Asset Management Strategy October 2014

NetworkRail



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Executive summary

Network Rail's approach to asset management

Through excellence in asset management we will make sure that our assets are managed in a way that contributes towards a better railway by delivering the outputs expected by taxpayers and customers, safely, efficiently and sustainably at optimal whole lifecycle cost.

"We measure success through benchmarking with frontier organisations. We will also publish the progress we make against an Asset Management Excellence Model." We have made significant improvements in our asset management capability during CP4, however we recognise that there remains scope to improve further. Our work to date has permitted Network Rail to demonstrate an overall asset management capability that is at least on a par with the best asset intensive companies in the UK and the best railway infrastructure companies in Europe. The purpose of this strategy document is to define the improvements that will allow us to deliver enhanced reliability in our infrastructure and to demonstrate that by the end of CP5 we provide a benchmark against which organisations worldwide assess their own asset management capabilities.

We measure success through benchmarking with frontier organisations. We will also publish the progress we make against an Asset Management Excellence Model. Over recent years we have used this approach to develop a thorough understanding of what needs to be done to achieve our objectives, and have defined numerical forecast maturity targets against which our progress will be monitored.

The intended improvement is comprehensive, covering all aspects of asset management. With Boarddefined 2019 and 2024 outcomes, these improvements will be realised through the delivery of our Network Rail strategy and its Ten Strategic Themes. There are a number of priority areas that are fundamental improvement steps towards an excellent asset management regime. These form the scope of the asset management excellence theme and are structured within six key chapters covering:

- 1 Asset Policies
- 2 People Competency
- 3 Risk Based Maintenance and Remote Condition Monitoring
- 4 Enhanced Information (ORBIS)
- 5 Depot Programmes, and
- 6 Measurement of Asset Management Capability.

A strong governance framework has been implemented with an executive level sponsor, periodic executive review forums, and senior management leadership of individual workstreams. This permits ongoing participation, challenge and review of progress and checks to ensure that the implication of wider Network Rail programmes can be evaluated and corrective actions identified.

Criteria have been developed that will assess the outputs. Internal checks are carried out together with critical and independent checks through benchmarking reviews.

Context

This document forms a key part of our overall asset management system. A brief summary of the purpose and scope of each key document is provided below.

This Asset Management Strategy

 sets out our high-level asset management objectives – those delivered in CP4 and those established for CP5 (2014 to 2019)

and

• defines what needs to be done to improve Network Rail's asset management capability further in order to deliver the CP5 requirements, and to achieve our goal of being at a level of asset management maturity which organisations worldwide would choose to assess their own asset management capabilities against. This document forms part of our overall asset management system, as shown in Figure 1. A brief summary of the purpose and scope of each document is provided opposite. Overarching documents Our Asset Management System operates in the context of our regulatory, contractual and legislative commitments. It is underpinned by our safety management system, and the key principle that we will reduce passenger, public and workforce safety risk so far as is reasonably practicable. It is also aligned with and informed by the role, purpose and vision that have been developed for Network Rail, and our business plan and strategic objectives.

Asset Management Policy This summarises our overall approach and describes how our organisational objectives and network strategies will be supported by asset management. It is based on seven policy statements aligned to corporate objectives that reflect our overall company role, purpose and vision, and sets out 11 core asset management principles on which our asset management approach will be based. The policy therefore plays a key role in creating the Line of Sight between our asset interventions and the overall Network Rail objectives. The policy also sets out the framework and document hierarchy for our Asset Management System (see Appendix A).

Asset Management Strategy and

Objectives This document adds detail to the Asset Management Policy, focusing on what Network Rail plans to do to build its asset management capability. Further definition of these activities and interventions on our assets is provided within the Asset Information, Network Operations and Infrastructure Projects functional strategies.

Asset Policies Specify how to select the major inspection, maintenance and renewal interventions for each asset discipline to deliver the required outputs at lowest whole lifecycle cost (WLCC). As our Business Critical Rules programme develops, the asset policies will form a key means of control, and will be continuously improved to progressively provide protocols that describe:

- how to deliver output whilst according with lowest WLCC
- planning of appropriate maintenance/renewal activities to remain within critical performance limits
- the derivation of work bank volumes for short, medium and longterm business planning purposes
- the performance, reliability, availability, maintainability and safety framework for each asset including provisions for sustainable development, future weather and climate change adaptation
- mechanisms to permit clear assurance and learning to be derived.

Route Plans These include the asset management plans that document activities, resources and timescales for interventions on our infrastructure.

Route Asset Strategies Aid route planning by clarifying how assets will be managed given the route specific context – for example, the degree of change (enhancements) within the route and relevant customer reasonable requirements, while retaining alignment with asset policies.

Delivery Schedules/Programmes Form the detailed plan to optimise the delivery of renewals, maintenance and enhancement. These group works temporally and spatially and involve coordination of people, plant, materials and track access and supplier capability to deliver the Route Plan in the most efficient and effective way.

Figure 1 Our Asset Management Strategy and Objectives and the relationship with other key documents in our Asset Management System, and the key overarching documents.



1. Purpose

A safe, reliable, efficient and sustainable approach to managing our infrastructure requires a well developed capability in asset management which is reflected in assets that are performing optimally for the level of funding available.

We already have several strong areas of capability but are looking to develop these and others further. This Asset Management Strategy sets the direction of improvement in two main areas, as follows:

- firstly, it summarises the high-level objectives and targets – those achieved in CP4 (2009 to 2014) and those established for CP5 (2014 to 2019)
- secondly, it defines what needs to be done to improve Network Rail's asset management capability in order to deliver these requirements and to achieve a level of asset management maturity against which organisations worldwide assess their own asset management capabilities

This document forms the network-wide Asset Management Strategy for Network Rail and this is complemented by more detailed strategies within our operational routes and delivery organisations. It is intended to define the strategic objectives, principles and approach to the management of the relevant physical assets. This includes the infrastructure operated by Network Rail to allow trains to run safely and reliably, in a manner which:

- enables delivery of Network Rail's long-term asset management objectives in accordance with the Network Rail Asset Management Policy and the general asset management obligations defined in the Network Rail Licence Conditions
- confirms assumptions of current and future demand, and condition and performance requirements of the rail infrastructure assets, and the approach to assuring the delivery of these future requirements, including provisions to improve the resilience of our infrastructure to reduce vulnerability to extreme weather recognising the changing climate
- aligns with the requirements of BSI PAS 55 and ISO 55000
- is optimised and sustainable in terms of whole-life, whole-system cost over the long-term; considered by Network Rail to be 30 years for the purposes of appropriate rail network planning and decision making

 appropriately considers the necessary current and future asset management capabilities of the overall organisation, in terms of people, processes, systems and equipment to a level of maturity necessary to deliver our outputs and objectives.

This strategy should be read in conjunction with the Asset Management Policy which summarises Network Rail's Asset Management System, comprising an Asset Management Framework and a document hierarchy. This strategy is one of the components of the Asset Management System. It defines the constituent parts of the Asset Management Excellence strategic theme necessary to deliver our Asset Management Policy, and the dependencies with other strategic themes. It focuses first on the context of asset management and its contribution to overall delivery of services to our customers; for completeness the key related aspects of Network Rail's overall strategy are restated here for context and clarity as are extracts on current infrastructure performance, further details of which are available in our delivery plan for CP5.

2. Background

Network Rail's purpose is to generate outstanding value for taxpayers and customers. Our strategy is supported by a series of Ten Strategic Themes covering areas of improvement. These are shown in Figure 2 below, one of these themes relates to an enhanced asset management capability.

Our purpose To generate outstanding value (Why we exist) for taxpayers and customers Our role A better railway for a better Britain (What we do) Our vision To be a trusted leader Our strategy To work with our partners and use our full (How we are going to do it) potential to improve safety, reliability, capacity and value for customers and taxpayers Our behaviours Customer Accountable Challenging Collaborative driven (How we need to work) **Our Strategic Themes Corporate capabilities** Key enablers Safety Asset management • Technology and innovation Sustainability • Capacity and performance Organisational change management • People • Transparency and public Project development and delivery information • Funding and affordability

Figure 2 Network Rail's Purpose, Role, Vision, Strategy, Behaviours and Strategic Themes.

The overall future development of Network Rail is dependent upon the completion of all Ten Strategic Themes; each provides a degree of support or enablement to each other, attaining excellence in asset management will therefore be supported by the wide array of initiatives across the strategic themes.



1 Our safety vision.

2 Asset Management Policy document.

The bedrock for all our activity is our safety vision: Everyone Home Safe Every Day.



The Asset Management Strategy supports this vision by providing evidence and analytical tools to help the rail network's asset managers make the right decisions – ones which build safety into the physical environment and into the way people (workforce, passengers and public) interact with it. For example:

Our Asset Policies and guidance will make doing the right thing simpler, easier and more verifiable. These policies will continually improve available specifications for reliability, maintainability and safety to support improved approaches to design, construction, operation, maintenance and decommissioning activities to keep everyone safe. Embedding whole-life decision making with the appropriate emphasis on safety, through our planning processes, will also lead to improvements in how we plan work so that it can be delivered safely, also contributing to our commitment to plan so that our work environments are tidy, and will remain tidy when projects are completed.

Our work on future competencies through our professionalisation of asset management competence, is well aligned with wider work on safety behaviours and culture within the organisation, and will underpin the skills development required to give people the skills and the appreciation of risks required to work safely and to deliver a railway which is sustainably safe for its workforce, passengers and public.

Our continued measurement, benchmarking and innovation work will also seek to find new ways to keep ourselves, colleagues, passengers and the public safe.



- 1 Increasing the capacity of the North London line.
- 2 Utilising modern plant and machinery to more efficiently deliver track renewals.

2.1 The case for asset management

Asset management requires that we align the way we manage our assets with our corporate objectives. In the case of Network Rail our principal objective is the delivery of a better railway, in a safe, reliable and sustainable way for the lowest whole-life, whole system cost.

Safety is integral to everything we do. It goes hand in hand with good performance and, while we have made significant progress in the past 10 years, we recognise that we still have much more to do to make the railway even safer for the public, passengers, and particularly our workforce, an area where we lag behind other industries. Our approach to asset management helps to promote new ways of thinking, building on traditional good engineering practice, helping to transform safety and performance and value. These are not three separate goals. Asset management supports this with an additional emphasis in four main areas:

- it explicitly focuses maintenance, renewal and enhancement activities on delivering sustainable outputs valued by customers and funders at the lowest whole-life cost, as opposed to prioritising work predominantly according to condition or reliability alone
- it provides an integrating mechanism that crosses boundaries, between organisational functions and asset disciplines, and between the infrastructure manager and supplier organisations

- it places a greater weight on evidence-based decision making, using knowledge of how assets both degrade and fail in order to optimise maintenance and renewal interventions
- it requires changes to our past behaviours, with greater focus on customer need and collaboration across functions to create an interdependent/collective responsibility for achieving consistent objectives.

The significant benefits from applying an asset management approach are recognised by many asset intensive companies. They include the creation of a Line of Sight between strategy and implementation, the capability to deliver the same level of sustainable performance with reduced volumes of work, and the ability to demonstrate to external stakeholders that activities are being undertaken at the lowest whole-life cost.

The commitment required to achieve these benefits is also significant. We are working to achieve a highly developed approach to asset management. This includes alignment of planning processes, functional and technical specifications, approvals processes, installation and commissioning processes and the design of complementary and efficient inspection and maintenance regimes.

We have made significant progress in CP4, but recognise that continued improvement in our asset management capability is required during CP5 to deliver our planned efficiencies and effective long-term planning of the railway. "Our renewals expenditure of £12.5bn over five years is approximately the same as the total equivalent investment of the 23 UK water and sewerage companies combined."

2.2 Communication and engagement of stakeholders

In addition to our direct passenger and freight customers, we provide a service to four million passengers every day, have 10 million lineside neighbours, and are subject to active political, regulatory and local community interest reflecting our role in society, and the public subsidy the rail industry receives. Maintaining consideration of all these stakeholder views and needs when formulating our objectives and actions is crucial, as is creating a full Line of Sight as to how activity at every point in the Asset Management System contributes towards our agreed objectives.

2.3 Further context

Network Rail is one of the biggest asset management companies in the UK. When we last undertook a detailed comparison with other sectors our renewals expenditure of £12.5bn over five years is approximately the same as the total equivalent investment of the 23 UK water and sewerage companies combined. In railway terms, we have the oldest system in the world and one of the busiest networks in Europe, with 20 per cent more train services than France, 60 per cent more than Italy and more than Spain, Switzerland, The Netherlands, Portugal and Norway combined. We maintain around 30,000 bridges, 2,500 stations and over 20,000 miles of track. The effective management of these assets requires a robust understanding of their behaviour and the most appropriate actions to mitigate asset degradation or failure.

We share many of the challenges faced by the utility companies, such as a geographically dispersed asset base, an ageing infrastructure and a constant drive for service improvement at reduced cost. In addition, the categorisation of rail as a high-hazard sector (along with the nuclear, chemical and oil and gas industries) imposes additional safety requirements, requiring more precise planning and for safeguards to be designed into each discrete activity. We also manage complex interfaces between trains and our assets, requiring us to understand the dependencies between our assets and work jointly on initiatives to enhance overall performance. These add to already marked challenges harmonising the interfaces between our own assets, for example, how our signalling, electrification, telecoms, track and structures assets work as a system to allow level crossings to function safely.

2.4 Current capability

Our benchmarked comparisons have demonstrated that we are already established as best practice among European railways and UK utilities in our strategic planning, our asset policies, our asset information strategy, the delivery of projects and maintenance, and the way we work with our suppliers. We are striving to develop these areas further while working on improving our acquisition and use of asset information, whole lifecycle planning, approach to sustainable development, adaptation to climate change, and organisational culture. These are all areas where our benchmarking has shown improvement is both possible and desirable.

The principles of asset management require that the decisions we take consider railway system-wide implications, crossing departmental and discipline boundaries and focus on whole lifecycle value. This is not easy as complexities surround cost, risk and performance trade-offs, short-term and long-term impacts and understanding of how activity on one asset group (e.g. track) may impact on another part of the overall railway system (e.g. signalling). Thus we must make 'wise' decisions supported by reliable information, effective processes and delivered by competent people.

To help us address these challenges we have devolved asset management decision making and accountability within the business to route teams, supported by improvements to the provision of policy, assurance and essential services (telecoms, energy and asset information) from a centralised Asset Management Services organisation. This change is encouraging more local decision making (within a national policy framework) allowing local knowledge of customers and our assets to be appropriately factored in, and driving an improved system view of assets, improved trade-offs between maintenance and renewal activities, and more innovation and challenge to asset management processes. Additionally, we have produced a comprehensive asset information strategy and implementation programme (ORBIS) that is progressively addressing the challenge of strengthening our asset information.

We have spent considerable time in CP4 seeking out asset management best practice from other organisations. Our objective for asset management capability by 2019 is that we will provide a benchmark against which organisations throughout the world choose to assess their own asset management capabilities.

Table 1 Summary of benchmarked comparisons.

Criteria	Network Rail's 'Best Practice' Capability
Asset Strategy and Planning	Benchmark confirms we are towards the frontier of UK organisations. We are the first railway company to have produced an Asset Management Policy and Asset Management Strategy.
Whole-Life Decision Making	We have made significant investment in whole lifecycle costing and strategic forecasting models which underpin the Asset Policies. In these areas we are at least as advanced as the best UK utilities.
Asset Creation (management and delivery of major projects)	Comparisons with utility sectors confirm that our capability is judged to be similar. Additionally, the AMEM model confirms we are close to the frontier.
Maintenance Delivery	In these activities we lie at the frontier compared to both UK comparators and other rail organisations.
Weather and Climate Change	Our current research work into climate change is at the lead of known practices in both rail and utilities.

2.5 Scope of the Asset Management Strategy

Asset management applies to all activity involved in stewarding our infrastructure assets, this includes demand forecasting, strategic planning, investment decision making, annual activity planning, work scheduling, design development, project and work delivery, operation, incident management, assurance, review and learning. This involves a wide cross section of roles from central strategy and policymakers, process designers, asset stewards within our routes, and delivery organisations - whether maintaining, operating, renewing or enhancing our infrastructure.

This strategy applies to the whole lifecycle management, including acquisition/provision, operation, maintenance and disposal of all equipment relating to our fixed assets in each of the 10 categories listed below:

- signalling
- track
- structures
- earthworks
- electrification and plant
- drainage
- vegetation and fencing (off track)
- operational property
- level crossings
- telecoms.

Further details of the assets within each asset category can be found in the relevant Asset Policy.

Although not included in the suite of current Asset Policies, asset information is considered a fundamental asset in its own right and underpins good asset management. To recognise this we plan to create an Asset Information Policy within the plans laid out in this strategy. The scope of asset information includes:

- an inventory of our assets, what they are and where they are
- asset condition reports including inspections, and maintenance records and measurements
- failure and fault data
- asset performance data
- operating and maintenance manuals and as-built records
- configuration records
- materials and spares registers.

Further information sources held on corporate systems include:

- staff competency records
- audit and investigation reports
- financial records and unit costs
- corporate risk registers.

The remainder of this strategy document is structured as follows:

- Section 3 provides a summary of our current position, how our asset management activity has supported improvements in infrastructure performance and identifies planned changes in CP5.
- Section 4 summarises our asset management objectives, how these are derived from our corporate objectives and our Asset Management Policy objectives and principles and provides an assessment of our current asset management capability.
- Section 5 identifies target levels of capability to be achieved within the next control period, summarises the workstreams that have been designed to implement the required Improvement, including constituent parts of the Network Rail Asset Management Excellence Strategic Theme and dependent actions from other programmes and provides an outline programme for the delivery of the workstreams enhancing processes, competence, access to information.
- Section 6 confirms how we will govern the programme, including monitoring and measuring progress towards an anticipated trajectory of improvement.
- Section 7 confirms conclusions, approval status and communicating the strategy.

Our customers rely on us to provide a safe and reliable infrastructure on which to run train services.

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3. Current position

We recognise that continued improvement in our asset management capability is required during CP5 in order to deliver on proposed efficiencies. To achieve this we have a target of 'setting a worldwide benchmark for excellence in asset management' by the end of CP5.

3.1 Performance during CP3 to CP4

The condition and performance of the infrastructure improved significantly in the five-year regulatory control period up to 2009. In parallel with these improvements in condition, reliability, safety and performance impact, there was a significant reduction in the cost of maintaining, renewing and operating the infrastructure. Our cost base reduced by 27 per cent, despite the number of train kilometres (the major source of asset degradation) having increased by five per cent.

During CP4 (2009-14), the industry achieved nine per cent train km growth, ahead of the five per cent planned growth supporting a significant growth in passenger numbers. Less positively, the service provided to customers (measured by passenger train punctuality, PPM) was less resilient to the traffic growth and although PPM initially rose from 90.6 per cent, to 91.6 per cent in 2011/12, it then declined to 90.3 per cent in 2013/14 due to a variety of factors, not least the extreme weather we experienced during winter 2013/14. The availability of the infrastructure has increased with our disruption indices improving by 35 per cent for passenger and 12 per cent for freight. These outcomes were delivered while achieving additional efficiencies of 15 per cent.

The contribution towards these targets offered by changes in the condition and reliability of the infrastructure was represented by the Asset Stewardship Index (ASI). This measure improved by 10.5 per cent over CP4, ahead of the original forecasts. Despite the overall achievement, the anticipated contribution to train service performance improvement has not materialised, analysis of the reasons for this has demonstrated that infrastructure reliability alone offers only a limited contribution towards overall PPM – other factors including the timetable configuration are more significant. Thus, in moving forward, we are looking to realise additional performance from our infrastructure based upon overall asset system performance, in particular by addressing the most critical assets through targeted interventions and reliability improvements.

3.2 Future demand

Demand continues to grow on key parts of the network, today more people travel by rail than at any point since the 1920s, when the rail network was around twice its current size.

Every year 1.3 billion journeys are made on Britain's railway and 100 million tonnes of freight is transported by rail between ports and factories and demand is still increasing. Over the next 30 years passenger demand for rail is forecast to more than double and freight demand is expected to go up by 140 per cent.



- 1 Euston Station platforms during rush hour.
- 2 Demand for rail freight transport is set to increase by 30 per cent over the next 10 years.

3.3 Current asset management capability

Significant improvements in the management of the infrastructure have been achieved in the control periods to date, yet despite this, continued work is required to further improve outputs while reducing costs. This challenge is going to be even bigger and more difficult than those experienced to date. In response to this challenge we have been progressively developing the means to enhance our organisational capability in asset management.

To achieve this requires that we have an objective method to allow us to measure our developing capability and one which allows us to benchmark ourselves against acknowledged leading performers. Not only does this demonstrate our capability to external stakeholders, but it also ensures our plans make further improvements informed by best practice. This helps to both shape our improvement plans in asset management and demonstrates our capability to our external stakeholders. This is part of our Network Rail-wide benchmarking work where a benchmarking maturity dashboard is being used to monitor and steer our wider benchmarking activities, ensuring appropriate depth and coverage across the business.

3. Current position continued

3.3 Current asset management capability continued

The best practice approach to measuring asset management capability is through the use of an 'excellence' model. Since 2006, we have used the Asset Management Excellence Model (AMEM), a tool created and owned by Asset Management Consulting Ltd (AMCL Ltd), specialists in the subject matter of asset management. The discipline and subject matter of asset management is now well defined through both the requirements of the ISO 55000 series of standards and the six groups and 39 subjects of 'asset management' defined within the 'Asset Management Landscape' developed by the Global Forum for Maintenance and Asset Management (GFMAM). The scope of subject matter within the AMEM model align to these definitions of asset management, and its provenance and breadth makes it an enduring set of criteria against which to measure our progress towards excellence in asset management, not just within a UK context but also against international standards

The GFMAM six groups and 39 subjects within the AMEM model are:

The GFMAM six groups and 39 subjects.



The AMEM is a questionnaire based model with a six point maturity scale that ranks the responses in a range from 'Innocent' to 'Excellent'. The assessment has been undertaken in 2006, again in both 2009 and 2011 at the time of SBP 2013 and most recently at exit of CP4. The progress we have made within each of the six groups between 2009 and 2014 and our future targets are summarised in Figure 3.

The 2014 AMEM assessment showed improvement in all priority areas relative to past studies. It also found

that although relative gaps had reduced, the majority of strengths and weaknesses had changed very little since the baseline in 2006. This reflects our intention to achieve continuous improvement on all fronts with accelerated improvement on weaker areas.

In some areas we have added additional scope and new areas of improvement (for example Weather Resilience and Climate Change, Technical Standards and Organisational Structure). In other areas where we have found progress harder (Asset Data and Risk-Based Maintenance) we have not yet completed all we had hoped but have continued to explore and resolve issues to conclude remaining work as early in CP5 as is possible.

We have found the AMEM tool to be a powerful and objective means to track our progress and reveal key issues at a network level.



Figure 3 Group score, start CP4, exit CP4.

3. Current position continued

3.4 Route asset management capability

Since devolution we have been investigating the means to help routes appreciate their own capabilities, where their own strengths and weaknesses lie and permit the development of their own prioritised improvement initiatives from a route-specific, rather than simply a network-wide, generic perspective. During the past six months we have developed a simplified version of the AMEM model, 'AMEM-Lite,' that can create a route specific measurement of capability. We have carried out baselining with each route; this has enabled opportunities for improvement to be identified.

Work is ongoing to identify Network Rail-wide themes and to design the best approach for disseminating results and information to enable continual improvement within the routes. Preliminary results show that route capability while varying to some extent within each of the six AMEM groups is broadly in line with expectations, reflecting the overall development of asset management capability maturity within Network Rail as a whole, and the dependencies on centrally driven initiatives such as ORBIS and the development of whole-life cost models. There is undoubtedly more to be made of some recent process improvements and a number of route-specific good practices that require sharing and adopting across other routes.

In addition to the above, separate workshops were held with Routes during the summer of 2013 to reveal concerns and priorities for improvement. The outputs of these sessions have supported the development of this strategy.

"During the past six months we have developed a simplified version of the AMEM model that can create a routespecific measurement of capability." Maintenance activities are a major part of the asset management discipline.



4. Asset management objectives

Asset management is about aligning the way we manage our assets with our corporate objectives. In the case of Network Rail our principal objective is the delivery of a better railway, in a safe, reliable and sustainable way for the lowest whole-life, whole system cost.





- 1 Through the Line of Sight, every employee contributes to the Asset Management System.
- 2 We must ensure that we equip staff with the knowledge to perform their roles properly.

4.1 Corporate objectives

The key organisational objectives for asset management are to:

- deliver the organisations' strategic plan; (summarised in Table 2 opposite)
- understand the required asset performance, condition, costs and risk; at both asset system and discrete asset level
- use whole-life management tools and techniques to seek benefit/cost optimisation
- prioritise capital investment programmes based upon an assets contribution to service (asset criticality)
- monitor, forecast and improve performance of the assets.

At the same time we will be trying to deliver more for less in the way we operate and run the railway on a daily basis. In the next five years our target is a 20 per cent reduction in our operation, maintenance and renewal costs.

4.2 Optimisation criteria

Asset management supports the delivery of the required outputs at the lowest whole-life cost.

The factors that are analysed to determine options for the delivery of outputs, costs, and risk at both asset system and discrete asset levels, include the following:

- safety risk to passengers, workforce and members of the public caused by infrastructure issues
- impact of infrastructure faults on train performance, measured by PPM attribution
- impact of the infrastructure on the environment
- life of the infrastructure, measured by long-term condition trends, whole lifecycle cost requirements and assessments of asset residual life
- resilience of the infrastructure to weather and climate change.

These factors determine the required maintenance, renewal or enhancement interventions, which are evaluated to establish whole lifecycle costs. To ensure consistency in the application of these criteria we are developing a consistent set of analysis tools drawing from integrated information sources.

Table 2 Asset output specification table.

Output	Network Rail's commitment in CP5	How this is reflected in our Asset Output Specification CP5 to CP11
Safety	We commit to continually reducing the risk to the public, passengers and our workforce. By 2019 we want to reduce the risk at level crossings by at least a further 25 per cent; reduce train accident risk by 50 per cent; and eliminate all fatalities and major injuries among our workforce and the contractors who work for us.	Further enhance our emphasis on safety provisions. The way we will meet this is firstly, deepening our understanding of the underlying factors that create the risk and then identifying what we can do to make a real difference. We will drive improvements through better design, refined intervention and modern equivalent asset forms, reducing time spent trackside. Close a further 500 level crossings by 2019 and, where necessary, improve safety measures at the 6,000 crossings that remain.
Performance	We will focus on reducing the variability in train service reliability and reduce the gap between the best and worst performing services. Our aim by the end of CP5 is to deliver for passengers and freight the best ever level of punctuality with a target of 92.5 per cent of trains arriving on time.	Increasing the performance of our infrastructure, reducing disruption to services through increased reliability of the overall asset system, and reducing the number of failures where these impact on service, through better targeting of sources of risk and criticality in renewals, greater refurbishment and risk-based maintenance activity to retain overall levels of reliability while accommodating traffic growth.
Capacity	We have developed a plan with train operators to accommodate the demand forecasts set out in the HLOS. Our plan sets out the enhancement programme required to support the necessary train service changes. Our plan also sets out for each specific enhancement programme the outputs delivered, scope, cost and key milestones.	Improve performance planning to better understand the causes of delays and give us the best evidence to design specific enhancements and change to inventory. Maintenance, renewal and enhancement activity will be fully coordinated at route level to deliver required asset capability.
Availability	We develop our access strategies in each route with train operators.	Asset Policy developed to optimise whole lifecycle cost, with required changes to access identified. Iterate to form final policy in conjunction with route and industry feedback. Detailed and deliverable access requirements to be developed at Route level in Route Plan.
Sustainable Development	We have developed a vision and strategy for sustainable development. We will commit to including climate change scenarios in our asset policies and investment decisions to protect the future value of our assets.	Asset Policy to be justified on whole lifecycle basis and to demonstrate economic, social and environmental sustainability. Policy to cover specific climate change adaptation requirements through specified programmes or changes to design and environmental specifications.

4.3 Future measures of asset management

We have built upon the Asset Stewardship Indices used in CP4 (and its underlying measures) to develop improved measures of reliability and sustainability of our assets. The objectives of which are:

Reliability To assure that any shortfall in performance or early indications of prospective gaps are identified such that appropriate mitigating actions can be implemented. These are typically service-affecting failures or faults requiring immediate intervention. Sustainability To assure that our maintenance and renewal regime will sustain performance in the longer term, avoiding the build-up of backlogs of work that would need to be recovered. This is measured as a trend over several control periods. Our preferred sustainability measures are the percentage of asset life that has been used or is remaining.

In addition to these measures, we measure further aspects of asset performance and overall asset management. These measures adopt an array of lead and lag indicators and are summarised in Table 3 below.

"We have built upon the Asset Steward Indices used in CP4 to develop improved measures of reliability and sustainability of our assets."

Table 3 Key Indicators of asset performance and asset management.

Key performance indicators	Lead	Lag
Asset performance	Models and forecasts of Reliability Sustainability Condition forecasts Capability forecasts Data quality	Reported asset condition Reported capability Trends in reliability/ sustainability measure and submeasures Safety measures (Wrong side failures/ accident frequency) Volume variance (plan vs actual) Unit costs of delivery
Asset management	Network-wide asset management capability measure (AMEM) Route asset management capability measure (AMEM-Lite) Programme milestones Safety culture scorecard	Assurance findings Non-conformance trends Competency trends Volume variance (plan vs actual) Unit costs of delivery

- Images, top to bottom
 Apprentice training programme, HMS Sultan, Gosport.
 Penhelig.
 London Paddington Station.
 Newcastle Central Station

- Station.

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5. Creating asset management excellence

The engineering competencies that have served the railway well over many decades are as relevant today as they have ever been. But in order to deliver on our asset management objectives we must develop and blend specific skills in this area, and measure and assess our progress.

5.1 Target capability

During CP4, AMEM has become a key asset management indicator for Network Rail and this has helped assist our continued asset management improvement.

In addition to our own target to be a benchmark against which organisations worldwide assess their own capabilities, the ORR has included requirements for levels of capability measured network-wide by the AMEM model within the final determination for CP5, this requires Network Rail to demonstrate an achievement of capability levels of 72 per cent for each of the six groups by January 2018 measured as a regulated output.

5.2 Key asset management milestones

To achieve these capabilities we recognise the need for a long running programme of improvement (see Appendix B CP5 Roadmap), within this we have identified a select number of critical deliverables as follows:

- updated Asset Policies incorporating priority safety and sustainable development improvements and alignment with priority work in the risk-based maintenance programme to be in place by April 2015
- a complementary suite of decision support tools to meet the needs of network-wide and local asset management planning, supporting the above analysis to be developed and cascaded by December 2016
- optimised maintenance interventions for a selection of high-criticality assets to be established, on a fully quantified cost/risk basis by March 2016
- updated Asset Policies with defined reliability, availability, maintainability and safety requirements aligned to asset systems thinking to be in place by January 2017
- optimised maintenance interventions for an appropriate range of medium and low-criticality assets to be established, on a defined and appropriate cost/risk basis by January 2018.

In addition, appropriate asset management maturity capability requirements, metrics and targets for CP6 will be published by January 2018.

"Network Rail is required to achieve capability levels of 72 per cent for each of the six AMEM groups by 2018."



1 The sheer quantity and variety of Network Rail's asset portfolio, including track, signalling and overhead line equipment.

5.3 Asset Management Strategic Theme

The Asset Management Strategic Theme has been developed from intelligence we have gathered from benchmarking work, prior AMEM reviews, and wider audit and assurance work, together with knowledge gleaned from professional institutions and work within Network Rail and our routes. **The programme is structured within six chapters as follows:**

5.3.1 Chapter 1 Asset Policies

This chapter includes an explanation of our overall policy for asset management, and the structure and content of individual (whole-life cost) policies for each asset group, including links to network capability and performance – including consistent approaches to deliver asset system level performance. These form the key documents in our overall management system – a synopsis of which is included in Appendix A. The Asset Management Policy and its relationship with other key documents and processes are shown in Figure 1 on page 3.

Our Asset Policies specify how to select the major inspection, maintenance and renewal interventions for each asset discipline. Very few organisations document their asset interventions to this level of detail. These documents require continuous improvement and our programme reflects this with a phase of development to April 2015 and subsequent activity published in late 2016. Further work will continue beyond these milestones. The sequence of improvements reflects enhanced evidence including: verified outcomes from maintenance, renewal, and enhancement works, early adoption of knowledge on sustainable development priorities including adaptation to climate change, and progressive adoption of a system-based approach to asset management.

It is intended that all related policy, strategy and management systems documents will be the subject of ongoing review and development. The Asset Management Policy and Asset Management Strategy will be reviewed on a two-yearly cycle, with the system updated at least annually or as required to align with organisational changes.





- 1 Asset management requires people to work together and share information openly.
- 2 Asset management must be communicated to all parts of the workforce.

5.3.2 Chapter 2 People capability and competencies

This chapter covers the plans to develop the capabilities and competencies of our people in order to deliver our Asset Management Strategy.

Because asset management is multidisciplinary and cross functional it requires people who can work in multidisciplinary teams; are open to evidence, methodologies and approaches shared by people from different backgrounds and know-how to integrate and interpret these factors in their decision making. To realise this we need a mix of practical and thinking skills underpinned by knowledge and understanding relevant to the activity being carried out, complemented by collaborative behaviour.

We already have an established technical strength, and we plan to nurture this talent, including actions that will create a pipeline of future technical skills through raising awareness in primary education, through advocacy of science subjects in secondary education and work with academia to retain and enhance further education and technician development. We will complement this with entry level graduate and technician training schemes, and initial and continuing professional development through our established 'professional communities'.

In addition to technical skills, our safety leadership and culture change programme seeks to develop a culture that supports behavioral change including effective collaboration, challenge, customer focus and accountability and ensure that safety is never compromised. This directly contributes towards the culture necessary to improve our asset management. In addition to this we need to extend the capabilities of our people beyond the areas of historical technical strengths to facilitate collaborative sharing of knowledge, decision making that considers all aspects of our required outcomes, including enhanced commercial awareness and skills required to evaluate cost and performance risk trade-offs. The improved capabilities we seek also include a strengthening of our ability to evaluate design choices against their through-life safety and reliability performance, further improving workforce, passenger and public safety through better design.

To support the development of these capabilities requires raised awareness within our leadership community and an enhanced appetite across all our people to seek, share and adopt others learning.

We therefore plan to undertake specific action on the following capability areas:

- coverage of asset management awareness and requirements in our leadership programmes
- development of systems engineering thinking, helping to integrate expertise from a discrete function into design solutions that meet the overall asset systems needs, thereby delivering consistent railway services
- developing whole lifecycle decision-making capability for decision-making roles in capital improvements and to support the development of optimised maintenance regimes. This will include proficiency in tools aligning discrete interventions with longer term deliverables, factoring in economic considerations and evaluation of cost/service risk trade-offs.

• assurance and knowledge management activity, promoting skills that support the sharing and use of wider knowledge.

The Institute of Asset Management (IAM) Competency Framework has been developed to assist organisations identify the competencies they need and for selecting, assessing and developing people as individuals and in cross-disciplinary teams. We have used this framework to develop our own competencies, mapped to our asset management activities within our Asset Management System.

We have piloted the use of our Asset Management Competency Framework and rolled out initial awareness training. We plan next to integrate our new Asset Management Competency Framework with our well-developed technical frameworks in order to systematically identify competence requirements, assess gaps and complete the development of our training and development programmes, many priority modules of which we have already put in place. This will cover all of our people involved in core asset management activities, which is approximately 200 staff as first priority, those that closely support this group (approximately another 500) and a total reach into a further 1,500 Network Rail staff who are engaged in asset management activity. This material will be made available for succession planning and the creation of a pipeline of talent. This will be complemented by overall asset management awareness raising helping business-wide appreciation of why we carry out the interventions we do. Our work continues to be informed by the professionalisation and chartership initiatives being pursued by the Institute of Asset Management.

5.3.3 Chapter 3 Asset information and data, including the 'Offering Rail Better Information Services' (ORBIS) programme

This chapter comprises the overall plan to deliver improvements in the quality of our asset information, the plans to collate and make this more readily available, together with visualisation and decision support tools.

Asset information is critical to maintenance and renewal decision making at both the strategic and tactical levels. It is essential that enhanced mechanisms for automated data capture, collation and visualisation is complemented by improved governance of data capture across Network Rail's business.

Asset information comprises all our data sets that are accessed through information systems which store, process and transmit asset management information. Asset information supports all the primary decision and activity components covered in our asset management framework, including the development of optimised asset policies and the production and implementation of asset plans. The scope of asset information is broad, covering all meaningful data relating to assets and asset management. This includes asset type/location, age, capability, and condition. It also includes failure histories and consequences, work histories, unit costs and as-built drawings.

We have set specified data quality targets that align with the needs of our decision-making processes. To achieve these will require improvements in the completeness and quality of data held across all of Network Rail functions, this chapter focuses on all aspects that will assist and enable improvements, including the data policies, standards and the systems and tools that collate and allow visualisation of data.

We see data as an asset in its own right, and our future approach to its management will be developed to accord with ISO8000 Master Data: Quality Management System. In addition to the benefits of using tried and tested methods, this approach will also enable Network Rail to grow its benchmarking and best practice sharing capability beyond traditional comparators.

Our Asset Information Policy will define the outputs, and clarify system interfaces, activities, constraints and minimum competencies required to deliver those outputs.

Currently, our asset information is held in a number of differing systems supported by a range of data maintenance and assurance procedures. Our Asset Information Strategy covers the scope and sequence of improvements we intend to make up to the end of CP5. This is complemented by a long-term programme of improvement – Offering Rail Better Information Services (ORBIS).

The ORBIS programme has been created to deliver:

- tools to capture, maintain and access high-quality asset data
- the ability to join and view asset data in collaborative environments
- decision support tools to better manage the asset.



1 Smartphone and tablet technology is helping frontline staff work safely and efficiently. Improvements to Network Rail's asset-related data and data collection, evaluation and collation capabilities will be delivered through a number of key programmes:

- mobile device and works management to provide the front line workforce with tools to collect accurate asset-related data. The data collection services strategy will improve the capability to automate data collection through enhancements to the train-borne monitoring fleet
- geo viewer and location data improvement to visualise the railway using image-capture techniques such as LIDAR, birds eye and oblique photogrammetry. This capability will provide data stewards with a new perspective of the railway that will highlight instances of inaccurate data previously not easily visible
- improved management of the handover/hand back of assetrelated data from enhancement and renewals projects to improve the timely transaction of accurate asset-related data exchanged throughout the lifecycle of enhancement/renewal activities
- development of the Rail Infrastructure Network Model (RINM) as a model of the railway as a system to enable the system to be viewed both topographically as a map and topologically as a schematic. RINM will bring together infrastructure data sets describina what, where, workbank and condition, and system-level data sets of capability, utilisation and performance. It will enable a step change in data quality business rules that can be applied to assess inaccuracy and direct subsequent improvement activities

• the Asset Data Improvement **Programme** will work in parallel with local improvement initiatives delivered by data stewards to enhance specific areas of asset data quality shortfall.

This programme is fully funded within CP5. Detailed benefits analysis forecasts that the programme will deliver significant sustainable financial, performance and safety benefits during CP5 and beyond, and further evaluation and knowledge gained during the deployment of capability will further enhance our ability to leverage maximum benefits from these investments.

In addition, our asset information organisation will continuously improve our asset information aligned to business need, and will help specify mechanisms to capture this systematically, enhancing data governance, sharing and exploitation of data, as well as further deployment of handheld technology and progressive support to business change and benefit realisation.

The ORBIS and asset information organisation improvements are complemented by other programmes including improved systems to hold civils assets data (Civils Strategic Asset Management Solution – CSAMS), report on financial data, and the processes/systems involved in sharing and receiving information from construction suppliers (through the Building Information Modelling 'BIM' programme).

5.3.4 Chapter 4 Risk-based Maintenance and Remote Condition Monitoring

This chapter covers our plans to improve our maintenance decision making, allowing us to progressively optimise maintenance intervals for a cost-effective level of performance and risk, quantifying the trade-off between the cost of undertaking maintenance and the increasing risks associated with a deteriorating asset. The chapter is defined further within the Network Operations Business Strategy.

Best practice has been researched, and this confirms that the total cost of providing reliable infrastructure has been reduced by others through the adoption of risk-based maintenance techniques. However, to achieve the optimal maintenance regimes requires a range of business initiatives to be pursued and aligned.

We are applying techniques using Failure Modes and Effects Analysis (FMEA) and evaluating the acceptability of the consequences of failure. These requirements are consistent with the design of our lifecycle cost models and we are using these as a core part of the process of developing improved future maintenance regimes, testing the possible trade-offs that exist between renewal and maintenance (cost) with differential levels of risk. This work has also included improved specification of future information on reliability and defects, together with wider work to improve the integration of processes surrounding failure management, capturing new information to allow us to evaluate opportunities to vary the cost/risk trade-off achieved through our maintenance. For example, we may establish it is right to do more

maintenance to provide a significant extension to asset lives, or conversely we will reduce the level of maintenance we carry out where the actual implication of not carrying out a maintenance task does not import undue risk and is less costly than carrying out the task.

Regimes will continue to be refined and improved as the results from the other programmes become available. It is essential that the new regimes are based upon strong evidence that they are robust, sustainable, demonstrably manage safety and performance risk, whilst being as efficient as practicable.

In order to derive greater real time understanding of asset performance, reduce access to track and improve our understanding of rates of asset degradation, we continue to seek cost effective opportunities to adopt Remote Condition Monitoring (RCM) technology. This equipment is deployed on critical assets with the monitoring records deployed direct to our control rooms. This equipment detects asset degradation and can highlight the need to intervene before individual assets fail. and therefore alians well with our risk-based maintenance initiative as it enables us to maintain our infrastructure in a more reliable way and at a lower cost. RCM technology can be applied to equipment that is located on fixed infrastructure to monitor the condition of this as well as equipment that is located on rolling stock to measure the condition of fixed infrastructure and vice versa.

We will expand the use of RCM in CP5 across the areas of earthworks stability, signalling, electrification and plant, and telecoms. This area of the programme will be delivered in a sequence of phases such that we can respond swiftly to opportunities (from the launch of new technology) or improved knowledge of degradation patterns and trigger levels within our asset portfolio such as arises from reliability analysis, operational performance analysis, and our asset policy development work.

5.3.5 Chapter 5 Depot project

This chapter covers our plans to increase the productivity of our people who manage and maintain our assets on a daily basis, further details are contained within the Network Operations Business Strategy. Studies have shown that Network Rail's depots and maintenance activities are not operating efficiently by benchmarked standards. As a result, the 'Depot Programme' has been instigated. It consists of around half the efficiency projects included in the Maintenance National Efficiencies but will add a coordinating and driving role and also identify new opportunities through CP5.

Reforming the maintenance workplace through better technology and management is critical. A comprehensive programme of staff (management and operative) and trade union engagement will be adopted. Further definition of activities is under way.

5.3.6 Chapter 6 Asset Management Excellence Model

This chapter covers how we assess our capabilities in asset management. This therefore covers the adoption and use of the AMEM model. The chapter also covers our use of benchmarking as a key component of our asset management strategy. Asset management is still relatively new and is rapidly developing. A number of companies have embraced the subject and have attained best practice in some key areas. We are eager to learn from such organisations. Structured questionnaires have been used to support discussions with each organisation. The results from these exchanges have been used to inform our improvement planning. We have learned a lot from benchmarking, both in terms of guiding our improvement and how to better target benchmarking activities. We plan to continue this approach to refine and progressively enhance our improvements. Additionally, we will continue our involvement in industry forums, and established work with professional institutions. Most notably we are a Patron of the Institute of Asset Management, who we are working with to support our work on professionalisation (People Competency).

Asset Management Excellence.

Contributing Programmes.																
Кеу	Strategic Theme	Sustainability		Capacity and	periormance		RTS	People		Safetv		Project development	and delivery		Funding and affordable	
Key contribution to excellence			ent													ents
Other contribution	Project Heading	Weather and climate change	Fault management improveme	Decision support framework	Performance planning review	Industry access planning	Rail technical strategy	Behaviours/Safety culture	Capability framework	Business Critical Rules	Integrated risk framework	Programme management	Clienting 'Role'	Unit costs	Long-term plan process	Supplier engagement improvem
Strategy and Planning																
Asset Management Decision-Making														[[[[]		
Lifecycle Delivery																
Asset Knowledge																
Organisation and People																
Risk and Review																

5.4 Key related areas of improvement

The overall challenge in Network Rail is to transform safety and performance and value. These are not three separate goals. We need an integrated approach where improved safety drives improved train performance and releases value. We recognise that progress will come from focused, accountable leadership, robust planning, well-trained and highly motivated teams, working in the right ways, within a culture of continuous improvement. Thus our asset management excellence strategic theme must be developed in harmony with wider programmes and is in part dependent on these to develop complementary behaviours and approaches across Network Rail.

The most significant dependent projects and initiatives are outlined below, these are not exhaustive but represent the most critical related areas of work.

5.4.1 Technology strategy

We recognise that we currently have an incomplete understanding of how our assets change in condition and performance throughout their lifecycle, that is how assets degrade and fail with age and usage, how this degradation and failure impacts on service outputs and the optimum interventions to mitigate or prevent failures. We have therefore established complementary research and development programmes to help develop robust lifecycle cost methods and tools. Our intentions in this regard will be established more specifically in parallel with both the Rail Technical Strategy and our own technical strategy.

5.4.2 Business Critical Rules

The Business Critical Rules programme will reduce the complexity of our working regime (i.e. standards, competence and business processes) by implementing a new control framework across the company. This framework will replace the current Network Rail standards framework with a reduced number of rules applicable to all staff and suppliers complemented by new integrated management systems. Compliance with the rules will be supported by changes to our competence arrangements and by better provision of information.

5.4.3 Capacity and performance management

The relationship between train service performance, recovery of the service when disrupted and, availability of train paths is inextricably linked to asset performance, and access to assets to carry our renewal, maintenance or repair. This strategic theme is developing improved mechanisms across the rail sector to share knowledge and plan integrated access. Dependency between the two strategic themes and common areas of technical capability are aligned through integrated planning and participation in governance mechanisms. Knowledge gained through this theme will be reflected in updated Asset Policies and decision support tools and processes.

5.4.4 Safety leadership and culture change

We know that success in CP5 depends on everyone being engaged and committed to the part they can play. Delivering CP5 requires more than just sustained investment in our infrastructure. It is also about our people, it means involving every person in our plans for the future and it means harnessing the creativity and experience of our teams to improve the way we work and the way we interact with customers and partners.

We are seeking to develop real ownership and accountability for seeing actions through at a local level and it means holding each other to account for the way we behave and the impact we have on each other. Our work in CP4 included devolution to a route structure, this places decisions on future planning much closer to our customers and comprises the best balance of top-down consistent frameworks and bottom-up local knowledge.



1 & 2 Understanding how climate change will affect our assets is key to building resilience in our systems.

5.4.4 Safety leadership and culture change continued

We can only unlock people's potential and become the business we wish to be by being **customer driven**, **accountable**, **collaborative** and prepared to **challenge** throughout CP5. These four behaviours were identified as part of Network Rail's strategy development in 2012 and remain the focus of improvement, and the basis for evaluating how we work.

Our Safety Leadership and Cultural Change Programme is aiming to develop the required future culture, for example through activities such as the development of 'fair culture' principles for investigating and addressing breaches of our Life Saving Rules.

The definition, measurement and future plan of this programme has been tested against known best practice guidance (available from Institute of Asset Management and Institution of Civil Engineers, and Australian Council of Asset Management publications) together with wider organisational development guidance. It has been found to fully align to the needs of an excellent asset management organisation.

5.4.5 Weather and climate change

As with rail networks throughout the world, the operation of Britain's network can be affected by adverse weather conditions. Ice, snow, heavy rainfall, lightning, heatwaves and high winds can all lead to asset system failure or degraded operation. For example, periods of drought can lead to embankment deterioration, and high temperatures increase the risk of track buckling: both impacts may result in the requirement to impose temporary speed restrictions. Network Rail is committed to seeking improvements in infrastructure design and asset components to increase reliability during periods of extreme weather.

Weather resilience issues will be exacerbated by climate change. Although it is difficult to predict the precise changes in future weather events with any certainty, there is sufficient evidence to suggest that there will be an increase in the range of weather-related factors that the system will need to be resilient to. Climate change research indicates the potential impacts of climate change in the UK include increases in average and maximum daily temperatures and changes in rainfall patterns (both intensity and duration). Additionally, it is understood that the UK will still experience occasionally very cold winter conditions perhaps more regularly than it has done in recent years.

Both weather resilience and climate change are the subject of long running programmes of improvement in Network Rail. This work will continue through the development of our technology strategy, developments to design specifications and the progress of our sustainable development strategy. This work is supported by technical resources involved in improving asset policies, thus intended changes will be aligned with updates to asset policy and decision support tools to progressively enhance resilience to weather and climate change.

In the same way that we need to better understand how climate change affects our assets, we too must work to minimise our impact on the natural environment.

6. Delivery of the Asset Management Strategic Theme

In order to ensure that defined asset management targets are met, Network Rail has implemented a regime of controls and reporting mechanisms that enable progress to be accurately tracked. Monitoring and direction is provided at executive level through the Asset Management Strategic Theme Board.

6.1 Tracking annual milestones

Our Strategic Theme and broader asset management improvements will continue to deliver enhanced capabilities throughout CP5. However, it is important that we are able to measure and demonstrate good progress at regular points during this timeframe. Key milestones have been set in detail over two years, with extended actions to the publication of the next Strategic Business Plan in 2018 and additional activity to exit of CP5. Table 4, below, shows a summary of the key milestones of the strategic theme structured against the AMEM model groups.

We will keep the required elements of the Strategic Theme under review to reflect learning from management reviews, internal verification, professional community feedback and audit and assurance activity. Our next intended update to our plans will be December 2014 reflecting feedback from independent reporting into ORBIS, RBM, AMEM and AMEM Lite.

Table 4 Key milestones table.

AMEM Group	Year 1 2014/15	Year 2 2015/16	Year 3 2016/17	Year 4 2017/18	Year 5 2018/19
Strategy and Planning	Left blank intentionally	Updated Asset management strategy reflecting learning from first two years of CP5 and wider benchmarking March 2016	Modelled long-term work volumes and costs for agreed CP6 scenarios March 2017	Updated asset management policy and strategy with future rates of capability improvement available January 2018	Integrated route asset management, resourcing and access plans in place for CP6 March 2019
Asset Management Decision-Making	Decision support tools for whole lifecycle cost analysis deployed across business March 2015	Our key maintenance regimes are optimised on a full understanding of risk March 2016	Our policies have been updated to inform the initial industry plan for CP6 September 2016	Lifecycle value analysis processes, and toolset have been applied in developing CP6 plan for SBP January 2018	Left blank intentionally
Lifecycle Delivery	WLCC toolset deployed across agreed Enhancement and Large Renewal projects. Verification and investment papers confirm uptake March 2014	Project Requirements specification, Clienting and Sponsor capability deployed, verified and demonstrably BAU March 2016	Depot project milestone TBC	Left blank intentionally	Future resource planning aligned to SBP and delivery plan March 2019
Asset Knowledge	Roll-out completed of the linear asset decision support tool – a key development of the ORBIS programme May 2014	Signalling and E and P toolset delivered to agreed ORBIS Milestone March 2016	Ellipse becomes the master system for civils June 2016	Data confidence assessment confirms core data at specified data quality targets April 2017	Left blank intentionally
Organisation and People	First phase RAMS specs in product acceptance processes March 2015	Completion of core training catalogues March 2016	Attainment of MSc or equivalent by priority cohort March 2017	Competency requirement and actual team competency fully align. Forward plans exist to sustain January 2018	Left blank intentionally
Risk and Review	Updated policy documents align with Sustainable development strategy priorities March 2015	Route capability improvements indicated through AMEM-Lite reviewed, reported and any corrective action implemented to support progress to excellence March 2016	Left blank intentionally	Network Rail's asset management capability independently assessed as Excellent January 2018	Left blank intentionally

6.2 Governance arrangements

A strong governance framework has been implemented to provide direction and monitoring of the progress of the Asset Management Strategic Theme.

As illustrated below, the overall programme has an executive sponsor and is supported by senior representation from Group Strategy, Safety and Sustainable Development, Network Operations centre, Route Asset Management, Finance and Asset Management Services. For each of the chapters, the client, sponsor and delivery roles are separated. Direction to, and monitoring of the programme is provided by the Asset Management Strategic Theme Programme Board, which comprises senior managers from across the business. A programme board member is assigned to each workstream and is accountable for its success. Asset Management Strategic Theme meetings are held every four weeks. Additional progress meetings involving the client, sponsor and the programme director for delivery are held frequently to provide more detailed guidance and review.

Progress, issues and risks across the programme are highlighted as part of the monthly executive review meeting where performance across the whole of the asset management system is monitored with exceptional reporting and referral to Network Rail's Executive Committee.





6.3 Trajectories of improvement

Our Asset Management Improvement Programme has been developed to allow us to enhance our asset management capabilities in some regard for each of the 39 subjects of asset management (as measured within the AMEM model). We have placed greatest emphasis thus far on those where we have identified the most compelling business benefit. We expect to retain this approach as we review programme progress through CP5.

The strategic improvements we intend to make are underpinned by a much more detailed technical programme that specifies activity over a rolling 18-month period. Thus we have greater confidence about the full scope and likely deliverables in the short term and are able to forecast trajectories of improvement. In the longer term these become less certain, but we are able to confirm the minimum levels we plan to achieve. The trajectories towards excellence for each of the six groups of the AMEM model are shown in Table 5 below. We would expect to exceed these minimum levels in a number of the 39 subjects and be towards the frontier for our most critical areas of asset management.

We see the achievement of these trajectories as an essential part of delivering 'a better railway for a better Britain', in some areas we may choose to go further faster, reflecting our belief that excellence in asset management supports effective and efficient business performance.

6.4 Managing the trajectories in CP5

Generating anticipated trajectories of improvement against the AMEM model is not a deterministic process. This is because the model is the subject of revised scoring parameters as new best practice emerges. Some improvement is therefore necessary simply to be seen to stand still. This makes the rate of change hard to predict. It is understood that these issues become more significant the higher up the scoring scale Network Rail is placed. In CP5 the uncertainty of the rate of improved scores is more significant than in CP4. Our forecast rates reflect the diminishing return within the model as we approach frontier performance, rather than any reduction in our efforts towards further developing our asset management capability.

In order to ensure that we have appropriately designed scope we will continue to review each project against both acknowledged best practice (derived through our benchmarking programme) and published guidance (from sources such as the Institute of Asset Management). In addition we plan to verify scope against the AMEM model, not to simply accord with the model, but to permit us to explore and resolve any apparent contradictions in a proactive and timely way.

Table 5 AMEM Group Scores.

AMEM Group	Jan 09	Apr 14	Apr 16	Jan 18
	Actual	Actual	Forecast Trajectory	Target
Strategy and Planning	56%	67%	70%	72%
Asset Management Decision-Making	47%	60%	66%	72%
Lifecycle Delivery	65%	71%	72%	72%
Asset Knowledge	52%	67%	69%	72%
Organisation and People	63%	69%	71%	72%
Risk and Review	50%	62%	67%	72%
Average	56%	66%	69%	72%

We intend to undertake full measurement through the AMEM model every two years. Results will be published in 2014, 2016 and in accordance with our regulatory targets at 2018. We will continue to update our forecast of the AMEM score as we progress with our plans during CP5. Where necessary we will update our plans with reference to the underlying objectives rather than in order to achieve a particular AMEM score.

Good asset management is vital everywhere, irrespective of location.

7. Conclusions

The purpose of this Asset Management Strategy is to specify the activities that, if implemented successfully, will provide Network Rail with a significantly improved asset management capability. Such that Network Rail will deliver the future requirements for the railway infrastructure, safely and sustainably at the lowest whole-life cost.

> The programme of work has been phased to deliver key improvements that are aligned with the delivery of the expected CP5 outputs safely, sustainably, and efficiently at optimal whole lifecycle cost, while also equipping Network Rail with capabilities required to deliver the next Strategic Business Plan in January 2018.

The Strategic Theme defines the key programmes of improvement that will run through CP5. Completion of the programmes will deliver further improvements to our asset management activities to the required standard and, in doing so, will establish an asset management capability that would be classed as excellent, and which will be used as a benchmark by which other organisations measure their own capability.

7.1 Approval and accountability

This document has been authorised by the executive leader for asset management, who is fully accountable for this Asset Management Strategy, its communication, implementation, and continual development.

"We will establish an asset management capability that would be classed as excellent, and which will be used as a benchmark by which other organisations measure their own capability."



1 Information is key to decision making.

2 Refining of routine maintenance regimes is set to progress rapidly over CP5.

7.2 Communication

Communication to relevant internal and external stakeholders, service providers and other relevant parties who require knowledge of the Asset Management Strategy is via the following mechanisms:

- intranet publication
- internet publication
- standard company
- briefing processes
- training courses
- contractual requirements.

7.3 Continual review and improvement

The strategy shall be reviewed at least once every two years. Each review shall include due consideration:

- that the document remains relevant, suitable, consistent and appropriate for the implementation of the Asset Management Policy
- of opportunities for continual improvement in terms of asset management activities
- of opportunities for improvements in the format, communication and implementation of the Asset Management Strategy itself.

Any proposed amendments to this Asset Management Strategy will be submitted to the executive leader for asset management for acceptance as part of the biennial review.

Appendix A

Asset Management Framework

Overview

The integration of decision making across an organisation is one of the key principles of good asset management. This requires a clear conceptual view of how decisions flow from the high-level objectives for the railway infrastructure to the delivery of work on the ground. This Line of Sight supports a clearer understanding of an individual or team's role and purpose in the overall Asset Management System.

Figure 6 shows the cycle of Network Rail's asset management decisions and activities arranged in a plan-doreview framework. The framework is consistent with the intentions of both the ISO 55000 and BSI PAS 55 standards but uses terminology that is well established in the business and aligned with the current devolved organisational structure.

The purpose of the framework is to provide a simple representation of the major building blocks of asset management and the key interfaces between them. It is further developed with more detailed process mapping and the assignment of responsibilities and accountabilities in the Asset Management Systems documentation. Asset management is a major component of Network Rail's business. Maintenance, renewal and enhancement activities account for the majority of the company's expenditure. It is however part of a bigger framework which has parallel strategic and delivery components relating to the operation of the network. The focus of the Asset Management Strategy is on the optimisation of asset interventions and operational asset management.

Figure 6 Asset Management Framework.



Components of the framework

The Asset Management Framework is divided into two major areas.

- primary decisions and activities: these are the decisions and activities that start with the high-level objectives for the infrastructure and end in the delivery of work on the ground. The framework facilitates the establishment of a Line of Sight between them
- enabling mechanisms: the effectiveness of the primary decisions and activities is dependent on many support mechanisms such as asset information, analysis tools, competencies and business processes. The importance of these mechanisms is emphasised by their position at the core of the framework.

Outline descriptions are provided in the table below for each component of the framework. Full details of our current approach to asset management are provided in our Asset Management Systems documentation and associated guidance.

Figure 7 The six stages of the AMS as simple questions and outcomes.



Enabling mechanisms

The Asset Management Framework includes some of the key enabling mechanisms for asset management, brief explanations for which are provided below. There are several more, including risk management, business processes, and supply chain management. Asset information Supports all the primary decision and activity components of the framework, including the development of optimised asset policies and the production and implementation of asset plans.

Analysis tools These are used to support aligned decision making applying common source information. The required array of tools cover decisions made at portfolio/projects and network/asset system level.

Asset management

competencies Competencies represent the skills, aptitudes and behaviours required by individuals and teams. The competence requirements provide direction to the recruitment and development of staff including assessments, training and deployment. Our technical, front line and leadership competency frameworks are well developed and effective. They do not however address all the demands of a professional asset management organisation and we are progressively prioritising in order to enable the development of new skills.



Figure 8 Required array of decision support tools.



2019

Improvement plans by group

Our improvement plans are built in such a way as to exceed the targets we have set ourselves. This addresses the risks and uncertainties described in Section 6.4

				Effoctivo		Even	llont
		50 %	55%	60 %	65%	70 %	75 ref
ıp 1	– Strategy and Planr	ning					
,							
4					07.3 %		
5	Aligned Asset Managen Delivery Plan/Resources Asset Management Sys	nent Policy, Strate and access. Route tem accords with	gy, Asset policy e plans updated ISO 55000				
6	Long Term Planning Pro Integrated planning too	ocess – Updated R ols deliver Route A	US sset Management Plans	as BAU			
7	CP6 Options from Scene Initial Industry Plan alig	ario Models gns enhancement,	maintenance and renew	ral			
8							
	Delivery plan for CP6 co	onfirms optimal bo	llance of E, M and R				
19							750%
							7 3.0 70
ıp 2	? – Asset Managemen	nt Decision-Ma	king				12.070
up 2	9 – Asset Managemen	nt Decision-Ma	king	60.4%			
ір 2 4 5	2 – Asset Managemen Updated Asset Policy. W Reliability Centred. Mtc	nt Decision-Ma //LC Models used a embedded. Impra	king Is BAU oved Unit costs	60.4%			
<i>IP 2</i> 4 5	P – Asset Managemen Updated Asset Policy. W Reliability Centred. Mtc Policy for CP6 aligns RBi Requirements for climat In use across business R	nt Decision-Ma /LC Models used a embedded. Impro M and renewals te change, sustain tisk-Based Maintei	king Is BAU oved Unit costs able development and re nance regimes and toolse	fiability et embedded as BAU			
1p 2 4 5 6	P – Asset Managemen Updated Asset Policy. W Reliability Centred. Mtc Policy for CP6 aligns RBI Requirements for climat In use across business R Asset Policies used in CF and Industry Access Pla	At Decision-Mai ALC Models used a embedded. Impro M and renewals te change, sustain Risk-Based Mainter P6 align requireme unning toolset	king Is BAU oved Unit costs able development and re nance regimes and toolse ent specifications, resource	60.4 %			

74.0%

AMEM M	aturity Score						
				Effective		Excellent	ŧ//////
		50 %	55%	60 %	65%	70%	75%
Group 3	– Lifecycle Delivery						
2014						71.4%	
2015	Clienting/Sponsors han Maintenance strategy Business Critical Rules i	adbooks embedded. Whole aligned to Asset Manager mplemented	e Lifecycle Cost toolset nent Policy	deployed		1	
2016	Alignment of requirem Industry Access Plannir New cost and reliability	ents specification includin ng toolset deployed. Confi y data informs intervention	g Reliability, Availability guration management n designs	r, Safety and Maintainability improvements embedded	targets for projects		
2017	Options and Choices fo aligned to resource and	or cost/performance and ri d possession availability us	sk outcomes from mair sed to support SBP prep	tenance, aration			
2018						1	5.0 %
	Alignment of maintene	ance and capital delivery n	nodels to optimise deliv	very of SBP			
2019						75	5.0 % +

Group 4 – Asset Knowledge

2014			66.9%	
2015	CP5 Asset Information Specs completed and being used through Asset Data Sta FMS app in use as BAU. Assurance of data embedded as BAU Data quality trajectories agreed. Data capture on plan	pre		
2016	Railway Infrastructure Network Model in place Available ORBIS decision-support tools in full use (LADS for track other cover signals and EP)			
2017	Achievement of specified datasets to A2 With demonstrable evidence. Ongoing Governance processes in full use. GEOGIS replaced			
2018				73.0 %
	Updated data spec for Railway system needs in CP6 implemented			
2019				75.0%

AMEM M	aturity Score					
			Effective		Exce	ellent
	50 %	55 %	60 %	65%	70%	75%
Group 5	– Organisation and People					
2014					69.2 %	
2015	Capability framework in use as l Future Strategy aligns compete Professionalisation guidance av	BAU. Priority training developed a ncy and culture to Asset Manage ailable and in use as part of PDP	nd delivered ment Policy and succession planning			
2016	Progress towards accredited que Supply chain engagement align Route talent/competency mane	alifications on target. Complete so ed to Asset Management Policy Igement used in recruitment and	uite of training modules succession planning			
2017	Priority roles have either attaine Future state competency and co Current competency aligned to	d or are working towards MSc or Ilture measures and targets inclu needs of CP6	chartered status ded on SBP			
2018	Competency and Culture measu	ures show substantial achievemen	at of CPS targets			74.0 %
2019		ארבי ביויטש בעודגעו ונועו ערוופעפוופן	it of Cr'3 targets			75.0%

Group 6 – Risk and Review

2014		61.8%
2015	Management review and update to Asset Management System Climate Change Route plans exist and are being implemented. AMEM-Lite shows widespread continuous improvement. Unit cost framework enhanced	
2016	Stakeholder input to early stages of SBP informs future strategy and future sce Unit Cost data verified at required quality level Network and Route plans use common risk framework	narios
2017	Climate Change adaptation and SD scenarios. Available in SBP Benchmarking and AMEM confirm area of Excellence in Asset Management	
2018		72.0%
	Full alignment of corporate risk register and Prioritisation criteria in plan for CP	6. Corrective actions from 2017 reviews all delivered
2019		

Definition of terms

British Standards Institute Publicly Available Specification for the management of physical assets (BSI PAS 55:2008) contains a useful glossary of key terms in asset management. The following items are extracted from these standards and have been complemented by the specific addition of Network Rail documents.

Asset(s) Plant, machinery, property, buildings, vehicles and other items that have a distinct value to the organisation.

Asset Information Strategy The activities Network Rail is undertaking to ensure that our definition, collection and use of asset information meets current and future requirements.

Asset management Coordinated activities of an organisation to realise value from physical assets.

Asset Management Competency

Framework Defines the competencies required to successfully implement asset management.

Asset management information

Meaningful data relating to assets and asset management.

NOTE Examples of asset management information include asset registers, drawings, contracts, licences, legal, regulatory and statutory documents, policies, standards, guidance notes, technical instructions, procedures, operating criteria, asset performance and condition data, or all asset management records.

Asset Management Information System

System for the storage, processing and transmission of asset management information.

Asset Management Objective(s)

- Specific and measurable outcome or achievement required of asset system(s) in order to implement the asset management policy and asset management strategy; and/or
- 2. Detailed and measurable level of performance or condition required of the assets; and/or
- Specific and measurable outcome or achievement required of the asset management system.

Asset management performance

Measurable results of an organisation's management of its assets and /or asset system(s).

Asset Management Plan Document specifying activities and resources, responsibilities and timescales for implementing the asset management strategy and delivering the asset management objectives. Applicable as either a network-wide plan or operational route level. Asset Management Policy Principles and mandated requirements derived from, and consistent with, the organisational strategic plan, providing a framework for the development and implementation of the asset management strategy and the setting of the asset management objectives.

Asset Management Strategy Long-term optimised approach to the management of assets. It is derived from, and consistent with, the organisational strategic plan and the asset management policy including a high-level, long-term action plan.

Asset Management System An

organisation's Asset Management Policy, Asset Management Strategy, Asset Management Objectives, Asset Management Plan(s) and the activities, processes and organisational structures necessary for their development, effective communication, implementation and continual improvement.

Asset Policy Specified approach, rules and boundaries that provide direction and the framework for the control of specific asset-related processes and activities such as capital investment and maintenance.

Asset portfolio Complete range of assets and asset systems owned by an organisation.

Asset System Set of assets that interact and/ or are interrelated so as to deliver a required business function or service.

Contingency Plans These confirm how we identify and respond to incidents and emergency situations, including the maintenance of critical activities and services. These confirm competence requirements, arrangements for communication, access to resources and means to revert to business as usual.

Enablers (asset management) Supportive systems, procedures, processes, activities and resources that enable an organisation to operate its asset management system efficiently and effectively.

Lifecycle Time interval that commences with the identification of the need for an asset and terminates with the decommissioning of the asset or any associated liabilities.

Maintenance Strategy A defined approach to the undertaking of maintenance. This includes approaches to planning, delivery, outsourcing and improvement priorities, as well as mechanisms to continuously improve and acquire feedback. **Optimise** Achieve by a quantitative or qualitative method, as appropriate, the best value compromise between conflicting factors such as performance, costs and retained risk within any non-negotiable constraints.

Organisation Company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration.

Route utilisation strategy/Network

strategies Aligned to the strategic business plan, the RUS defines at high-level current infrastructure capability, capacity and availability and how these are intended to change over 10 and 30-year timelines.

Route Delivery Plan Detailed plan to optimise the delivery of renewals, maintenance and enhancement, grouping works spatially and where complementary in form with the coordination of people, other resources, track access and supplier capability to deliver in the most efficient and effective way.

Strategic Business Plan Overall long-term plan for Network Rail that is derived from, and embodies, our Role, Purpose and Vision, key Strategic Programme Themes, stakeholder requirements, objectives, management of its risks and funding requirements for the five-year regulated Control Period.

Sustainable Achieving or retaining an optimum compromise between performance, costs and risks over the lifecycle, while avoiding adverse long-term impacts to the organisation from short-term decisions.

Sustainability Achieving the quality of being sustainable.

Sustainable development Achieving an enduring balanced approach between environmental responsibility, social progress and economic aspects of activities.

Technical Strategy Identifies the technical barriers that prevent us from achieving our corporate objectives and the R&D activities that will allow us to overcome these. With this Strategy in place, technology will be able to function as a key driver for our business.

Related corporate documents and contact information

This Asset Management Strategy should be read in conjunction with the following:

- Asset Management Policy
- Network Rail Strategic Business Plan
- Corporate Responsibility Report
- Sustainable Development Policy
- Health and Safety Policy
- Diversity and Inclusion Policy
- Route Utilisation Strategies
- Delivery Plan (updated annually)
- The Network Operating Strategy
- Technical Strategy

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