirical evidence in Figure 11.

There are some intentional factors which shape the trajectories in the chart above:

- Risk & Review is lowest scoring Group at the end of RP2 as there are limited specific efficiencies to be gained here but the continual review, improvement, audit and measurement of the Asset Management System and associated risks is critical;
- Asset Information is the highest scoring Group at the end of RP2 as it is a critical enabler to gaining efficiencies;
- Organisation & People also scores highly as relevant competence and capabilities are pre-requisites for continued improvement and the realisation of efficiencies;
- Strategy & Planning increases consistently as it is an area where Highways England has, and continues to, put a lot of effort and focus, including the establishment and embedding of the overall Asset Management System; and
- The trajectory for Asset Management Decision Making increases rapidly after the end of RP1 because to make significant improvements in this area requires initial improvements of planning processes, people capabilities and supporting asset information and tools, which will have been achieved by that point.

7. RP1 TO RP2 ROADMAP

7.1 OPERATIONAL EXCELLENCE ALIGNMENT

AMCL used an analytical approach, based on the AMEM, to develop Highways England’s proposed position at the end of RP2 and establish the potential trajectories identified in Section 6.3. This was done to assure transparent and bottom-up definition of the trajectories and to validate they were realistic and achievable in terms of the Asset Management capability improvements in the timescales. This analysis has been captured in a document called the ‘RP1 to RP2 Roadmap’ (roadmap) and provided separately to Highways England and the ORR for their consideration. The roadmap is based on the typical activities that other asset intensive businesses have undertaken to achieve the benefits referenced in this review. The roadmap therefore contains AMCL’s view on the individual improvement activities required to increase Asset Management capability in accordance with the potential trajectories AMCL has identified and achieve the proposed end of RP2 position.

Note that the provided roadmap is just one potential approach to attaining the proposed position at the end of RP2. Specific improvement requirements will vary based on Highways England’s actual efficiency targets and delivery plans.

The individual improvements activities specified in the roadmap can be mapped against the 39 Subjects of Asset Management, as per the analysis. However, it was considered more relevant and effective to map the individual improvements to Highways England’s ongoing Operational Excellence programme, with which there is strong alignment.

The key themes of the Operational Excellence programme are shown in Figure 13. The proposed improvements have each been mapped to one of these themes.

Simplify how we work	We will create consistent and simple organisational design that supports every person’s line of sight to what we do and how we do it. We will create role profiles for every unique role. We will consider all the work that we do so that we focus on those that are most important to us, our stakeholders and our customers.
Building our capability	We will help our people to succeed with us. We will give accountability, authority and responsibility to every role. We will develop our people to fulfil their potential. We will provide a range of training and coaching to our people and leaders to drive the behaviours that will underpin what we do, helping them get to best in class.
Focussing on the customer	We will specifically focus on the customer – at the heart of all that we do. We already understand how important safety is in what we do and how we work. Focussing with equivalent passion and integrity on our customers will help us to do the right thing more and more.
Getting Planning and Performance Management right	We will become better proactive asset managers and owners of the decisions we make about what we do on our network. We will become rigorous and aligned in how we focus on delivering to time, cost and quality, and report delivery performance to ourselves and our stakeholders.

Figure 13 Highways England’s Operational Excellence Programme Themes

7.2 ROADMAP SUMMARY

A total of 206 individual improvements have been identified in the roadmap. These have been grouped into 21 Roadmap Themes of closely related individual improvements. The Roadmap Themes have then been mapped to and aligned with Highways England’s Operational Excellence Themes to support the further potential development and integration of the improvements.

The breakdown of Roadmap Themes and individual improvement actions against Highways England’s Operational Excellence Themes is summarised in Table 1.

OE Ref	OE Key Themes	R'map Ref	Roadmap Theme	Total
1	Simplify how we work	1.1	Asset Management System & Policy	12
		1.2	Organisational Definition	9
		1.3	Asset Management Objectives	5
		1.4	Asset Management Strategy	10
2	Building Our Capability	2.1	Asset Management Leadership	9
		2.2	Resourcing & Outsourcing Strategy	10
		2.3	Competence Management	10
3	Focusing on the Customer	3.1	Customer & Stakeholder Engagement	12
4	Getting Planning & Performance Management Right	4.1	Strategic Planning Approach	7
		4.2	Asset Class Policies & Lifecycle Modelling	15
		4.3	Risk Management	11
		4.4	Strategic Plan	7
		4.5	Road Access Strategy	6
		4.6	Asset Management Plans	10
		4.7	Capital Prioritisation	10
		4.8	Operations & Maintenance Optimisation	18
		4.9	Asset Information Strategy	9
		4.10	Asset Information Standards	6
		4.11	Asset Information Systems	15
		4.12	Data & Information Management	10
		4.13	Asset Performance & Health Monitoring	5
Total				206

Table 1 Roadmap Summary by Operational Excellence Themes

7.3 ROADMAP CONTENT

The roadmap has been developed to include the following attributes for each of the 206 individual improvement actions:

- Highways England Operational Excellence Theme alignment;
- Roadmap Theme level reference;

- Roadmap Theme level description;
- Roadmap Capability level reference;
- Roadmap Capability level name;
- RP2 Capability Statement;
- RP2 Improvement Specification; and
- RP2 Success Criteria.

These attributes enable the individual and grouped improvements to be referenced and monitored as well as providing a specification for the work required and how success could be measured by Highways England, as appropriate.

The overall make-up and balance of improvement actions against the Operational Excellence Themes is shown in Figure 14.

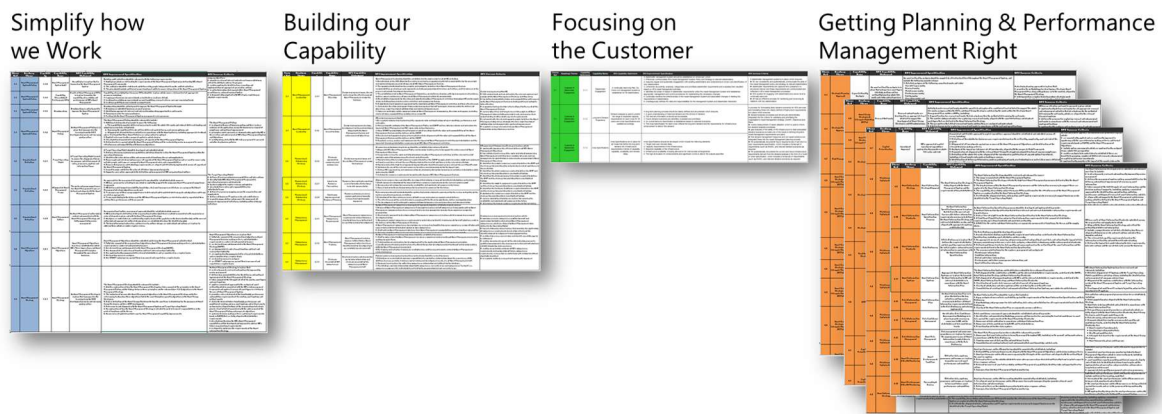


Figure 14 Roadmap Make-up and Balance

In summary, the individual improvement proposed in the roadmap focus on the following themes:

- **Simplify how we Work:**
 - Embedding and continual improvement of the Asset Management System, Policy, Objectives and Strategy;
 - Development of a comprehensive Target Operating Model;
 - Clarification of roles and accountabilities across the organisation; and
 - Development of an Asset Management focused culture.
- **Building our Capability:**
 - Establishing strong and consistent Asset Management leadership at all levels of the organisation;
 - Optimising resourcing and outsourcing; and
 - The definition and management of competences across the Asset Management System.
- **Focusing on the Customer:**

- Stakeholder engagement and management of the impacts of stakeholder requirements across the Asset Management System;
- Demand analysis; and
- The conversion of demand into infrastructure specifications.
- **Getting Planning & performance Management Right:**
 - Strategic planning;
 - Asset Management planning and the integration of risk management;
 - Asset Group Strategies and lifecycle modelling/DSTs;
 - Risk-based capital investment prioritisation;
 - Risk-based maintenance optimisation; and
 - Asset information, data and systems, which underpin the above.

The full roadmap, including RP2 Improvement Specifications and Success Criteria has been provided to Highways England for its consideration and to support the development of its own plans.

8. POTENTIAL EFFICIENCIES SUMMARY

8.1 OVERVIEW OF ASSET MANAGEMENT BENEFITS

8.1.1 CATEGORIES OF BENEFITS

There are many different types of benefit that occur from effective Asset Management implementation, some of which are more easily measurable than others. For example, direct savings that occur in the form of either reduced risk or reduced maintenance costs may be quantified based on improved performance or reduced resources. However, benefits such as public satisfaction resulting from increased availability of the asset may provide benefits indirectly, through increased custom and the resulting value of the business.

The benefits of a systematic Asset Management approach may be realised over several years but given the large scale of investment even small improvements can produce big savings. Potential benefits have been evidenced in the following areas.

8.1.2 OPERATING AND MAINTENANCE COST SAVINGS

Although bottom line benefits are not always apparent at first glance, the evidence shows that benefits can be achieved in various forms and combinations, including one or more of better performance, increased productivity, reduced risk or reduced costs. For example, in 2007/08 Network Rail achieved savings of £178million in this area by adopting a systematic approach to Asset Management. [Network Rail Annual Return 2011].

8.1.3 EXTENDING AND PRESERVING THE LIFE OF ASSETS

Ensuring timely asset intervention is the key to optimisation of asset life. The New York State Department of Transport found that replacement of highways that had reached 'very poor' condition was 5 to 6 times the cost of replacement in 'poor' state ones [NYSDOT, Multimodal transportation Programme submission: 2009-2014].

8.1.4 PERFORMANCE IMPROVEMENT

There are various key performance indicators (KPIs) which an organisation can consider in order to monitor service delivery, quality and performance. The perceived wisdom is that if something gets monitored it will be improved with the right incentives in place. However, there have been several cases where the wrong indicators were monitored, or findings ignored which can give an organisation a false sense of security in terms of the underlying state of the assets and associated risks. The final report into the Piper Alpha Disaster of 1988 found that one of the causes was that although the asset owner carried out regular safety audits of its facility, the findings were not acted upon and serious deterioration of critical assets was often ignored [The Public Inquiry into the Piper Alpha Disaster, Cullen, The Honourable Lord, HMSO 1990.].

8.1.5 BUSINESS RISK REDUCTION

Every type of business faces risks that can present various types of threats to its success. Risk can play a key role in informing Asset Management decision making. It is also the mechanism by which an organisation can prepare for significant events like accidents, incidents or the impacts of climate change to ensure that it has appropriate contingency planning in place and mechanism for assuring business continuity. By understanding risk in relation to your assets you can facilitate the constant and evolving trade-off between performance, cost and risk.

Reducing business risk is, however, a benefit of Asset Management that is difficult to quantify. By reducing business risk you've reduced the chances of that risk happening. However, when a recognised risk or issue does occur, and contingency plans aren't in place, the effect on an organisation can be significant. One such example is Jarvis plc [BBC news "Jarvis's Track record" Oct 2003] where failures in maintenance procedures on a stretch of railway line that the company was responsible for contributed to the death of 7 people and injuries to more than 70. Following this incident Jarvis lost its maintenance contract and went from a diverse services company with an 8,000-strong workforce and annual sales of £750m to an organisation with 3,000 staff and sales of £200m.

8.1.6 COMPLIANCE WITH LEGAL AND REGULATORY REQUIREMENTS

Compliance is usually seen as a cost to a business. However, this could be viewed as an investment in risk mitigation. When managed properly this protects the business from possible losses involving financial penalties, loss of reputation, market confidence, etc. Good practice Asset Management considers the legal obligations, standards, statutory requirements and so on to ensure that the business meets its obligations to customers, stakeholders and regulators. As an example of the impact of noncompliance, Thames Water was fined £11.1 million in September 2007 for failing to provide Ofwat with robust information because of poor processes and systems resulting in poor service.

8.1.7 SUSTAINABILITY

The concept of triple bottom line accounting was first coined by John Elkington in 1994 [Elkington, J "Cannibals with Forks: The Triple Bottom Line of 21st Century Business"] and later developed in his book on the subject. In practical terms triple bottom line (TBL) accounting means considering an altruistic approach which considers environmental, social and financial performance. The term "sustainability" pre-dates TBL and was first defined by the Brundtland Commission of the United Nations in 1987. TBL requires an organisation to be more responsible to stakeholders (including customers and end-users) rather than just to its shareholders, placing their interests on par with maximising profits. The development of high-speed rail lines in Europe in the 1980/90s have not only improved travel times on intra-national corridors but have cut carbon emissions compared to air travel. A 2008 study found that when compared to budget air travel (Ryanair) the Eurostar produced 60% less CO2 emissions per 100 seat Km [Transport Watch UK. Fact sheet 5(b) "Carbon Emissions: High-speed rail and air compared" June 2008].

8.1.8 AUDITABLE PLANS IN SUPPORT OF BUDGETING

The importance of having robust and auditable plans cannot be over-emphasised. Typically, for large infrastructure organisations the approach to gaining funding approval used to be an annualised ritual. The organisation would use best endeavours to calculate maintenance and renewals requirements for the coming year. The departments would have a budget allocation and manage these funds to best effect. If the budgets were not used up by the end of the year, then they would be cut the following year. Without having justified Asset Management plans in place an organisation will be at a disadvantage in negotiations with its sponsors and stakeholders especially where decisions are based on a qualitative rather than a quantitative approach. When Railtrack was placed into administration in 2001 the regulatory settlement was £14.8 billion for the period 2001-2006, however due to issues previously unidentified the new Network Rail settlement was reset for 2004-2009 at £26billion. [Network Rail Annual Return 2011].

AMCL worked with Network Rail High Speed (NR (HS)) to deliver detailed plans for funding for the current control period (2014-2019), plus the 40-Year Strategic Plan - which identified over £10m worth of savings [NR (HS) 40-Year plan].

8.2 RANGE OF EFFICIENCIES FROM ASSET MANAGEMENT

To support the assessment of efficiency ranges for Highways England, AMCL has based its figures on multiple quantified examples. These come from a variety of infrastructure sectors where savings have been realised through the implementation of good practice Asset Management processes and regimes.

8.2.1 ASSET MANAGEMENT SYSTEM EFFICIENCIES RANGES

A recent study by the Institute of Asset Management (IAM) on the benefits of establishing a well-defined, continually improving and ISO55001 compliant (or beyond) Asset Management System identified an observed range of annualised total expenditure benefits of 1% to 8%. This was based on 20 case studies from corporate members of the IAM.

In support of this the IAM also published two specific case studies as part of the study outputs:

- Case A:
 - Initial 5 Year CAPEX Reduction 20%;
 - WLCC TOTEX savings (discounted) 8%; and
 - No increase in performance / risk exposure.
- Case B:
 - Initial 5 Year CAPEX 'Increase' 50%;
 - WLCC TOTEX savings (discounted) 0% (Today's TOTEX); and
 - Significant reduction performance / risk exposure (5% to 10%).

8.2.2 CAPITAL (RENEWALS) EXPENDITURE EFFICIENCY RANGES

The examples shown below demonstrate that, whilst capital savings through the implementation of Asset Management vary significantly from organisation to organisation, the minimum level of saving is unlikely to be less than 5%.

Industry Sector	% Capex (Renewals) Saving (Annualised Costs)	Description
Water	15%	Orange County Sanitation District, USA
Rail	15%	Metronet, UK
Power	29% increase in production with 0% increase in Capex	Baltimore Gas and Electric, USA
Water	10%-20%	Average of Australian Water Companies
Cross-sector	5%-8%	Average of UK Infrastructure Companies

Table 2 Example Range of Quantified Asset Management Capex (Renewals) Benefits

8.2.3 OPERATIONAL (MAINTENANCE) EXPENDITURE EFFICIENCY RANGES

A study carried out over several years by The Woodhouse Partnership Limited (TWPL) outlined the likely percentage savings that can be realised within maintenance (i.e. planned intervention) activities through the application of good practice Asset Management techniques. This study, the results of which are reproduced in the diagram below, shows that the most likely level of savings that can be realised within operational maintenance expenditure is typically 20% to 30%.

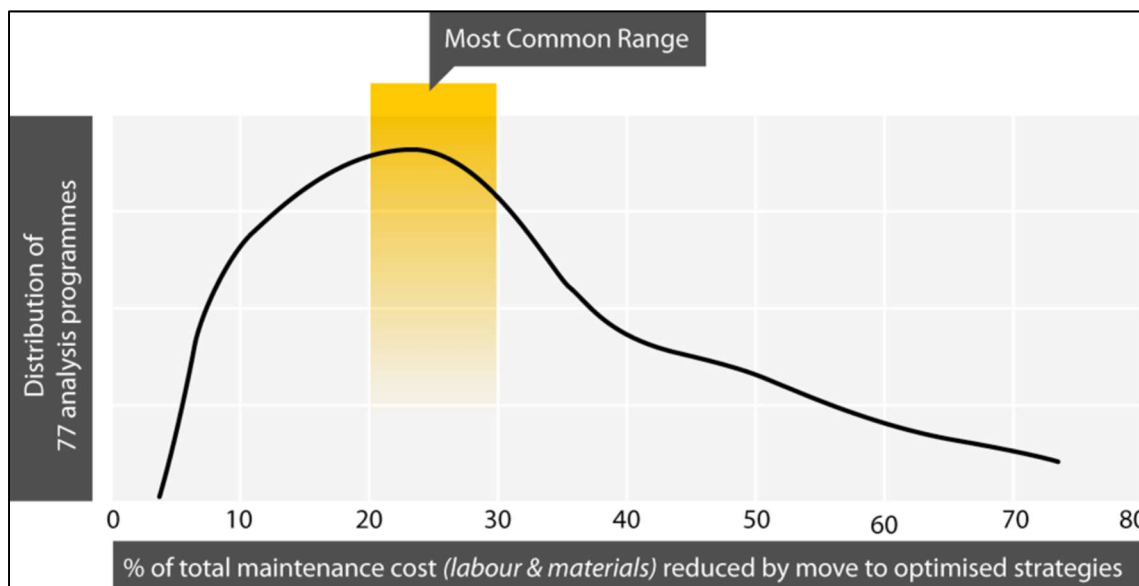


Figure 15 Maintenance Expenditure Efficiency Ranges (Source: TWPL)

8.3 CASE STUDIES

The following two case studies provide published, real-world examples from other infrastructure managers of the benefits of implementing an Asset Management approach. The claimed benefits in these case studies are provided as examples only and the published figures are taken as accurate.

8.3.1 CASE STUDY 1 – GCC WATER & POWER COMPANY

This case study outlines the benefits from an Asset Management business transformation programme to establish an effective Asset Management System. The work included initially aligning with PAS 55 (then transition to ISO55001 and latterly the 39 Subjects of the Asset Management Landscape) and a re-design of capital investment processes and governance structure to optimise the organisation’s Government funded investments.

Qualitative outcomes identified by the organisation included:

- Established Asset Management System – aligned with other management systems;
- Structured Asset Management documentation aligned with Corporate Strategy;
- Aligned Asset Management Policy, Strategies, Objectives and Plans;
- Controlled and coordinated capital investment processes with ‘stage’ and ‘gate’ decision points;
- Integrated Risk Management Framework aligned with ISO 31001 – with escalation routes;

- Proactive risk-based maintenance methodologies;
- Improved communications / information management – better knowledge transfer / dissemination;
- Successful de-siloing – improved cross-functional / geographical interactions and team-working;
- Built-in periodic review capability against the performance of the Asset Management System;
- Embedded Authority Matrix and RACI Matrix;
- Revived sense of purpose for all staff – improved morale, motivation, culture and climate;
- Enhanced company reputation;
- Improved regulatory negotiation capability – through demonstrable evidence of funding requirements; and
- Certification to an internationally recognised specification;

Financial savings identified by the organisation included:

- 10% reduction in maintenance costs based on a clearer risk-based direction from Asset Performance based on condition and performance rather than time, and the introduction of coherent planned maintenance activity – a 2-year order book of work in detail with 5-years in outline. This included:
 - Quality assured information for effective scheduling and manpower planning, including ensuring the right team, at the right time, with the right skills, equipment and instructions were agreed access, which led to reduced abortive visits, increase first time fix, reduced non-productive waiting time, etc.
 - Combining inspections with maintenance activity led to reduced travelling time, all against a backdrop of an increasing asset base and measured through a year-on-year comparison of controllable Opex costs.
- 2% increase in Maximum Allowed Revenue (MAR) through Regulatory Asset Value (RAV) on a \$2billion portfolio (equivalent to an extra \$40 million per annum) which was independently assessed to measure how efficiently Capex was spent – metrics included: design options; procurement process; project management; risk assessment approach. The efficiency score increased as a direct result of implementation of compliant processes.
- 14% reduction in strategic stock levels through scenario planning, risk management and risk acceptance levels (e.g. consequence of reduced (or no) stock) and measured through year on year comparison of stock levels.
- 40% reduction in network downtime measured by the availability of the networks. Downtime was taken as faults, maintenance and shutdowns for commissioning. This was measured through a year-on-year comparison – downtime previously was the equivalent of taking the whole network down for 5 days, and the improved performance was equivalent to 3 days (e.g. 40% reduction in downtime).
- 50,000 man-hour savings through information management and mobile data upload technology through use of hand-held devices for data capture, improved asset information that is available and utilised consistently for decision-making and measured by year-on-year comparison of de-briefed work instructions and actual time taken.

- Reduced repair time from 21 to 5 days (GRP pipelines), measured from leak reporting time to full restoration of pipeline to its prior state and results related to better information and effective scheduling.

8.3.2 CASE STUDY 2 – NETWORK RAIL

As part of a published IAM award submission, Network Rail analysed the real-world benefits achieved through a sustained programme of Asset Management capability improvements. Network Rail had been on an Asset Management journey since its inception in 2002 and started actively monitoring its Asset Management capability in 2006, as shown in Figure 16. This was further supported when the now Office of Rail and Road (ORR) established Asset Management capability as a formal measure in 2009. The ORR has subsequently gone on to set Asset Management capability targets as a regulatory target in the current Control Period.

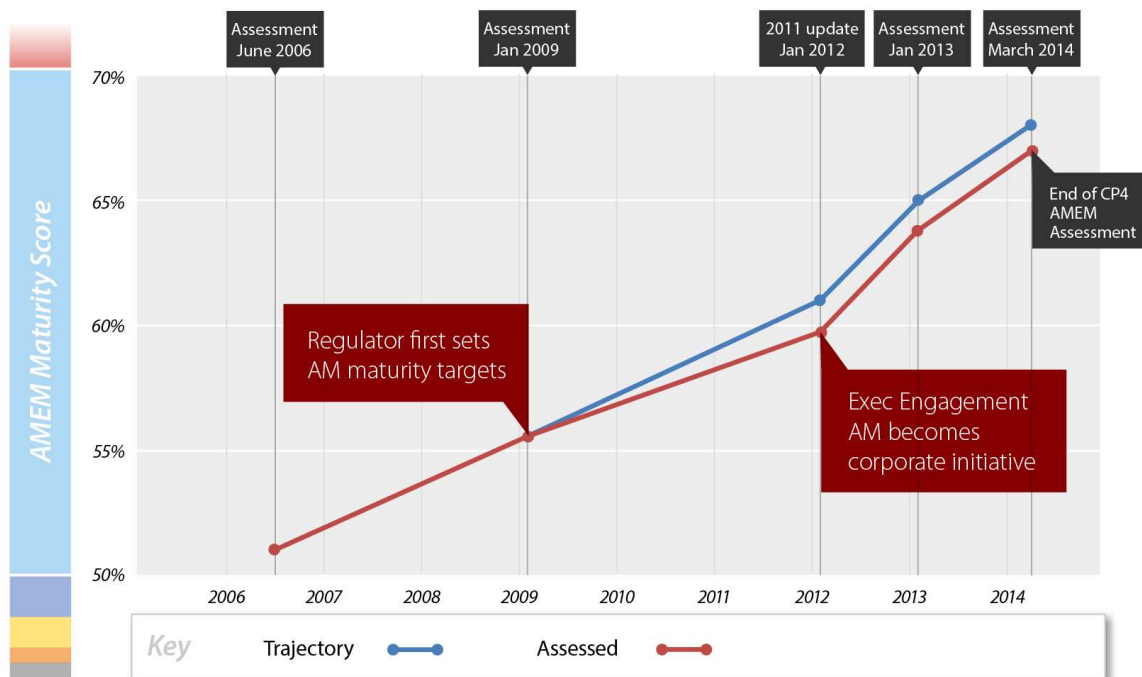


Figure 16 Network Rail's Asset Management Capability Trajectory

Network Rail identified the following key benefits it achieved during the period of its Asset Management progression to date:

- **Reduced Capex:** initial focus on highest spend asset group (Track) resulting in extended asset lives, reduction of capital spend by around **20%**.
- **Reduced Opex and maintenance costs** per vehicle kilometre by **46%** between 2003/04 to 2011/12.
- **Improved asset performance** with greater reliability and sustainability, e.g. incidents of broken rails have reduced from **322** in 2004/05 to **125** in 2011/12.
- **Better regulatory outcomes:** ability to demonstrate evidence for decision-making to prove that approach is sustainable over the long term.
- BSI PAS 55 **accreditation:** achieved in April 2013.

- **Safest** 'major' railway in Europe, and significantly safer than road and comparable with air transport.
- Carries **more trains than ever before**, with **10%** more train kilometres and **3%** more freight moved than 2004/05.

8.4 ALIGNMENT TO ROADMAP

Based on some of the examples provided in the sections above, and AMCL's wider knowledge of specific Asset Management efficiencies gained by other organisations, the potential efficiencies applicable to Highways England have been mapped to the relevant proposed Roadmap Themes. This is shown below in Table 3.

Note that this is not a definitive mapping. As Asset Management is an integrating discipline, bringing together and making more effective and efficient the activities already undertaken by Highways England, benefits can only be realised as part of a coherent and structured improvement programme. Implementing single Roadmap Themes or individual improvement actions will not realise the efficiencies mapped to groups of Roadmap Themes below. Neither will the efficiencies be realised without core enablers, such as an effective and embedded Asset Management System and sufficient and appropriate asset data, IT systems, processes and tools.

OE Theme	Roadmap Theme Groups	Potential Benefits	Sources
Simplify how we Work	1.1 – Asset Management System & Policy 1.2 – Organisational Definition 1.3 – Asset Management Objectives 1.4 – Asset Management Strategy	Benefits related to the implementation of an overall Asset Management System (or Framework) are difficult to quantify. In general, the benefits are related to consistent decision-making aligned to stakeholder needs, and the ability to systematically continually improve capabilities. This benefit is validated through ISO 55001 compliance and / or certification. The IAM has estimated that this can lead to overall efficiency benefits in the order of 1% to 8% of Capex (renewals) and Opex (maintenance).	IAM 2015 Conference presentation: The impact, value and quantifiable benefits of AM
Building our Capability	2.1 – Asset Management Leadership 2.2 – Resourcing & Outsourcing Strategy 2.3 – Competence Management	This is an enabler – no quantified benefits can be explicitly mapped but these enable realisation of the benefits identified under 'Simplify how we Work' and 'Getting Planning & Performance Management Right'.	N/A

OE Theme	Roadmap Theme Groups	Potential Benefits	Sources
Focusing on the Customer	3.1 – Customer & Stakeholder Engagement	No quantified benefits can be explicitly mapped but there are inherent efficiencies in assuring the alignment of all Asset Management activities and expenditure with stakeholder requirements, customer satisfaction and forecast demand.	N/A
Getting Planning & Performance Management Right (Part 1)	4.1 – Strategic Planning Approach 4.2 – Asset Group Strategies & Lifecycle Modelling 4.3 – Risk Management 4.4 – Strategic Plan 4.5 – Road Access Strategy 4.6 – Asset Management Plans 4.7 – Capital Prioritisation 4.8 – Operations & Maintenance Optimisation	~15% Whole Life Cost savings ~20% Deferral of capital expenditure ~27% Deferral of capital expenditure ~20% to 30% Risk based capital investment prioritisation ~15% to 30% Risk-based maintenance / inspection	London Underground Network Rail Orange County Sanitation District Copperleaf Technologies TWPL Survey
Getting Planning & Performance Management Right (Part 2)	4.9 – Asset Information Strategy 4.10 – Asset Information Standards 4.11 – Asset Information Systems 4.12 – Data & Information Management 4.13 – Asset Performance & Health Monitoring	This is an enabler – no quantified benefits can be explicitly mapped but it is a critical enabler to realisation of the benefits identified above.	N/A

Table 3 Mapping of Potential Benefits to Roadmap

8.5 TIMESCALES FOR REALISATION

There is no definitive formula for specifying how long it will take to realise efficiencies. This will vary by organisation and the specific business context and constraints. However, it is possible, to map capability improvements to efficiencies gained (see Sections 8.1 and 8.2) and subsequently to align these efficiencies with proposed Asset Management capability improvement trajectories.

As introduced in Figure 11, AMCL’s experience of the efficiencies achieved by various organisations globally, the timescales needed to achieve these and the technical improvements that enabled them, can provide a substantive guide. Figure 17 reproduces Figure 11 and overlays a mapping of empirically evidenced capability improvement trajectories and efficiencies gained (summarised in the black arrows and text). Mapping the technical improvements undertaken by these organisations to the maturity requirements defined in the AMEM allows a general understanding of the efficiencies viable as Asset Management capability increases.

The 1-8% of efficiencies demonstrated by the Institute of Asset Management occurs in organisations moving to an effective, embedded and continually improving Asset Management System. This level of maturity is broadly aligned to the 45% point (top of 'Competent') of the maturity scale shown in Figure 17, which is comparable with ISO 55001 nominal compliance. These efficiencies are generally gained because of incremental improvements in a range of areas, such as better definition and consistency of approach, understanding of roles and responsibilities, better alignment with objectives and stakeholders, more focused investment and planning, leaner processes, embedded management review and continual improvement, etc.

Once this effective Asset Management System is in place and functioning it enables organisations to leverage the Asset Management System to make better Asset Management decisions. This occurs when organisations are in the 'Effective' maturity band (see Figure 17) and may include wide-ranging and high-impact improvements such as risk-based maintenance, risk-based prioritisation of capital expenditure and asset life-extension, whole life value modelling to justify investment and sustainability, etc. This is shown as the potential for 15-30% efficiencies in Capex (renewals) and Opex (maintenance) in Figure 17 (as evidenced in Section 8.2).

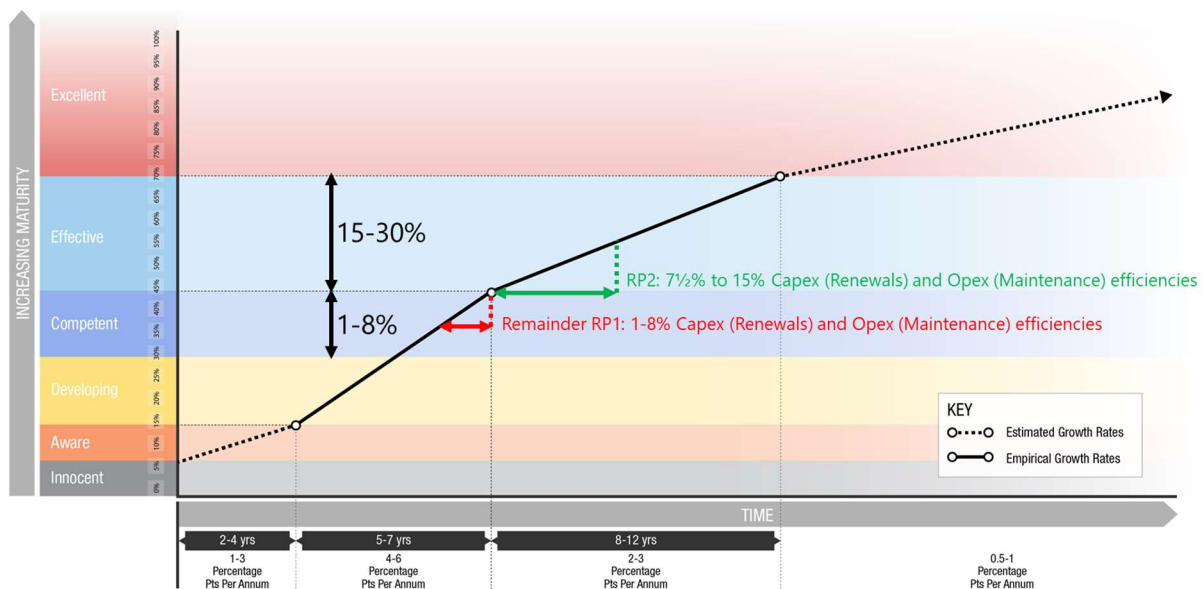


Figure 17 Proposed Highways England RP2 Efficiencies

This approach has been applied to Highways England. Figure 17 also overlays, on the black trajectory line, Highways England's average current maturity and proposed target maturity at the end of RP2 (approximately 35% and 55% respectively – see Section 6.3). Two potential tranches of benefit are then identified, running from now until the end of RP1, and then from there to the end of RP2, as defined by the 35% and 55% points.

The first tranche of benefit (marked in red) assumes Highways England will successfully implement and embed its defined Asset Management System as planned, and will achieve this by the end of RP1. The second tranche of benefit (marked in green) assumes that half of the total benefit of 15% to 30% is achievable during RP2, based on Highways England progressing approximately halfway through the 'Effective' maturity band, as defined by the proposed targets and roadmap.

Figure 17 therefore identifies, as a substantive guide, the potential efficiency ranges for Highways England between now and the end of RP2. The analysis also identifies there are likely to be further efficiencies available in RP3.

It should be noted that there is no definitive way of calculating available efficiencies, but this approach provides a substantive guide, using evidence based efficiency ranges and is consistent with AMCL's experience worldwide. It should also be noted that Highways England's starting position on the generic improvement trajectory has been estimated based on evidence made available and that any efficiencies are subject to a number of assumptions and known constraints, including Highways England's actual starting point and funding.

9. RECOMMENDATIONS

Based on the findings of this review, AMCL recommends that Highways England, in consultation and agreement where required with the ORR, should:

- 1) Validate the Asset Management capability starting point, improvement trajectories, targets and efficiencies proposed in this report against their own experience, visions and plans for Asset Management capability improvements at Highways England.
- 2) Agree RP2 Asset Management efficiency definitions and targets considering available funding, the outputs of this project and the other reviews relating to 'Portfolio and programme management' and 'Procurement and contract management' to assure no double-counting.
- 3) Define an achievable and realistic delivery programme to implement the Asset Management capability improvements necessary to deliver the agreed efficiencies, including timescales, resources, responsibilities and constraints.
- 4) Set out a sequence of regular Asset Management capability review points, through to the end of RP2, to provide assurance of progress against trajectories and achievement of targets. These reviews should typically be undertaken every one to two years.