2014 End of CP4 AMEM Assessment

Version 1.0

A report for the Office of Rail Regulation and Network Rail
from Asset Management Consulting Limited (AMCL)

The Institute of Asset Management PATRON

IAM TRAINER

amcl asset management excellence model™

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Executive Summary

This report documents the findings of an independent assessment of Network Rail's Asset Management capability maturity at the close of Control Period 4. It evaluates progress against the AMCL Asset Management Improvement Roadmap ("AMCL Roadmap") which has been delivered by Network Rail through its Asset Management Improvement Programme (AMIP), and against the target trajectories agreed between the ORR and Network Rail. To put Network Rail's progress into perspective it also compares Network Rail's current Asset Management capability maturity with previous assessments undertaken in 2006, 2009, 2011 (the "IIP assessment") and 2013 (the "SBP assessment"). The assessment was undertaken by Asset Management Consulting Limited (AMCL), the Independent Reporter for Asset Management, on behalf of the Office of Rail Regulation (ORR) and Network Rail.

The previous assessment at the time of the SBP, published in May 2013, provided an extensive review of Network Rail's position at that critical point in time and followed a significant amount of development that Network Rail had undertaken in preparing the SBP submission. The assessment findings were that significant progress in Network Rail's Asset Management capabilities had been achieved, and the report contained a detailed review of the evidence provided and a number of specific indications of what Network Rail should be considering for CP5.

This report has a different focus and presents Network Rail's closing position at the end of CP4 (March 2014) against the AMEM maturity scale targets agreed between Network Rail and the ORR. It does not provide new recommendations or repeat the findings or recommendations contained in Version 1.0 of the SBP assessment report, which was published in May 2013.

Network Rail is currently developing its Asset Management improvement plans for CP5, which will include the information now available through the application of 'AMEM Lite' in the Routes, and AMCL will support the development of these plans through the validation of Network Rail's proposed improvement activities against the Asset Management Landscape's '39 Subjects' which is the preferred measurement framework for CP5.

Overall, the conclusion of this assessment is that Network Rail has made further progress since the SBP assessment and has made significant progress across the whole of CP4. The average maturity score across all the subject groups has increased by over ten percentage points since 2009, from 56.4% to 66.7%, which is just short of the average end of CP4 target across the subject groups of 67.8%.

The performance across the six Subject Groups has been mixed, with two of the six Group level targets set by Network Rail and ORR being achieved or exceeded, two being missed by less than two percentage points and two being missed by greater than two percentage points. These results can be seen in the following table.

	Network Rail as assessed 2009	Network Rail as assessed at IIP Update	Network Rail as assessed at SBP	AMCL Roadmap Target for End of CP4	Network Rail End of CP4 as assessed	Achieved Confidence interval at 80% level of confidence
Strategy & Planning	56.3%	61.2%	65.8%	67.3%	67.3%	±1.31%
Whole-Life Cost Justification	47.3%	51.9%	58.7%	63.5%	60.4%	±1.90%
Lifecycle Delivery	64.8%	66.3%	69.2%	72.3%	71.4%	±0.93%
Asset Knowledge	51.7%	55.0%	60.7%	67.2%	66.9%	±0.80%
Organisation People	63.0%	64.0%	67.3%	73.6%	69.2%	±0.89%
Risk & Review	49.5%	59.4%	60.8%	60.8%	61.8%	±2.66%
Overall	56.4%	60.6%	64.4%	67.8%	66.7%	±0.54%

This is broadly in line with our expectations at the SBP assessment where we considered that there was high confidence that Network would achieve target in the Strategy & Planning and Risk & Review Groups, medium confidence that they would achieve target in the Whole-life Cost Justification, Lifecycle Delivery and Asset Knowledge Groups, and a low confidence that they would achieve target in the Organisation & People Group. A summary of the progress made in each group is discussed below.

The Strategy and Planning Group target has been achieved and this is an area where Network Rail has significantly developed its capabilities over CP4. Central to this is the establishment and operation of an Asset Management System which also underpinned Network Rail's achievement of PAS 55 certification in May 2013. Network Rail has provided the industry leadership and coordination of the Long Term Planning Process (LTPP) and its development of long-term plans to underpin the UK main line rail industry for the next 30 years. The development of Asset Management Plans at a Route level and the alignment of these to the CP5 delivery plan is also a significant step forward. The only individual Activity in this group that did not achieve the end of CP4 target was the Policy & Strategy Activity and this was primarily a result of the Asset Management System, framework and Strategy not being updated to reflect the overall strategy for CP5 (see also the Risk & Review Group).

The Whole-Life Cost Justification Group has not met the end of CP4 target but this is largely due to the Opex Evaluation Activity being behind target. The most recent work undertaken by Network Rail on maintenance optimisation (via the Risk Based Maintenance (RBM) Programme) has been reviewed by AMCL under separate remit and this is now starting to address many of the shortfalls we have highlighted in previous assessments. However, the overall strategy for maintenance is not yet fully documented and the initial Reliability Centered Maintenance (RCM) regimes are still at the

pilot stage for a number of asset disciplines. This is an area that will need significant attention and focus during CP5 if Network Rail is to deliver the benefits from this programme that it has assumed. The Capex Evaluation Activity within this group has exceeded the end of CP4 target primarily due to the production of justified work volumes and costs for the SBP submission which were developed using what AMCL considers to be some best-in-class WLC modelling approaches.

The Lifecycle Delivery Group has just missed the end of CP4 target, but in general Network Rail demonstrates good control over its Lifecycle Delivery Activities and this has improved further over CP4. Network Rail's relative strengths within this Group include Incident Response and Maintenance Delivery, where concerted effort in the early years of CP4 brought a discipline to these areas which is still evident and embedded. Asset Creation is also a relative strength, although Network Rail's achievements in delivering new infrastructure do not always meet planned milestones. Network Rail also has many excellent examples of Systems Engineering tools, techniques and models, yet these do not have a systematic approach to their implementation and integration. Network Rail has also provided industry leadership in setting up the Network Optimisation process for the rationalisation of S&C infrastructure. The challenge for CP5 will be for Network Rail to maintain the level of control it has over its Lifecycle Delivery Activities, while at the same time integrating them more effectively into the overall Asset Management System (see also the Risk & Review Group).

Although Network Rail narrowly missed the end of CP4 target for the Asset Knowledge Group, it should be acknowledged that very significant progress has been made in this area since the IIP assessment. At that assessment (in 2011), the Asset Knowledge Group score was 4% behind the trajectory and at the SBP assessment was 2.8% behind the trajectory. The subsequent improvement is primarily as a result of the development of the Asset Information Strategy and the on-going implementation of the ORBIS programme. There are still some areas of data quality that are not yet fully addressed, but Network Rail has recognised this and has plans in place to address these during CP5 and CP6.

Progress in the Organisation & People Group has been slow due to the length of time it has taken Network Rail to develop its approach for a continually improving Asset Management culture, and to underpin its Asset Management development through an effectively designed and implemented competence management system for Asset Management. However, after several attempts, it appears that these Activities are now starting to make progress and should have a more significant impact on Network Rail's performance in this area during CP5.

Although the Risk & Review Group has exceeded the end of CP4 target, two individual Activities within this group are behind the target and two have exceeded the target. The development of sustainable development and weather and climate change resilience strategies and plans have resulted in Network Rail exceeding the end of CP4 target for these two Activities. However, there are still some challenges to fully embed the new Enterprise Risk Management (ERM) framework during CP5 after several previous attempts with other frameworks. A further challenge is to ensure that Network Rail's Asset Management System has an effective focus and is subject to methodical attention as part of Network Rail's overall Governance, Risk & Assurance framework (GRA –

introduced at the end of CP4). The Asset Management System was re-defined mid-CP4 and is currently going through its first full review 'in preparation' for CP5 as also referenced in the Strategy & Planning Group commentary above.

Network Rail was awarded full certification to the requirements of BSI PAS 55:2008 in May 2013 and has expressed an interest in the ISO 55000 suite of standards (published in January 2014) which will eventually supersede PAS 55. This report therefore contains a surveillance update of Network Rail's BSI PAS 55:2008 minor non-conformances in Section 10.3, and a high-level assessment of the level of compliance to ISO 55001 in Section 10.4. It is highly likely that Network Rail would be able to achieve compliance to the requirements of ISO 55001 with fairly minimal but focused efforts in the areas identified in Section 10.4, but it is recommended that a more detailed gap analysis is completed first. To achieve this one of the key areas that Network Rail will need to demonstrate works effectively is the systematic review of its re-defined Asset Management System. This activity is underway at time of publication, but is not yet complete nor considered to be as systematic and coordinated as it could be. The review would be aided by a pro-active focus on the Asset Management System from an audit and assurance perspective, which has been the subject of a number of the AMCL Roadmap Capabilities and BSI PAS 55:2008 minor non-conformances throughout CP4, but which Network Rail has yet to fully implement.

The purpose of this report is to provide a final 'scorecard' for Network Rail for the end of CP4, and as such there are no forward-looking recommendations. These were picked up in the SBP assessment in May 2013, and should be incorporated into Network Rail's forward Asset Management improvement plans over the coming months as these are finalised for CP5.

AMCL would like to take the opportunity to thank all staff within Network Rail and the ORR for their time and effort in participating in this assessment.

Glossary

Acronym	Description
ADIP	Asset Data Improvement Programme
AIS	Asset Information Strategy
AMEM	Asset Management Excellence Model
AMIP	Asset Management Improvement Programme
AMS	Asset Management Services
APM	Association of Project Managers
ARM	Active Risk Manager
ASI	Asset Stewardship Indicator
BAU	Business As Usual
BCAM	Buildings & Civils Asset Management
BCMI	Bridge Condition Marking Index
BCR	Business Critical Rules
BRIG	Business Readiness Implementation Group
BSI	British Standards Institute
CCAP	Climate Change Adaptation Plan
COBR	Cabinet Office Briefing Rooms
CP4	Control Period 4
CP5	Control Period 5
CP6	Control Period 6
CRI	Composite Reliability Measure
CRR	Corporate Responsibility Report
CSI	Composite Sustainability Measure
DfT	Department for Transport
DRAM	Director Route Asset Management
DST	Decision Support Tools
DWWP	Delivering Work Within Possessions
EMS	Environmental Management System
EP	Electrical Power

Acronym	Description
ERM	Executive Review Meeting OR Enterprise Risk Management
FCL	Fault Code Lookup
FMEA	Failure Modes and Effects Analysis
FOC	Freight Operating Company
GFMAM	Global Forum for Maintenance and Asset Management
GRA	Governance, Risk and Assurance
GRIP	Governance for Railway Investment Projects
HF	Human Factors
IAP	Industry Access Planning
II	Intelligent Infrastructure
IIP	Initial Industry Plan
IP	Investment Projects
IRM	Integrated Risk Management
ISBP	Initial Strategic Business Plan
ISO	International Standards Organisation
KPI	Key Performance Indicator
LADS	Linear Asset Decision Tool
LTPP	Long Term Planning Process
LNW	London North Western (Route)
MDM	Master Data Management
MUC	Maintenance Unit Cost
MWM	Mobile Works Management
NCAP	National Core Audit Programme
NCR	Non Conformance Report
NDS	National Delivery Service
OGC	Office for Government and Commerce
OHLE	Overhead Line Equipment

Acronym	Description
Opex	Operational Expenditure
ORBIS	Offering Rail Better Information Services
ORR	Office of Rail Regulation
PAS	Publically Available Specification
PRS	Project Requirements Specification
PPM	Public Performance Measure
PRAMS	Performance Reliability Availability Maintainability Safety
QRA	Quantified Risk Analysis
RACI	Responsibility Accountability Consulted Informed
RAM	Route Asset Manager
RAMS	Reliability Availability Maintainability Safety
RBM	Risk Based Maintenance OR Rule Based Manual
RCA	Root Cause Analysis
RCM	Reliability Centred Maintenance OR Remote Condition Monitoring
RDG	Rail Delivery Group
RIPG	Route Industry Planning Group
ROC	Route Operations Centre
RoSE	Reliability Centred Maintenance of Signalling Assets
RMM	Rail Method of Measurement
RSSB	Railway Safety & Standards Board
RUS	Route Utilisation Strategy
S&C	Switch & Crossing
S&SD	Safety & Sustainable Development
SAMP	Strategic Asset Management Plan
SBP	Strategic Business Plan
SCMT	Strategic Crisis Management Team
SICA	Signalling Infrastructure Condition Assessment
SRA	Strategic Rail Authority
SSADS	Signalling Schemes Asset Data System
TOC	Train Operating Company
WLC	Whole Life Cost
WRCC	Weather Resilience and Climate Change

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1 Introduction

1.1 Background

AMCL has previously undertaken assessments of Network Rail's Asset Management capability maturity using its Asset Management Excellence Model (AMEM).

In 2006 AMCL conducted a full review, assessing Asset Management capability maturity against 20 activities. In mid-2007, the findings of the 2006 review were translated into AMCL's 'Asset Management Vision', which set out the level of Asset Management maturity that the reporter considered achievable by 2009.

In 2009 AMCL conducted a Best Practice Review Update, which assessed Network Rail's Asset Management capability maturity against 23 key activities. This updated the findings of the 2006 review, but with the focus on activities identified as being 'high priority' in terms of CP4 delivery, and understanding progress in more detail.

In May 2010 AMCL produced an AMCL Roadmap, which defined the Asset Management capabilities that AMCL believed Network Rail should develop for each of the key regulatory milestones, i.e:

- June 2011 as the publication date for the ISBP for CP5 (which became the IIP and the delivery date moved to September 2011);
- January 2013 as the publication date for the SBP for CP5; and
- April 2014 at the close of CP4 (the focus of this assessment) and the start of CP5 (this will be reported separately).

The Asset Management capabilities defined in the AMCL Roadmap were discussed with Network Rail in a series of workshops and the target maturity scores, shown in Diagram 1, were agreed by Network Rail to be challenging but achievable.

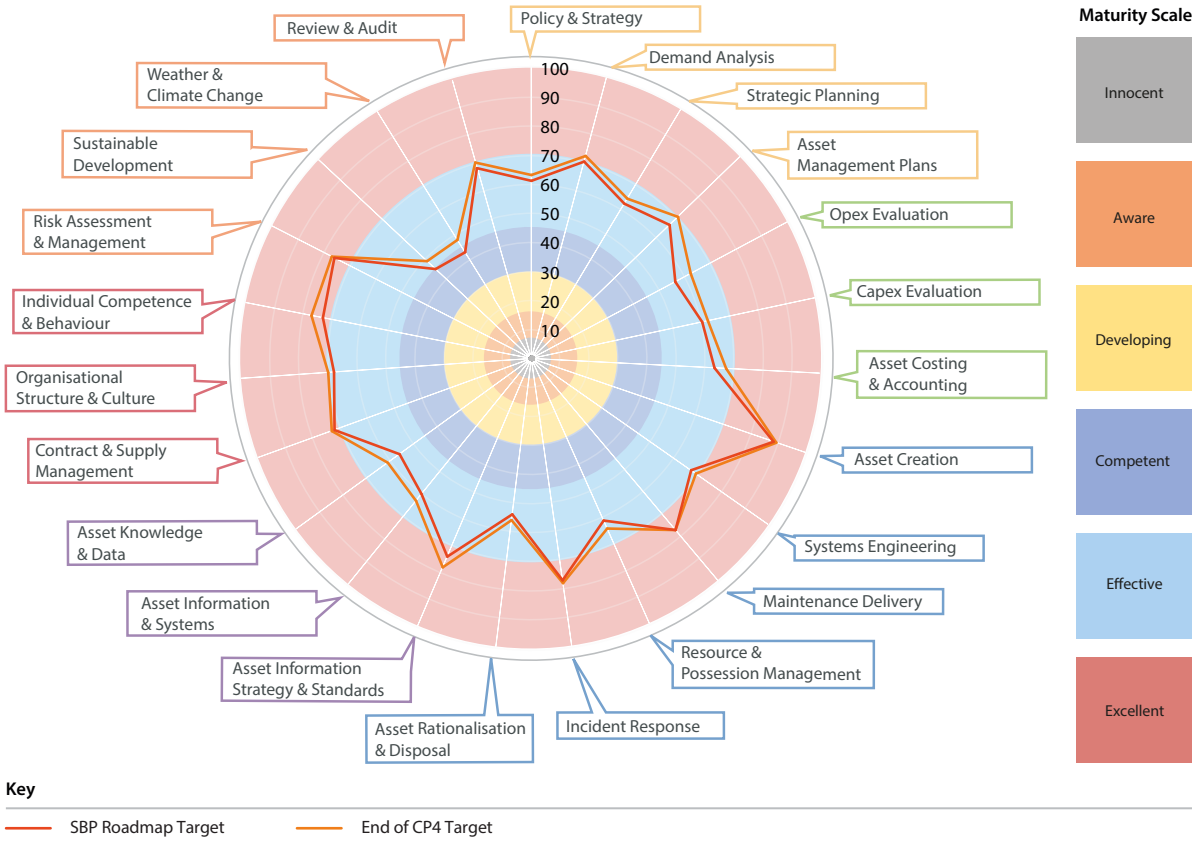


Diagram 1 *Asset Management Capability Maturity Target Scores*

In December 2010, Network Rail produced its Asset Management Improvement Programme (AMIP), which was its delivery programme in response to the AMCL Roadmap. The AMIP was agreed between the ORR and Network Rail Boards in January 2011, and progress against its proposed improvement milestones (bulleted above) to be tracked by AMCL.

A full AMEM assessment was carried out between April and June 2011, including a review of progress against the AMIP. The initial report was published in December 2011. For reasons of completeness, Network Rail and ORR requested that a further assessment be undertaken, to take account of work completed, but not available during the initial assessment.

The 'IIP Update', published in May 2012, reported that Network Rail had missed its targets for 14 of the 23 AMEM capabilities, and 5 of the 6 ORR/Network Rail Board agreed improvement trajectories. Subsequently, it was agreed necessary to update the AMIP and AMCL's Roadmap, to assist Network Rail in meeting the agreed SBP and end-of-CP4 maturity targets. This resulted in the publication of the Asset Management Roadmap Update in May 2012.

In early 2013 a further AMEM assessment was undertaken to assess the maturity of Network Rail's SBP. At this stage a detailed assessment of Network Rail's position against each of the AMEM Group targets and their trajectories was also completed alongside work to begin to define CP5 targets and trajectories.

1.2
Approach of this AMEM assessment

This report contains the 'End of CP4' assessment position against the targets agreed by the Network Rail and ORR Boards. It has been presented in the same format and using the same version of the AMEM used at SBP to ensure consistency.

Although not in the scope of this assessment, the information collected will enable a second report to be produced if required which will present the starting position for CP5. This output will be based on the current version of the AMEM which has been updated to include the latest understanding of Asset Management good practice, the launch of the ISO 55001 international standard on Asset Management, and the latest version of the Global Forum for Maintenance and Asset Management's (GFMAM's) '39 Subjects' which is the de-facto international definition for good practice Asset Management.

1.3
Scope & Objectives of this AMEM assessment

The scope and objectives of the review were defined in the Independent Reporter Mandate 'Network Rail's Asset Management Capability - End of CP4' (Draft C, September 2013) and are reproduced below:

'The 'End of CP4 AMEM Assessment' will include the following:

- *AMEM Assessment at end of CP4 covering all AMEM activities (23/39 activities).*
- *Verification of 'closed' but subject to verification tracker recommendations*
- *Use of the AMEM-lite baseline audits to inform the 'centre' AMEM assessment where relevant*

The assessment should be carried out to give a network-wide confidence interval of + / – 1.5% at a confidence level of 80%. Group scores should give a confidence interval of + / – 2.5% at a confidence level of 80%, except for 'Risk and Review' which should give a confidence interval of + / – 4% at a confidence level of 80%'.

1.4
Network Rail CP4 Objectives

The ORR set out its vision for Network Rail's Asset Management capability in 'Promoting safety and value in Britain's railways – Our strategy for 2009-14'. In this it describes seven strategic themes of which Theme 3 is 'Excellence In Asset Management'. This has the following stated goal:

'…by 2014 whole-life Asset Management in the rail industry matches that of other best practice comparators'

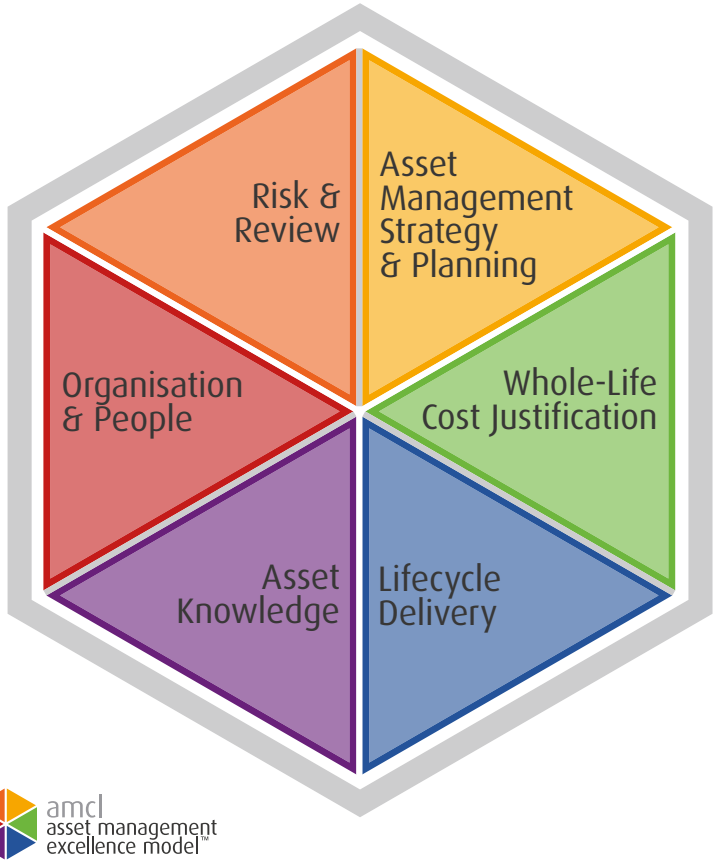
This objective is fully aligned with the AMEM assessment methodology, as evidenced by the success measures detailed in the ORR's strategy document, which are as follows:

1. By 2014 Network Rail is rated excellent in Asset Management using an internationally recognised measurement system, and other relevant parts of the industry are testing their Asset Management processes in a similar way.
2. Network Rail meets the efficiency challenges set in the 2008 periodic review, and works with train operators and suppliers to strive for further improvement and innovate for the future.
3. Interfaces between different parts of the railways (for instance between track and train) are specified and managed in a safe and cost effective way, taking best advantage of European Union interoperability requirements.
4. All parts of the industry develop and implement risk-based maintenance procedures.
5. The industry monitors its carbon footprint and other aspects of its environmental performance and at least maintains its relative position compared with other modes.

1.5
Introduction to the AMEM

This assessment has been undertaken using the internationally recognised AMCL Asset Management Excellence Model™(AMEM), as were the previous reviews undertaken in 2006, 2009, 2011 (at IIP) and 2013 (at SBP).

The AMEM enables clients to assess their Asset Management capability maturity and benchmark it against world best practice. It is built around 23 activities, shown in Diagram 2 below, which span the range of technical, organisational and human capabilities needed to achieve world-class Asset Management. The AMEM tests the existence, completeness, effectiveness and integration of these activities and is applicable to any organisation operating in an asset intensive, highly regulated environment.



Asset Management Strategy & Planning
1.01 Policy & Strategy
1.02 Demand Analysis
1.03 Strategic Planning
1.04 Asset Management Plans

Whole-Life Cost Justification
2.01 Opex Evaluation
2.02 Capex Evaluation
2.03 Asset Costing & Accounting

Lifecycle Delivery
3.01 Asset Creation
3.02 Systems Engineering
3.03 Maintenance Delivery
3.04 Resource & Outage Management
3.05 Incident Response
3.06 Asset Rationalisation & Disposal

Asset Knowledge
4.01 Asset Information Strategy & Standards
4.02 Asset Information Systems
4.03 Asset Knowledge & Data

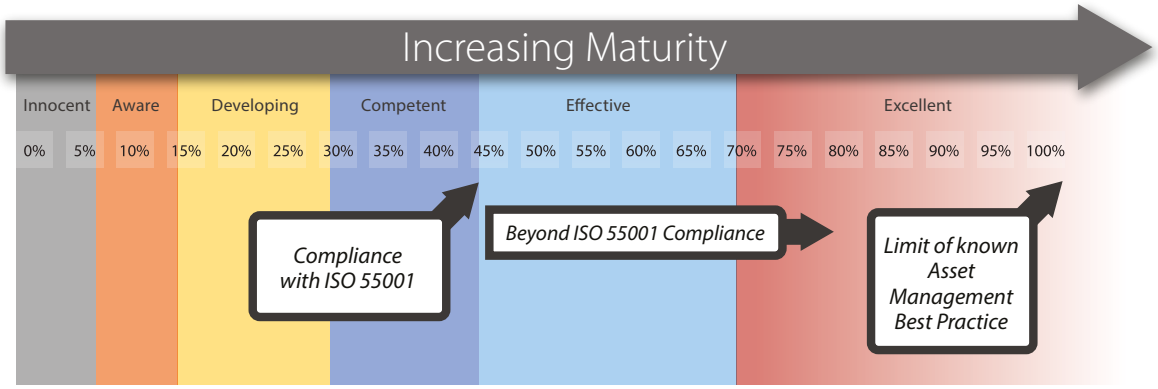
Organisation & People
5.01 Contract & Supply Management
5.02 Organisational Structure & Culture
5.03 Individual Competence & Behaviour

Risk & Review
6.01 Risk Assessment & Management
6.02 Sustainable Development
6.03 Weather & Climate Change
6.04 Review & Audit

Diagram 2 *The AMCL Asset Management Excellence Model™ (AMEM)*

Organisations are scored against each of the 23 AMEM activities using a range of assessment criteria and questions. The scores are presented using the maturity scale shown in Diagram 3, which in turn is based on that in the International Infrastructure Management Manual. Improvement actions are identified based on the criticality of each activity to the organisation, the current scores for the assessment criteria that make up each activity and the targets an

organisation and its stakeholders wish to set themselves for each activity. AMEM results are used to identify and prioritise improvements based on where an organisation sits relative to world best practice, including BSI PAS 55: 2008 ("PAS 55") or the new ISO 55001.



The maturity scale has six maturity states as follows:

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

Diagram 3 *The AMEM Asset Management Maturity Scale*

1.6
Development of the AMEM

The AMEM is also aligned with the Asset Management Landscape, published by the Global Forum for Maintenance and Asset Management (GFMAM). The Asset Management Landscape provides an international Asset Management framework against which organisations can be assessed. This will significantly increase the availability of comparator data against the framework over time.

The Asset Management Landscape defines an updated set of activities, now known as 'subjects', which are similarly collected into the six top level groups described in Section 1.5. At the time of the SBP assessment, the first edition of the Asset Management Landscape was current which contained 39 Subjects (as opposed to the previous 23 AMEM Activities) and this is the structure that the AMEM was aligned to at the time. A first edition Asset Management Landscape view was provided in the SBP assessment report. This was aligned to the Institute of Asset Management's (IAM's) free book 'Asset management – an anatomy', which provides a more detailed explanation of the 39 Subjects and how these interrelate, which was the only detailed description available at the time.

In March 2014 a second edition of the Asset Management Landscape was published, which presented a slightly re-arranged set of 39 Subjects, and also provided a much fuller description of each of these. The second edition structure is shown in the diagram below.

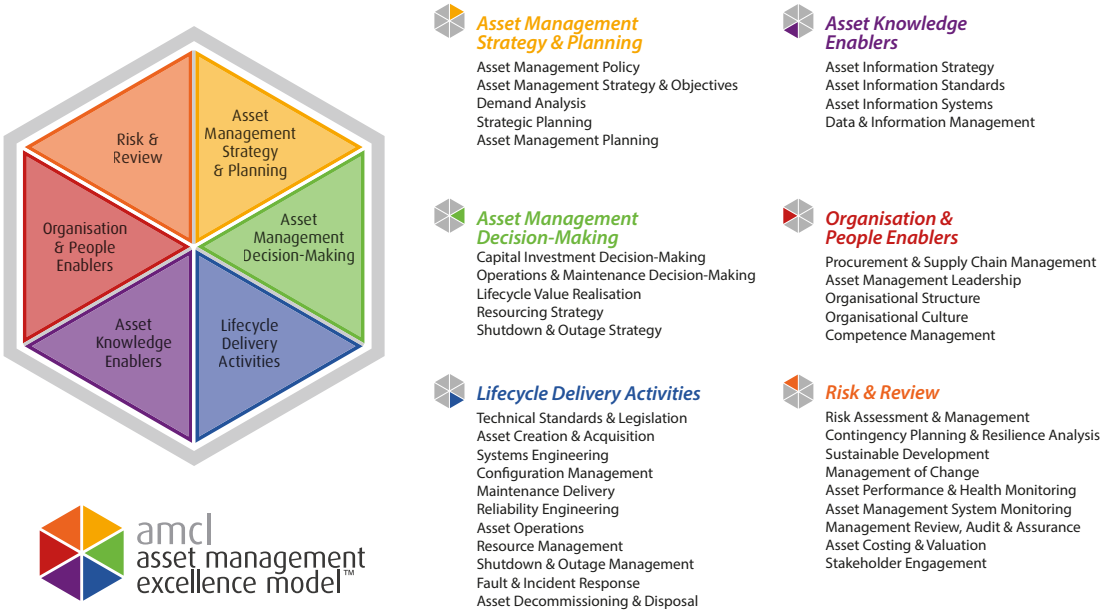


Diagram 4 *The AMEM as aligned to the Asset Management Landscape 39 Subjects (Second Edition)*

Although this assessment is presented according to the original 23 AMEM Activities to ensure consistency with the agreed CP4 monitoring process, a second edition 39 Subjects view of Network Rail's Asset Management capabilities is provided in Appendix A of this report, as this is the preferred structure for CP5.

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2 Overview of Assessment Process

2.1 Activity Prioritisation

The End of CP4 AMEM assessment of Network Rail followed the AMCL AMEM Assessment Methodology and reflected the priorities identified in Table 1 below. This table also shows where the activities have been assessed generically and where they have been assessed by asset discipline. Where activities are to be assessed by asset discipline, this has included all six disciplines of track, signalling, structures (including earthworks), E&P, telecoms and operational property. Table 1 also describes the Asset Management activities that will be assessed at the Centre, those activities that will be assessed at the Routes and those that will be assessed at both.

Activity	Criticality	Sources Required	Assess by
Policy & Strategy	High	Centre	Generic
Demand Analysis	Low	Centre	Generic
Strategic Planning	Low	Centre & Route	Asset Discipline
Asset Management Plans	High	Centre & Route	Asset Discipline
Opex Evaluation	High	Centre & Route	Asset Discipline
Capex Evaluation	High	Centre & Route	Asset Discipline
Asset Costing & Accounting	High	Centre & Route	Asset Discipline
Asset Creation	Low	Centre & Route	Asset Discipline
Systems Engineering	High	Centre & Route	Asset Discipline
Maintenance Delivery	High	Route	Asset Discipline
Resource & Possession Management	High	Centre & Route	Generic
Incident Management	High	Centre & Route	Asset Discipline
Asset Rationalisation & Disposal	High	Centre	Generic
Asset Knowledge Strategy & Standards	Low	Centre	Asset Discipline
Asset Information Systems	Low	Centre & Route	Asset Discipline

Activity	Criticality	Sources Required	Assess by
Asset Data & Knowledge	Low	Centre & Route	Asset Discipline
Contract & Supplier Management	High	Centre & Route	Generic
Organisational Structure & Culture	High	Centre & Route	Generic
Individual Competence & Behaviour	High	Centre & Route	Asset Discipline
Risk Assessment & Management	High	Centre & Route	Asset Discipline
Sustainable Development	Low	Route	Generic
Weather & Climate Change	High	Centre & Route	Generic
Review & Audit	High	Centre & Route	Asset Discipline

Table 1 Prioritisation of AMEM Activities

2.2 Assessment Process

The assessment process is designed to ensure three principles are maintained based on recognised best practice in performance measurement. Their application ensures that assessments of organisational Asset Management capability using the AMEM are reliable, valid, and informative. These principles have been researched and applied to the design and delivery of performance assessment processes by AMCL.

The three principles are:

1. Reliability: The consistency of assessment scores or results over time or across multiple assessors.
2. Validity: The extent to which an assessment measures what it is supposed to measure and the extent to which decisions made on the basis of assessment scores or results are justifiable.
3. Interpretation: The extent to which assessment scores are grounded in recognisable business practice and lead to consistent suggestions for business process improvement.The AMEM Assessment Criteria and accompanying Questions are designed to gather evidence on four aspects of Asset Management capability, namely:

- Existence: Is there a process to cover a specific aspect of Asset Management (for example the existence of policy and strategy) and is it current?
- Completeness: Is the scope of the process consistent with best practice?
- Effectiveness: Is the process properly implemented and does it have the desired impact?
- Integration: Are the organisation's various Asset Management capabilities aligned with corporate strategy and orchestrated effectively?

The type of evidence required in each of these four areas varies. In the case of Existence, documentary evidence will often suffice, although there may be questions about currency which require further probing by interview or enquiry. The same is usually the case where Completeness is concerned. To ascertain Effectiveness, it is often necessary to drill down into operational records, performance data, minutes of meetings, audit reports and to interview line managers, front line staff and suppliers. To determine the degree of Integration it is necessary to seek documentary evidence that the relationship between the different Asset Management activities is understood, planned and proactively managed to support business goals. The nature of the Assessment Criteria and Questions, therefore, influences the types of assessment evidence required, which in turn indicates the methods of assessment most likely to generate reliable and valid evidence for scoring.

To maintain the integrity of assessments with respect to these principles, AMCL only uses assessors trained and experienced in the AMEM and its associated methodology. AMCL is endorsed under the Institute of Asset Management's Endorsed Assessor Scheme as competent to undertake evaluations against PAS 55 and ISO 55001 using the AMEM assessment process.

2.3
Assessment Confidence

The scope of the assessment included Network Rail's central organisation and sufficient interviews to sample one equivalent Route, although these were across a number of Routes. The number of sources and interviews for each activity were designed to achieve the ORR's mandate requirements for confidence described in Section 1.3, namely:

'The assessment should be carried out to give a network-wide confidence interval of + / – 1.5% at a confidence level of 80%. Group scores should give a confidence interval of + / – 2.5% at a confidence level of 80%, except for 'Risk and Review' which should give a confidence interval of + / – 4% at a confidence level of 80%.'

A planned interview scope across the 39 Subjects was generated to achieve the required assessment confidence detailed above. The final interview list from the SBP assessment was utilised as the starting point for developing the interview list for this assessment. This was optimised to ensure that synergies with the concurrent RBM review work were taken into account, and that where interviews identified for this assessment were repeats of interviews at SBP, that these interviews were 'light touch' only. AMEM Lite assessments (being delivered under a separate mandate) were also used as additional sources of evidence to support as appropriate. Table 2 below shows the planned and actual confidence levels achieved. The confidence intervals are tighter because the move from 23 Activities to 39 Subjects provided a greater number of sampling points for the assessment.

Group	Number of sampling points	Planned Confidence interval at 80% level of confidence	Achieved Confidence interval at 80% level of confidence
Overall	**494**	**± 1.17%**	**± 0.54%**
1 – AM Strategy & Planning	91	± 2.50%	± 1.31%
2 – AM Decision-Making	69	± 2.50%	± 1.90%
3 – Lifecycle Delivery	120	± 2.50%	± 0.93%
4 – Asset Knowledge Enablers	96	± 2.50%	± 0.80%
5 – Organisation & People Enablers	56	± 2.50%	± 0.89%
6 – Risk & Review	62	± 4.01%	± 2.66%

Table 2 Planned and Actual Confidence Intervals

2.4 Timescales and Sources of Evidence

Evidence was obtained through a number of methods. The primary method was interviewing Network Rail personnel who had been identified by Network Rail as having the appropriate knowledge of the Activities. The assessment commenced on the 12th March 2014 and the final interview was completed on the 22nd May 2013, although most of the interviews were completed by the 2nd May 2014.

During this time a cross-section of 188 Network Rail staff were interviewed, and over 1,000 pieces of documentary evidence were requested. All interviewees are listed in Appendix A to this report. Where this evidence is referred to in the text of this report, a reference to the specific evidence has been added. Some of the evidence may not be referenced in the report but is referenced in the detailed scores held within the AMEM database.

2.5
Scope

The scope of the assessment is defined in three parts as follows:

1. Timescale – The effective assessment date is the end of CP4. Interviews and review of evidence were based on AMCL's understanding of Network Rail's position at this date.
2. Geographic – The geographical scope of the assessment is National with Route samples from all ten Routes, but not to a level that these Route samples would be statistically significant presented on a Route by Route basis, i.e. the assessment team cannot draw conclusions about Routes individually.
3. Assets – The assets within scope have been described in Section 2.1.

2.6
Activities in this Assessment

In undertaking the End of CP4 AMEM assessment of Network Rail, AMCL has completed the following activities:

- A full AMEM assessment to achieve the confidence levels identified in the remit in accordance with the priorities and scope defined in this section. In respect of the asset specific areas this has included all six asset disciplines of track, signalling, structures (including earthworks), E&P, telecoms and operational property. The focus has been on areas where there have been significant changes since the SBP review and a review of where Network rail has achieved best practice in the UK, with a view to effectively closing off the CP4 control period.
- An update of the AMEM assessment findings and maturity scores for the current six AMEM Groups and 23 Activities. This report presents findings on a national basis and also presents the findings against the latest version of '39 Subjects' (Version 2 of the Asset Management Landscape from the GFMAM).
- A review of Network Rail's capabilities against the agreed end of CP4 target and the AMCL Roadmap, providing commentary on any shortfalls and areas where targets have been exceeded.
- An update on Network Rail's status in closing out the minor non-conformances from the PAS 55 assessment, and an overview of ISO 55001 compliance (see Section 10).
- A report on the close-out of any recommendations from the tracker that have been stated as complete, but not yet verified (see Section 11).

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3 Overall Findings

The overall assessment scores for Network Rail are shown in Diagram 5 opposite. Network Rail has missed its overall assessment target by approximately one percentage point. The top level assessment trajectory can be seen in Diagram 6

The overall findings by each AMEM Group are summarised in the following sections.

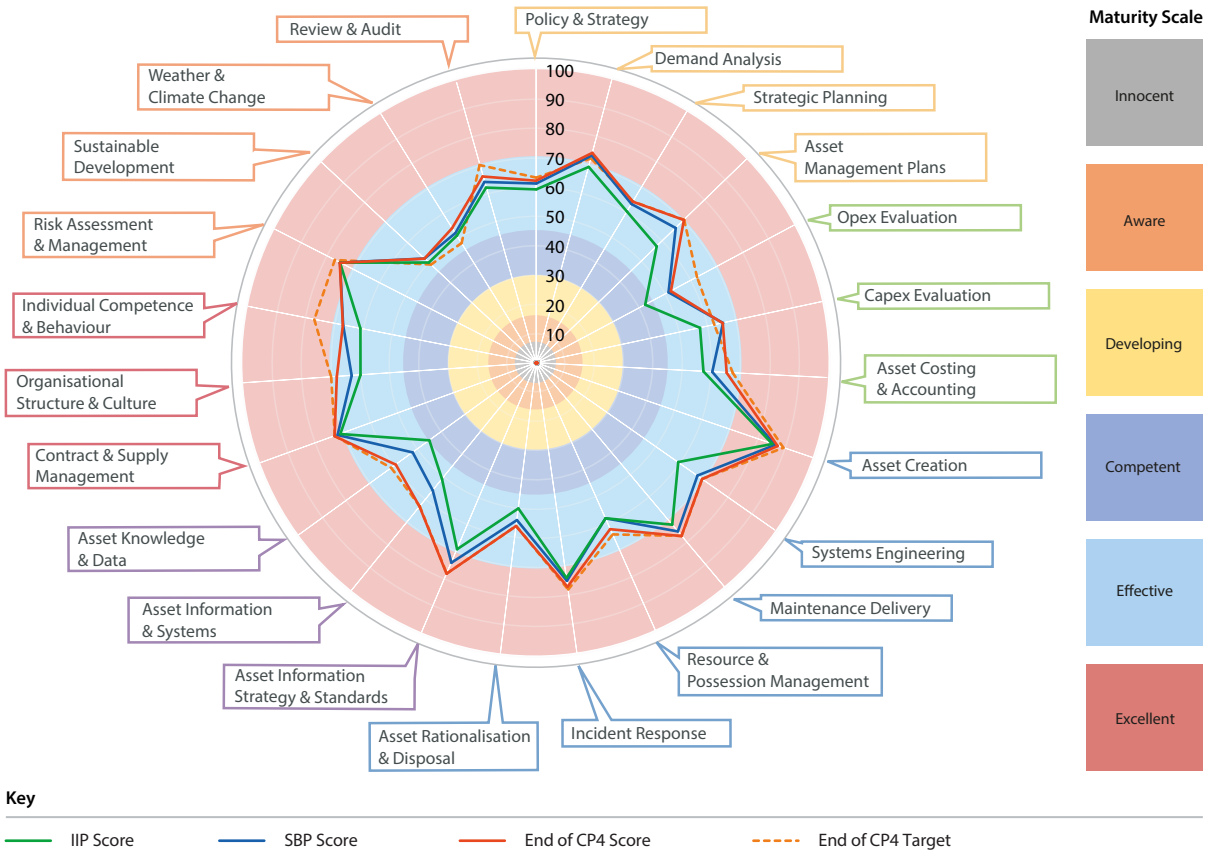

Diagram 5 *Network Rail SBP AMEM Assessment Scores by 23 Activities*

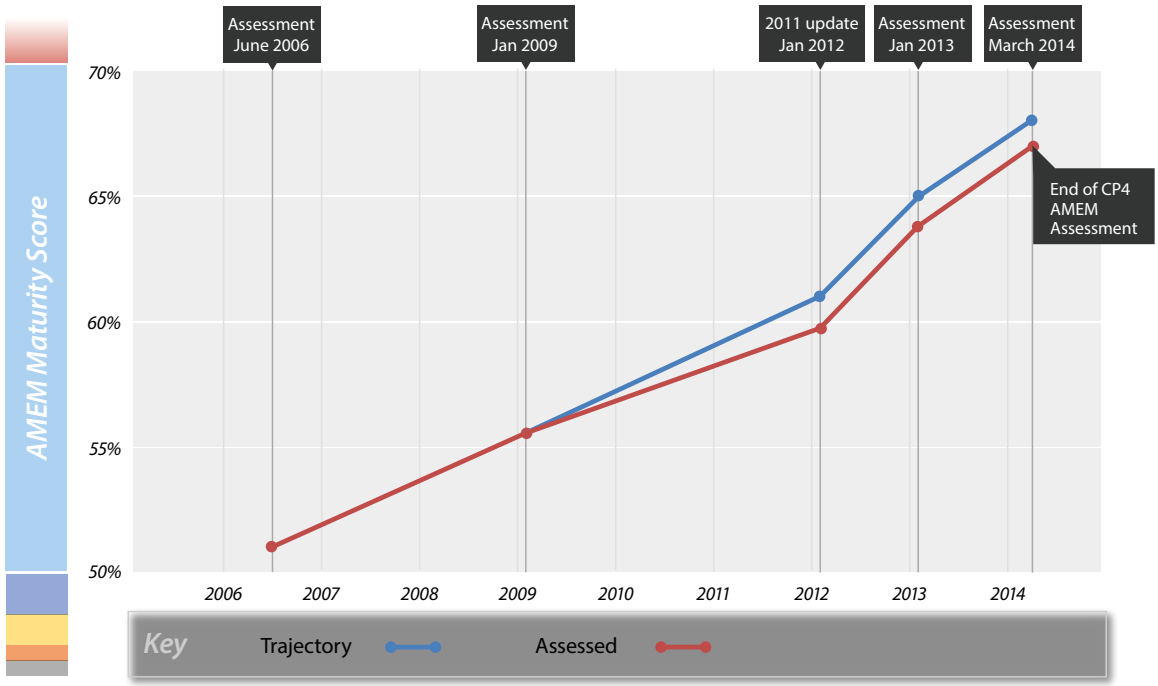

Diagram 6 *Network Rail's overall assessment progress since 2006*

3.1
Strategy & Planning

The Strategy & Planning Group has met the target trajectory at the End of CP4 assessment as shown in Diagram 7 below.

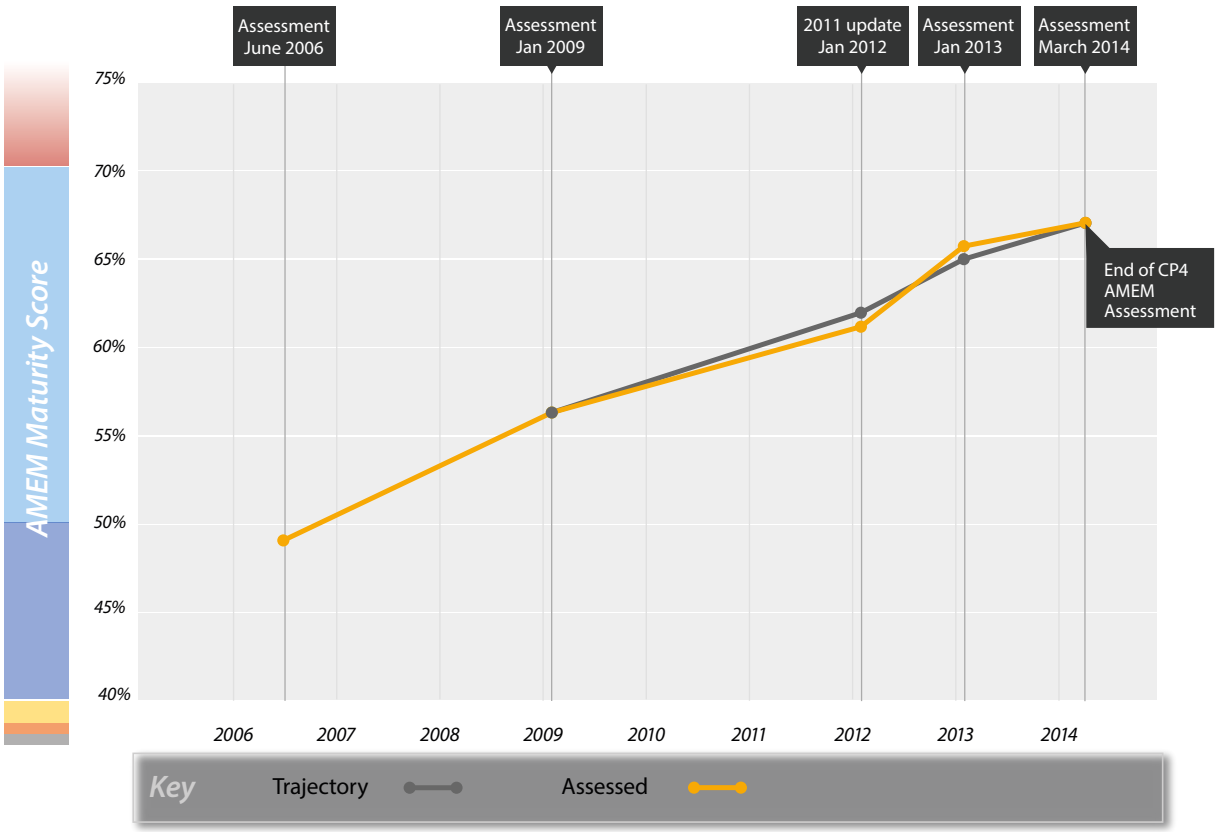

Diagram 7 *Network Rail's progress in the Strategy & Planning Group*

Network Rail's main achievements in this Group have been the establishment of a defined Asset Management System and a defined strategic planning framework, underpinned by a long-term view of the UK main line rail industry's infrastructure requirements. Significant progress was made between the IIP and SBP assessments as the strategic planning framework was implemented for the first time to support the creation of the SBP. Overall this approach was successful and is now being normalised as 'business as usual' within Network Rail. In addition, Network Rail's industry leadership of the LTPP for UK main line rail, which it inherited from the SRA in 2005 has, in AMCL's opinion, produced some best in class practices. Network Rail's challenge for CP5 will be to capitalise on this first full iteration of its strategic planning capabilities and to embed and continually improve its processes through further industry stakeholder engagement and the validation of the SBP plans.

3.2
Whole-life Cost Justification

The Whole-life Cost Justification Group has missed the target trajectory at the End of CP4 assessment as shown in Diagram 8 below.

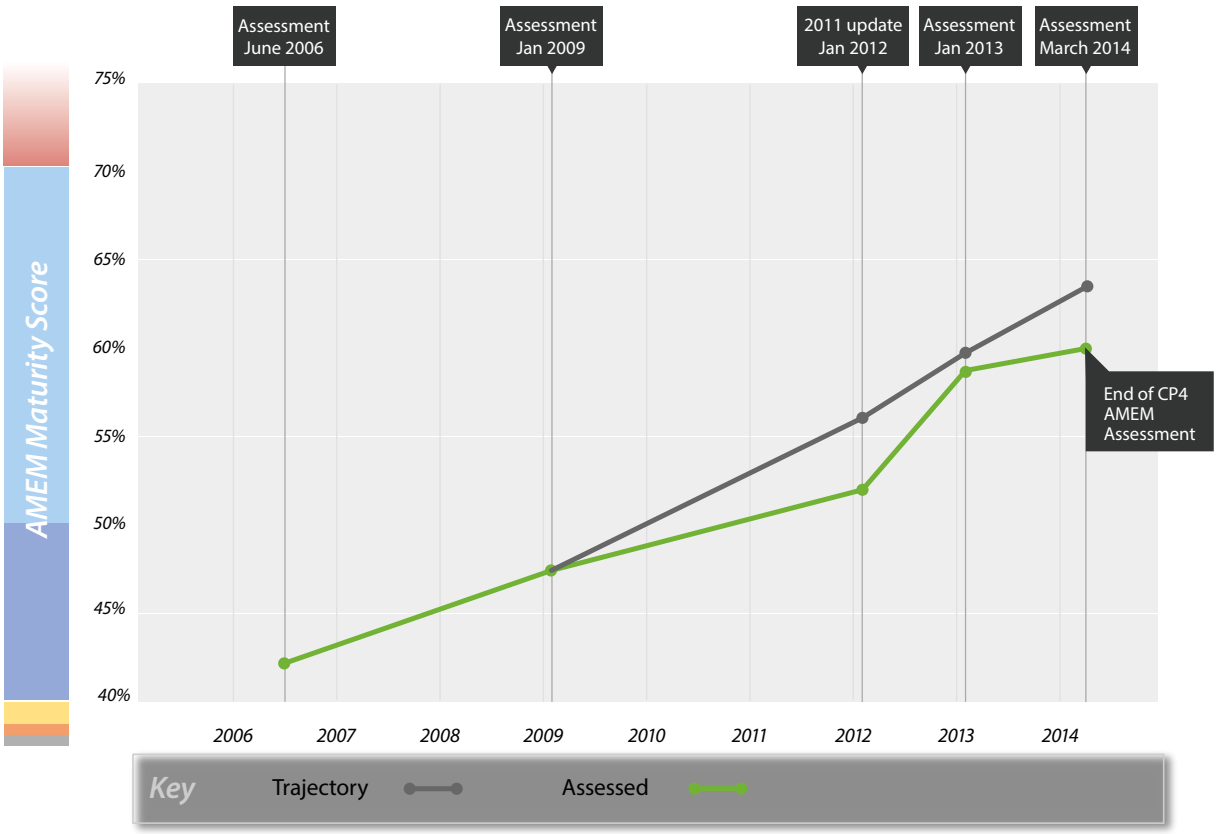

Diagram 8 *Network Rail's progress in the Whole-life Cost Justification Group*

The individual Activities within this Group tell a mixed story. The Capex Evaluation Activity, which was underpinned by some best in class WLC modelling and approaches, was the Activity that drove the rapid increase in maturity between IIP and SBP. Since SBP this activity has embedded within the organisation and is well understood within the Routes, but the progress has slowed.

It is the Opex Evaluation Activity which has, however, affected the overall Group score. Network Rail has been unable to demonstrate a systematic approach to the definition and continual improvement of maintenance and inspection regimes that is underpinned by a true understanding and management of risk. RCM related approaches have been successfully applied, particularly within the signalling discipline, but a broader RBM implementation has, as yet, not materialised.

And finally for this Group, the definition and utilisation of unit costs for both operational and capital expenditure has improved significantly over CP4, and at the start of CP5 Network Rail has again shown industry leadership by producing the RMM which is poised to introduce a standardised cost framework into UK main line rail.

The challenges for CP5 include the capitalisation of its success in the areas of whole life costing and the RMM, and to break the deadlock which has delayed the development and exploitation of true RBM regimes.

3.3
Lifecycle Delivery

The Lifecycle Delivery Group has narrowly missed the target trajectory at the End of CP4 assessment, as shown in Diagram 9 below.

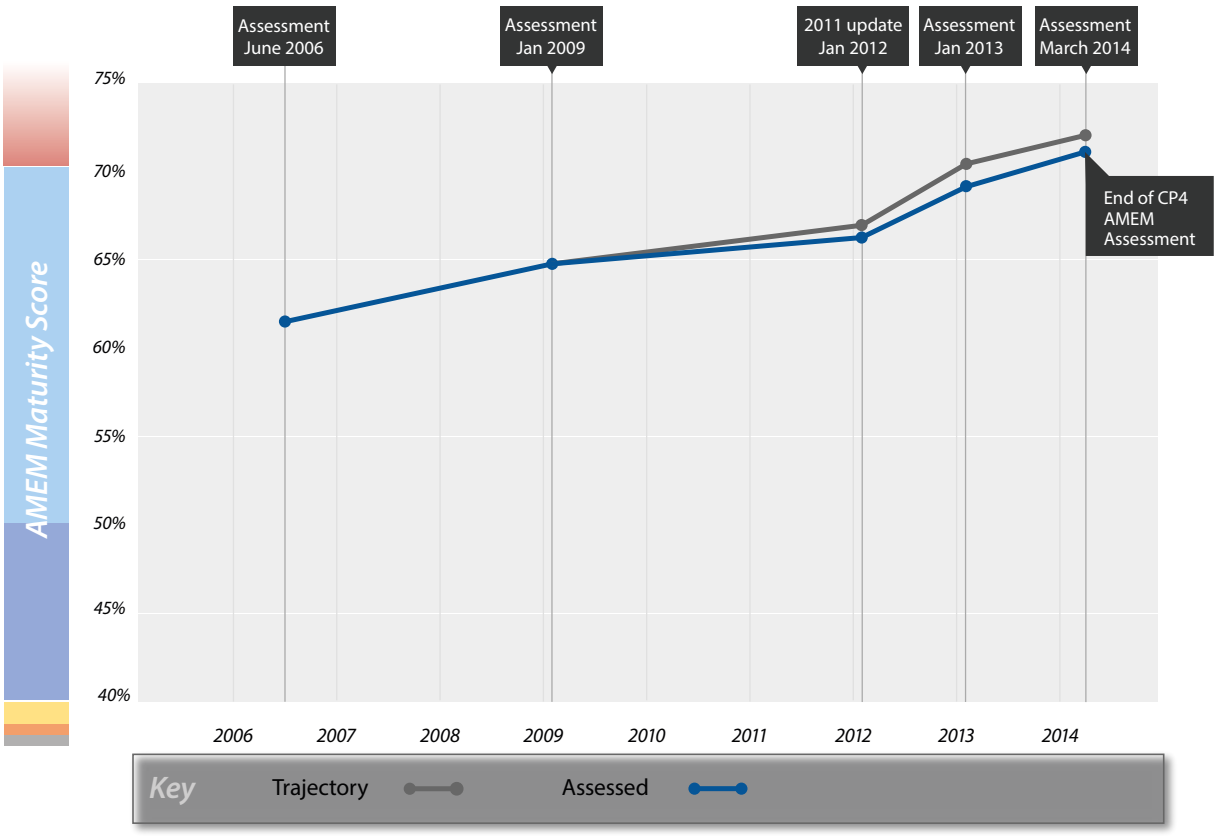

Diagram 9 *Network Rail's progress in the Lifecycle Delivery Group*

In general Network Rail demonstrates good control over its Lifecycle Delivery activities and this has improved over CP4, although the improvement started from a higher base than for the Strategy & Planning and WLC Justification Groups, and has not always been as focused. Network Rail's strengths within this Group include Incident Response (which railways are typically good at) and Maintenance Delivery, where concerted effort in the early years of CP5 brought a discipline to this area which is still evident and embedded. Asset Creation is also a strength, although Network Rail's achievements in delivering new infrastructure do not always meet planned milestones. The organisation's main challenge in this area is to put into place a more effective programme management approach that is as successful as the now well-established GRIP approach for managing individual projects, which is recognised industry best practice.

Network Rail also has many excellent examples of Systems Engineering tools, techniques and models, but these lack a systematic approach to their implementation and integration. If this was

achieved it would enable best in class infrastructure systems delivery which then feeds directly into the operations and maintenance phase of the system lifecycle. Network Rail has again provided some industry leadership in setting up the Network Optimisation process for the rationalisation of S&C infrastructure.

The challenge for CP5 will be for Network Rail to maintain the level of control it has over its lifecycle delivery activities, while at the same time integrating them more effectively into the overall Asset Management System through more effective programme delivery, systems integration, maintenance regime optimisation and infrastructure rationalisation.

3.4
Asset Knowledge

The Asset Knowledge Group has narrowly missed the target trajectory at the End of CP4 assessment, as shown in Diagram 10 below.

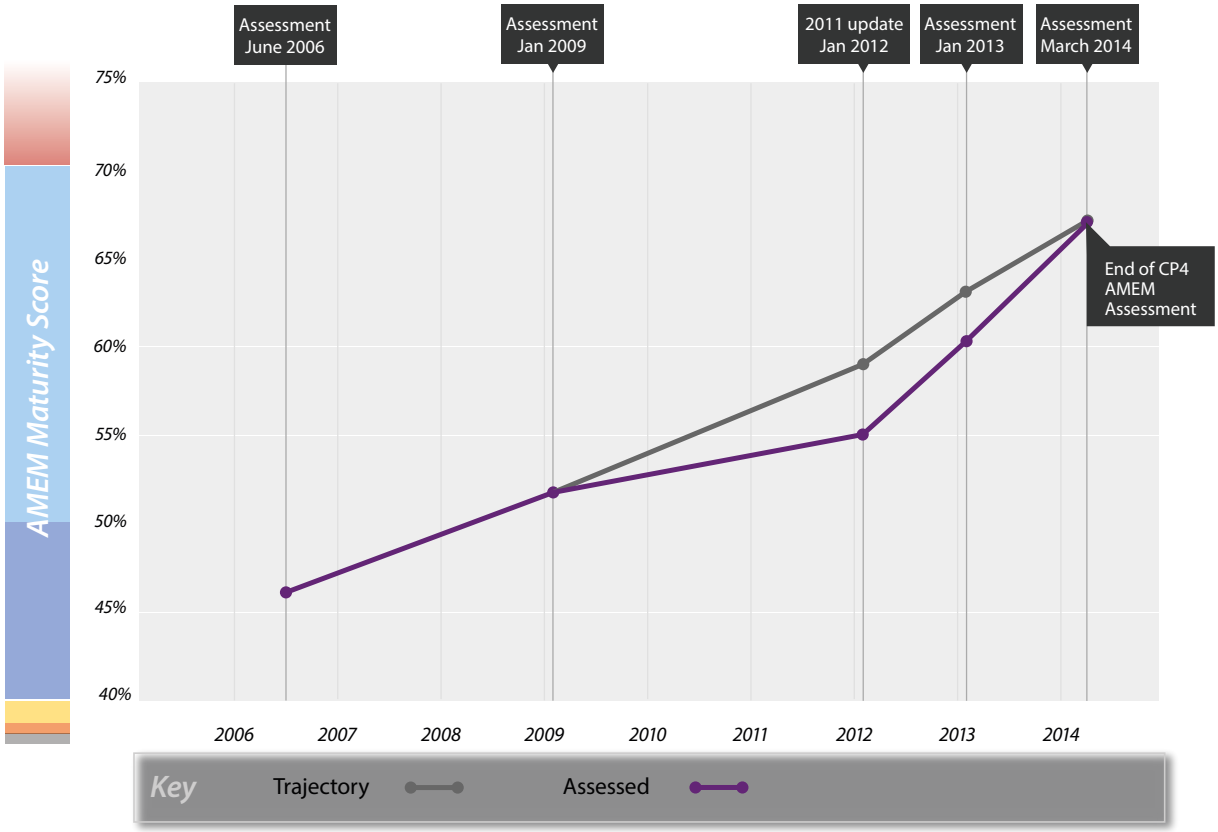

Diagram 10 *Network Rail's progress in the Asset Knowledge Group*

The context for this was that Network Rail was starting from a low base at the beginning of CP4. Underpinning this improvement has been the development of an Asset Information Strategy and the supporting ORBIS initiative which, at the time of the IIP assessment, had been slow to come on stream but by the End of CP4 has begun to make a more pronounced impact. This is evidenced through the structured improvement of asset information specification, collection and dissemination of information through systems such as LADS (which has been rolled out), through to specific trials such as FCL and significant enterprise-wide system developments such as MWM or RINM. Implementation in the Routes appears to be successfully supported through the BRIG approach, although there is some concern that the ORBIS programme and potential benefits are still not fully appreciated by the Routes which gave mixed feedback during the assessment with respect to data quality and use. The challenge for CP5 will be to continue the momentum that ORBIS has built up, whilst ensuring it always stays connected to actual Asset Management needs.

3.5
Organisation & People

The Organisation & People Group has missed the target trajectory at the End of CP4 assessment, as shown in Diagram 11 below

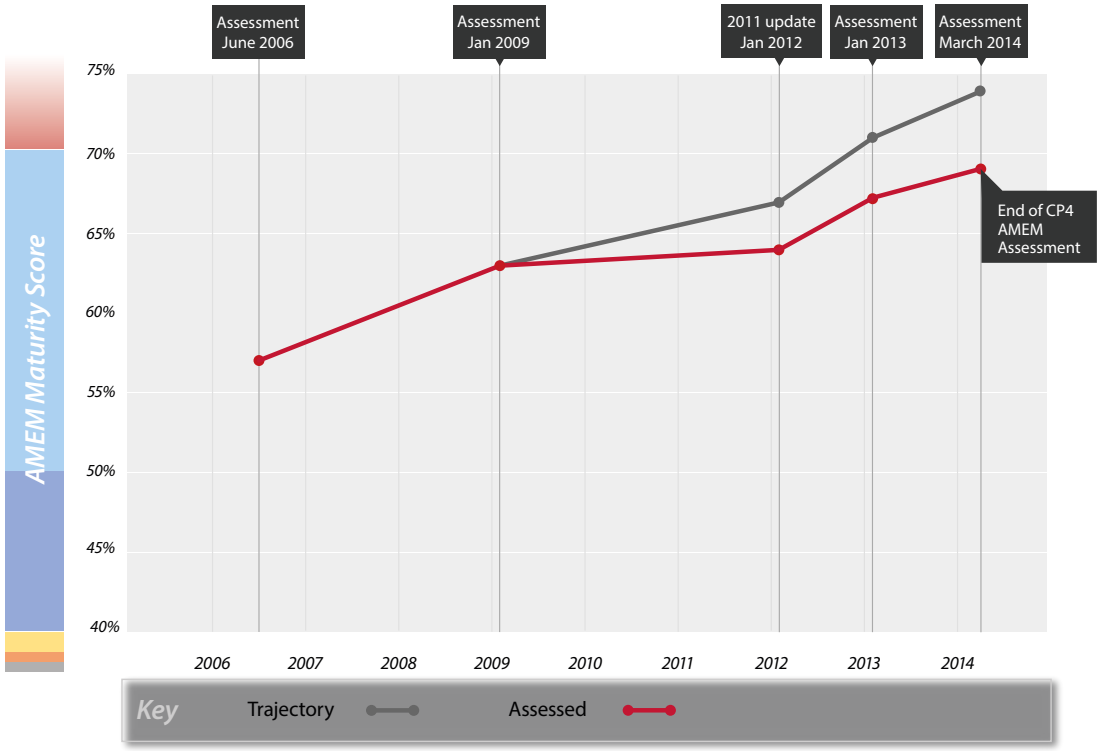

Diagram 11 *Network Rail's progress in the Organisation & People Group*

With respect to Contract & Supplier Management, the Network Rail Routes have developed much better relationships with local suppliers as the benefits of devolution and the need to develop locally derived CP5 delivery plans have established themselves. There has also been demonstrable improvement in the understanding Network Rail has of its Asset Management culture, and a more pro-active approach to behavioural change and the development of an improved Asset Management culture within the organisation. These developments are still early in their deployment but are likely to generate benefits in CP5. With respect the development of individuals there is some evidence of a more pro-active approach to the management of human factors and a more structured approach to the development of Asset Management competences, but again these are a work in progress, although also likely to generate benefits in CP5.

The challenge for Network Rail during CP5 will be to complete the initial development and roll-out of these approaches and to embed them into the organisation.

3.6
Risk & Review

The Risk & Review Group has exceeded the target trajectory at the End of CP4 assessment, as shown in Diagram 12 below.

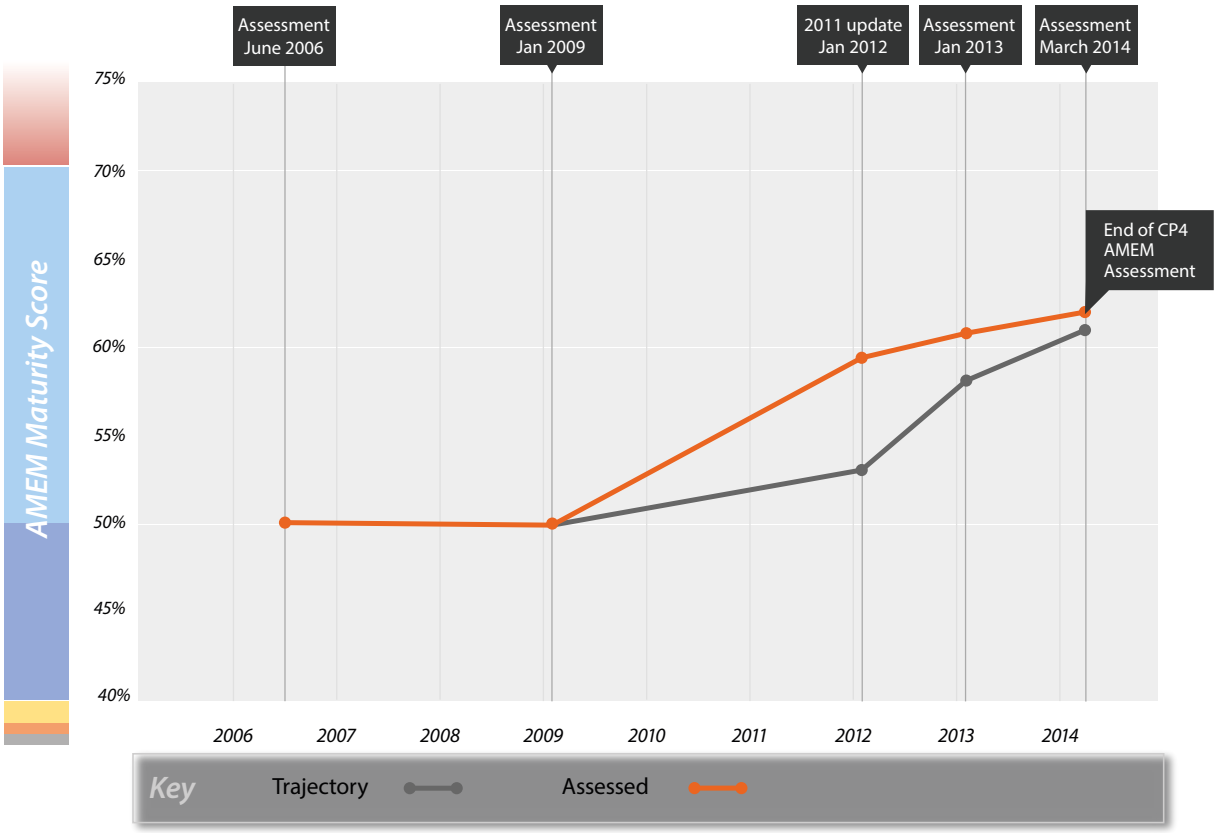

Diagram 12 *Network Rail's progress in the Risk & Review Group*

As with the WLC Justification Group, the reasons for this success are mixed, with two of the Activities within the Group (Sustainable Development and Weather & Climate Change) comfortably ahead of their End of CP4 targets. Both of these Activities have shown rapid development from a relatively low base during CP4, and both have achieved a significant amount of development work which will show benefits throughout CP5 as the importance of these areas to the successful delivery of Network Rail's corporate objectives becomes more apparent and is integrated more effectively into its Asset Management System.

Throughout CP4 Network Rail has sought to introduce a more effective risk management approach. The roll-out of the ERM and the successful application of new best-practice risk assessment techniques such as bow-tie analysis appears to be effective at the senior levels of Network Rail's organisation. However, Route level compliance to the ERM and its supporting guidance and methodologies is not consistent, knowledge of the new ERM is limited and the transition has stalled the score for this Activity.

Within the Review & Audit Activity the main concern is not that Network Rail does not have effective day-to-day review and assurance approaches in place, but that there is no focus on the relatively newly-defined Asset Management System, and that the management review of this and the incorporation of relevant inputs is behind the AMCL Roadmap schedule. There is a level of disagreement within Network Rail over how the organisation demonstrates compliance to the Engineering Verification standard NR/L2/RSE/070, and while the GRA appears to be reasonably well embedded, the multiple audit plans within the GRA also do not demonstrate a clear enough Asset Management System focus.

Network Rail's challenge for CP5 is to build on its various relatively strong risk management, review, audit and assurance capabilities to ensure they coordinate effectively and systematically on the review and update of the Asset Management System.

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4 Asset Management Strategy & Planning

The Strategy & Planning Group contains the core Asset Management Activities required to develop, implement and improve Asset Management within an organisation, taking into account business and organisational objectives and the effects of changing demand over time on the asset portfolio. The output of this Group is a fully justified, long-term Asset Management Plan which clearly explains what the organisation plans to do with its assets with respect to creation, maintenance and operation, and disposal.

The Strategy & Planning Group is split into four Activities within the AMEM model:

Policy & Strategy - The processes that govern the development of Asset Management Policy and Strategy which are aligned with business objectives.

Demand Analysis - The processes that govern the understanding and forecasting of demand on the asset portfolio and the consequent specification of infrastructure requirements to meet that demand over time.

Strategic Planning - The processes that govern the conversion of the infrastructure requirements identified through Policy & Strategy development and Demand Analysis into long-term work volumes and costs on the assets.

Asset Management Plans - The requirements which characterise best practice Asset Management Plan documentation.

The Following key is used in section 4.1 and subsequent sections to show variance from targets:

Key to End of CP4 RAG	
YES	Activity score achieved or exceeds End of CP4 target
NO	Activity score misses End of CP4 target by <2%
NO	Activity score misses End of CP4 target by >2%

4.1 Review of Roadmap Trajectories

Table 3 below shows the scores from the SBP assessment, the target score from the AMCL Asset Management Roadmap for the End of CP4, the actual score from the 2014 (End of CP4) assessment and comments on any variance from target.

Activity	SBP Score	End of CP4 Roadmap Target	End of CP4 Score	End of CP4 RAG	Comments
Policy & Strategy	61%	63%	62%	NO	***Roadmap – 3/5 achieved, 2/5 partially achieved*** Target not achieved due to following: • Evidence of active continual improvement of the Asset Management System • However, Asset Management Strategy and System revisions behind original AMCL Roadmap schedule
Demand Analysis	73%	72%	74%	YES	***Roadmap – 2/2 achieved*** Target exceeded due to following: • Route Specs now in place and link from Group Strategy to IP improved • LTPP now well established and process / outputs (such as Market & Route Studies) now being produced • Network Rail's place as the focus for UK national main line demand analysis now well established
Strategic Planning	63%	64%	64%	YES	***Roadmap – 1/4 achieved, 2/4 partially achieved, 1/4 not achieved*** Target achieved due to following: • Preparing for draft determination (cross-asset funding analysis scenarios) • Development of CP5 delivery plan – although limited evidence on revision of QRA • However embedding strategic planning processes as BAU has only just started
Asset Management Plans	66%	70%	70%	YES	***Roadmap – 1/1 achieved with minor deficiencies*** Target achieved due to following: • CP5 Delivery Plan now developed in alignment with final determination and Route work banks • However, Route Plans have not been updated, although this is with ORR agreement and all changes since SBP have been controlled

Table 3 Strategy & Planning Group Trajectories

The requirements defined in the AMCL Roadmap and the review of Network Rail's capabilities are included in the following sections for each activity.

4.2
Review of Roadmap Capabilities

Table 4 below shows a summary of the End of CP4 assessment findings against each of the AMCL Roadmap capability statements within the Strategy & Planning Group.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Policy & Strategy	1.1	Asset Management System	The Systems, Process and Monitoring Document fully describes the Asset Management System	The Systems, Process and Monitoring document includes: 1. A description of Network Rail's Asset Management System, boundaries and interfaces 2. A high-level process definition of the Asset Management System 3. A high-level description of how Network Rail meets each of the requirements of BSI PAS 55 4. Key RACIs and mapping 5. An explanation of the interfaces between the Centre and the Routes	The Systems, Process and Monitoring document has been updated based on lessons learned from the SBP and from the issue of ISO 55000 by December 2013	This capability has been partially achieved. The 'Asset Management System' document is still at Issue 1 but is planned to be re-issued in May 2014.
Policy & Strategy	1.2	Asset Management Policy	An Asset Management Policy is in place that incorporates the learning from the IIP development process and emerging good practice.	The Asset Management Policy is enhanced to include: 1. The additional statements of principle to cover the following: a. The capability to consider different scenarios to enable the whole-life costs and risks of different funding and output scenarios to be articulated b. Assessing the trade-off between efficiency of work delivery through longer possessions and access of the network to customers to deliver the timetable c. Work delivery activities will always be undertaken in accordance with the Asset policies including appropriate feedback where it is found that these Asset Policies are not practical or optimal 2. Explicit reference to other corporate policies and strategies; and 3. Clearly defined consistent terminology for all aspects of the Asset Management System. In addition criteria should be defined against which the Asset Management Policy will be evaluated to assure effectiveness and compatibility with business objectives.	The Asset Management Policy has been evaluated against the defined evaluation criteria, the lessons learned from the SBP submission and from the issue of ISO 55000. It has been updated and signed-off accordingly by March 2014	This capability has been achieved. The Asset Management Policy has been completely revised in accordance with the lessons learned from the SBP submission and from the issue of ISO 55000. It was published in March 2014.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Policy & Strategy	1.3	Asset Management Strategy	An Asset Management Strategy is in place that incorporates the learning from the IIP development process and emerging good practice.	The Asset Management Strategy is enhanced to include: 1. A better explanation of how the Asset Management Strategy has taken account of the principles in the Asset Management Policy and the linkage between these principles and the objectives in the Asset Management Strategy 2. A clear definition of the Asset Groups that described how the infrastructure is divided up for the purposes of Asset Policy and Route AMP development 3. The inclusion of measureable Asset Management objectives in the Asset Management Strategy and better referencing to show how these objectives link to the asset discipline specific objectives in the Asset Policies 4. Reference to and alignment with the strategic Asset Management framework and process (see capability 1.8) 5. An explanation of how the Asset Management Strategy is intended to work in terms of responsibilities in the Centre and the Routes 6. An overview of the updated workstreams for the AMIP that will deliver the end of CP4 AMCL Roadmap trajectory for the 23 AMEM activities	The Asset Management Strategy has been evaluated against the defined Asset Management objectives, the lessons learned from the SBP submission and from the issue of ISO 55000. It has been updated and signed-off accordingly by March 2014	This capability has been partially achieved. The draft of a revised Asset Management Strategy is going through the final stages of consultation and review and was due to be published in May 2014. The Asset Management Strategy published in 2011 is withdrawn, but is still available on Network Rail's website. Internally to Network Rail, within Asset Management Services and the Executive at least, it is clear what will replace it but this is not evident to the broader organisation until the revised strategy is published. This is something that requires further work, as although Routes work in accordance with the Asset Management Strategy, there is a lack of recognition and understanding of the actual document in the Routes.
Policy & Strategy	1.4	Asset Stewardship Report	The 2012/13 CSR, or other similar publication, contains a section on Asset Stewardship that describes the 'state of the nation' of Network Rail's Infrastructure	Network Rail should further develop the section on Asset Stewardship in its Corporate Responsibility Report, or other similar publication, to include the following: 1. A summary of Network Rail's Asset Management principles to demonstrate that these are aligned with the long-term interests of customers and stakeholders; 2. A brief report on the 'state of the nation' of Network Rail's assets and how Network Rail's stewardship will ensure the infrastructure capability required by Network Rail's customers will be delivered in a sustainable manner; 3. An overview of Network Rail's Asset Management strategy and objectives to show how Network Rail is sustainably reducing the costs of ownership of its infrastructure assets whilst continuing to deliver the required level of service and risk; 4. An explanation of how Network Rail's sustainable development objectives and activities are supporting the overall Asset Management approach; 5. An overview of how Network Rail is developing the competence of its people to develop and deliver more effective asset stewardship of Network Rail's infrastructure.	The 2013/14 CSR, or other equivalent publication, has been updated to reflect changes in Network Rail's Asset Stewardship since the SBP submission	This capability has been achieved. Network Rail has not issued a new CRR since 2011, but this capability has been covered and at SBP was covered by SBPT232 Asset Output Measures Summary (or Asset Stewardship Summary). Many of the Improvement Specification requirements are also fulfilled in the detail of the SBP and supporting documentation. Network Rail has now split the ASI into the Composite Reliability and Sustainability Indicators (CRI and CSI) which differentiate between the long and short term aspects of the ASI. These have been developed, forecasts and targets defined, and are now being monitored for CP5.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Policy & Strategy	1.5	CP5 Asset Management Capabilities	A forecast is in place for the Asset Management capability maturity of Network Rail's Asset Management system at the end of CP5 and a corresponding Asset Management Improvement Plan has been identified	Asset Management capability maturity forecasts are identified for each of the activities within Network Rail's Asset Management System for the end of CP5 that will be necessary to deliver in order to 'provide the benchmark against which organisations throughout the world assess their own Asset Management capabilities' [extract from Network Rail 2011 Asset Policy]. These forecasts are expressed as a percentage maturity on an agreed maturity scale. The Asset Management capability maturity forecasts will be compared to peer organisations in both the rail sector and in other asset intensive industries to ensure the targets are comparable with its peers. Fully funded and costed improvement projects will be identified that will deliver the required improvements in Asset Management capability by the required dates. Customers and other stakeholders will be consulted on these plans to ensure they adequately reflect the priorities facing the UK rail industry. Appropriate arrangements are implemented to ensure Network Rail can demonstrate achievement of these Asset Management capability maturity targets throughout CP5 by using an Independent Reporter or equivalent independent assessor.	Asset Management capability maturity forecasts are identified for all 23 AMEM activities for the end of CP5 and a fully funded Asset Management Improvement Plan to deliver these forecasts is in place by March 2014	This capability has been achieved. Forecasts and plans for improving Asset Management capability are defined in the existing Asset Management Strategy and the SBP 'Asset Management Capability' document, and have been incorporated into the new (still in draft) Asset Management Strategy, which also contains Network Rail's new Asset Management Improvement Plan.
Demand Analysis	1.6	Long-term Demand Projections	Demand analysis is used to predict the range of expected capacity requirements for each route for 30 years and RUSs updated accordingly	The long-term planning process is clearly defined, with a good understanding of historical demand and the drivers of demand are documented with the relevant information stored and accessible. The Network RUS will clearly inform the Scenario Planning process. Bespoke demand forecasting tools are developed from the requirements identified during the Scenario Planning process. The RUS for each Route reflects the long-term demand and the requirements for infrastructure enhancement to deliver this demand.	The RUSs are updated where necessary by December 2013 to reflect any changes in demand or policy since the SBP	This capability has been achieved. Although the LTPP no longer publishes RUSs it is on target to publish the equivalent set of documentation (Market and Route Studies). All Market Studies have been published and the first tranche of Route Studies are in production.
Demand Analysis	1.7	Route Specifications	Route Specifications are in place for all Routes that define the infrastructure requirements for CP5 in terms of capability, capability, availability and minutes delay	Route Specifications include the following elements which are derived from the requirements set out in the HLOS: 1. Target infrastructure minutes delay 2. Capacity requirements of the infrastructure including headway and timetable 3. Required capability of the infrastructure including gauge, line speed and bridge strength 4. Infrastructure availability including allowance for possessions	The Route Specifications are updated by December 2013 to reflect any constraints on Network Rail's ability to deliver the HLOS as a result of the CP5 determination	This capability has been achieved. Route and Network Specifications were updated in April 2014, and include all the Improvement Specification requirements with the exception of target minutes delay and detail on possessions, although basic timetable information is provided.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Strategic Planning	1.8	Strategic Planning Framework and Process	Network Rail's strategic Asset Management planning framework and process is implemented	The strategic Asset Management planning framework and process considers: 1. Clear alignment with the Systems, Process and Monitoring document showing 'line of sight' from SBP to Asset Policies, Route AMPs and Delivery Plans 2. How the difference processes, asset information, models and plans are linked 3. The appropriate method to develop work volumes, cost schedules and output measures for different types of asset, where necessary, taking into account asset criticality 4. How demand analysis and required outputs are considered and modelled in the development of the strategic Asset Management Plan 5. How work volumes and costs are developed for different funding scenarios to reflect potential changes in demand, output requirements and available funding. 6. How confidence levels in asset information, and asset policies and unit costs will be considered and how this will the impact on the confidence levels in work volumes and costs 7. The extent to which each component of the framework will be developed and integrated by the time the SBP is published.	The strategic Asset Management planning framework and process has been updated to reflect lessons learned from the SBP by December 2013	This capability has been partially achieved. The 'Asset Management System' document is still at Issue 1 but is planned to be issued in May 2014. The Group Strategy for Asset Management Services requires Asset Management Services to develop a plan to embed the strategic planning processes and models utilised during SBP as 'business as usual'. This strategy has been approved and it is understood will be a priority in the early stages of CP5. At the time of this assessment the next revision of the Tier 1 & 2 models has been authorised by investment panel, and the specification for updating the Asset Policies agreed, now pending investment panel authorisation.
Strategic Planning	1.9	Strategic Business Model	A strategic business model is in place for producing CP5 work volumes and costs	The strategic business model that is used for determining CP5 work volumes has the following capabilities: 1. Able to predict work volumes and costs for all enhancement, renewal and maintenance activities in CP5 for the agreed funding scenarios 2. Work volumes are derived from the application of the asset policies to the asset populations 3. Work volumes and costs for high criticality assets are based on whole-life cost modelling with interfaces to Tier 2 models 4. Work volumes and costs for medium criticality assets are based on service life relationships 5. Work volumes and costs for low criticality assets are based on historical spend 6. Predicts key outputs for CP5 and future control periods	The strategic business model is updated based on lessons learned from the SBP by December 2013 in order to produce the CP5 Delivery Plan	This capability has been achieved. The strategic business model (Tier 1 and 2 models) have been re-run to support the draft to final determination process and to support the production of the CP5 delivery plan.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Strategic Planning	1.10	Network Strategic Asset Management Plan	A Network-wide Strategic Asset Management Plan is in place that defines the long-term Asset Management activities and expected outputs across Network Rail's infrastructure	The network-wide Strategic Asset Management Plan includes: 1. Work volumes and costs for each key activity and each key asset type for each funding scenario; 2. A preferred scenario that delivers the required CP5 outputs for the lowest sustainable whole life costs; 3. Confidence levels in both work volumes and costs over the next 25 years reflecting the levels of confidence in the Asset Information, Asset Policies and Units Costs 4. An appropriate level of detail and level of confidence to reflect the criticality of the different activities and asset types; 5. A summary of the asset portfolio and its service condition and age profile, including historical changes over the last 10 years and the predicted changes to this condition and age profile over the next 25 years; 6. The expected outputs and performance that will be delivered by the work defined within each scenario over the next 25 years; 7. The metrics and performance inductors that will be used to monitor these outputs and performance measures; 8. The expected efficiencies that will be delivered over CP5 clearly differentiating between work scope efficiencies from unit costs efficiencies; 9. Different scenarios to reflect different assumptions relating to demand, output requirements and available funding.	The network-wide CP5 Delivery Plan is issued in March 2014 which includes: 1. Work volumes and costs for all enhancement, renewal and maintenance activities that reflect the CP5 Determination 2. An explanation of why the work volumes have changed since the CP4 Delivery Plan(s) and the CP5 SBP 3. Expected outputs for each year of CP5 and alignment with HLOS and Route Specifications	This capability has been partially achieved. The CP5 Delivery Plan contains details of all CP5 work volumes identified by Network Rail to deliver the final determination requirements, but does not detail costs or the reasons for change from the SBP.
Strategic Planning	1.11	Quantified Risk Assessment	A Quantified Risk Assessment is in place that provides confidence levels for both the work volumes and costs in the network-wide Strategic Asset Management Plan	The QRA analysis should be allow the following to be produced: 1. Target level of confidence to reflect the criticality of the different activities and asset types 2. The levels of confidence in the Asset Information, Asset Policies and Units Costs used to produce the Strategic Asset Management Plan 3. Confidence levels in work volumes and costs (including efficiency assumptions) over CP5 reflecting the levels of confidence in the Asset Information, Asset Policies and Units Costs 4. Sensitivity Analysis showing the greatest contributors to uncertainty in work volumes and costs over CP5 5. An estimate of the confidence levels in both work volumes and costs in CP5	QRA is updated to reflect the confidence levels in the CP5 Delivery Plan in March 2014	This capability has not been achieved. The QRA published at SBP has not been updated, although Network Rail reports that CP5 delivery risk has been managed at the Route level. However there is little evidence of a systematic approach or national oversight.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
AMPs	1.12	Route AMPs	Route AMPs are in place for all Network Rail's Routes which include expected work volumes, costs and expected outputs for each year of CP5	Route Asset Management Plans are in place that contain: 1. All proposed enhancement, renewal, refurbishment and maintenance activities throughout the remainder of CP4 and CP5 2. Top down (from strategic business model - see capability 1.10) and bottom up work volumes and costs (from delivery units) for each year of CP4 / CP5 for high and medium criticality activity 3. Explanation on how the top down work volumes and costs were derived 4. Costs for low criticality activities for each year of CP4 / CP5 5. Commentary on any discrepancy between top down and bottom up volumes and costs (high and medium criticality) - including discrepancy between proposed activity types 6. Justification for any deviation from Asset Policy 7. Analysis of CP5 proposed work volumes with CP4 work volumes and commentary on key differences 8. Review of historical condition and performance against CP4 targets 9. Predicted condition, performance and other outputs for each year of CP5 and how these align to the requirements defined in the Route Specification. In addition, review processes are in place to monitor progress against the Route AMPs during the remainder of CP4 and CP5 and to ensure the plan continues to be aligned with the SBP and CP4 and CP5 Delivery Plan (when published). These review processes require the monitoring of performance and condition compared to the expected outcomes described in the SBP and the Delivery Plans.	Route AMPs have been reviewed in accordance with the defined review process and are updated for each of Network Rail's 10 Routes to reflect the CP4 actual delivery against the Delivery Plan and the CP5 determination by March 2014	This capability has been achieved. The CP5 Delivery Plan has been derived from, and is therefore aligned to, the various Route work banks. The Route Plans published at SBP have not been updated to reflect any changes, although Network Rail reports that this is with ORR agreement and that all changes to the plan since SBP have been change controlled.

Table 4 Summary of assessment findings for the Strategy & Planning Group

4.3
Policy & Strategy

The SBP assessment provided a detailed review of Network Rail's core Asset Management System documentation, including the definition of its Asset Management System, its Asset Management Policy, Asset Management Strategy, its overall asset stewardship and the development of its Asset Management capabilities. All of these areas are subject to Roadmap commitments and the findings underpinning these can be found in Table 4.

In summary Network Rail has made significant progress on the definition, implementation and review of its Asset Management System during CP4 and has just missed the End of CP4 target of 63%, scoring 62%. During CP4 Network Rail has:

- Defined its Asset Management System and set out the core processes and approaches for implementing it;
- Defined and published two revisions of its Asset Management Policy (in February 2011 and March 2014 (NRCP4-SP1);
- Defined and published its first Asset Management Strategy (in February 2011) and at the time of assessment was close to publishing its first revision (NRCP4-SP2);
- Demonstrated an increasing level of senior commitment and accountability for these documents and approaches through their continual improvement, review and authorisation by the executive board (NRCP4-SP3); and
- Demonstrated that sufficient 'line of sight' exists within the organisation to implement and sustain the approach.

Network Rail's challenge for CP5 will be to fully embed and continually improve its Asset Management System within the devolved organisation. The primary reason for Network Rail missing the End of CP4 target in the Policy & Strategy Activity is that the review of the Asset Management System and Strategy documentation was not completed within the timescales anticipated in preparation for CP5. Although it is understood that the reason for this is to ensure full and effective consultation and engagement with the senior team, which in AMCL's view is essential for fully embedding the approach, it is symptomatic of a broader concern related to management review of the Asset Management System which is explained in more detail in Section 9.6 on Review & Audit. It was also noted that, although the Routes demonstrate a clear understanding of the strategic planning framework defined by the Asset Management System and are focused on delivering the corporate and Asset Management Objectives, recognition and understanding of the core Asset Management System documentation is not high.

4.4 Demand Analysis

Demand Analysis remains one of Network Rail's relative strengths with an End of CP4 score 2 percentage points ahead of the target of 72%. It was reported at the SBP assessment that good progress was being made against the SBP AMCL Roadmap Capabilities 1.6 and 1.7 related to developing an agreed 30-year forward view for each Route, and the publication of Route Specifications respectively. Network Rail has firmly established itself at the centre of the LTPP, which is the industry-wide process for long term planning governed by the RIPG which Network Rail chairs.

The most significant development since the SBP assessment has been the progress made implementing the revised LTPP which at the time of the SBP assessment had been defined in consultation with the wider industry through the RIPG, and had been endorsed by the ORR. The output from the LTPP externally informs the Government with respect to its options and choices, and internally informs Network Rail Asset Managers with respect to the capability and capacity changes required to the infrastructure over time. The LTPP is replacing the current geographic RUS documentation with the following outputs:

- Market Studies, which will forecast future rail demand, and develop 'conditional outputs' for future rail services, based on stakeholders' views of how rail services can support delivery of their strategic goals. These have been completed (NRCP4-SP4 through to NRCP4-SP7).
- Route Studies, which will develop options for future services and for development of the rail network, based on the conditional outputs and demand forecasts from the market studies, and assess those options against funders' appraisal criteria in each of Network Rail's devolved Routes. The first tranche of Route Studies are currently being developed (NRCP4-SP8).
- Cross-boundary analysis, which will consider options for services that run across multiple routes, and ensure that Route Studies make consistent assumptions in respect of these services. Since SBP the decision has been made that these will not be produced, but that alignment between the various Route Strategies will be maintained through the governance of the 'Cross Boundary Group' (NRCP4-SP9).

The challenge identified at SBP was the effective linking of the RUSs to the Route Plans via the Network and Route Specification documents. These documents had been published at SBP, and have been revised since, with updated documents published in April 2014 (NRCP4-SP10 & NRCP4-SP11). However, these revised documents still do not provide information on the required Reliability, Availability and Maintainability elements of a full RAMS requirements specification and therefore continue to have consequential effects on the effective integration of these documents into Network Rail's strategic planning framework as described in Section 4.5. Despite this, there is increasing evidence from other parts of Network Rail that the development of systems engineering and availability modelling techniques are being utilised outside of the traditional project and

programme environment, and that efforts are being made to understand and define the correct level of RAMS specification to optimise strategic planning activities within the Routes (see Section 6.4 and the Western Route TRAIL model).

Aligned to this, the progress reported at SBP with respect to providing further clarity on the process for handing over schemes from the Strategy & Planning Directorate to the delivery arm of Network Rail (usually IP) has now been further defined with the introduction of the 'Clienting Guidelines' (NRCP4-SP12) and the 'Sponsors' Handbook' (NRCP4-SP13). Both of these documents now provide much clearer guidance on the project delivery lifecycle as follows:

- The Clienting Guidelines provide an overview of the operating model, roles and organisational principles, approaches, relationships, behaviours, processes and governance.
- The Sponsors' Handbook provides much more detail on the key role of sponsor, including information on the operating model, funding, investment and the LTPP, and the development and delivery of projects including requirements for stakeholder engagement, requirements specification, verification and validation of requirements, estimating and whole-life cost requirements, the identification and management of risks and opportunities as well as the sponsor's role in the delivery, procurement and governance of project work and the related GRIP and engineering processes.

The challenge for CP5 will be to embed and optimally connect the LTPP to the effective delivery of infrastructure to meet national and Route requirements in a way that is controlled and validated.

4.5
Strategic Planning & Asset Management Plans

Network Rail has achieved the End of CP4 target for both the Strategic Planning and Asset Management Plans Activities, scoring 64% and 70% respectively. The SBP assessment provided a detailed review of Network Rail's strategic planning framework, the SBP plan documentation (including the Strategic Business Plans for England & Wales and Scotland, the Renewals and Maintenance Expenditure Summaries, the Route Plans and associated documents), the CP5 delivery plan, and the strategic planning processes and models used to develop these plans. This included an assessment of how Network Rail's Asset Policies had been applied.

Since the SBP Network Rail has reached a final determination with the ORR for CP5 and developed its CP5 Delivery Plan, which includes the Scotland KPI Package and the CP5 Enhancements Delivery Plan (NRCP4-SP14 through to NRCP4-SP16). At the time of this assessment these plans were well understood within Network Rail, both at the Centre and in the Routes, and there were defined governance and monitoring of these plans in place. Network Rail's performance in this area has

met Roadmap expectations (at 64%) and it just remains for Network Rail to fully embed as 'business as usual' the strategic planning framework, processes and approaches during the early stages of CP5 to ensure on-going maintenance of the strategic plan (NRCP4-SP17 & NRCP4-SP18).

Diagram 12 repeats a diagram from the SBP assessment report which showed AMCL's view on Network Rail's strategic planning framework at that point. The conclusion was that the level of integration is not yet complete for two main reasons, summarised below, and this remains AMCL's view:

- The information presented in the Network and Route Specifications does not include all the information required to clearly disaggregate RAMS requirements into the Route Plans (for example on the target minutes delay (Reliability / Availability) and possession allowances (Maintainability)) – see also Section 4.4 on Demand Analysis.
- The current Asset Management Policy and Strategy not being aligned with the SBP documentation (see Section 4.3 on Policy & Strategy), combined with a lack of clarity about how infrastructure capability at the Route level is defined, expressed and modelled for different scenarios. Some of this is achieved in the Tier 2 modelling (particularly for signalling), and TRAIL is used for larger programmes (such as Crossrail, Thameslink, and Great Western Route) but this is not a systematic part of the framework. See also Section 6.4 on Systems Engineering.

Related to this, AMCL Roadmap Capability 1.12 requires the final alignment of Route work banks to the CP5 Delivery Plan and the Route Plans. Although the former is complete the latter is not, with Route Plans not yet aligned. Network Rail reported that this approach has been agreed with the ORR and that changes from SBP to CP5 Delivery Plan have been change controlled (for example within Western Route EP - (NRCP4-SP19).

Despite these issues, the strategic planning framework has proved to be broadly effective for CP5 planning, and the challenge for CP5 will be to refine it further to rectify any deficiencies.

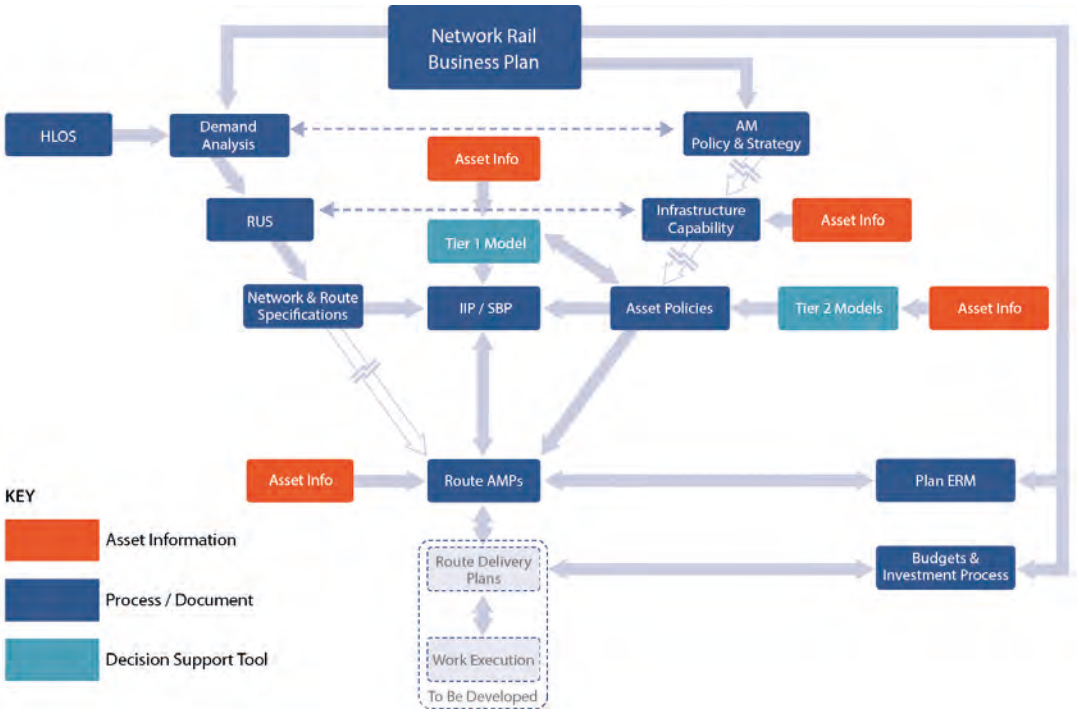

Diagram 13 AMCL View on Strategic Framework at SBP / End of CP4

Since the SBP assessment Network Rail has completed a 'cross-asset funding analysis' which aimed to prepare the organisation for a range of potential funding scenarios coming back in the Draft Determination from the ORR (NRCP4-SP20). This included three scenarios for 5%, 10% and 20% less funding and was created by the Routes under the Centre's guidance. The assessment defined common measures, and focused on managing safety and performance risks to defined levels through the qualitative comparison of options according to defined criteria. The Routes provided plans for meeting the three funding scenarios which they believed would optimise the delivery of required outputs by re-arranging funding across and within the different disciplines.

Once the Draft Determination was issued Network Rail was in a better-prepared position to evaluate the impact than it has traditionally been. The impact of the Draft Determination was modelled in the Tier 1 model (ICM) and the work volumes and outputs re-calculated. The Routes had the final responsibility for defining how the relevant funds were distributed in the CP5 Delivery Plan, with the Centre retaining the overall view of Network Rail's ability to maintain outputs through the delivery of a sustainable and whole-life cost optimised plan. There were several iterations between the Draft and Final Determinations to achieve this. The generic approach to deliverability assurance was that the Route RAM teams liaised with the relevant Network Rail IP team to review issues and potential work packaging and smoothing options. In turn, IP liaise with the relevant suppliers to undertake an equivalent review (NRCP4-SP21).

At the time of the SBP assessment an uncertainty analysis had been completed. It was noted at the time that the uncertainty analysis was based on a 'top-down' view of uncertainty for each part of the expenditure plan. As Network Rail's SBP submission (and final CP5 Delivery Plan) is nominally

based on the Route Plans from the devolved Routes it would appear that uncertainty analysis should be a combination of both 'bottom-up' and 'top-down' analysis as each Route is likely to have its own levels of uncertainty. AMCL Roadmap Capability 1.11 reflected this issue.

However, the uncertainty analysis has not been updated and Network Rail reported that the management of uncertainty and risk within the CP5 Delivery Plan was devolved to the Routes. There is, however, little evidence to suggest that this approach has been systematic or coordinated by the Centre with Routes reporting different approaches. Therefore the evaluation at the End of CP4 for Roadmap Capability 1.11 is that this has not been achieved.

Given the general success of the strategic planning approach and the use of the Tier 1 and 2 models for CP5 planning Network Rail is putting investment programmes in place to embed the models and processes further with the aim of ensuring strategic planning becomes 'business as usual'. At the time of this assessment the next revision of the Tier 1 & 2 models had been authorised by investment panel, and the specification for updating the Asset Policies agreed, and was pending investment panel authorisation (NRCP4-SP22).

5 Whole-life Cost Justification

The Whole-Life Cost Justification Group contains the Asset Management Activities required to enable the development of whole-life cost justified and optimised Asset Management Plans. The outputs from this Group are typically a set of Asset Policies which contain optimised Asset Management lifecycle decisions for all the organisation's assets and guidance on how these should be applied or modified.

The Whole-Life Cost Justification Group is split into three Activities within the AMEM model:

Opex Evaluation - The processes that govern the development of cost/risk optimised maintenance and inspection regimes.

Capex Evaluation - The processes that govern the identification and cost/risk evaluation of capital expenditure jobs, projects and programmes.

Asset Costing & Accounting - The processes that govern the specification and capture of unit cost information for maintenance and renewal decision-making and processes and asset valuation.

5.1
Review of Roadmap Trajectories

Table 5 below shows the scores from the SBP assessment, the target score from the AMCL Asset Management Roadmap for the End of CP4, the actual score from the 2014 (End of CP4) assessment and comments on any variance from target.

Activity	SBP Score	End of CP4 Roadmap Target	End of CP4 Score	End of CP4 RAG	Comments
Opex Evaluation	51%	62%	52%	NO	***Roadmap – 2/7 achieved, 3/7 partially achieved, 2/7 not achieved*** Target not achieved due to following: • Maintenance strategy and objectives still incomplete • Limited justification of varying maintenance requirements analysis processes • No evidence of cost-risk trade-off approach • RCM Pilot stage only outside of signalling discipline • Lack of integration with Intelligent Infrastructure • Process for justifying benefits realisation unclear
Capex Evaluation	65%	62%	65%	YES	***Roadmap – 3/6 achieved, 1/6 partially achieved, 2/6 not achieved*** Target exceeded due to following: • Tier 1/2/3 models in place and aligned to SBP Asset Policies • Modelling has exceeded Roadmap expectations • However, Asset Policies have not yet been updated and DST deployment is not yet complete (at Tiers 2 & 3)
Asset Costing & Accounting	60%	67%	65%	NO	***Roadmap – 1/2 achieved, 1/2 partially achieved*** Target not achieved due to following: • MUCs and RUCs definitions, collection, monitoring and continual improvement in place however, not yet to a defined level of confidence (RUCs) • Opportunity to align completely with the RMM

Table 5 WLC Justification Group Trajectories

The requirements defined in the AMCL Roadmap and the review of Network Rail's capabilities are included in the following sections for each activity.

5.2
Review of Roadmap Capabilities

Table 6 and Table 7 below show a summary of the End of CP4 assessment findings against each of the AMCL Roadmap capability statements within the Whole-life Cost Justification Group. These are split into maintenance (Table 6) and renewal (Table 7) elements.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Opex Evaluation	2.1	Maintenance Criticality Analysis	A maintenance criticality analysis has been undertaken that prioritises asset types based on maintenance costs and risks	1. The criticality analysis includes consideration of the following annualised costs and risks: • Planned maintenance costs; • Reactive maintenance costs; • Performance costs; • Risk costs; • Operating costs; • Environmental, societal and reputational risks 2. Asset types are categorised into different risk categories, e.g. high, medium or low criticality asset types from a maintenance perspective	The priority asset types for the development of risk-based maintenance regimes up to the end of CP4 have been identified by February 2013	This capability has been achieved. The priority assets by asset group within the RBM programme have been identified using quantitative analysis and through discussions with key stakeholders in the Routes.
Opex Evaluation	2.2	Maintenance Strategy	A maintenance strategy is in place detailing the approach to determining risk-based planned maintenance, minimum action and inspection interventions.	A maintenance strategy is in place that includes the following: 1. Definition of the key principles that define Network Rail's approach to maintenance 2. The approach to determining maintenance requirements (including inspection and minimum actions) depending on the criticality and characteristics of deterioration of the different asset types 3. The approach to addressing risk mitigation including appropriate consideration of probability and consequence of failures 4. How technology can support the maintenance strategy including the contribution of Intelligent Infrastructure and remote condition monitoring 5. High-level assessment of the resources, information requirements and competences required to undertake the proposed maintenance requirements analysis 6. The strategy for resourcing both the analysis and implementation of the new maintenance regimes 7. High level business case based on the analysis costs and expected benefits of optimising maintenance regimes 8. The parameters that define what decisions the Routes can make with respect to changing maintenance regimes	The maintenance strategy has been updated based on the lessons learned from the development of risk-based maintenance regimes for the sample asset types within the pilot by February 2013	This capability has been partially achieved. The Maintenance Strategy document is part of the overall Network Operations business plan (which is currently under development) and is currently at draft status only. It is understood that the Maintenance Strategy is planned to be issued in May 2014.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Opex Evaluation	2.3	Maintenance Requirements Analysis Process	A maintenance requirements analysis process is in place that defines the approaches) for developing maintenance regimes for all asset types	The maintenance requirements analysis process for determining the appropriate maintenance and inspection regimes for high, medium and low-criticality asset types considers the following: 1. The steps in the analysis process and how this aligns to the 10 step asset policy process 2. How asset hazards will be identified including appropriate use of FMECA 3. How maintenance and inspection tasks will be identified including the appropriate use of RCM techniques 4. How risks will be identified and evaluated for different maintenance interventions, including appropriate consideration of uncertainty 5. How maintenance and inspection intervals will be set, taking into account the cost- risk trade-off 6. How reliability and safety justification will be undertaken 7. How activities will be packaged into practical work schedules 8. The requirements for implementation of the new inspection and maintenance regimes 9. RACI for the definition of the maintenance regimes and the extent to which the Routes will be able to determine maintenance requirements 10. The asset information requirements to support the maintenance requirements analysis process	The maintenance requirements analysis process has been updated based on the lessons learned from the risk-based maintenance analyses of the sample asset types in the pilot by March 2013.	This capability has been partially achieved. The Optimising Maintenance Regimes document is now withdrawn pending publication of the revised Maintenance Strategy. Details of the analysis process have been further developed in some areas as detailed in 10662 however items 4 to 6 in the Improvement Specification are not addressed in this standard.
Opex Evaluation	2.4	Maintenance Analysis Plan	A resourced plan is in place for the proposed risk-based maintenance analysis activities	A plan is in place that defines the activities and resources necessary for analysing risk-based maintenance regimes that includes: 1. Inclusion of all priority asset types to analyse up to the end of CP4 including those selected for the pilot analysis 2. The justification for the priority asset types 3. The timescales for the analysis to be completed and for the appropriate changes made to standards 4. The resources necessary to undertake the analysis work 5. The competences required to undertake the analysis work 6. Any requirements for training and / or outsourcing to overcome resource or competence shortfalls 7. Any constraints and assumptions	A fully resourced plan for the analysis of risk-based maintenance regimes for the priority asset types in up to the end of CP4 is in place by March 2013	This capability has been achieved. The current RBM programme, as defined by Network Rail, has a resourced programme plan in place.
Opex Evaluation	2.5	Risk-based Maintenance Analysis	Risk-based maintenance regimes have been developed for all appropriate asset types	Risk-based maintenance regimes have been developed in accordance with the maintenance requirements analysis process for all appropriate asset types and the following undertaken: 1. Revised maintenance, inspection and minimum action activities and periodicities are defined 2. Requirements for fitment of Intelligent Infrastructure or other remote monitoring equipment are identified 3. Tolerances and mitigations for missed maintenance are identified 4. Competence requirements for the maintenance activities are identified 5. Spares and tools requirements for the maintenance activities are identified 6. Safety and reliability justification for new regimes are peer reviewed and approved by the appropriate stakeholders. 7. Expected outputs and business benefits from implementation are identified 8. Requirements for implementation are identified	Risk-based maintenance regimes have been developed for the priority asset types identified in the maintenance analysis plan by January 2014	This capability has not been achieved. A number of RCM roll-outs and pilots have been completed or are under way across a number of asset groups, but there is no evidence of quantified cost-risk optimisation at this stage. Network Rail's RBM programme is targeting a move to cost-risk optimisation towards the end of CP5.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Opex Evaluation	2.6	Maintenance Standards	Maintenance standards have been updated and implemented to reflect the new risk-based maintenance regimes	An agreed corporate approach to changing maintenance standards to reflect changes in the revised risk-based maintenance regimes is in place. Relevant maintenance specifications and standards have been updated in accordance with this process and the following undertaken: 1. Peer review to ensure resulting tasks and intervals are consistent with the maintenance requirements analysis process and the safety and reliability justification 2. Changes to standards briefed to internal maintenance personnel 3. Changes to standards briefed to external contractors where appropriate	The relevant standards have been updated for the priority asset types identified in the maintenance analysis plan by March 2014	This capability has not been achieved. Updated documentation evidenced (including 10662) but wider update to standards across all asset groups has been impacted by the delayed BCR programme. However, there is insufficient overlap between the BCR and RBM programmes to align the management of their objectives and risks.
Opex Evaluation	2.7	Maintenance Implementation Plan	A resourced plan is in place for the implementation of the new risk-based maintenance regimes	A plan is in place for the implementation of the revised risk-based maintenance regimes which includes the following: 1. Prioritised implementation plan for each Route reflecting local priorities 2. Impact on resources for each Route including changes to competence requirements 3. Changes required to work management systems and schedules 4. Changes to spares and tools requirements 5. Updates to procedures for missed maintenance 6. Plans for implementation of Intelligent Infrastructure or other remote monitoring equipment 7. Arrangements for monitoring the reliability and other outputs and comparing these to assumed outputs	A fully resourced plan for the implementation of the risk-based maintenance regimes for the priority asset types identified in the maintenance analysis plan is in place by March 2014	This capability has been partially achieved. There is clear RACI defined in 10662 for RBM implementation but the Routes have identified resource constraints in delivering the analysis effort at DU level.
Unit Costs	2.8	Maintenance Unit Costs	Maintenance units costs are specified and captured in a consistent manner	Activity-based maintenance unit costs are specified and captured to a sufficient level of detail to support the analysis of risk-based maintenance requirements. This includes the consideration of which portion of the unit cost is treated as variable and fixed for the purpose of the cost-risk trade-off undertaken as part of the maintenance requirements analysis process.	Maintenance unit costs are available for the priority assets types identified in the maintenance analysis plan by April 2013	This capability has been achieved. Unit costs are identified against each standard job in Ellipse. However, Network Rail will have to continue to review and assure appropriate unit costs are utilised. The Routes will also have to continually assure themselves they have sufficient headcount to deliver the revised regimes given the resource based (as opposed to bottom-up) analysis of maintenance costs for SBP. This is further impacted by the identified efficiencies.

Table 6 Summary of assessment findings for the WLC Justification Group (Maintenance)

Table 7 below shows the WLC Justification (Renewal) Roadmap capabilities and Network Rail's progress against these.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Capex Evaluation	2.9	Capex Criticality Analysis	An asset criticality analysis is in place that categorises Network Rail's asset types into high, medium and low criticality based on whole life costs and risks and categorises asset types into appropriate risk categories across the network	1. The criticality analysis includes consideration of the following annualised costs and risks: • One-off Capex costs; • Renewal costs; • Maintenance costs; • Performance costs; • Operating costs; • Environmental, societal and reputational risk costs 2. Asset types are categorised into different risk categories, e.g. high, medium or low criticality asset types 3. Within an asset type, assets are grouped into risk categories that reflect the criticality of the route or the specific asset criticality 4. 'System' criticality is considered where appropriate to reflect the interdependencies between asset types	All assets are allocated to risk categories by March 2014	This capability has been achieved. Considered to be closed against the relevant sections of the Asset Policies. However, Network Rail is considered by AMCL to have currently limited consideration/ analysis of environmental, societal and reputational costs and the accuracy and demonstrability of maintenance costs are constrained by the resource based costs analyses for SBP. There is also considered to be limited 'system' consideration between asset types in terms of criticality as defined in the Asset Policies. Although it is noted that drainage and S&C are considered in a more system based approach in general.
Capex Evaluation	2.10	Asset Policy and DST Deployment Strategy	A strategy is in place that defines how the Asset Policies and Decision Support Tools will be deployed across Network Rail's Routes	A strategy has been developed that shows how the Asset Policies and DSTs are to be deployed in the devolved Routes. This will include: 1. The overall vision for how Asset Policies and DSTs will develop to support devolution 2. The use of 'Policy on a Page' for communicating the Asset Policies (see capability 2.14) 3. The extent to which the Routes can identify interventions that vary from those defined in the Asset Policies 4. The extent to which the Routes are engaged in evaluating the outcomes of the Asset Policies (see capability 2.13) 5. The extent to which the Routes will use the DSTs to evaluate asset interventions 6. The way in which lessons learned from the application of Asset Policies and DSTs can be fed back into the Asset Policy development process	The Asset Policy and DST deployment strategy has been agreed and is implemented in the Routes by January 2013	This capability has been partially achieved. The 'Asset Management System' document is still at Issue 1 but is planned to be issued in May 2014. The Group Strategy for Asset Management Services requires AMS to develop a plan to embed strategic planning across Network Rail, including Asset Policy and DST development, and these initiatives are currently receiving investment panel authorisation. However this has not been implemented in the Routes within the Roadmap timescale.
Capex Evaluation	2.11	Asset Policy Scenarios	Funding and technical scenarios that will be evaluated during Asset Policy development are agreed	The funding and technical scenarios are defined for each Asset Policy that consider: 1. Common funding scenarios across the asset groups that align with the requirements in the HLOS 2. Technical scenarios that describe different technology choices, for example the introduction of ERTMS, which may differ by asset group	n/a	n/a

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Capex Evaluation	2.12	Asset Policies - Renewal & Enhancement	Asset Policies for renewal and enhancement interventions contain renewal criteria and preferred choice of asset type (where appropriate) for different risk categories that represent the lowest asset system and whole-life cost and risk.	Asset Policies for renewal and enhancement are developed in a consistent manner across the asset groups in accordance with the 10-step Asset Policy development process and include the following: 1. Consideration of all agreed funding and technical scenarios to reflect different assumptions relating to demand, output requirements and available funding; 2. Different policy options for delivering the scenarios showing the assumptions and constraints applied within the different scenarios; 3. Deterioration and whole-life cost analysis to justify the choice of asset type and renewal criteria to a level appropriate to the criticality of each asset type based on the DSTs (see capability 2.15); 4. Consideration of the whole asset system costs and the interdependencies between asset types; 5. An assessment of the impact of unit cost efficiencies on the preferred policy; 6. The level of confidence for each of the scenarios based on sensitivity analysis and uncertainties in asset information; 7. The specification of asset information requirements that are needed to support Asset Policy development and the justification for this information 8. Evidence that shows the extent to which the interventions contained within the Asset Policies are sustainable; 9. Consideration of the cost implications and other impacts on policy options for the wider industry; 10. Analysis to show the impact on safety, performance, environmental, social and reputational risks; 11. The expected asset condition, age profile and other outputs and the proposed metrics to monitor and evaluate the Asset Policy (see capability 2.13);	Asset Policies for renewal and enhancement are segmented by system or route for all high and medium criticality assets and published as part of the CP5 Delivery Plan in March 2014.	This capability has not been achieved. Network Rail reported that it was not necessary to revise the Asset Policies prior to the end of CP4. A specification for the review of the Asset Policies has been approved and is currently going through investment panel authorisation.
Capex Evaluation	2.13	Asset Policy Monitoring & Evaluation	A monitoring and evaluation process is in place to review the outcomes from the application of Asset Policies and to compare these with the expected outcomes	The monitoring and evaluation process considers the following aspects of the Asset Policies to assess the extent to which the expected outcomes defined in the Asset Policies are being achieved in practice: 1. The expected asset lives; 2. The expected condition of the assets; 3. The expected unit costs of renewal activity; 4. The expected asset reliability and availability; Findings from the evaluation are documented and fed into the Asset Policy development process as required by stage 2 of the 10-stage process	An updated regime is in place for monitoring and evaluating the CP5 Asset Policy outcomes by April 2013	This capability has been achieved. Revised asset stewardship measures have been produced (the CSI and CRI) and these are now being used by the Routes and Centre to monitor outputs. Forecast CSI and CRI trends have been modelled and will be used in conjunction with the ongoing monitoring as an input to Asset Policy development. It is noted that these are at an early stage of implementation in CP5.
Capex Evaluation	2.14	Asset Policy Communication	An appropriate means of communicating the Asset Policies is in place which has resulted in effective implementation of the Asset Policies	Communication methods have been developed to ensure the Asset Policies can be effectively implemented in accordance with the Asset Policy and DST deployment strategy (see capability 2.10) including:: 1. Appropriate briefing on the purpose and objectives of the Asset Policies 2. Development of 'Policy on a Page' to ensure the Asset Policies can be effectively communicated 3. Guidance on where the Routes can deviate from defined policy options including permitable tolerances 4. Appropriate training and support for the above	Implementation and communication of CP5 Asset Policies is complete and effective from March 2014	This capability has been achieved. All RAM teams are fully aware of and utilise the relevant Asset Policies, and maintain regular contact and review with the Professional Heads.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Capex Evaluation	2.15	Decision Support Tools	Decision Support Tools are in place to develop policy options that represent the optimum trade-off for whole life cost and risk for different risk categories and for different funding scenarios.	Appropriate Decision Support Tools have been developed to include the following: 1. Undertake modelling for each asset type in a manner consistent with the Asset Management Framework and Strategic Planning Processes (see capability 1.8) taking into account the criticality of different asset types. 2. Model the costs and risks over the life of each asset type to determine the optimum renewal interventions. 3. Model the trade-off between maintenance and renewal interventions to identify the optimum combination of interventions. 4. Assess the impact of efficiencies and changes in unit cost on the optimum interventions. 5. Assess the impact of different scenarios and policy options on the optimum interventions. 6. Utilise the outputs form the decision support tools as part of the justification for the preferred choice of asset type and interventions define within the Asset Policies for each scenario or policy option. 7. Apply the interventions defined within Asset Policies to Network Rail's asset portfolio to determine work volumes, costs and expected outputs over a minimum of 25 years. 8. Determine confidence levels in these outputs based on the confidence in the asset information and in the interventions defined within the Asset Policies.	1. The Decision Support Tools have been deployed within the appropriate teams at the Centre and in the Routes by March 2013 2. An evaluation of the Decision Support Tools with the Routes has been undertaken and documented by September 2013	This capability has not been achieved. The Group Strategy for Asset Management Services requires AMS to develop a plan to embed strategic planning across Network Rail, including Asset Policy and DST development, and these initiatives are currently receiving investment panel authorisation. However this has not been implemented in the Routes within the Roadmap timescale. However, there is evidence of ad-hoc use and deployment of DSTs beyond what was in place at SBP (for example LADS and the iPhone Apps).
Unit Costs	2.16	Renewal Unit costs	Renewal and unit costs are developed to an appropriate level of detail to support the development of Asset Policies and the CP5 SBP.	Activity-based renewal unit costs are specified and captured to a sufficient level of detail to support the whole-life costs analysis within the DSTs and Asset Policies which includes consideration of the following: 1. A specification for renewal unit costs is in place that clearly describes the method of determining the unit costs 2. The cost breakdown structure for capturing renewal unit costs is aligned with the asset definitions and standard work types that are defined in the asset information strategy. 3. The parameters that affect renewal unit costs are analysed and understood. 4. A process for capturing renewal unit costs in accordance with the unit cost specifications has been defined. 5. Confidence levels are estimated for each unit cost which reflect the relative criticality of the activity Activity-based renewal unit costs are used to develop the costs within the Strategic Asset Management Plan and Route AMPs	Renewal unit costs are available for all high and medium criticality asset types by April 2013 at an appropriate level of confidence	This capability has been partially achieved. Clear evidence has been seen of extensive Unit Cost development in order to support development of the CP5 Delivery Plan, efficiencies and the establishment of Framework Contracts, where applicable. However, there is no level of confidence associated with these unit costs. There is still further development required to refine the unit costs and to align to the newly implemented Rail Method of Measurement (RMM).

Table 7 Summary of assessment findings for the WLC Justification Group (Renewal)

5.3
Opex Evaluation

The SBP assessment report provided an extensive assessment of Network Rail's work in the area of operational expenditure evaluation, particularly the development of RCM regimes across some asset disciplines. In parallel with this End of CP4 assessment, AMCL has also completed a more in-depth review of the current 'RBM Programme' within Network Rail and this work has been utilised to inform the Opex Evaluation scores and AMCL's conclusions as to where Network Rail stands at the end of CP4. Network Rail's maturity score in this area remains behind target at 52% (versus a 62% target) although there has been some progress since SBP.

The AMCL Roadmap Capabilities 2.1 to 2.7 defined an outline set of stages Network Rail would have to go through to achieve a fully optimised risk-based approach to defining maintenance and inspection regimes. Table 8 summarises Network Rail's achievement against these.

AMCL Roadmap Capability	2.1 – Maintenance Criticality Analysis	Status at and of CP4
2.1	Maintenance Criticality Analysis	Achieved
2.2	Maintenance Strategy	Partially achieved
2.3	Maintenance Requirements Analysis Process	Partially achieved
2.4	Maintenance Analysis Plan	Partially achieved
2.5	Risk-based Maintenance Analysis	Not achieved
2.6	Maintenance Standards	Not achieved
2.7	Maintenance Implementation Plan	Partially achieved

Table 8 Summary of Network Rail's Achievement of AMCL Roadmap Capabilities

In general Network Rail's achievements during CP4 can be summarised as follows.

- A well-defined governance structure for the RBM Programme has been put into place; (NRCP4-WLC1)
- There is evidence of a clear 'pull' from the Routes who can see the potential benefits and are keen to develop the optimised maintenance and inspection regimes;
- A criticality analysis has been completed within the RBM programme to prioritise the analysis programme (NRCP4-WLC2 & NRCP4-WLC3);
- An FMEA process that aligns with established good practice has been embedded and there are emerging data improvement plans aligned with FMEAs (NRCP4-WLC4);

- An extensive training programme has been completed which has led to greater understanding of RCM techniques within the Routes (NRCP4-WLC1 & NRCP4-WLC5); and
- Four of the asset disciplines now have live pilots or new regimes in place NRCP4-WLC1 & NRCP4-WLC6).

However, these achievements have been made in the absence of a clearly defined strategic framework and roadmap for risk based maintenance to ensure alignment to corporate and Route objectives (Roadmap Capability 2.2), and risk accountabilities. The current maintenance requirements analysis process is based on a traditional RCM approach as opposed to a genuine risk-based approach and does not easily allow risk to be taken into account when setting intervention intervals (Roadmap Capability 2.3). Network Rail's challenges for CP5 will be to:

- Define a future vision and strategy for optimised maintenance including cultural change and programme phases – similar to the ORBIS approach.
- Clearly define its RBM objectives with a focus on the genuine optimisation of cost, risk and performance, including alignment with the BCR programme.
- Ensure each of the RBM processes (for instance, within track or signalling) are justified and that there is alignment of decision-making and risk accountabilities.
- Assurance that the national programme and Route level rollouts will achieve CP5 efficiencies – both with respect to timing and benefits realisation mapping.

The draft Network Operations Business Plan, which is intended to include the maintenance strategy, summarises the challenge Network Rail has in defining a clear vision for RBM by confusing it with RCM:

'RBM means doing necessary and sufficient maintenance, at the right time on the right asset. The approach used is Reliability-Centred Maintenance (RCM). It determines tasks and inspection intervals for an asset based on applicable failure modes and criticality.'

A significant amount of good work has been completed in accordance with traditional RCM tools, techniques and approaches. However, until an approach which encompasses a genuine trade-off between cost, risk and performance is defined the benefits of the RBM programme will remain unrealised. An extensive assessment of Network Rail's performance in this Activity can be found in AMCL's report 'Introduction and Application of Risk-Based Maintenance', mandate reference BA/031, Draft A Report published 11th June 2014.

5.4
Capex Evaluation

The SBP assessment report provided an extensive assessment of Network Rail's work in the area of capital expenditure evaluation, particularly the continued development of the Asset Policies and the application of these through the Tier 1 and 2 whole-life cost models to generate the top-down work volumes and costs against which the Routes generated and validated their work banks. At the time of the SBP assessment Network Rail had made significant progress in this area and had exceeded their capability maturity target, scoring 62%. At the end of CP4 this score has increased to 65% and has therefore exceeded the End of CP4 target. Progress has, understandably, slowed as the Tier 1 and 2 models have been further used to help validate the Route work banks in response to the Draft and Final Determinations.

AMCL Roadmap Capabilities 2.12 and 2.15 (related to the update of Asset Policies and the full deployment of the Tier 2 and 3 models respectively) have not been achieved, however AMCL recognises that both of these are requirements of the Asset Management Services Strategy. At the time of this assessment the next revision of the Tier 1 & 2 models had been authorised by investment panel (NRCP4-WLC7 & NRCP4-WLC8), and the specification for updating the Asset Policies agreed, and was pending investment panel authorisation (see also Section 4.5).

At the time of the SBP assessment AMCL noted three opportunities for improvement which are updated below:

1. Progress had been made in linking capex interventions to Route Specifications, however, the link was considered by AMCL to be high-level and largely based on engineering judgement. At the time, but with the notable exception of TRAIL modelling undertaken for Western Route and the Crossrail and Thameslink projects, there were no asset specific Route level RAMS targets aligned with overall output requirements that AMCL was aware of. This made the value for money of the planned capex interventions difficult to justify (see also Sections 4.4 and 4.5 on Demand Analysis and Strategic Planning). At the End of CP4 this remains broadly the case although there is an increasing level of evidence emerging, particularly from IP, that the tools and techniques for achieving this are being developed (see Section 6.4 on Systems Engineering).
2. Additionally there appeared to be limited empirical evidence to support the understanding of the direct impact of the capex interventions on asset performance or other appropriate Asset Management measures. At the End of CP4 this remains the case – for example the new Composite Reliability and Sustainability Measures (the CRI and CSI)(NRCP4-WLC9) which replace the ASI are still not linked to underlying work volumes – either capital or operational.

3. It was understood that planned outputs for the Routes were essentially 'flat-lined' at CP4 exit rate, but if CP5 funding was constrained it would require a reworking of the modelling, Asset Policy (and associated work bank rules where relevant), and the required outputs of the Route. This was addressed as described in Section 4.5 through the 'cross asset funding analysis' and the iterative refinement of work banks to meet Final Determination requirements. (NRCP4-WLC10 & NRCP4-WLC11)

5.5
Asset Costing & Accounting

Network Rail has continued to develop its capability in this area, with MUC and RUC cost allocation frameworks, and collection and review processes now reasonably well established. In addition the Rail Method of Measurement (RMM – a nationally agreed rail cost framework) is almost complete (NRCP4-WLC12). The result of these advances is that this activity scores 65%, against an End of CP4 target of 67%.

At the time of the SBP assessment the definition, recording and continual improvement of renewal and maintenance unit costs used in the creation of the SBP was quite well advanced. Renewal unit costs were arguably a little further ahead than maintenance unit costs and it was noted that:

'This has resulted in greater involvement of the Routes in reviewing and challenging the definitions and values used. It is understood that as for other areas of the SBP process this initially led to tensions between the parties involved in specifying and using these costs, particularly for Renewals activities where ownership of risk and efficiency assumptions had to be established.'

The general theme at the Final Determination was that the ORR agreed broadly with Network Rail's planned work volumes, but that the unit costs were too high. This is a reflection of the risk noted above, and there are now a number of initiatives on-going within Network Rail (including within IP) to align costs better with the ORR's expectations. One of the reasons this happened is that there is no industry-wide agreed cost framework. However the RMM is now in its final stages of development and once established in the industry will go a long way to harmonising an agreed view of cost for all stakeholders.

Maintenance Unit Costs (MUCs) are now defined for most maintenance and inspection activities. Ellipse continues to be the source of work order data on the activities undertaken and resource data is matched to these work orders to calculate the average unit costs over a given time period. Because the coverage of the unit costs continues to improve the quality of the unit costs emerging

from this process continues to improve. In addition, since the SBP Network Rail has issued the MUC Manual (NRCP4-WLC13) and FRM702 (NRCP4-WLC14) which contain the now established MUC process and cost allocation framework.

Renewal Unit Costs (RUCs) are now reported to be defined for all renewal activities, are stored in Hyperion and matched through the unique Oracle project number. Since SBP the 'Cost and Volume Handbook' (NRCP4-WLC15) has been issued which is now Network Rail's standard guidance for RUCs. The Routes produce period reports and a variance analysis (NRCP4-WLC16 & NRCP4-WLC17) which Asset Management Services review and assess prior to meeting with the RAMs to discuss issues or escalate as required.

Network Rail reported that usage of RUCs was good but that usage of MUCs could be improved. Generally the Routes are concerned with work volumes rather than rates, however as Network Rail's approach to operations and maintenance gets more sophisticated (for example the RBM programme begins to require quantified analyses of the costs and benefits of various maintenance strategies) the need for more accurate MUCs will emerge.

The challenge for CP5 will be for Network Rail to fully embed the RMM in the wider UK rail industry as the de-facto standard and ensure alignment of its internal cost frameworks. The RMM consists of three volumes:

- Volume 1: Cost Planning for Rail Infrastructure Works - Standard Cost Planning Structure;
- Volume 2: Measurement Rules for Rail Infrastructure Works - Standard descriptions of Works Activities; and
- Volume 3: Measurement Rules for Operational Maintenance - Standard descriptions of Operational Activities.

At the time of this assessment the publication of Volumes 1 and 2 (which relate to RUCs) was imminent. In addition Network Rail had been using earlier drafts of these documents within its IP organisation to plan and cost renewal and enhancement work. Volume 2 is yet to be completed, although it appears to be in the final stages of drafting. This situation reflects the maturity and usage of RUCs and MUCs within Network Rail in general.

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6 Lifecycle Delivery

The Lifecycle Delivery Group contains all the Asset Management Activities required to implement the Asset Management Plans created in the Strategy & Planning Group. The Lifecycle Delivery Group is split into six Activities within the AMEM model:

Asset Creation **-** the processes that govern the financial, project and programme management control for the creation of new assets identified within Capex Evaluation.

Systems Engineering **-** the processes that govern the management, verification and validation of requirements throughout Asset Creation.

Maintenance Delivery **-** he processes that govern the implementation of the maintenance and inspection regimes created in Opex Evaluation.

Resource & Outage Management **-** the processes that govern the delivery of work within access and resource constraints.

Incident Response **-** the processes that govern the organisation's response to steady-state failures and emergency disruptions to its assets.

Asset Rationalisation & Disposal **-** the processes that govern the identification, analysis and implementation of asset rationalisation opportunities.

6.1
Review of Roadmap Trajectories

Table 9 below shows the scores from the SBP assessment, the target score from the AMCL Asset Management Roadmap for the End of CP4, the actual score from the 2014 (End of CP4) assessment and comments on any variance from target.

Activity	SBP Score	End of CP4 Roadmap Target	End of CP4 Score	End of CP4 RAG	Comments
Asset Creation	86%	89%	87%	NO	***Roadmap – 1/3 achieved, 1/3 partially achieved,1/3 not achieved*** Target not achieved due to following: • Good practice programme management approach being developed in line with P3M3 but not yet implemented • Good practice approaches within the clienting guidelines and Sponsors' Handbook but early in implementation
Systems Engineering	67%	69%	69%	YES	***Roadmap – 1/2 achieved, 1/2 partially achieved*** Target achieved due to following: • Evidence of good systems engineering approaches across Network Rail although not yet fully integrated • AMIP Systems Engineering Capability Development plan now established and being implemented
Maintenance Delivery	75%	77%	77%	YES	***Roadmap – 1/2 partially achieved, 1/2 not achieved*** Target achieved due to following: • Delivery of standard maintenance activities continues to be consistently and systematically achieved and monitored
Resource & Possession Management	58%	64%	62%	NO	***Roadmap – 1/1 partially achieved*** Target not achieved due to: • Lack of clarity over accountabilities related to disaggregation of withdrawn standard NR/L3/NDS/302 • The validation of forward resource forecasts using the CP5 integrated planning processes yet to be validated
Incident Response	75%	78%	77%	NO	***Roadmap – 1/1 achieved*** Target not achieved due to: • Roll-out of Fault Code Lookup is not yet complete – pilot stage only • However, NTF dashboard and Operating Strategy (e.g. Traffic Management) continue to drive improvement
Asset Rationalisation & Disposal	54%	56%	56%	YES	***Roadmap – 1/1 partially achieved*** Target achieved due to following: • Systematic, pro-active application of network change procedure (Network Optimisation initiative) has completed its pilot stage • Full toolkit for Routes to utilise has been made available for CP5

Table 9 Lifecycle Delivery Group Trajectories

The requirements defined in the AMCL Roadmap and the review of Network Rail's capabilities are included in the following sections for each activity.

6.2
Review of Roadmap Capabilities

Table 10 below shows a summary of the End of CP4 assessment findings against each of the AMCL Roadmap capability statements within the Lifecycle Delivery Group.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Asset Creation	3.1	Programme Management Methodology	An overall, scaleable methodology to govern Network Rail's overall programme and project management requirements is in place which applies in whole or in part to any of the engineering disciplines.	An overall, scaleable methodology to govern Network Rail's overall programme and project management requirements is in place which: 1. Builds on the existing GRIP and E2E processes 2. Incorporates appropriate external best practice 3. Defines an appropriate level of control commensurate with the criticality of the programme or project 4. Incorporates an appropriate level of systems engineering commensurate with the complexity of the programme or project 5. Is applicable to all engineering disciplines in whole or in part 6. Is mandated but applied as appropriate according to the required LoC for the project	The revised methodology is implemented and effective by March 2014.	This capability has not been achieved. A P3M3 compliant Programme Management framework has been defined within IP but is still in the early stages of roll-out and implementation.
Asset Creation	3.2	Project Handback	Network Rail's projects at LoC 1 and 2 are effectively handed back into maintenance.	1. Handback criteria are clearly defined at the 'Outline Design' stage of the project (GRIP stage 4 or equivalent). 2. These criteria are based on the revised processes introduced in 2011, and are implemented in a consistent and complete fashion for all projects ranked LoC 1 or 2. 3. Handback performance against the criteria are monitored quarterly.	Network Rail hands back a targeted percentage of projects above its baseline in accordance with the handback criteria by December 2013.	This capability has been partially achieved. IP provides a 'live' report of all works at GRIP 3 and GRIP 6 to Asset Management through Delivering Work Within Possessions (DWWP) system. Asset Management have access to the system and can obtain the report at their required timescales.
Asset Creation	3.3	Alignment with Asset Management Plan	The scope and timing of all renewal and enhancement work undertaken is aligned with the Route AMP and Delivery Plan	All renewal and enhancement work is undertaken in accordance with the Route AMP and Delivery Plan, and deviations from these plans are effectively change controlled and justified.	Network Rail can demonstrate that work is delivered in accordance with the Route AMP and Delivery Plan, with appropriate change control, by March 2014 across all Routes.	This capability has been achieved. The CP5 Delivery Plan has been completed and is aligned to Route work banks. Governance and change control of delivery of the CP5 plan is in place.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Systems Engineering	3.4	RAMS Requirements	RAMS requirements management processes proportionate to the complexity of a project are defined and implemented.	A RAMS requirements management process that is aligned with BSEN50126 is in place which is proportionate to the LoC assigned to the project.	RAMS requirements management process is defined and implemented in accordance with BSEN 50126 by December 2013.	This capability has been achieved with minor deficiencies. There is a significant amount of evidence that Network Rail is now regularly managing RAMS requirements within some projects, although this is not yet fully proportionate to the complexity of a project. The AMIP Systems Engineering Capability Development Plan presented at the SBP assessment is now being implemented but not in a coordinated manner under the AMIP programme board.
Systems Engineering	3.5	Reliability & Availability Modelling	Reliability & Availability Modelling is routinely undertaken on significant enhancement projects	The availability and reliability models are, to a level of granularity related to the criticality of an investment decision, able to: 1. Identify and prioritise changes in infrastructure capability necessary to deliver changes in output specification, for example PPM; 2. Analyse enhancement projects, including different design options, to determine their impact on different outputs measures; 3. Quantify the financial benefits of different enhancement projects and to develop more robust business cases; 4. Identify the critical drivers of performance and to prioritise improvement initiatives accordingly; 5. Provide an input to the development of different scenarios within asset policies by identifying preferred designs and choice of technology for given output or funding scenarios.	The reliability and availability models have been used to refine the enhancements in the CP5 Delivery Plan as a result of the determination by April 2014	This capability has been partially achieved. This area is also subject to AMIP 'Systems Engineering Capability Development' plan, and is part of a wider IP initiative to introduce a greater level of systems integration in programme and project planning. Evidence was provided of the application of TRAIL modelling within the Western Route and the retrospective alignment of the Reading programme scope requirements to this model.
Maintenance Delivery	3.6	Handheld Devices	Handheld devices are utilised to manage maintenance and inspection activities where the cost is justified.	1. The experience of the Signalling discipline in the use of handheld devices for maintenance and inspection work control management is assessed for the other disciplines. 2. If a business case is evident the use of hand-held devices is extended accordingly.	Use of handheld devices for maintenance and inspection work control management is extended according to a fully justified business cases by March 2014.	This capability has partially been achieved. Roll-out of the iPhone and iPad technology is well advanced but Mobile Works Management is not yet complete.
Maintenance Delivery	3.7	Maintenance Tolerances	All engineering disciplines have clear guidance on the tolerance of maintenance and inspection activities and processes in place to manage any exceedences.	1. Each engineering discipline enhances its core maintenance and inspection instructions to include tolerances for critical maintenance and inspection activities, and clear guidance on what to do if these tolerances are exceeded. 2. These revised maintenance and inspection specifications are underpinned by Opex Evaluation analyses.	Each engineering discipline has issued and effectively implemented the priority new standards on maintenance and inspection tolerances by April 2014.	This capability has not been achieved, however maintenance backlog is monitored. Successful definition of maintenance requirements using RBM should provide quantitative tolerances.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Resource & Outage Management	3.8	Long-term Resource Forecasting	Resource forecasting beyond two years is formalised into a long-term risk-assessed plan.	A long-term resource forecast is developed that informs a range of identified stakeholders and includes: 1. A risk-assessed evaluation of the impact of future resource requirements on the current resource pool 2. An agreed set of actions for ensuring the availability and continuity of resource in the future 3. Agreed and co-ordinated programmes for investment in resources for the future	None	N/A
Resource & Outage Management	3.9	Continuous Improvement of Resource Planning	Resource planning accuracy against work plan is formally reviewed and continuously improved.	NR/L3/NDS/302 is updated to include a formal requirement for the review and update of the possession & resource planning process at a national level, to include: - evaluation of the forecasting accuracy of both access and resources against actual delivery - the effectiveness of the national process in engaging with the Routes to produce, deliver and monitor plans - the development and tracking of recommendations to improve NR/L3/NDS/302 and associated documentation	NR/L3/NDS/302 has been through one formal review cycle by December 2013.	This capability has been superseded with specific respect to NR/L3/NDS/302. This capability has been partially achieved. Resource planning has developed significantly at Route level and with the ongoing introduction of the Industry Access Programme, and the various methods the Routes have chosen in building their CP5 delivery plans. Resource and access plans have been created for CP5, however the accuracy of these plans has not yet been tested.
Incident Response	3.10	Root Cause Analysis	Information sufficient for the immediate or subsequent unambiguous identification of root cause of failure is collected and captured in a consistent fashion and utilised to demonstrably improve asset performance.	Infrastructure Control Centres (ICCs), supported by Route staff, capture sufficient information to establish the failure mode for all reported infrastructure incidents to allow root cause analysis. The process should include: 1. Definitions of failure modes that are consistently applied and aligned with the processes underpinning Opex Evaluation (e.g. Failure Modes & Effects Analysis (FMEA) studies) 2. Consistent process for collecting and capturing failure modes and asset ID if applicable for both Route staff (e.g. checklists or handheld menus) and ICCs (e.g. fields in FMS aligned to FMEA studies) 3. Defined guidance for what to do if failure mode information does not align with the processes prescribed above (e.g. alternative, free-form, inputs) 4. Defined process for the evaluation of root cause from the information gathered. 5. Demonstrable feedback and use of root cause information in the development of risk-mitigation strategies and plans (e.g. systematic analysis and identification of opportunities for asset enhancement or maintenance / inspection improvement) 6. Analysis by manufacturers where root cause cannot be established by Network Rail Route personnel 7. Integration of failure date and performance data (e.g. FMS and TRUST)	Analysis of root cause of failure is being used to improve Asset Management processes, policies and standards by March 2014.	This capability has been achieved. There are a number of examples of and approaches to RCA being generated within the Centre which are being used to improve Asset Management processes, policies and standards. In general the Kepner Tragoe methodology has been adopted as a relatively standard approach and has been supported by training. Specifically the Head of Infrastructure Reliability frequently instigates root cause studies to improve reliability and to address safety concerns within the infrastructure.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Asset Rationalisation & Disposal	3.11	Asset Rationalisation	Periodic asset rationalisation analysis is undertaken and equipment identified for removal and disposal	Network Rail's Routes periodically undertake analysis for the potential rationalisation of assets on the Route based on: 1. 'bottom up' engineering and 'top down' strategic (demand led) requirements for Route utilisation 2. Optimisation of the trade-offs related to the rationalisation opportunities (operational flexibility, performance risk, and whole-life cost of ownership) Opportunities to rationalise assets are included in the Route AMP and Delivery Plan and the appropriate assets are removed and disposed of within a reasonable timescale.	Any assets identified for rationalisation during CP4 have been removed and disposed of and the expected outcomes assessed against the original justification by March 2014	This capability has been partially achieved. The Network Optimisation RDG project has now been closed and guidance on how Routes can utilise the tools and techniques developed, based on the experience of the pilot site in Wessex and further implementations such as LNW, has been published on Connect. Although the S&C assets identified during the Network Optimisation programme have not yet been removed there are plans in place to achieve this in CP5.

Table 10 Summary of assessment findings for the Lifecycle Delivery Group

6.3
Asset Creation

Asset Creation continues to be a mature activity within Network Rail, based on the strength of its core project delivery processes and the evidence provided during the assessment, however the End of CP4 score has missed the target of 89% by two percentage points. Throughout CP4 Network Rail's main achievement has been the embedding of the GRIP process ensuring an increased level of compliance and delivery. At the time of the SBP assessment the main issue was the anticipated completion of Roadmap Capability 3.1 with respect to programme management requirements and it was suggested that this should include the recommendations made by Halcrow at the time. This remains Network Rail's main challenge for CP5, along with the broader Systems Engineering issues discussed in the next section, and the balance of this section summarises how Network Rail's activities in this area are raising its corporate self-awareness and improving the overall impact of its Asset Management effectiveness.

The GRIP process remains the standard and until relatively recently there was no formal definition other than 'projects'. In October 2013 ExCom approved the rollout of the P3M3 approach developed by Investment Projects and the introduction of 'portfolios', 'programmes' and 'projects' terminology (NRCP4-LCD1). However, understanding the differentiation is key and to date this is limited throughout the wider company and the organisation is in the process of rolling out the new approach. Network Rail has developed its own variation of the process, adapted from industry good practice as defined by the APM and OGC, which aligns with the overall context of the business. The overall portfolio of work is effectively the CP5 SBP, under which lie two tranches; Business Change and Infrastructure & Operational, each with their own overall portfolio, programmes and projects. Included under projects in the Infrastructure & Operational portfolio is a Delivery Portfolio which diverges from the OGC approach and considers Network Rail synergies in terms of geographical or work type packaging.

The approach will be supported by a Programme Lifecycle definition, which is currently out for consultation, and a revised GRIP standard which has just been approved (NRCP4-LCD2), will be released in June 2014 and complied with by July 2014. The definition and alignment of projects and programmes within the overall portfolios in the new approach will take time and wider understanding and training across the organisation is key. Embedding will be supported by relevant tools such as a Decision Tree (NRCP4-LCD3) for Project Managers and a Programme Process tool, however the latter has not been introduced yet.

In summary, Network Rail have produced a good practice aligned approach, which is recognised by relevant industry bodies as a best practice application within a specific business context, however, it has only recently been defined and approved within Network Rail and will take time to embed and integrate throughout the organisation.

6.4
Systems Engineering

Systems Engineering has been a growing area of capability for Network Rail throughout CP4 and Network Rail has hit its End of CP4 target of 69%. Whereas Network Rail has for a long time had good elements of Systems Engineering thinking embedded in its processes, notably GRIP and the TRAIL modelling capability, it was noted at the SBP assessment that this required greater integration and a more positive connection to other aspects of Network Rail's Asset Management capabilities (such as Strategic Planning and Asset Policy development) to really be effective. At the SBP, Network Rail had demonstrated that AMCL Roadmap Capabilities 3.4 and 3.5 were now formally recognised within the organisation, and were included in a coordinated AMIP plan for improvement. One of the key elements of this plan was the establishment of a clear Systems Engineering governance structure and the effective horizontal integration of Systems Engineering activities across the organisation. At the End of CP4 this governance structure is broadly in place, in that the key elements are part of Network Rail's strategic themes, but overall governance does not come under AMIP. The Engineering Director has signalled his intention to improve the overall coordination of this work and AMCL can only endorse this aspiration. Some of the key development areas are:

1. ***Lifecycle Management*** – This has been pursued through work on Clienting Guidelines and the Sponsors' Handbook (NRCP4-LCD4 & NRCP4-LCD5) (as already introduced in Section 4.4) and general updates to the GRIP processes. This is underpinned by the established Total Value programme.
2. ***Integrated Engineering Approach*** – This identified that Network Rail lacked a definition of the rail system and that Network Rail's structure inhibited the horizontal integration and common understanding for the development of railway infrastructure. This has led to new strands of work including the definition of the railway system by RSSB (NRCP4-LCD6).
3. ***Whole Systems Analysis and Modelling*** – This includes plans and investments to enable whole system modelling, for example ORBIS / RINM (NRCP4-LCD7). Other developments include improved tools and techniques to undertake analysis across the rail system, the next generation of Asset Policies (which will require further work on cross asset dependencies and areas of equivalent specification - NRCP4-LCD8) and the suite of performance and capacity planning tools in place in Network Operations are the subject of improvement and integration.

For example, the Western Route Investment Projects team appear to be developing internal best practice in the realms of Programme Management and Systems Engineering. An incredibly complex programme of works, ranging from Crossrail and Reading Station Development in the East, enhancements around the Bristol area and extensive CP5 renewals in both Western and Wales Routes, is being combined with franchise changes and the introduction of new and pre-specified rolling stock in the area, all by 2019 (NRCP4-LCD9). Network Rail has also been appointed as the Industry Systems Integrator for all relevant works in the area, which includes significant national

Network Rail programmes such as SCADA, ERTMS and GSM-R. All existing works are based on the previous PRS approach and are currently in a state of flux with the recently introduced Sponsors Guidelines and Clienting Handbook approach. A key challenge is understanding what is currently specified by the numerous individual PRSs to be delivered across the system and the gap between that and an overall specification to achieve PPM targets and other key measures. Investment Projects are working with the Route based Sponsor team to develop a PRAMS approach, including the extensive use of TRAIL modelling on the Route and the definition RAMS requirements at the system and sub-system level. This is also being fully aligned with interoperability requirements, via an Authorisation Plan agreed with the DfT (NRCP4-LCD10), and the Common Safety Method, via a System Safety Strategy, both of which are relatively recent factors (NRCP4-LCD11).

Although an on-going process, clear evidence was provided of the PRAMS remit and emerging RAMS requirements (NRCP4-LCD12). Although a RAMS specification was currently limited to two key sub-systems - OHLE and Power Distribution – with the rest of the system still to go it does appear to represent a step-change in approach in terms of quantitative specification of programme requirements to enable formal verification and validation processes. Other emerging good practice includes a Route SRP process, which is owned by the DRAM, and the use of TRAIL modelling by the Route against forecast future timetables to enable iterative testing and assurance of achieving targets (NRCP4-LCD13). There are also clear plans in place for undertaking the gap analysis between high-level performance specifications – to be agreed with the DfT in early July – and the range of on-going projects and their impact on the overall system performance.

Again, Network Rail is demonstrating an emerging approach which aligns with Systems Engineering good practice for this particular programme and represents a step change in approach for the company. It is critical that this approach is understood and more widely utilised, where appropriate, and integrated with the emerging P3M3 methodology to assure the realisation of overall business benefits.

6.5 Maintenance Delivery

Network Rail continues to demonstrate good control of its Maintenance Delivery activities and has achieved the End of CP4 target of 77%. Increasingly since devolution the Routes have begun to look for further efficiencies in this area, including adopting the new RCM / RBM regimes and taking advantage of the Intelligent Infrastructure initiative. There was some evidence that Routes are expecting a reduction in maintenance levels due to increased renewal, and it was also expected that the widespread adoption of Intelligent Infrastructure and more intelligent use of access will unlock efficiencies. However, the two AMCL Roadmap capabilities 3.6 and 3.7 related to handheld technologies and maintenance tolerances have still not been achieved.

At the time of the SBP assessment it was noted that the Signalling and Tunnels disciplines had successfully implemented handheld technology for the scheduling and reporting of maintenance and inspection workloads to and from maintenance teams. The remaining asset disciplines were still working from paper schedules, albeit produced from Ellipse. This situation has not changed significantly at the end of CP4. However, the ORBIS MWM initiative (NRCP4-LCD14 & NRCP4-LCD15) is the next major planned implementation and although AMCL Roadmap Capability 3.7 was not achieved in CP4 it is expected to be achieved within CP5.

At the time of the SBP assessment the use of maintenance tolerances within Network Rail, and guidance on what to do if maintenance is missed, was not consistent. Tolerances were specified in some standards (for example for some Track and EP activities) but not in all, or specifically for assets or maintenance activities that were considered high criticality. During this assessment this finding was again reinforced. This capability will only be fully resolved once the challenges facing Network Rail in the systematic development of risk-based maintenance and inspection regimes are resolved and so will remain a challenge for CP5.

During the SBP assessment there was a concern over the loosely integrated nature of the RBM and II initiatives. This concern remains as they continue to be managed separately, with no clear integration between them, and evidence during this assessment suggested that this challenge now extends into the BCR initiative (NRCP4-LCD16 through to NRCP4-LCD18) and its validation of existing maintenance and inspection standards and the identification of appropriate 'Means of Control' (for example NRCP4-LCD19 & NRCP4-LCD20). Coordination of these approaches, all worthwhile on their own, will ensure benefits are not double-counted and that synergies are taken advantage of. The approach to coordinating these should be set out in Network Rail's Maintenance Strategy for CP5 (see Section 5.3 on Opex Evaluation).

6.6
Resource & Possession Management

Within Resource & Possession Management the one remaining AMCL Roadmap Capability that has been partially achieved, (Capability 3.9 related to the validation and continual improvement of resource planning), and overall Network Rail has missed the End of CP4 target by approximately two percentage points at 64%. Review of NR/L3/NDS/302 has not been completed as this standard has been superseded, however other developments within this Activity were evidenced. Resource and access plans have been created for CP5, however the accuracy of these plans has not yet been validated. In summary, the route to determining the CP5 Route delivery plans was:

1. Draft Determination issued by the ORR;
2. Network Rail response to the Draft Determination;
3. ORR issues requirements for the CP5 delivery plans;
4. Final Determination issued by the ORR;
5. Draft CP5 delivery plans issued;
6. Network Rail response to the Final Determination; and
7. CP5 delivery plan published on 31st March 2014 which includes the Scotland KPI Package and the CP5 Enhancements Delivery Plan (NRCP4-LCD21 through to NRCP4-LCD23).

Network Rail reported that each of these steps involved executive-level dialogue and engagement with the ORR regarding requirements and the management of change from the SBP. This stepped planning sequence involved a series of separate reviews and decisions by the executive, resulting in an agreement to publish in accord with the ORR requirements for the delivery plan.

At the time of the SBP assessment the Deliverability Review for CP5 had been put in place which had been supported by IP and NDS. Since then, resource planning has developed significantly at Route level with the ongoing introduction of the Industry Access Programme initiative which has completed trials in Kent Route (NRCP4-LCD24), and the various integrated planning methods the Routes have chosen for building their CP5 delivery plans.

The Industry Access Programme is an RDG initiative which reported in May 2014 that (NRCP4-LCD25):

- A nine step approach to enhance the current access planning process has been designed;
- A suite of tools that provides the ability to analyse and understand Industry impacts to inform decision making have been produced;
- The Kent trial yielded a 52% increase in productivity opportunity, and 84% reduction in maintenance backlog, and a 41% reduction in maintenance delivery costs; and
- A training programme supported by interactive training materials is beginning to embed the capability across the industry.

Within the Routes various forms of integrated planning have been implemented which vary from Route to Route but have many common themes, such as the 'bubble' approach adopted by LNW Route (NRCP4-LCD26), which aims to coordinate planned work within defined 'bubbles' of integrated activity. These approaches are typically coordinated (although not exclusively) by an Integrated Planning Manager or Master Planning Manager. Some of the commonality of approach emanates from the IP Regions spanning Route boundaries, helping to ensure that a degree of joined up thinking and shared learning occurs (for example between LNW and East Midlands), however, there does not seem to be a nationally defined approach for planning for the Routes to follow and it may be that a degree of formal coordination would improve capability further. Although the plans produced appear to meet good practice requirements, the accuracy of these plans will not be validated for some time, as originally required by AMCL Roadmap Capability 3.9.

6.7
Incident Management

At the time of the SBP assessment the conclusion was that Incident Management continued to be a relative strength for Network Rail but that little progress had been made since the previous assessment. This is still true at the End of CP4. However, Network Rail can demonstrate some clear progress in the areas of root cause analysis (the subject of AMCL Roadmap Capability 3.10) and the implementation of its Operating Strategy. Overall Network Rail missed the End of CP4 target by one percentage point, scoring 77%.

Specifically in relation to facilitating effective root cause analysis, AMCL Roadmap Capability 3.10 called for improvements in two main areas:

- The common definition of failure cause codes linked directly to the failure modes identified in the FMEA analyses which underpin the RoSE and RBM regimes, and the creation of a consistent process for ensuring faults are coded accordingly by incident response and control centre staff; and
- Defined processes for the integration of information and the evaluation of fault and failure data, including the identification of root cause as appropriate, and demonstrable feedback into risk-mitigation strategies and manufacturers specifications and processes.

The first area is being addressed through the 'Fault Code Lookup' initiative, which has developed an iPhone application that provides technicians with standard failure codes structured from the RoSE and RCM FMEA analyses. This application is part of a wider set of applications which will cover mobile tasking, diagnostics, and component tracking. At the time of the SBP assessment, only the fault coding application had been developed and trialled, with roll-out planned for April 2013. At the End of CP4 this trial had been completed, but a decision had been reached that a further trial, with a revised application that addressed the feedback from the first trial, should be completed before roll-out was implemented nationally (NRCP4-LCD27). This has introduced a frustrating but probably unavoidable delay into the FCL roll-out.

With respect to the second area, the Head of Infrastructure Reliability frequently instigates root cause studies to improve reliability and to address safety concerns within the infrastructure, such as robustness and R&R studies (NRCP4-LCD28 & NRCP4-LCD29). There are a number of examples of and approaches to RCA being generated within the Centre which are being used to improve Asset Management processes, policies and standards. In general the Kepner Tragoe methodology has been adopted as a relatively standard approach and has been supported by training (NRCP4-LCD30 & NRCP4-LCD31).

The broader implementation of Network Rail's Operating Strategy continues to progress with the creation of the 12 Rail Operating Centres (ROCs) to bring signalling control, electrical control and operations control together in one location, including key elements such as Traffic Management which will underpin this (NRCP4-LCD32). The challenge for CP5 will be to complete and embed the ROCs and the associated Traffic Management systems within each ROC to further improve operational capability including the optimisation of Incident Management.

6.8 Asset Rationalisation & Disposal

Network Rail has met the End of CP4 target for Asset Rationalisation & Disposal scoring 56%. At the time of the SBP assessment it was reported that the Network Optimisation initiative, sponsored by the RDG had been started with the following objectives:

- Abandon a minimum of 1,000 extra point ends 'pre-renewal' between 2013 and 2019 (over and above the 399 identified in the SBP); and
- Proactively target and abandon unused, underused, unnecessary or problematic S&C using criticality data and local decision-making.

At the End of CP4 the initiative has been rolled out in three stages (NRCP4-LCD33). Firstly, national point operating information on point usage and tonnage was analysed and 10% of points were identified as potential rationalisation candidates. Secondly, a pilot trial on the Wessex Alliance was completed, where the raw data from the national study was assessed by a cross-functional team to properly understand whether or not rationalisation could be achieved. The team included representatives from Network Rail and the TOCs and FOCs. At the time of the SBP assessment these first two stages had been completed. A further trial on LNW has been completed, and the third stage, refining the methodology based on lessons learnt and rolling this out across the rest of the network, has now been completed.

With the closure of the programme Network Rail reported that it is now up to the Routes to decide how, or whether, to take forward the outputs and deliver pre-renewal S&C abandonment (NRCP4-LCD33). The programme has provided the following to support this:

- Initial assessment of pre-renewal S&C abandonment within CP5 & 6 re-signalling schemes;
- 'How to guide': running a workshop or mini-study session;
- Business Case tool: to assess the viability of pre-renewal S&C abandonment on a case-by-case basis (NRCP4-LCD34);
- Suggested funding approach; and
- Industry endorsed approach to Network Change.

In summary, the approach appears to have been successful and is now rolled out, but it is just one example of a defined rationalisation approach within Network Rail. The challenge for CP5 will be to ensure benefits are tracked (Network Rail proposes that the BRIG (NRCP4-LCD33) meetings that ORBIS has rolled out be used to track benefits and monitor KPIs), and to develop further methodologies and approaches where there is an identified need.

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7 Asset Knowledge

The Asset Knowledge Group contains all the Asset Management Activities required to specify, collect, maintain and dispose of asset information in a way that fully supports all aspects of an organisation's Asset Management System. The Asset Knowledge Group is split into three Activities within the AMEM model:

Asset Information Strategy & Standards - The processes that govern strategy and specification for the dissemination of asset information requirements within the organisation.

Asset Information Systems - An assessment of the ability of the asset information systems within the organisation to meet the asset information requirements contained in the Asset Information Standards.

Asset Knowledge & Data - The processes that govern the maintenance of asset data and knowledge held in the Asset Information Systems according to the Asset Information Standards.

7.1
Review of Roadmap Trajectories

Table 11 shows the scores from the SBP assessment, the target score from the AMCL Asset Management Roadmap for the End of CP4, the actual score from the 2014 (End of CP4) assessment and comments on any variance from target.

Activity	SBP Score	End of CP4 Roadmap Target	End of CP4 Score	End of CP4 RAG	Comments
Asset Information Strategy & Standards	73%	78%	78%	YES	***Roadmap – 3/3 achieved*** Target achieved due to following: • ORBIS programme continues to develop and deliver • Asset information specifications defined across priority asset groups with the exception of BCAM Asset disciplines.
Asset Information Systems	56%	63%	63%	YES	***Roadmap – 1/1 achieved*** Target achieved due to development and implementation of systems in accordance with the ORBIS plan (e.g. LADS & mobile applications)
Asset Knowledge & Data	52%	61%	59%	NO	***Roadmap – 1/3 achieved, 2/3 partially achieved*** Target not achieved due to the following: • Route stakeholders were unclear on their role on assuring data quality and identified some on-going data quality issues • Good practice data quality assurance process has been developed but not yet fully implemented

Table 11 Asset Knowledge Group Trajectories

The requirements defined in the AMCL Roadmap and the review of Network Rail's capabilities are included in the following sections for each activity.

7.2
Review of Roadmap Capabilities

Table 12 below shows a summary of the End of CP4 assessment findings against each of the AMCL Roadmap capability statements within the Asset Knowledge Group.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Asset Information Strategy & Standards	4.1	Asset Information Strategy Alignment	The Asset Information Strategy is fully aligned with the Asset Management System and the requirements of key stakeholders	The Asset Information Strategy is reviewed in the light of the publication of the Asset Management System (see capability 1.1) to ensure: 1. The scope is consistent with the Asset Management System 2. The Asset Information Strategy reflects the high-level Asset Management processes defined within the Asset Management System 3. The key decisions within the Asset Management processes and the information necessary to support these are captured in the Asset Information Strategy 4. The capability, stewardship and performance KPIs used to monitor the effectiveness of the Asset Management System are captured within the Asset Information Strategy (see capability 6.6) 5. It reflects the findings from the periodic review of the Asset Management System (see capability 6.4)	The Asset Information Strategy has been tested and reviewed, using a defined process, against the revised Asset Management System requirements and the Asset Information Strategy, Information Specification, Data Dictionary and Asset Information Plan have been updated, where appropriate, by March 2014.	This capability has been achieved. The Asset Information Strategy, Specification and Implementation Plans for the Asset information Vision have been consistently reviewed and updated. Alignment with the Asset Management System is appropriately managed through governance arrangement between the AMSG, AMIP and ORBIS programme boards.
Asset Information Strategy & Standards	4.2	Asset Information Specification Process	An Asset Information Specification process is in place that defines the current and foreseeable future information requirements necessary to deliver the Asset Information Strategy and external stakeholder needs, and is aligned with appropriate systems architecture(s).	An Asset Information Specification process is developed and implemented to provide: 1. An Asset Information Specification that defines internal and external stakeholder information requirements for key milestones, eg. SBP and start of CP5 2. A clear 'line-of-sight' from the Asset Information Specification to the Asset Information Strategy. 3. A Cost/benefit justification and prioritised information requirements to take account of stakeholder requirements, operational contexts and asset data criticality. 4. A RACI for the end-to-end Asset Information arrangements as a result of devolution.	1. The Asset Information Specification process for CP5 has been developed and implemented by September 2012. 2. The Asset Information Specification for CP5 has been produced by September 2013	This capability has been achieved. The data specifications have been developed for all asset groups (outside of BCAM) via the MDM process. The core data specification for Track has also been completed but this is still work in progress for all other asset groups.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Asset Information Strategy & Standards	4.3	Data Dictionary	A Data Dictionary is in place that defines the required attributes and data quality requirements for the initial capture and maintenance of information in accordance with the Asset Information Specification.	The Data Dictionary is developed to provide: 1. A centralised data dictionary detailing the required asset information as defined in the Asset Information Specification, including asset attributes and hierarchy. 2. An appropriate means of assuring control and quality of asset data and estimating the impact of data changes, consistency in data use, easier data analysis, reduced data redundancy and the enforcement of standards. 3. Defined confidence levels for data quality and accuracy based on the criticality of the asset information and the requirements defined in the Asset Information Specification. 4. The necessary definitions for the capture, management and analysis of: - Maintenance information; - Condition information; - Defect and failure information; - Performance and failure consequence information; and - Asset utilisation information. 5. Clarity of the Asset Knowledge Standards arrangements as a result of devolution.	The CP5 Data Dictionary for all assets has been implemented and it can be demonstrated that it aligns with the CP5 Asset Information Specification for all assets by September 2013.	This capability has been achieved. The data specifications have been developed for all asset groups (outside of BCAM) via the MDM process to form the structure of the data dictionary. The core data specification for Track has also been completed but this is still work in progress for all other asset groups.
Asset Data & Knowledge	4.4	Asset Information Plan	An Asset Information Plan is in place that defines the key activities and timescales necessary to deliver all Asset Information requirements defined in the Data Dictionary and is being implemented.	An Asset Information Plan is in place that includes: 1. A gap analysis of current data availability against the requirements of the Asset Information Specification and Data Dictionary. 2. A methodology and programme for data collection, data entry and validation for all requirements defined in the Data Dictionary. 3. Clarity of the Asset Information Plan arrangements as a result of devolution. Asset data is being collected and validated in accordance with the Asset Information Plan.	1. The CP5 Asset Information Plan for Track assets has been developed for all routes and is fully aligned with the Track elements of the CP5 Data Dictionary by June 2013. 2. The CP5 Asset Information Plan for all assets has been developed and is fully aligned with the CP5 Data Dictionary by March 2014. 3. The data collection process for CP5 is progressing in accordance with the CP5 Asset Information Plan by March 2014.	This capability has been achieved. An overall information plan is defined but some enabling technologies are still in development (such as Mobile Works Management and Plain Line Pattern Recognition).

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Asset Data & Knowledge	4.5	Data Confidence Assessment	An effective Data Confidence Assessment methodology is in place to provide necessary assurance to Network Rail and its stakeholders of data confidence levels.	The data confidence assessment approach has been enhanced to provide: 1. An effective and consistent methodology, process and timescales for assessing the level of confidence in asset data against the requirements of the Asset Knowledge Standards 2. Assurance of data collection in accordance with Asset Information Plan. 3. Assurance of data confidence to both Network Rail and its stakeholders. 4. Prioritisation of further data capture.	The outputs of the data confidence assessment continue to be consistent with the requirements of the Data Dictionary for CP5, or corrective actions established, and have been shared with relevant stakeholders by March 2014 as part of the Delivery Plan.	This capability has been partially achieved. Network Rail has not responded specifically to the concerns raised in the Arup report or to the seven PAS 55 minor non-conformances identified at SBP, however it does have in place a range of data quality initiatives which over time are likely to address these issues. These include a draft data quality policy statement, a data quality management dashboard and set of targets for CP5 aligned to the data quality assessment methodology and asset information specifications which include the 'core' asset information requirements to meet Regulatory requirements for Track to date
Asset Data & Knowledge	4.6	Asset Data Management	Data management and assurance procedures are in place to ensure the ongoing governance of Asset Information is undertaken in accordance with the Data Dictionary.	The Asset Data Management procedures have been enhanced to provide: 1. Assurance that asset information is formally managed throughout Network Rail, including 'on the ground', in accordance with the Data Dictionary. 2. Ongoing assurance of data confidence levels. 3. Consolidation of existing tactical Asset Knowledge & Data AMEM recommendations identified.	The Asset Data Management procedures have been updated and it can be demonstrated that they fully align with the CP5 Data Dictionary and have been fully briefed and implemented throughout the organisation by March 2014.	This capability has been partially achieved. Data management procedures are in place at Route level but they are opportunistic and it is not clear how this aligns to the Data Dictionary. Good work and progress has been evidenced with respect to managing data as an asset and assuring data quality but this is still to be fully implemented.
Asset Information Systems	4.7	Asset Information Systems	Appropriate Asset Information Systems are in place that provide the Asset Information to Network Rail and external stakeholders in accordance with the Asset Information Plan	The Asset Information Systems and Architectures have been enhanced to provide: 1. Full alignment of the architecture with the organisation's and its external stakeholders' requirements as defined in the Asset Management Strategy, Asset Information Strategy, Asset Information Specification, Asset Knowledge Standards and Asset Data Management procedures. 2. Full alignment of all proposed systems with the organisation's and its external stakeholders' requirements as defined in the Asset Management Strategy, Asset Information Strategy, Asset Information Specification, Asset Knowledge Standards, Asset Information Plan and Asset Data Management procedures. 3. Clarification of 'master data' sources and interfaces of all proposed systems. 4. Clarity of which, how and when systems will be used during CP5. 5. Consolidation of existing tactical Asset Information System AMEM recommendations identified.	1. The Asset Information Systems and Architectures for CP5 and beyond have been shared with relevant stakeholders and it can be demonstrated that they fully align with the Asset Information Strategy and Data Dictionary by March 2014. 2. Asset Information Systems have been implemented in accordance with the ORBIS strategy by March 2014.	This capability has been achieved. The ORBIS programme continues to develop, refine and consolidate systems in accordance with the programme but the impact of these changes is not yet fully understood or appreciated in the Routes.

Table 12 Summary of assessment findings for the Asset Knowledge Group

7.3
Asset Information Strategy & Standards

At the time of the SBP assessment the general finding for Asset Information Strategy & Standards was that of an organisation that had put in place a clear vision and strategy for Asset Information that was aligned to the wider organisation and was moving into the delivery phase. However, the delays to starting the programme meant that there were several milestones in 2013 that needed to be met to achieve the overall target for the end of CP4. This has broadly been achieved at the End of CP4 and Network Rail has met its target of 78%.

At the time of the SBP assessment the risk that the new systems would be seen by the wider asset data community as being either 'imposed' or something that they are not connected with was identified. This came from two perceptions identified at the time:

1. That an ORBIS 'centric' initiative was being driven with limited involvement from the Routes; and
2. That projects outside the Scope of ORBIS were of lower priority and that integration with the Asset Information Strategy was not clear.

These perceptions remain to a degree, but Network Rail has mitigated the effect by adopting the BRIG approach which has improved engagement of the wider asset information community in the roll-out of key projects, such as LADS (see more in Section 7.4 on Asset Information Systems).

Alongside publication of the Asset Information Strategy, the priority for Network Rail during CP4 was to establish its Asset Information Specification and the Asset Knowledge Standards to support this. This was seen as key to the successful delivery of the AIS and improvements to the overall quality of Network Rail's Asset Information. The current position on the four key elements of this, as first reported at the time of the SBP assessment, can be summarised as follows:

- Asset Information Specification Process – The robust and pragmatic process for developing Asset Information Specifications produced at the time of the SBP assessment has now been successfully implemented (NRCP4-AKN1 & NRCP4-AKN2).
- Asset Information Specifications – All Asset Information Specifications outside the BCAM programme are now reported as complete. The Track discipline is still further ahead than the other asset disciplines in terms of the maturity of these specifications as it has expanded to include the 'core' specification required for regulatory reporting (NRCP4-AKN3).
- Master Data Management (Data Dictionary) – The MDM system was under construction at the time of the SBP assessment but now has all core Asset Information Specifications outside the BCAM programme loaded.

- Asset Information Plan – At the time of the SBP assessment an overall plan linking all data definition and specification activities with the production, review and sign-off of Asset Information Specifications and the dependencies to MDM system progress for each asset type had not been produced. At the End of CP4 this is still in the process of being completed, with specific effort in producing the data interface specifications (for example NRCP4-AKN4 & NRCP4-AKN5) and overall management through the ProVision system.

The challenge for CP5 will be to finalise the full specification of asset information and to embed the Asset Information Strategy into business as usual within Network Rail.

7.4
Asset Information Systems

At the time of the SBP assessment Asset Information System progress remained behind AMCL Roadmap target timescales, due principally to the knock-on effects of historic delays from the development of the Asset Information Strategy and initiation of the ORBIS programme. As a result only high-level architecture models had been produced at that time. However, Network Rail has made significant progress in the area of systems implementation since SBP, and at the End of CP4 demonstrable evidence was available that indicated systems are being effectively implemented in accordance with the revised and well established ORBIS programme. As a result Network Rail has met its End of CP4 target for this activity.

At SBP it was noted that a 'one front door' approach was being adopted to building new relationships between those in the Routes and the Asset Information function. This involved individuals being appointed as points of contact from the Asset Information team. This was anticipated to become a key linkage in the process of defining and delivering improvements to Asset Information in the post-ORBIS environment. During this assessment evidence of this approach was presented with respect to the MWM implementation in the form of a 'Route Champion Network' (NRCP4-AKN6).

At the time of the SBP assessment it was found that Network Rail did not have a standard methodology for asset information system implementation in place, but was developing certain elements of this. During this assessment the BRIG approach was identified as the main management mechanism for systems implementation, supported by an overall ORBIS Roadmap (NRCP4-AKN7) and individual phased release plans (NRCP4-AKN8).

Route BRIGs provide the mechanism for the central asset information team to update, engage and task Routes with respect to systems implementation and provides an effective forum for the Routes to challenge, understand and support relevant activities. Although there was some evidence from

interviewees that ORBIS engagement was sometimes lacking, this may be as much to do with internal Route communications as any lack of central engagement.

At the time of the SBP assessment it was reported that Asset Management decision making within the Track asset discipline would be greatly supported by the LADS system, which had recently completed initial trials as part of the SBP development process and was considered by AMCL to reflect good practice in the management of linear rail assets. At the End of CP4 LADS implementation, managed via the BRIG approach and a structured engagement and communications plan (NRCP4-AKN10), is well advanced nationally, with positive feedback received from interviewees affected. Another example is the Fault Code Lookup application (already introduced in Section 6.5 on Maintenance Delivery) which has improving engagement on the trial Route (Anglia) and clearly defined outcomes from the second trial, albeit that only one trial was originally intended (NRCP4-AKN11 & NRCP4-AKN12).

The challenge for CP5 will be to continue the roll-out of the ORBIS programme, building on the successes so far and effectively engaging the wider asset information user community to ensure this is fully supported and provides the benefits envisaged.

7.5
Asset Data & Knowledge

Network Rail's score for Asset Data & Knowledge remains behind target at the End of CP4 although it is acknowledged that progress has been made since the SBP as ORBIS has begun to make an impact. At the time of the SBP assessment the ADIP had delivered benefits in the area of existing datasets, there had been an overall improvement in governance procedures for asset information, and various new groups and meetings had been instigated. At the End of CP4 there is evidence that the overall approach to the improvement of data governance and assurance processes and the consequential improvement and tracking of improvements continues to be a focus for CP5, although many elements are not yet fully implemented (NRCP4-AKN13 through to NRCP4-AKN16). Network Rail is also aligning the management of asset information with the requirements of ISO 8000 (NRCP4-AKN17).

At the time of the SBP assessment a high level methodology for data confidence assessment had been designed by Network Rail using an alphanumeric coding, similar to that developed in the UK Water Industry. Arup (Part A – Independent Reporter) had conducted a data quality review of Network Rail utilising that methodology in the lead up to the SBP assessment and the results of the Arup report were utilised to convert the PAS 55 major non-conformance identified against data quality in the 2011 (IIP) assessment into seven minor non-conformances. Progress against these can be seen in Section 10 of this report. In summary, Network Rail has challenged the veracity of the Arup report and provided direct responses and progress updates on the seven minor PAS 55

non-conformances. Network Rail has also put into place a range of data quality initiatives which over time are likely to address these issues. These include a draft data quality policy statement (NRCP4-AKN14), a data quality management dashboard (NRCP4-AKN15), a set of targets for CP5 aligned to the methodology described above, and the work on asset information specification described in Section 7.3.

The evidence presented within the Routes with respect to asset information and data quality during this assessment was similar to previous assessments. It was noted at the time of the SBP assessment that with the change in data ownership to the Routes under devolution there was now a local requirement for the Routes to conduct data audits and manage the corrective action process, with the central asset information team providing assurance on this process. The range of actions available for non-compliance, and the responsibilities for specifying audit process requirements and sample sizes were not clear at the time of the SBP assessment, and this remains the case. In general interviewee responses indicated that opportunistic local checking, where staff are already present on site for another role or another type of audit, was the process utilised for data auditing. This is a pragmatic approach but may require a central framework and guidance to ensure consistency.

Despite these issues, the deployment of new systems such as LADS has been positively reported during this assessment, and the benefits that have flowed from the quality, amount and integration of data recognised within the Routes.

The challenge for CP5 will be to ensure that the data quality and assurance issues identified during CP4 will be effectively managed to an agreed level in the future.

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8 Organisation & People

The Organisation & People Group in AMEM is focused on assessing the capability of an organisation to effectively implement all aspects of Asset Management. The Group is split into split into three Activities within the AMEM model:

Individual Competence & Behaviour - The processes that govern the specification, implementation, monitoring and continuous improvement of the workforce's Asset Management competences.

Organisational Structure & Culture - The effectiveness of the organisation in supporting the implementation of all Asset Management Activities.

Contract & Supplier Management - The processes that govern the specification, selection, evaluation and management of the supply chain to fully support implementation of the Asset Management Plans.

8.1
Review of Roadmap Trajectories

Table 13 shows the scores from the SBP assessment, the target score from the AMCL Asset Management Roadmap for the End of CP4, the actual score from the 2014 (End of CP4) assessment and comments on any variance from target.

Activity	SBP Score	End of CP4 Roadmap Target	End of CP4 Score	End of CP4 RAG	Comments
Contract & Supply Management	72%	73%	73%	YES	***Roadmap – 1/2 achieved, 1/2 not achieved*** Target achieved due to: • Route relationships with suppliers improving • However, procurement relationships with Routes could be more effective
Organisational Structure & Culture	63%	70%	68%	NO	***Roadmap – 1/3 achieved, 2/3 partially achieved*** Target not achieved due to following: • Although there is evidence of a more proactive approach taking shape to behavioural change and organisational culture development much of it pertains to CP5 plans and developments
Individual Competence & Behaviour	67%	77%	67%	NO	***Roadmap – 2/2 not achieved*** Target not achieved due to following: • Some evidence of a more proactive approach to HF but structured approach to AM competence still work in progress

Table 13 Organisation & People Trajectories

The requirements defined in the AMCL Roadmap and the review of Network Rail's capabilities are included in the following sections for each activity.

8.2
Review of Roadmap Capabilities

Table 14 below shows a summary of the End of CP4 assessment findings against each of the AMCL Roadmap capability statements within the Organisation & People Group.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Individual Competence & Behaviour	5.1	Asset Management Competence Requirements	Asset Management competence requirements and performance standards have been defined and are used for personal development	1. An overall Asset Management competence framework is in place and all competence frameworks with an Asset Management component have been reviewed and revised as appropriate to make them consistent across the organisation. 2. A systematic approach to developing Asset Management competence is in place which incorporates personal development plans. 3. Assessment against Network Rail competence requirements is undertaken to identify training needs for staff who have a role in the delivery of the Asset Management Strategy. 4. Asset Management competence descriptions are reviewed and modified to ensure consistency across all roles with respect to level of detail and what counts as core competence. 5. Staff with an Asset Management role have their Asset Management responsibilities written into their role profiles 6. Assessment of Asset Management related competence places a greater emphasis on practical skills.	1. Role profiles are defined for all asset manager roles that include the performance standards required against the Asset Management competence framework by April 2013 2. Annual Assessments are carried out for all asset manager roles against the role profiles and any gaps indented by June 2013 3. All staff in Asset Management roles have personal development plans relating to their Asset Management competence in place by June 2013 4. Processes for assessing competence have been reviewed, revised and their effectiveness validated by March 2014	This capability has not been achieved. This is due to the fact that progress on the first criterion was slower than originally anticipated..

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Individual Competence & Behaviour	5.2	Asset Management Training	Asset Management training courses, tailored to key Asset Management roles, have been identified and / or developed and are available to relevant staff.	1. Staff in roles related to Asset Management are given a consistent understanding of Asset Management principles and how to apply them. 2. Training plans are put in place for developing staff in the application of Asset Management principles. 3. Locally oriented training and structured feedback focused on developing understanding of and decision making skills for Asset Management is provided. 4. Re-training and refresher training are available in key skill areas particularly related to Asset Management related initiatives.	1. The training and development plan has been delivered for staff in key Asset Management roles by January 2014 2. Staff in all Asset Management roles have training and development plans in place to address their Asset Management training and any refresher training needs by March 2014	This capability has not been achieved. These success criteria have not been met. Their achievement is hampered by the delay in rolling out an underpinning asset management competences framework although we note some progress in defining awareness and introductory level asset management training.
Organisational Structure & Culture	5.3	Alignment of Asset Management Teams	The goals and group competences for Asset Management teams are defined and aligned with the Asset Management Strategy	1. Network Rail has a process for selecting teams which is explicitly mapped to the company's Asset Management competence framework. 2. Network Rail defines what competences (skills, knowledge, etc.) asset managers need to have as a group so that Asset Management strategic objectives can be met. 3. Team coverage of these group competences is determined and translated into team goals and objectives and teams created as appropriate. 4. Teams contributing to the delivery of the Network Rail Asset Management strategy are briefed on what is expected of them and how their performance will be measured.	1. All Asset management teams have performance requirements which can be used to demonstrate their contribution to the delivery of the overall Asset Management Strategy by April 2013 2. Staff in all Asset Management teams have personal competence requirements in their job descriptions which are aligned with team competence requirements by March 2014	This capability has been partially achieved. Largely, this can be attributed to the new approach that is being taken to instilling company values and good behaviours. While this is not Asset Management specific it goes a long way towards satisfying our evidence requirements and creates a good platform for focusing the Asset Management effort. Progress would be stronger still if an Asset Management competences framework which was unambiguous about the knowledge, skills and performance expected from people in Asset Management roles has been rolled out.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Organisational Structure & Culture	5.4	Strategic Oversight of Asset Management competences	A system is in place which provides up-to-date information and strategic oversight of the competences of Asset Management staff	1. A database is created which contains a consolidated record of key information about the experience, skills, abilities, licences, permits, training record, training and development needs, etc. of Asset Management staff. 2. A process is put in place for collecting competence information and adding it to the database. 3. The database contains information about both competence currently in use and competence "in stock", i.e. competence possessed by individuals beneficial to the organisation but not currently in use.	1. Staff in all Asset Management roles have their competence records on the database by March 2014 2. The records cover both competence currently in use and competence "in stock" by March 2014	This capability has been partially achieved. Although a database is not fully in place the evidence suggests that it will be very soon and the analyses of the distribution of Asset Management capability that were underway by the end of CP4 confirm this view.
Organisational Structure & Culture	5.5	Asset Management Culture	An Asset Management culture(s) is evident and consistent with the Asset Management Strategy and fully supported by all senior managers	1. Network Rail has developed a definition of the organisational culture(s) it desires which is consistent with any mission or value statements in place and with its Asset Management Strategy. 2. Analyses are undertaken on a sufficiently regular basis of the gap between the desired culture(s) and the current culture(s) - this should make use of such evidence as is already collected but may also require additional survey work. 3. The key influencing factors for, and barriers to, culture change are understood and actions are in place to address these which are under regular review.	1. A culture change management programme and migration strategy have been produced by March 2014 2. The desired culture and the change management programme has been communicated to the organisation as a whole by March 2014 3. Survey evidence demonstrates that there has been meaningful change towards the desired culture by March 2014. 4. Outstanding barriers or pockets of resistance to change have been identified and options for actions to close the gaps identified and initiated by March 2014.	This capability has been achieved. A clear vision of the desired culture is in place and activities are being programmed to achieve this. Expectations are much clearer than they appeared in previous assessments and the linkages between these and performance reviews and incentives are stronger. New survey techniques are being established and the business is becoming more articulate about its sub-cultures and how to address them.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Contract & Supply management	5.6	Contract Performance Assessment	A performance assessment system is developed which explicitly relates supplier and contract performance to the company's Asset Management Strategy	1. Existing contract performance indicators are kept under review to determine their value with regard to the Asset Management Strategy. 2. Contractors are evaluated in terms of their contribution to meeting the Asset Management Strategy. 3. A fit for purpose performance improvement process exists the elements of which are proportionate to the importance of any problems that arise.	1. Performance indicators have been reviewed and revised as necessary by March 2014 2. New performance indicators have been communicated to suppliers and contractors and are included in all new contracts by March 2014 3.New performance improvement process has been developed, communicated and is written into all new contracts by March 2014	This capability has not been achieved. The introduction of quality performance indicators into contracts and quality assurance has proved harder to do than expected which has held back progress in this area.
Contract & Supply management	5.7	Contract initiation	The company explicitly sets out and meets its commitment to suppliers and contractors on contract start dates.	1. Performance standards are in place for Network Rail procurement. 2. The performance standards are captured as performance indicators for Network Rail in the tendering, contract negotiation and contract start-up processes. 3. Performance against these standards is regularly reviewed.	Standards are achieved for at least 95% of contracts awarded by March 2014	This capability has been achieved. This success criterion has been met in terms of the largely quantitative measures currently used.

Table 14 Summary of assessment findings for Organisation & People Group

8.3
Contract & Supplier Management

At the time of the SBP assessment Contract & Supplier Management met the SBP target and this remains the case at the End of CP4, with the Activity scoring 73%. Despite this not all the AMCL Roadmap success criteria have been met. In particular there was evidence that relationships between Procurement, Asset Management Services and the Routes are not fully aligned with Asset Management objectives.

There is evidence of some friction and a lack of empathy between Routes and the Centre (including IP) about who has the main influence on contracts. In particular, IP Procurement considers itself to be on the receiving end of Route requirements without always having sight of the inputs that AMS has made to these. As a result, it claims to find itself, more often than not, having to derive the more strategic AMS requirements from the more tactical Route requirements which reduces its opportunity to influence them.

The evidence suggests that the Routes should be encouraged or incentivised more strongly to take their lead from the Centre and that IP Procurement and Asset Management Services relationships below Executive level should be strengthened to improve alignment and line of sight.

Otherwise, the improved scores reflect the positive relationships being reported between Routes and local suppliers and an enhanced approach to managing client relationships (NRCP4-OP1). However, progress is slow on the quality of work issues which have arisen in previous assessments. The evidence indicates that the introduction of quality performance indicators into contracts and quality assurance has proved harder to do than expected and this has held back scores in this area.

The issues of developing performance criteria for contracts or how to capture these in contract requirements do not appear to have been fully resolved. These tend still to be focused mainly on delivery and costs (NRCP4-OP2) and reportedly this task is proving harder than expected.

The challenge for CP5 will be to continue to embed improved relationships in the Routes with local suppliers, whilst also improving Network Rail's internal relationships to focus more clearly on delivering Asset Management objectives.

8.4
Organisational Structure & Culture

Network Rail's score for this Activity has missed the End of CP4 target by two percentage points at 68%, but progress is now on track to meet the End of CP4 target which reflects increased clarity on the approach and increasing commitment at the top of the organisation. Largely, this can be attributed to the new approach that is being taken to instilling company values and good behaviours. While this is not Asset Management specific it goes a long way towards satisfying our evidence requirements and creates a good platform for focusing the Asset Management effort. Progress would be stronger if the Asset Management competences framework was available to underpin team design and the relationships and movement between roles.

The focus on Asset Management as core business appears to have been strengthened by the recent reorganisation and there seems to have been a shift in the way the culture of the organisation is perceived and some useful simplification in the way this is being put across (NRCP4-OP3 & NRCP4-OP4).

This is an important development because it holds the prospect of a more effective cross company approach. From the evidence we have seen, it can be expected to improve during CP5 as the new roles, relationships and interfaces between central functions and Routes brought about by devolution become better understood.

Some issues relating to the reorganisation still have to be resolved. Scores would be higher still if cross-functional relationships within The Centre were more conducive to effective Asset Management decision-making across the business. Instead, it appears that the Routes are enjoying new freedoms to pursue their own approaches which is resulting in some boundary testing.

We note there has been a change of emphasis in the way that organisational culture is understood. Whereas, previously, safety culture and Asset Management culture were considered separately, there is now a recognition that organisational culture affect all aspects of business performance including safety and Asset Management and the task is to ensure that the effect is positive.

From the documents we have reviewed and interviews we have held, it is obvious that a more coherent and integrated approach is taking shape. It is still work in progress but the progress in recent months has been more rapid than was the case previously. One good illustration of this is a flexible use of incentives to embed good behaviours and drive organisational change such as the short term adaptation of 2013 bonus criteria that produced sizeable increase in hazard reporting.

The challenge for CP5 will be to effectively embed the pro-active management of Asset Management culture throughout Network Rail, building on the foundations created during CP4.

8.5
Individual Competence & Behaviour

The overall position within the Individual Competence & Behaviour Activity has improved slightly but is ten percentage points below the End of CP4 target. There is a slight improvement since the SBP assessment, which is attributable to evidence of a more concerted approach to addressing human factors issues. This includes the greater emphasis now being put on staff welfare and well-being and a more structured approach to dealing with human factors in accident and incident investigations.

What holds scores down is the continued lack of evidence of a systematic approach to developing and managing the competence and performance of people in Asset Management roles. There are reasons to be optimistic that this will improve during CP5 - a people strategy appears to be taking shape, effort is being put into improving cross-functional working and a succession planning framework is forming - but at the end of CP4 these can only be regarded as work in progress. The work that has been done on technical and safety competences related to Asset Management activities is well developed but not integrated in an overall approach.

Specifically, an Asset Management competences framework and a set of role descriptions has been under development for a considerable time now. Version 2 of this was presented to AMIP Board in December 2013 (NRCP4-OP5) but it is unclear what reception it received and there does not appear to be a programme in place for further refinement or implementation. Some testing of this has taken place but it is unclear from the evidence how the results of this testing are being used and the framework seems still to be far from being in routine, purposeful use. In our interviews we encountered some frustration with the slow progress of this and some local initiatives being taken to fill what is seen by some as a vacuum.

The consistency and effectiveness of local initiatives is at this stage difficult to judge. What is clear, however, is that the debate about competence is still characterised by different perspectives on what good looks like, a need for stronger integration between the competence frameworks in use in the business, clarity about how the Asset Management competence framework relates to these and a lack of consensus on key terms and methodology and longer term direction on workforce competence and its development.

By the end of CP4, basic awareness and introductory Asset Management training courses were only just being defined (NRCP4-OP6). It was too soon therefore to verify the relationship between the training objectives and the Asset Management competences framework.

The challenge for CP5 is to rapidly complete the development work described above and to maintain the approach so that it can be effectively embedded in Network Rail's approach.

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9 Risk & Review

The Risk & Review Group contains all the Asset Management Activities associated with Risk Assessment & Management and the Review & Audit of the organisation's Asset Management System, ensuring that the continuous improvement loop is closed. The Risk & Review Group is split into four Activities within the AMEM model:

Risk Assessment & Management - the processes that govern the consistent identification, quantification, evaluation, management and close-out of asset-related risks to the business, including the integration of these with other Asset Management Activities such as Review & Audit.

Sustainable Development - the processes that govern the specific management of risks related to sustainability.

Weather & Climate Change - the processes that govern the specific management of risks related to weather and climate change.

Review & Audit - the processes that govern the way the organisation assures itself that its Asset Management System is working and producing the expected results, and is being continually improved.

9.1
Review of Roadmap Trajectories

Table 15 shows the scores from the SBP assessment, the target score from the AMCL Asset Management Roadmap for the End of CP4, the actual score from the 2014 (End of CP4) assessment and comments on any variance from target.

Activity	SBP Score	End of CP4 Roadmap Target	End of CP4 Score	End of CP4 RAG	Comments
Risk Assessment & Management	75%	77%	75%	NO	***Roadmap – 1/1 partially achieved*** Target not achieved due to following: • The roll-out of ERM and the successful application of new techniques such as bow-tie analysis effective at higher end of Network Rail • However, Route level compliance to the ERM and its supporting guidance and methodologies is not consistent and knowledge of the new ERM is limited
Sustainable Development	52%	49%	52%	YES	***Roadmap – 1/1 achieved*** Target achieved due to: • Sustainable Development strategy in place • Demonstrable good progress through Integrated Plan
Weather & Climate Change	52%	48%	54%	YES	***Roadmap – 1/1 achieved*** Target exceeded due to: • Progression of the CCAP • Structure, approach and outputs of the SCMT
Review & Audit	64%	70%	66%	NO	***Roadmap – 1/5 achieved, 3/5 partially achieved, 1/5 not achieved*** Target not achieved due to following: • Asset Management System review and incorporation of relevant inputs behind Roadmap schedule • There is a level of disagreement within Network Rail over how the organisation demonstrates compliance to the Engineering Verification standard • GRA appears to be reasonably well embedded but multiple audit plans within GRA with no Asset Management System focus

Table 15 Risk & Review Group Trajectories

The requirements defined in the AMCL Roadmap and the review of Network Rail's capabilities are included in the following sections for each activity.

9.2
Review of Roadmap Capabilities

Table 16 below shows a summary of the End of CP4 assessment findings against each of the AMCL Roadmap capability statements within the Risk & Review Group.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Risk Assessment & Management	6.1	Integrating Asset and Risk Management	The Risk Management Framework is effectively integrated into the Asset Management System	The Risk Management Framework is effectively integrated into the Asset Management System: 1. Risk management is clearly linked to the achievement of Network Rail's Asset Management objectives. 2. Asset Policies and DSTs are used to manage to an acceptable level the risks identified through the implementation of the Risk Management Framework. 3. The identification, assessment and migration of all Asset Management delivery risks is completed in accordance with the Risk Management Framework. 4. The risks identified and managed through the above are fed into the Asset Management System review.	Integrated Risk and Asset Management process (4) is implemented by March 2014.	This capability has been partially achieved. The newly defined ERM is working well at the senior levels of the organisation and there is good evidence of its application in Asset Management decision-making (e.g. weather crisis team, BCR, etc.). However, it was noted within the Routes that the ERM is less well understood or embedded in accordance with the guidance that is available.
Sustainable Development	6.2	Sustainability Strategy	A Sustainability Strategy in place and is integrated into the Asset Management system	Network Rail develops a Sustainability Strategy that is designed to deliver: 1. the content of the Sustainability Policy 2. the various projects and initiatives on-going or planned within Network Rail (including all of those reported in the CRR) 3. the defined plan for CP5. One senior person within Network Rail is then given accountability for the delivery of this strategy.	By December 2013 one senior person is accountable for the delivery of the Sustainability Strategy which is being effectively delivered.	This capability has been achieved. Head of Sustainable Business Strategy is accountable for the delivery of the Sustainable Development Strategy.
Weather & Climate Change	6.3	Climate Change Adaptation & Mitigation	Asset Policies include a link to the requirements of climate change adaptation and mitigation	Network Rail's climate change adaptation requirements are fully considered in the CP5 Asset Policies (as set out in various internal and external studies and plans) such as: 1. the Network Rail Climate change Adaptation report 2. the Climate Change Adaptation Study 3. the on-going CP5 delivery plans	The CP5 Delivery Plan includes a clear linkage to Network Rail's climate change adaptation requirements by March 2014.	This capability has been achieved. Although not published in the CP5 Delivery Plan document, there is clear evidence that climate change adaptation is being effectively addressed through the development of Route CCAPs and the shorter-term output from the SCMT.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Review & Audit	6.4	Asset Management System Review	An effective Asset Management System management review cycle is in place.	Network Rail has implemented its Asset Management System (see capability 1.1) and has designed a management review process for this system that meets the requirements of PAS 55 Clause 4.7.	At least one management review cycle of the Asset Management System has been undertaken by December 2013.	This capability has been partially achieved. The 'Asset Management System' document is still at Issue 1 but is planned to be re-issued in May 2014. A number of activities and supplementary reviews have been completed but these have not yet been fully coordinated into an updated Asset Management System approach. The issues around the revision of the Asset Management Policy and Strategy are also pertinent.
Review & Audit	6.5	Asset Management System Audit	An audit plan is in place that is focused on the Asset Management System.	The NCAP (or equivalent) is enhanced with the following requirements: 1. Audit plans which are defined by the requirements of the Asset Management System (as defined by Network Rail's Asset Management Framework). 2. The audit plan should be risk-based and delivered by people independent from the audited activities. 3. The plan should include sufficient cross-functional audits to ensure integration of the Asset Management System.	The outputs from Asset Management Framework audits are being used to support the Asset Management System review by December 2013.	This capability has been partially achieved. There are a number of audit plans in place, including NCAP, Internal Audit and S&SD which operate alongside other assurance activities in the 3-level Assurance Framework. However, there is no overall check that alignment to the defined Asset Management System is effective or that the defined Asset Management System is meeting its objectives, therefore fully supporting Roadmap Capability 6.4.
Review & Audit	6.6	Engineering Verification	An engineering verification system is in place to provide assurance that the expected outputs from the Asset Management System are delivered.	1. The current revision to the Engineering Verification standard is completed and takes into account the impact of devolution. 2. The Engineering Verification standard is implemented with sufficient resources to ensure it will be provide assurance that the expected outputs from the Asset Management System are delivered, including: - safety related issues - asset condition and reliability - quality of work undertaken - level of defects - non-compliance with standards or other requirements	The outputs from the Engineering Verification audits are being used to support the Asset Management System review by December 2013.	This capability has not been achieved. Engineering Verification is now exclusively completed by Centre AMS resources. However, the inspection volumes have been reduced to ensure the plan is achievable and there is a level of disagreement within Network Rail over how the organisation demonstrates compliance with NR/L2/RSE/070. The Engineering Verification process now has purely qualitative (albeit very worthwhile) objectives. This has not been formally acknowledged or the impact assessed with respect to the broader assurance framework, and Engineering Verification outputs are not obviously supporting Roadmap Capability 6.4.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	End of CP4 Success Criteria	Summary of End of CP4 Assessment Findings
Review & Audit	6.7	Capability, Stewardship & Performance KPIs	A suite of Asset Management KPIs is in place to monitor the capability, stewardship and performance of Network Rail's Asset Management	Capability, stewardship & performance KPIs are in place which include a balanced set of appropriate measures including: 1. Lagging performance measures (such as failures or minutes delay) 2. Leading stewardship measures (such as asset condition, renewal rates or average remaining lives) 3. Leading capability measures (such as competence)	Capability, stewardship & performance measures are being used to support the Asset Management System review by December 2013.	This capability has been partially achieved. Several performance measures are already established and regularly monitored. Others have been developed for CP5 and therefore in some areas the baseline is not yet understood. 1. Lagging measures are In place and regularly reported. 2. The ASI leading stewardship measure has now been replaced by the CSI and CRI and CP5 forecasts made. 3. Leading capability measures such as competence are understood to be under development.
Review & Audit	6.8	Benchmarking	Benchmarking is actively used to improve the Asset Management System	Benchmarking is actively used to improve the Asset Management System through: 1. Becoming an embedded 'business as usual' process. 2. Identifying appropriate internal and external benchmarking opportunities and targets. 3. Focusing on value for money outcomes. 4. Feeding into the Asset Management System management review process.	Benchmarking data is being used to support the Asset Management System review by December 2013.	This capability has been achieved. Benchmarking continues to be a core approach to identifying improvement in Network Rail's Asset Management System.

Table 16 Summary of assessment findings for the Risk & Review Group

9.3
Risk Assessment & Management

Network Rail has been through several iterations over the past three AMEM assessments within the area of Risk Assessment & Management, and although the intention of these iterations has been to more effectively embed a simpler and more flexible good-practice approach to risk management throughout the business, this has resulted in a slowing of Network Rail's capability score. The score for this Activity has not moved since SBP at 75% and has fallen just short of the End of CP4 target, but there is good evidence that this hiatus will be limited and progress will soon be made.

The key requirements for a good-practice risk management framework from an Asset Management perspective are that risk is assessed consistently across the business, and that the understanding and management of risks is effectively integrated into Asset Management decision-making. This is the intent of AMCL Roadmap Capability 6.1 which has been partially achieved by Network Rail. Since the SBP assessment, when the new ERM approach was first introduced, this approach has now started to be rolled out. The document 'Risk Management Approach at Network Rail' describes the overall approach, and provides basic information and a timeline over which the ERM will embed (NRCP4-RR1). This timeline stretches to December 2015 and at December 2013 a 'Foundational' state is expected, characterised by 'high level engagement' and 'awareness of causes and consequences but limited controls focus and awareness'. This is an accurate description of what was found during this assessment, however, only with respect to ERM roll-out.

At the time of the SBP assessment Network Rail already had established risk management frameworks and tools in place – the IRM standard and the ARM tool were current. The IRM standard has been replaced by the ERM approach and its supporting guidance which is available on Connect (for example – assessment and escalation (NRCP4-RR2), bow-tie assessment (NRCP4-RR3), 'deep-dives' (NRCP4-RR4), and reporting and monitoring (NRCP4-RR5)). ARM still exists and is in the process of being cleansed and aligned to ERM-compliant assessment techniques (such as bow-tie assessment). In general, there was plenty of evidence presented during the assessment that these techniques were being used (for example bow-tie assessment, see below), but very little awareness of the formal definition of ERM or its associated guidance. For example, no interviewee directed the assessors to the guidance available on Connect.

In parallel with the emerging ERM approach, the Route organisations have generally continued to maintain risk registers and to review risks on a regular basis, escalating risks as required under the previous risk management regimes (NRCP4-RR6 & NRCP4-RR7). There are exceptions to this, and it is notable that the risk review and escalation discipline characteristic of Network Rail in previous assessments is now fragmented, with differing approaches and tools in use. For example, some Routes utilise ARM whilst others utilise spread sheets, and risk registers are sometimes not utilised below DRAM level, although in many cases they are. In general, this gradual fragmentation of approach is one of the things the ERM is seeking to fix, and Network Rail is still a very active risk management organisation.

One notable improvement since the SBP assessment is the adoption of the 'bow-tie' risk assessment technique. This technique is recognised good-practice, and has been enthusiastically adopted by many parts of the organisation (for example, the SCMT (NRCP4-RR8) and the BCR initiatives (NRCP4-RR9), see Sections 9.6 and 9.5 on Review and Audit and Weather and Climate Change respectively). This is a very positive development and demonstrates how the ERM approach will help enable further improvements throughout CP5 as the approach embeds and gradually displaces the IRM approach. The challenge for Network Rail will be to maintain at least the levels of risk management currently evident and this will require further effort to managing the transition, and a commitment to the current ERM approach.

9.4
Sustainable Development

At the time of the SBP assessment, the S&SD directorate had been established within the corporate functions of Network Rail group. Within this group, overall responsibility for S&SD at Executive Level lies with the Director, Safety & Sustainable Development and within the team there is a dedicated Head of Sustainable Development responsible for shaping and implementing Network Rail's approach to sustainability. A Sustainable Development Strategy had been included in the SBP documentation suite, and the SBP AMEM assessment concluded that the challenge for Network Rail was now to focus on turning the vision and strategic objectives into a set of initiatives and embed these into its CP5 Delivery Plans. At the End of CP4 the Sustainable Development Strategy remains and an Integrated Plan has been developed to support its delivery (NRCP4-RR10), which was formally signed off in April 2014. These developments combined have put Network Rail into a good position at the start of CP5 but have not moved the AMEM score for the Activity which remains at 52%, still ahead of the End of CP4 target of 49%.

At the time of the SBP assessment on-going initiatives to address and align systems within Network Rail that address certain aspects of overall Sustainable Development, such as Environmental Management and Social Responsibility, were evident. For example, certain areas of the business had already established an EMS and the Thameslink project has achieved certification to ISO 14001:2004. NDS is also seeking accreditation for its EMS and the latest audit has identified areas to be addressed. There was also evidence of Sustainable Development activity in the new Asset Policies and Route Strategic Business Plans. Network Rail has since developed an ISO 14001:2004 compliant EMS (NRCP4-RR11) to underpin delivery of the Integrated Plan, but this has only just been developed and Network Rail is not yet certificated against the standard.

These developments are significant if not yet fully effective and are sufficient to satisfy the End of CP4 Success Criterion against AMCL Roadmap Capability 6.4 – 'By December 2013 one senior person is accountable for the delivery of the Sustainability Strategy which is being effectively delivered.' The challenge for CP5 is to fully embed the approach and to effectively deliver and continually improve the plan, ensuring tight alignment with the requirements of Network Rail's Asset Management System.

9.5 Weather & Climate Change

Network Rail's progression in the Weather & Climate Change Activity over CP4 has been good. At the End of CP4 Network Rail scores 54%, ahead of the target of 48% and two percentage points better than at SBP. The rate of progression has slowed as Network Rail has sought ways to effectively define and embed its climate change adaptation plans within the Routes, however its ability to anticipate and respond to adverse weather has remained strong. At the End of CP4 these two aspects have combined with Network Rail's response to the adverse weather experienced over the winter of 2013/14, with this short-term response now informing Network Rail's longer-term climate change plans.

At the time of the SBP assessment climate change formed a part of Network Rail's approach to Sustainable Development and as such was both led and supported by the central S&SD team, with specific analyses carried out by experts from Technical Services (within Asset Management Services) and functional and Route-based teams. A separate Weather and Climate Change Strategy did not exist and specific objectives for Weather and Climate Change were set out in the Sustainable Development Strategy. Supporting evidence for Weather and Climate Change provided for the SBP assessment included the SBP document 'Climate and Weather Resilience for Network Rail Assets'.

At the End of CP4 there is a more effective focus on Weather & Climate Change. The SCMT was established on 17th February with a remit to co-ordinate Network Rail's immediate response to the extreme weather experienced over the winter of 2013/14, and then to deliver a strategic, consistent and timely response to operational resilience in the future (NRCP4-RR12). The SCMT was required to liaise with COBR for management of the immediate weather-related risks, however it had two levels of objectives:

- Short term objectives – to coordinate the response to immediate risks resulting from extreme weather; and
- Medium term objectives – to develop enhanced plans to sustainably improve resilience to extreme weather events.

Although opportunistic, the creation of the SCMT has enabled an effective analysis of weather resilience and climate change risks using the 'bow-tie' risk assessment approach described in Section 9.3 on Risk Assessment & Management (NRCP4-RR8). It has been used to develop an enhanced WRCC programme (NRCP4-RR13) which has:

- Reviewed, rationalised and validated all legacy projects;
- Captured and incorporated lessons learnt and other stakeholder input (from TOCs, FOCs and the DfT); and
- Developed a structured analysis to identify gaps in current WRCC programme

The enhanced WRCC now contains the Infrastructure Resilience Programme, National Weather Event Response Programme, Climate Change Adaptation Programme, Cross-industry Resilience Programme, Earthworks Integrity Programme and the Information Exploitation Programme. Many of these programmes were recognised elsewhere within Network Rail (for example, all Routes recognised the next major step in the Climate Change Adaptation Programme which is to develop Route-level CCAPs by September 2014) and overall the enhanced WRCC represents a significant step forward in the integration and delivery of Network Rail's weather and climate change challenges throughout CP5 and beyond.

9.6 Review & Audit

The Review & Audit Activity has fallen short of the End of CP4 target by four percentage points and this is mainly due to AMCL Roadmap Capabilities 6.4 to 6.7 being only partially or not achieved. These focus on the overall management review of the Asset Management System and its related inputs and have already been introduced in Section 4.3 on Policy & Strategy. Network Rail's Asset Management Policy has been successfully revised and published, but the revision of the Asset Management Strategy and System documentation is still to be completed. In particular, these Capabilities are influenced very strongly by the 'Asset Management System' concept embedded in PAS 55 and ISO 55001 (see Section 10 for an update on these) and, in general, the day-to-day management review, audit, governance and monitoring of KPIs within Network Rail remains a relative strength. The four AMCL Roadmap Capabilities are put into more context below:

- ***AMCL Roadmap Capability 6.4*** – An effective Asset Management System management review cycle is in place. Networks Rail's Asset Management System is defined in a single document which was issued at SBP at Issue 1 and is planned to be re-issued in May 2014. However, this document is essentially a core description of how the Asset Management System operates, and was specifically tailored to delivering a successful strategic planning framework (see Section

4 on Strategy & Planning). Surrounding the review and update of this specific document are other activities and supplementary reviews, including the Asset Management Policy and Strategy (discussed in Section 4), a review of the Asset Management System RACI (NRCP4-RR14), the impact of Project Olympus and Apple (NRCP4-RR15), the introduction of the GRA framework (NRCP4-RR16) and the issue of Version 6 of the Devolution Handbook. These are all at various stages of completion but have not yet been fully coordinated into an updated Asset Management System approach. Until this level of coordination can be systematically demonstrated this remains an area of development for Network Rail.

- ***AMCL Roadmap Capability 6.5*** – An audit plan is in place that is focused on the Asset Management System. Network Rail has a number of audit plans in place, including NCAP, Internal Audit and S&SD which operate alongside other assurance activities in the 3-level GRA Framework. At the time of the SBP assessment this framework had been newly defined and introduced but appears to be reasonably well embedded now. With respect to audit, however, there is no overall check that alignment to the defined Asset Management System is effective or that the defined Asset Management System is meeting its objectives, therefore fully supporting Roadmap Capability 6.4. Again, from a general perspective, audit within Network Rail is a relative strength, but it is the focus on the Asset Management System and support for its periodic management review that is not yet systematic.
- ***AMCL Roadmap Capability 6.6*** – An engineering verification system is in place to provide assurance that the expected outputs from the Asset Management System are delivered. Engineering Verification is now exclusively completed by Central Asset Management Services resources. In February 2013 the S&SD Executive (NRCP4-RR17) noted four issues with the 2013/14 Engineering Verification plan related to the reduction in the number of Engineering Verification visits planned due to a shortage of resource compared to Professional Head recommendations, particularly within signalling. Therefore inspection volumes were reduced to ensure the plan was achievable but it appears that there is a level of disagreement within Network Rail over how the organisation demonstrates compliance to the Engineering Verification standard NR/L2/RSE/070 (NRCP4-RR18). Reports from the Routes are that Engineering Verification visits are now fewer in number and it was suggested by the Centre that the Engineering Verification process now has purely qualitative (albeit very worthwhile) objectives related to effective communication between the Centre and Routes rather than quantitative assurance. This does not appear to have been formally acknowledged or the impact assessed with respect to the broader assurance framework, and Engineering Verification outputs are not obviously supporting Roadmap Capability 6.4.

- ***AMCL Roadmap Capability 6.7*** – A suite of Asset Management KPIs is in place to monitor the capability, stewardship and performance of Network Rail's Asset Management. Several performance measures are already established and regularly monitored within Network Rail. In general these are:
  - Lagging measures which are in place, well embedded, and regularly reported.
  - Leading stewardship measures that at the time of the SBP assessment focused on the ASI which has now been replaced by the CSI and CRI (NRCP4-RR19). Forecasts for CP5 have been created and targets set for these new measures, which aim to split out the long-term (sustainability) and short-term (reliability) elements of the ASI.
  - However, the second type of leading stewardship measure required by AMCL Roadmap Capability 6.7 were for Asset Management capability (such as for competence) and these are understood to currently be under development.

In summary, Network Rail's challenge for CP5 within the Review & Audit Activity is to build on its various relatively strong review, audit and assurance capabilities to ensure they coordinate effectively and systematically on the management review and update of the Asset Management System as defined.

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10 PAS 55 Surveillance and ISO 55001 Overview

10.1 Overview

The BSI Publically Available Specification 55 (PAS 55 : 2008) for Asset Management 'Specification for the optimized management of physical assets' is a two-part specification for good practice Asset Management. It provides a useful benchmark for competent Asset Management within asset intensive industries, and has been widely adopted internationally across the utilities, transport, manufacturing and local government sectors. Part 1 contains the core requirements for the establishment, maintenance and continuous improvement of an Asset Management System.

AMCL awarded conditional certification at the IIP assessment with two major non-conformances identified, and full certification to PAS 55 at the time of the SBP assessment once the two major non-conformances had been cleared. Since then the ISO has issued a new standard, ISO 55001, which was developed using PAS 55 as the foundation document. ISO 55001 was launched in January 2014 and will effectively replace PAS 55 over the following 12 months as the de-facto standard for Asset Management System.

This section contains guidance on how the AMEM is used to support PAS 55 and ISO 55001 certification (Section 10.2), an update on Network Rail's PAS 55 minor non-conformances (Section 10.3), and an overview of it compliance to ISO 55001 (Section 10.4).

10.2 Using the AMEM for PAS 55 and Certification Audits

The AMEM and the Asset Management maturity scale are used as a source of evidence to support PAS 55 or ISO 55001 Gap Analyses and Certification Audits. Compliance with PAS 55 or ISO 55001 is broadly consistent with a level of maturity at the top of the 'competent' band. This is consistent with the guidance provided in the IAM's own assessment methodology. This is only used as a guideline when undertaking Gap Analysis Assessments and does not substitute the requirement to audit compliance with each specific clause of PAS 55 or ISO 55001 during Certification Audits.

Non-conformances against the requirements of PAS 55 are graded into three types, with the grades validated through the maturity assessment process as scored using the AMEM. These grades are described below:

1. ***Major Non-Conformance*** – The absence of a process or procedure, or a total systematic breakdown in the operation or management of that process or procedure, which if effective would have met a specific requirement of PAS 55 or ISO 55001. This is likely to be validated (although not necessary) by a sub 30% maturity score against the relevant PAS 55 clause.
2. ***Minor Non-Conformance*** – A deficiency in a process or procedure, or evidence of a significant failure (or multiple failures) in the operation or management of that process or procedure, which otherwise meets a specific requirement of PAS 55. This is likely to be validated (although not necessary) by sub 30% maturity scores against some specific questions within a PAS 55 or ISO 55001 clause, but may not significantly affect the overall maturity score for that clause.
3. ***Observation*** – Either a single (isolated) failure in the operation or management of a process or procedure, or a finding of conformance that is not fully substantiated by evidence. Observations will be recorded within the maturity scoring commentaries against questions within a PAS 55 or ISO 55001 clause.

10.3
Update on PAS 55 Minor Non-conformances

The IIP assessment also identified 16 Minor Non-conformances which were a sub-set of the overall assessment recommendations with specific respect to PAS 55 requirements. At SBP an additional seven Minor Non-conformances were identified with respect to Clause 4.4.6, which replaced one of the Major Non-conformances. Overall progress against these is summarised in Table 17 below. One new minor-non-conformances has been identified during this assessment related to Clause 4.7 – Management Review.

PAS 55 Clause	Minor NCRs identified at IIP (Conditional Certification	Minor NCRs identified at SBP (Full Certification	Status at End of CP4	Total Minor Non conformances at End of CP4	Action Required
Totals	**16**	**7**	**N/A**	**11**	**N/A**
4.1 - General Requirements	1	0	Closed	0	None
4.2 - Asset Management Policy	1	0	Closed	0	None
4.3.1 - Asset Management Strategy	1	0	Open	1	Publication of the revised Asset Management Strategy to include all relevant AMCL Roadmap Improvement Specification requirements.
4.3.2 - Asset Management Objectives	1	0	Open	1	Publication of the revised Asset Management Strategy to include all relevant AMCL Roadmap Improvement Specification requirements.
4.3.3 - Asset Management Plans	0	0	N/A	0	
4.3.4 - Contingency Planning	1	0	Open	1	Defined plan for a national approach to the generation, rehearsal and review of contingency plans which ensures the right degree of national consistency and best practice is matched with local freedom and awareness of plans.
4.4.1 - Structure, Authority and Responsibilities	0	0	N/A	0	None
4.4.2 - Outsourcing of Asset Management Activities	0	0	N/A	0	None
4.4.3 - Training, Awareness and Competence	1	0	Closed	0	None
4.4.4 - Communication, Participation and Consultation	0	0	N/A	0	None
4.4.5 - Asset Management System Documentation	2	0	Closed		None
4.4.6 - Information Management	0	7	Open	4	Three minor NCRs (nos. 1, 5 and 7) agreed closed –see note to table. Rectification of all other minor NCRs in accordance with the specific requirements set out in the SBP assessment report.
4.4.7 - Risk Management	0	0	N/A	0	None
4.4.8 - Legal & Other Requirements	0	0	N/A	0	None
4.4.9 - Management of Change	0	0	N/A	0	None
4.5.1 - Life Cycle Activities	2	0	Closed	0	None

PAS 55 Clause	Minor NCRs identified at IIP (Conditional Certification	Minor NCRs identified at SBP (Full Certification	Status at End of CP4	Total Minor Non conformances at End of CP4	Action Required
4.5.2 - Tools, Facilities and Equipment	0	0	N/A	0	None
4.6.1 - Performance and Condition Monitoring	1	0	Closed	0	None
4.6.2 - Investigation of Asset Related Failures, Incidents and Nonconformities	1	0	Open	1	Alignment of the RRDH to the outcomes of the FCL initiative and a revision to the scope and function of the RRDH to ensure all relevant aspects of Network Rail can access and contribute to its development.
4.6.3 - Evaluation of Compliance	0	0	N/A	0	None
4.6.4 – Audit	1	0	Open	1	Definition for how all the elements of the Asset Management System are covered by an integrated audit programme.
4.6.5 - Improvement Actions	1	0	Open	1	Re-clarification of the purpose of Engineering Verification and how it contributes to the overall GRA and alignment of NR/L2/RSE/070 to this.
4.6.6 – Records	1	0	Closed	0	None
4.7 - Management Review	1	0	New	1	Completion of current Asset Management System review cycle and generation of a defined approach for the systematic review of the Asset Management System in the future.

Table 17 Update on PAS 55 Minor Non-conformance Status

Note to Table 17

The following Minor Non-conformances to clause 4.4.6 are considered to be closed:

Minor Non-conformance (Clause 4.4.6 Para 1) – Network Rail has not yet fully implemented its defined asset information specification process (see Section 7.3.2 of this assessment report), which should include a measure of asset information criticality. This would allow an evaluation of the appropriate level of data governance and quality specified in the ADCGAM.

> ***Evidence*** *- MDM has delivered the tools to undertake the specification process and the process has been used to capture Asset Policy data requirements. This is now business as usual within the Asset Information Data Management team.*

Minor Non-conformance (Clause 4.4.6 Para 3b) – the quality of data for S&C measured in the 'consistency' study does not meet the minimum requirements for PAS 55 compliance as described in this report and evaluated through an ADCGAM compliant assessment methodology.

> ***Evidence*** *- The data reviewed by Arup was that held in GEOGIS, however the data collected during and after the audit is held in Ellipse. In addition a full programme of S&C verification has been completed and uploaded into Ellipse.*

Minor Non-conformance (Clause 4.4.6 Para 3c) – Network Rail has not yet sufficiently defined the appropriate roles, responsibilities and authorities regarding the origination, generation, capture, maintenance, assurance, transmission, rights of access, retention, archiving and disposal of items of information for day-to-day operation in the Routes.

> ***Evidence*** *- Recommendation ORBIS17 – 'Roles and accountabilities for Asset Information should be clearly identified in the suite of Asset Information documents provided for SBP in January 2013, with particular emphasis on Data Management and Assurance processes in the devolved structure' – was verified by AMCL as closed.*

10.4
Overview of ISO 55001 Compliance

The following table provides a high-level summary of the level of compliance Network Rail has against the clauses of ISO 55001 and identifies the most significant risks to the organisation's compliance to these. It is not a full gap analysis but this indicates where there is likely to be further work for Network Rail to undertake in order to comply with the 'shall' statements in each ISO 55001 clause.

ISO 55001 Clause	Overview of Network Rail's Compliance
4.1 - Understanding the organization and its context	Likely to be compliant, however a thorough review against the requirements of ISO 55001 (and as expanded in ISO 55002) is recommended as these requirements do not appear in PAS 55.
4.2 - Understanding the needs and expectations of stakeholders	Likely to be compliant, however a thorough review against the requirements of ISO 55001 (and as expanded in ISO 55002) is recommended as these requirements do not appear in PAS 55.
4.3 - Determining the scope of the asset management system	At risk – Network Rail's Asset Management System is defined in the Asset Management System document published at SBP, but this is currently with respect to PAS 55 requirements. This should be reviewed against ISO 55001 requirements. These requirements, which are explained in more detail in ISO 55002, are more specific with respect to how the Asset Management System scope is defined than PAS 55.

ISO 55001 Clause	Overview of Network Rail's Compliance
4.4 - Asset management system	At risk – Network Rail's Asset Management System is defined in the Asset Management System document published at SBP, but this is currently with respect to PAS 55 requirements. This should be reviewed against ISO 55001 requirements. Specifically, terminology such as 'Asset Management Strategy' (now referred to as a SAMP), and how the Asset Management System is integrated and reviewed within the broader organisation, will require review.
5.1 - Leadership and commitment	At risk – with specific respect to the management review and continual improvement of the Asset Management System which, as detailed in this report, should be Network Rail's 'management systems' focus for CP5, plus ensuring the full integration of Network Rail's changing risk management approach.
5.2 - Policy	Likely to be compliant
5.3 - Organizational roles, responsibilities and authorities	Likely to be compliant
6.1 - Actions to address risks and opportunities for the asset management system	At risk – Network Rail's ERM is not yet fully embedded and existing risk management approaches are in the process of being superseded. ISO 55001 refers to ISO 31000 as the de-facto risk management standard and arguably Network Rail's current situation would not fully meet this requirement. Effective integration of the risk management and Asset Management systems also needs to be demonstrated.
6.2 - Asset management objectives and planning to achieve them	At risk – this clause is heavily related to the Whole-Life Cost Justification Group and the deficiencies with Opex Evaluation (particularly around the provision of clear Maintenance Strategy) may affect compliance with this clause, with respect to 'determine and document: the method and criteria for decision making … to achieve its asset management plan(s) and asset management objectives.'
7.1 - Resources	Likely to be compliant
7.2 - Competence	At risk – Network Rail has just closed a minor NCR for the equivalent clause for PAS 55 and is still developing its higher-level Asset Management competence management approach.

ISO 55001 Clause	Overview of Network Rail's Compliance
7.3 - Awareness	At risk – wider recognition and understanding of the core Asset Management System documentation and approaches could be achieved within the Routes in particular.
7.4 - Communication	Likely to be compliant
7.5 - Information requirements	At risk – Network Rail currently carries four PAS 55 minor NCRs against the equivalent PAS 55 clause. ISO 55001 also contains much stricter requirements with respect to data management, governance and quality and specific requirements about the alignment of financial and non-financial asset information.
7.6 - Documented Information	At risk – Network Rail is currently completing the BCR initiative and still has the standards moratorium officially in place. ISO 55001 contains much stricter requirements on the specification, control and update of documented information related to the Asset management System.
8.1 - Operational planning and control	Likely to be compliant
8.2 - Management of change	Likely to be compliant
8.3 - Outsourcing	Likely to be compliant
9.1 - Monitoring, measurement, analysis and evaluation	At risk – The PAS 55 minor NCR related to Engineering Verification (clause 4.6.5) would put this ISO clause at risk.
9.2 - Internal audit	At risk – The PAS 55 minor NCR related to audit (clause 4.6.4) would put this ISO clause at risk.
9.3 - Management review	At risk – The PAS 55 minor NCR related to management review (clause 4.7) would put this ISO clause at risk.
10.1 - Nonconformity and corrective action	Likely to be compliant
10.2 - Preventive action	At risk – The PAS 55 minor NCR related to expanding the scope of the RRDH (clause 4.6.2) would put this ISO clause at risk.
10.3 - Continual improvement	Likely to be compliant

Table 18 Overview of Network Rail's Compliance to ISO 55001

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11 Verification of Tracker Recommendations 'Closed Subject to Verification'

The following Tracker Recommendation was 'Closed Subject to Verification' at the time of the End of CP4 AMEM assessment.

Rec. Number	Recommendation	Finding
AM 22	Network Rail should formalise its strategy for improving the SICA tool and supporting processes in its role as a Tier 3 tool to support Route Engineers, by October 2011. This strategy should include a plan with clear timescales, milestones and deliverables for each of the following: a. Short-term improvements to the Signalling Schemes Asset Data Store (SSADS) data capture and peer review processes to cover key supporting information and trend data, including the root causes of significant movements in element scores. Network Rail should formalise the capture of learning from its peer review processes to demonstrate consistency across assessments and that significant deviations can be identified and explained. The strategy should include a review of the additional supporting information collected by the Routes (such as Asset Condition Reports), to determine which information needs to be routinely captured in SSADS for business planning purposes; b. Longer-term improvements to the tool itself, including a full review of the regression analysis (including uncertainty), notional lives, sample selection and inputs; c. Evaluation of the benefits of a simplified Primary SICA tool and a decision on its future application; d. Revision of assessment frequencies to reflect overall asset criticality and notional lives; and e. Improved understanding of an interlocking's condition at its mid-life point (e.g. through a Secondary SICA) to assess its degradation to date and the impacts of any interventions already carried out.	Stays open. Tier 1, 2 and 3 model revision investment paper is currently progressing through Investment Panel but the work has not been completed.

Table 19 Tracker Recommendation 'Closed Subject to Verification'

Appendix A

39 Subjects View

The AMEM is also aligned with the Asset Management Landscape, published by the Global Forum for Maintenance and Asset Management (GFMAM). The Asset Management Landscape provides an international Asset Management framework against which organisations can be assessed. This will significantly increase the availability of comparator data against the framework over time.

Although this assessment was designed around the 23 Activities that have been used in Network Rail assessments since 2006, the AMEM is capable of presenting scores by the 39 Subjects and these are shown in Diagram 14 opposite. It should be noted that this is a second edition view of the Asset Management Landscape's 39 Subjects which was published in March 2014, and is not directly comparable to the first edition view shown in the SBP assessment report. The second edition of the Asset Management Landscape is the preferred structure for CP5. Due to the timing of the issue of the second edition in March 2014, the End of CP4 Assessment had already been scoped and designed against the first edition, and there may be some areas where this will affect the accuracy of the scores. In addition, AMCL is currently reviewing in detail the alignment of the AMEM to the second edition to ensure coverage is complete. Both of these issues mean that the scores presented below are subject to change.

The first and second editions of the Asset Management Landscape can be downloaded for free from:

First Edition:
http://gfmam.org/files/ISBN9780987179913_LANDSCAPE.pdf

Second Edition:
http://www.gfmam.org/files/ISBN978_0_9871799_2_0_GFMAMLandscape_SecondEdition_English.pdf

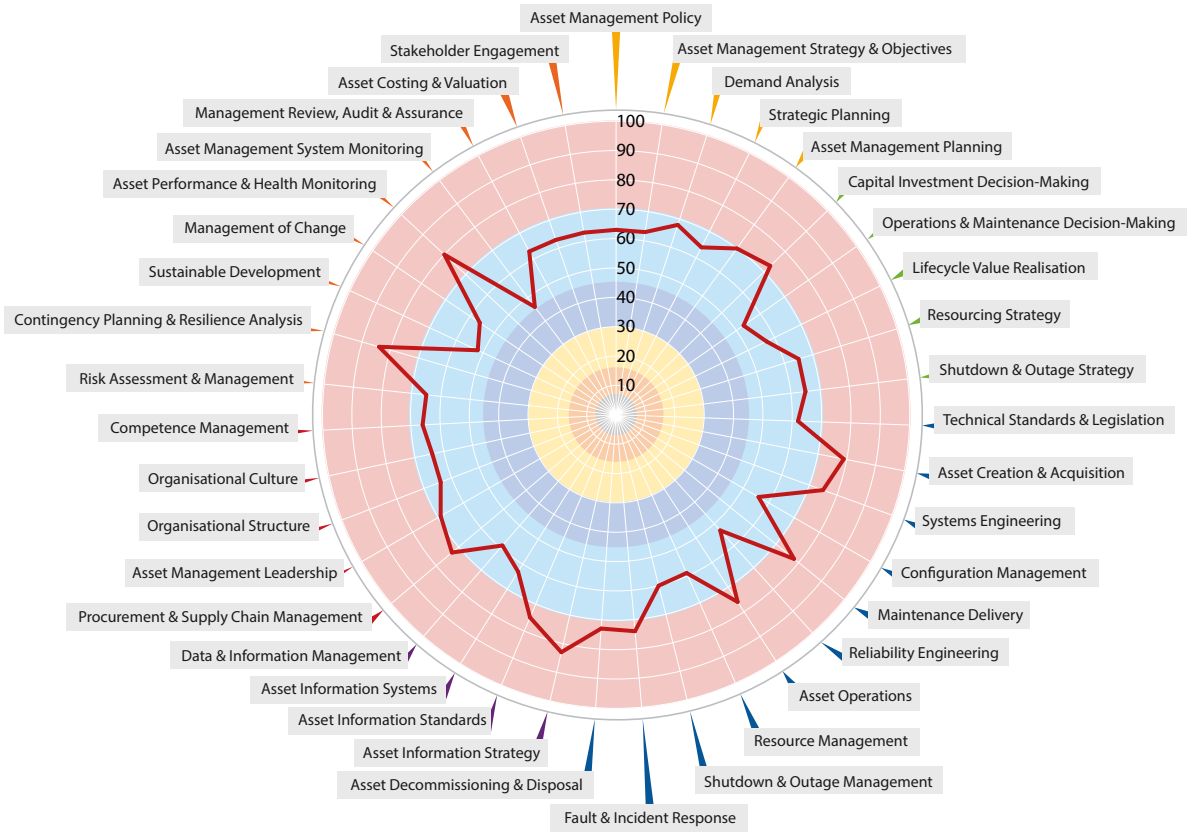

Diagram 14 *Network Rail SBP AMEM Assessment Scores by 39 Subjects*

Appendix C

Evidence

Due to the extent and availability of the evidence supplied by Network Rail for the assessment this appendix contains only those items that are specifically referred to within the main body of the assessment report.

C.1 Strategy & Planning References

Ref	Document Title
NRCP4-SP1	Asset Management Policy – March 2014
NRCP4-SP2	Draft Asset Management Strategy – first revision for May 2014
NRCP4-SP3	Asset Management Strategy paper to Executive Committee – April 2014
NRCP4-SP4	London & South East Market Study – October 2013
NRCP4-SP5	Long Distance Market Study – October 2013
NRCP4-SP6	Regional Urban Market Study – October 2013
NRCP4-SP7	Freight Market Study – October 2013
NRCP4-SP8	Route Study Programme – December 2013
NRCP4-SP9	Cross Boundary Analysis Working Group 8 Meeting Minutes – March 2014
NRCP4-SP10	Network Specifications – April 2014
NRCP4-SP11	Route Specifications – April 2014
NRCP4-SP12	Clienting Guidelines – December 2013
NRCP4-SP13	Sponsors' Handbook – December 2013
NRCP4-SP14	CP5 Delivery Plan – March 2014
NRCP4-SP15	Scotland KPI Package (part of CP5 Delivery Plan) – March 2014
NRCP4-SP16	CP5 Enhancements Delivery Plan – March 2014
NRCP4-SP17	Group Strategy – Remit for Asset Management Services – October 2013 (Draft)
NRCP4-SP18	Embedding Longer Term Planning – March 2014
NRCP4-SP19	Example Western EP Change Control Form v5 – May 2012

Ref	Document Title
NRCP4-SP20	Cross Asset Scenario Analysis – Report v5 – April 2014
NRCP4-SP21	Kent Signalling example CP5 Deliverability Reviews
NRCP4-SP22	Asset Policies Development Remit Part A Form

C.2 Whole-life Cost Justification References

Ref	Document Title
NRCP4-WLC1	RBM Programme Board Pack – Period 13 2013/14
NRCP4-WLC2	Smart Maintenance Prioritisation for E&P
NRCP4-WLC3	SBPT3004 – 'Optimising Maintenance Regimes'
NRCP4-WLC4	10662 Issue 7
NRCP4-WLC5	RBM Training Status – Period 11 13/14
NRCP4-WLC6	OLE Stage 2 – Maintenance Regime – Scotland-1 (Issue 1.0)
NRCP4-WLC7	Authority Request – WLC Models – v2.6, 11th April 2014
NRCP4-WLC8	Investment Panel – Minutes of Meeting held on 11th April 2014
NRCP4-WLC9	Monitoring asset performance in CP5: Method for aggregating the reliability and sustainability measures – 2nd April 2014 – Issue 1
NRCP4-WLC10	Example Western EP Change Control Form v5 – May 2012
NRCP4-WLC11	Cross Asset Scenario Analysis – Report v5 – April 2014
NRCP4-WLC12	RMM Review for Asset Management Services – IP Presentation
NRCP4-WLC13	MUC Manual – Version 1 – April 2014
NRCP4-WLC14	Maintenance FRM702 – Version 14 – April 2014
NRCP4-WLC15	Cost & Volume Handbook – Version 2 – April 2014
NRCP4-WLC16	Maintenance Unit Cost and Volume report P11 2014
NRCP4-WLC17	Wales Route Cost & Volume Template P13 2014

C.3 Lifecycle Delivery References

Ref	Document Title
NRCP4-LCD1	Strategic Direction – Portfolio, Programme & Project Management/P3M3 Maturity Model – ExCom Approval
NRCP4-LCD2	GRIP for Programmes – Release 1 (DRAFT) – February 2014
NRCP4-LCD3	Business Change Governance Decision Tree – Explanatory Presentation
NRCP4-LCD4	Clienting Guidelines – December 2013
NRCP4-LCD5	Sponsors' Handbook – December 2013
NRCP4-LCD6	RSSB System Workshop – May 2013
NRCP4-LCD7	RINM Baseline Roadmap Version 1
NRCP4-LCD8	Asset Management Strategy paper to Executive Committee – April 2014
NRCP4-LCD9	Western & Wales – timeline of major projects and key outputs
NRCP4-LCD10	Western & Wales Interoperability Authorisation Plan – August 2013
NRCP4-LCD11	Western & Wales System Safety Strategy – v2.0 – February 2014
NRCP4-LCD12	Western & Wales Systems Engineering PRAMS Strategy – v3.1 – April 2014
NRCP4-LCD13	GW02 RAM Targets v2.1
NRCP4-LCD14	MWM Release Content Presentation
NRCP4-LCD15	Project Initiation Document – Version 2.0 – April 2014
NRCP4-LCD16	BCR Framework Group Summary Presentation – 15th April 04 2014
NRCP4-LCD17	BCR Governance Paper V1.3 (including related TORs)
NRCP4-LCD18	BCR Framework Group Meeting Minutes v0.1 – 25th March 2014
NRCP4-LCD19	Signalling MoC SIG1, Issue 1, March 2014
NRCP4-LCD20	Track MoC 5142, Issue 3, January 2014
NRCP4-LCD21	CP5 Delivery Plan – March 2014
NRCP4-LCD22	Scotland KPI Package (part of CP5 Delivery Plan) – March 2014
NRCP4-LCD23	CP5 Enhancements Delivery Plan – March 2014
NRCP4-LCD24	IAP – Tonbridge to Hastings Trial Outputs Presentation – May 2014
NRCP4-LCD25	IAP – Central Initiatives Programme Review – May 2014
NRCP4-LCD26	LNW Route 'Bubble' Map for North Route – January 2014
NRCP4-LCD27	Fault Information Improvements Programme Board Agenda June 2013 – FCL Report
NRCP4-LCD28	Overview of the Relay Robustness Workshop Approach Presentation – March 2014
NRCP4-LCD29	Gauge R&R Study – 5X5 Risk Matrix Presentation – May 2013
NRCP4-LCD30	Multicore Cable Kepner Tragoe Analysis – August 2013

Ref	Document Title
NRCP4-LCD31	Repeat Twists Kepner Tragoe Analysis – v1.0
NRCP4-LCD32	Traffic Management Programme Update – December 2013
NRCP4-LCD33	Network Optimisation – LNW Route Report
NRCP4-LCD34	Network Optimisation – Business case tool: step by step guidance

C.4 Asset Knowledge References

Ref	Document Title
NRCP4-AKN1	Signals Asset Information Specification v1.0
NRCP4-AKN2	Telecoms Asset Information Specification v0.5.1
NRCP4-AKN3	CP5 Core Track Attributes v1.1
NRCP4-AKN4	Interface Control Document – Ellipse to Asset Data Store – v11
NRCP4-AKN5	Interface Control Document – Asset Data Store to Optram – v2
NRCP4-AKN6	Kent & Sussex Route BRIG – 27th March 2014
NRCP4-AKN7	Asset Information's ORBIS Roadmap – 14th April 2014
NRCP4-AKN8	MWM Programme Release Plan – 28th April 2014
NRCP4-AKN9	MWM Programme Release Content Presentation – 28th April 2014
NRCP4-AKN10	LADS Communication Plan – National Deployment – v0.19
NRCP4-AKN11	FCL User Experience Specification – v0.19
NRCP4-AKN12	FCL Visual Design Specification – v0.9
NRCP4-AKN13	Asset Data Framework – Draft
NRCP4-AKN14	Data Quality Policy Statement – Draft
NRCP4-AKN15	Data Quality Management Dashboard – Draft
NRCP4-AKN16	Asset Information Rail Sector Landscape – Draft
NRCP4-AKN17	ISO 8000 Service Overlay – Draft

C.5 Organisation & People References

Ref	Document Title
NRCP4-OP1	Network Rail Clienting Guidelines: A better railway for a better Britain - 1st July 2013
NRCP4-OP2	Contracts & Procurement Period 13 2013/14. Management Operating Review: Benefits edition. Published by the Performance Improvement Team - 17th April 2014
NRCP4-OP3	Behaviour table presentation slides – created 1st March 2013
NRCP4-OP4	Asset Management & AMS Culture presentation slides – created 15th October 2013
NRCP4-OP5	V2.0 AM Competency Framework 3 December 2013. Submitted for AMIP Board Approval
NRCP4-OP6	AM Awareness course specification – created 28th February 2014

C.6 Risk & Review References

Ref	Document Title
NRCP4-RR1	Risk Management Approach at Network Rail
NRCP4-RR2	Enterprise Risk Guidance: Risk Assessment & Escalation
NRCP4-RR3	Enterprise Risk Guidance: The Bow Tie Approach (Corporate Level)
NRCP4-RR4	Enterprise Risk Guidance: Deep Dive Sessions at ExCom and ARC
NRCP4-RR5	Enterprise Risk Guidance: Reporting & Monitoring
NRCP4-RR6	Kent Route Track Risk Register Period 13
NRCP4-RR7	Combined Signalling Kent / Sussex Risk Register – March 2014
NRCP4-RR8	Crisis Management Bowties by Asset Type V2
NRCP4-RR9	Broken Rail Bowtie – Issue 3 – January 2014
NRCP4-RR10	Sustainable Development - Integrated Plan – V3 – April 2014
NRCP4-RR11	Network Rail EMS Manual – v0.1 – 21-Mar-14
NRCP4-RR12	SCMT Crisis Management Process Slide
NRCP4-RR13	SCMT Crisis Management High-level plan
NRCP4-RR14	Asset Policy RACI
NRCP4-RR15	Olympus 3 month PIR – Findings, Recommendations and Lessons Learnt – November 2013
NRCP4-RR16	GRA Presentation
NRCP4-RR17	SSDE Meeting Pack February 2013
NRCP4-RR18	NR/L2/RSE/070 – Engineering Verification – Issue 2 – December 2011
NRCP4-RR19	Monitoring asset performance in CP5: Method for aggregating the reliability and sustainability measures – 2nd April 2014 – Issue 1

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