2013 SBP AMEM Assessment
Version 1.0

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

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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 time of publication of its Strategic Business Plan (SBP) on the 7th January 2013. It evaluates Network Rail's progress against the AMCL Asset Management Improvement Roadmap ("AMCL Roadmap") which is being delivered by Network Rail through its Asset Management Improvement Programme (AMIP), and against the targets agreed between the ORR and Network Rail. It also compares Network Rail's current Asset Management capability maturity with previous assessments undertaken in 2006, 2009 and 2011 (the latter one at the time of the publication of the IIP), to put Network Rail's progress into perspective. 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.

Overall, the conclusion is that Network Rail has made significant progress in a number of key areas, with other areas just about keeping pace with expectations. There is now an opportunity to focus on those other areas before the end of CP4 ensuring also that the risks identified by Network Rail related to the deliverability of the CP5 plans are fully understood and mitigated. It is essential that Network Rail is able to build on the momentum achieved to ensure that its Asset Management approach is embedded as "business as usual" with continual improvement throughout CP5. Network Rail's scores against the last assessment in 2011 and the SBP targets are shown in the diagram below.
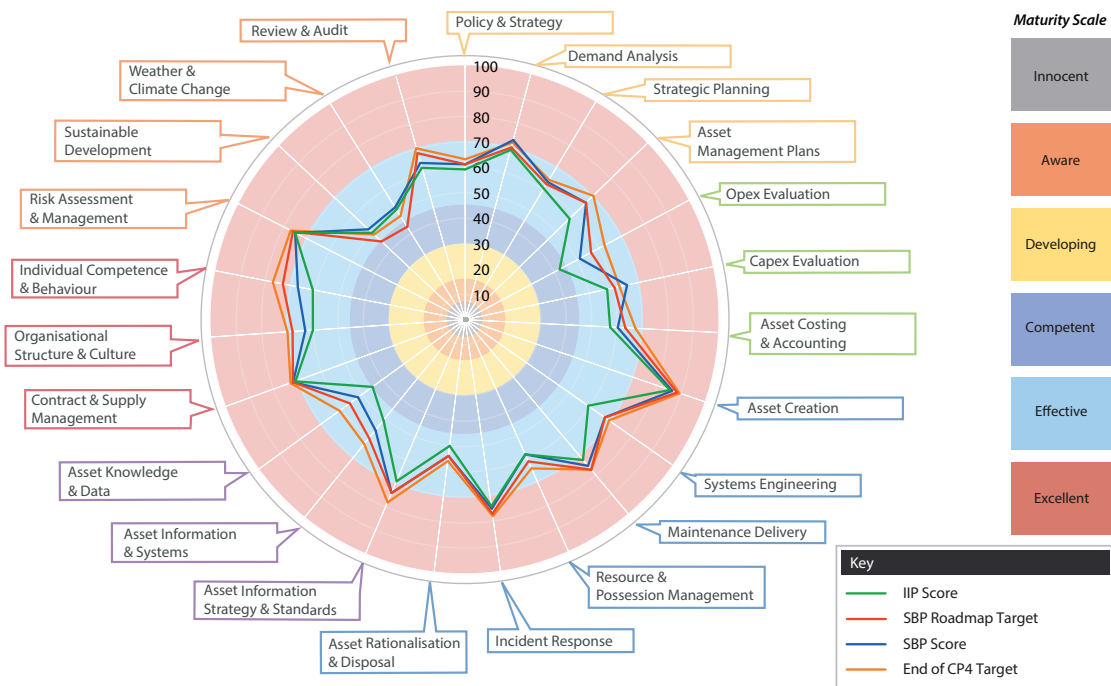
The most significant progress has been made within the Strategy & Planning Group, and in the generation of justified capital expenditure work banks, which have been created through an enhanced capability within the Capex Evaluation AMEM Activity. This has resulted in a very clear 'line of sight' from Network Rail's strategic objectives and its Summary Route Plans. However, the evaluation of operational expenditure (assessed through the Opex Evaluation AMEM Activity) is still broadly top-down and the efficiencies identified within the SBP for this are not yet as clearly justified as with capital expenditure. There are a number of initiatives progressing which will improve this situation, but these will not necessarily deliver prior to the start of CP5.

The outcome of the last assessment undertaken in 2011 was that Network Rail had achieved its targets for nine of the twenty three AMEM Activities, and one of the six ORR/Network Rail Board agreed improvement targets which are expressed at AMEM Group level. The outcome of this assessment is that Network Rail has significantly developed its capabilities and has now achieved eleven of the twenty three SBP Targets and has achieved the SBP Group Target for two of the six groups, as shown in the table below.

	Network Rail as assessed 2009	Network Rail as assessed at IIP Update	AMCL Roadmap Target for SBP	Network Rail as assessed at SBP
Strategy & Planning	*56.3%*	*61.2%*	*64.7%*	*65.8%*
Whole-Life Cost Justification	*47.3%*	*51.9%*	*59.7%*	*58.7%*
Lifecycle Delivery	*64.8%*	*66.3%*	*70.5%*	*69.2%*
Asset Knowledge	*51.7%*	*55.0%*	*63.5%*	*60.7%*
Organisation People	*63.0%*	*64.0%*	*71.1%*	*67.3%*
Risk & Review	*49.5%*	*59.4%*	*58.1%*	*60.8%*

A summary of each group is provided below.

Strategy & Planning

Network Rail has made significant advances in the Strategy & Planning Group and the generation of Asset Management plans underpinned by whole-life capital expenditure evaluation. The Activities in this Group have been the subject of a focused effort by Network Rail to improve its Asset Management capabilities, much of which was evident at the 2011 (IIP) assessment, but was not yet complete. All Activities in this Group have either exceeded or met their targets. Central to this achievement is the clarity Network Rail has brought to its Asset Management framework, a six-step approach to strategic planning, implementation and review, which is defined in a new document that describes the organisation's Asset Management System. The Asset Management framework set out in this document appears to have been successfully applied to generate the Route work banks from which the Summary Route Plans and the Strategic Business Plans have been created.

There are a number of opportunities to improve the framework further, including clarifying how the analysis of demand is integrated with the physical planning of Asset Management interventions. The actual planning documentation (the Strategic Business Plans and Summary Route Plans) are supported by a range of other documentation, including a CP5 Deliverability Review. That review has initially concluded that the SBP is deliverable, but has also identified a number of risks that require mitigation. It is essential that Network Rail puts these mitigations into place before the end of CP4, and supports all efficiency initiatives and savings with well-developed change management plans, as well as running further iterations of the Deliverability Review.

Whole-life Cost Justification

Network Rail has also made significant advances in the Whole-life Cost Justification Group with respect to capital expenditure evaluation, but Operational Expenditure Evaluation and Asset Costing & Accounting have not developed as far. The work Network Rail has completed with the application of its Asset Management Framework and the Tier 1/2/3 modelling has produced a set of robust strategic and Route level plans. Network Rail's ten-stage approach for the development of Asset Policies to define the management of the various asset disciplines continues to be fit-for-purpose and the Asset Policies have been demonstrably improved since the last assessment, with a number of new ones being introduced. These continued enhancements to the Asset Policies, combined with continued and significant development of the associated strategic planning and whole-life cost modelling capabilities has resulted in the considerable increase in capability maturity for Capex Evaluation.

However, Network Rail's Risk-Based Maintenance (RBM) initiative still presents some concern with respect to its scope, implementation and integration. This is due to both the relatively early status of the development programme and the lack of quantifiably justified cost-risk optimisation for maintenance interventions. Network Rail has recently accelerated its maintenance optimisation programme and has developed a number of revised maintenance regimes and implemented a number of pilots utilising the RCM2 (Moubray) process. Clear plans are also in place for the continued application of RCM2 across the asset base on a prioritised basis. However, the development of quantified cost-risk optimisation of maintenance regimes is not currently planned until CP6.

With respect to Asset Costing and Accounting, while further progress has been made, this is still behind the SBP Roadmap target. Day-to-day unit cost monitoring and tracking continues to improve in terms of coverage and quality of both Renewals and Maintenance data. The Renewal Unit Costs used for planning have also improved since the previous assessment, including the integration of Unit Costs and efficiencies in Framework Contracts with key suppliers for some asset disciplines, however the approach and associated maturity varies considerably across the asset base.

Lifecycle Delivery

Within the Lifecycle Delivery Group activities continue to be undertaken broadly as previously assessed, but there appears to be less focus in these areas on achieving specific Roadmap capabilities. Consequently only two of the six Activities in this Group have achieved their targets, with the other four close. Many observations within this Group focus on its key task of supporting and implementing key Asset Management approaches (such as RBM, Intelligent Infrastructure (II) and the Failure Information Improvement Programme (FIIP)), and also integrating better with the Strategy & Planning and Whole-life Cost Justification Groups through more strategic capabilities within Systems Engineering. We consider Network Rail's modelling capabilities should be expanded to introduce a national strategic whole-system rail model as proposed in its Systems Engineering AMIP.

Asset Knowledge

Within the Asset Knowledge Group the Asset Information Strategy & Standards Activity was the only Activity to meet its target. The late initiation of the ORBIS programme has impacted the development of asset information systems when compared to the SBP Roadmap target. Whilst initial individual system improvement projects within ORBIS are making good progress, integration of these projects into an overall systems architecture and plan has only been evidenced at a high level to date.

Whilst progress has been evidenced on the development of an Asset Information Specification and Asset Knowledge Standards for track as a result of the core Master Data Management element of ORBIS, this was not yet the case across the wider asset base. Consequently the demonstration, via data quality assessment, that the asset data and knowledge held by Network Rail is fully appropriate for the requirements of its Asset Management System has not been possible to date.

However, given the progress that has been made since the IIP assessment, if Network Rail continues to develop its capabilities in this area at the same rate, the end of CP4 target could still be achieved.

Organisation & People

Within the Organisation & People Group, Contract and Supply Management has met its target, however the Organisational Structure & Culture and Individual Competence & Behaviour Activities have not. The 2011 cultural aims have been revisited and the aims and strategy have been redesigned, and the central team has now developed methods for describing and measuring culture. The structural implications of devolution are being managed and trial projects are in place to assess some tensions that remain.

The approach to the management of individual competence has made considerable progress and is being trialled with the holders of key asset management posts.

Risk & Review

The Risk & Review Group has already met its end of CP4 target for the Group. However both the Risk Assessment & Management and Review & Audit activities are behind target. In the Risk Assessment & Management and Review & Audit activities, initiatives identified in the IIP assessment have now been implemented and embedded, although in some cases the effectiveness of these processes is under review. In parallel, the overall Governance, Risk and Assurance (GRA) review that

is currently underway is aligning activities across the organisation, although progress in this area is behind the trajectory set in the Roadmap as outputs from the review are required to demonstrate that top-down and bottom-up GRA activities are fully aligned and integrated in the devolved organisation.

Creation of the Safety & Sustainable Development (S&SD) function and appointment of the S&SD Director has provided a real focus for Sustainable Development activities, and Network Rail is continuing to develop its understanding of short, medium and longer-term weather impacts on its assets. However the score in both these Activities reflects the fact that this work is still not fully embedded in the business.

The impact of devolution continues to be managed. In general, the balance between centralised activities designed to provide common frameworks and approaches, and the needs of Routes to deliver and innovate, appears to be working. The generation of the Routes' work banks through a combination of top-down modelling and bottom-up challenge and reconciliation has produced a healthy tension which has resulted in plans which appear to be consistent with the Asset Policies and within which variances have been identified and understood. A review of the risks and opportunities of devolution can be seen in Section 11.

AMCL awarded Network Rail conditional PAS 55 certification in 2011 which was to be confirmed as a full certification at SBP subject to clearing two major non-conformances concerned with providing clear 'line of sight' and the quality of the organisation's asset information. Both major non-conformances have now been closed, and AMCL is pleased to confirm that Network Rail now has full certification to PAS 55. The major non-conformance related to 'line of sight' has not been replaced by any further minor non-conformances. However, asset data has been reassessed to evaluate whether Network Rail is compliant with clause 4.4.6 of PAS 55 at the time of the SBP submission. The ORR appointed Arup (Part A Independent Reporter) to complete an audit of Network Rail's asset data quality. This report utilised Network Rail's Asset Data Confidence Grading Assessment Methodology (ADCGAM), with agreed variations, to complete the assessment. This report, along with the other evidence reviewed by AMCL as part of this assessment, has resulted in seven minor non-conformances replacing the major non-conformance against this clause of PAS 55. PAS 55 findings can be seen in Section 10.

In the diagram below Network Rail's overall trajectory and progress against targets is plotted for the AMEM assessments undertaken since 2008. This shows that Network Rail's performance has continued to improve broadly in line with expectations.
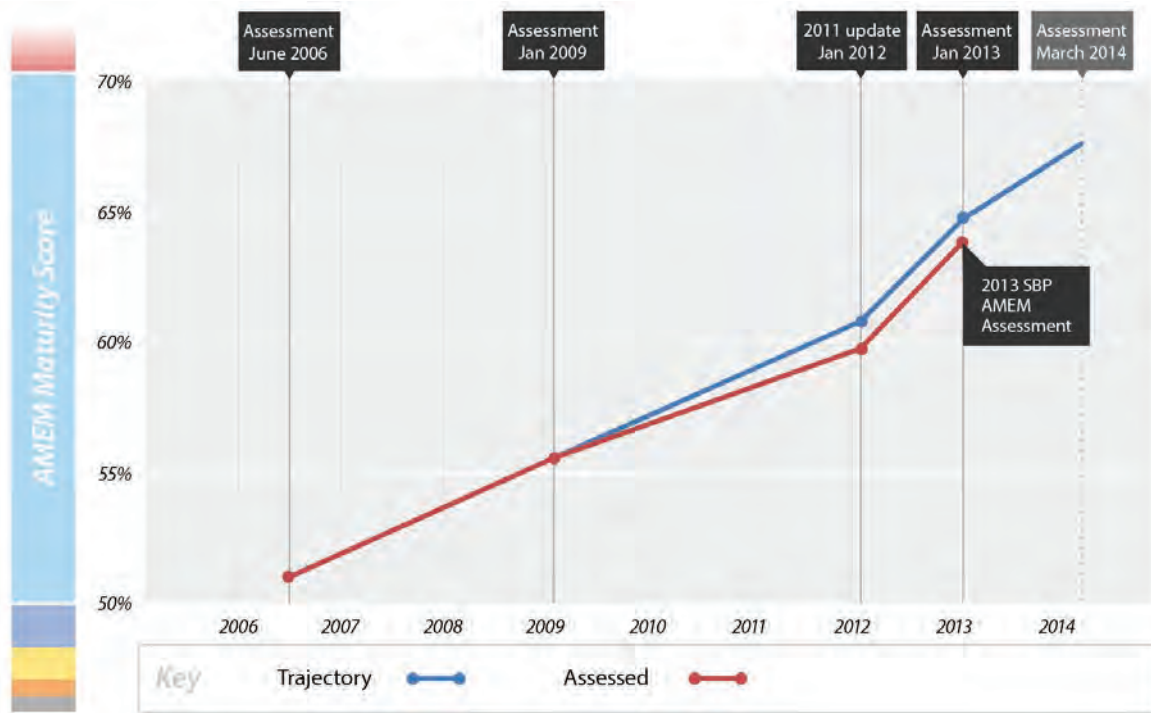
A number of detailed recommendations have been made in section 12 of this report. To ensure alignment with the current Roadmap, minimise duplication and support future revisions of the Roadmap, the recommendations have been assigned to one of three categories, either a CP4 Roadmap Reiteration or Clarification, or a CP5 Roadmap Recommendation. None of the identified recommendations materially affect the trajectories or targets defined in the current Roadmap but are intended to provide greater clarity and detail where appropriate and opportunities for further development. To consolidate these recommendations it is proposed that the AMCL Roadmap be updated to reflect the activities that Network Rail will need to deliver to achieve the capability maturity targets for the end of CP4. Network Rail should also update its AMIP plan to demonstrate alignment with the Roadmap and the end of CP4 targets.

We would like to take this opportunity to thank Network Rail and ORR personnel for their time and effort in participating in this assessment.

Glossary

Acronym	Description
ADIP	Asset Data Improvement Programme
ADS	Asset Data Store
AIS	Asset Information Strategy
AMEM	Asset Management Excellence Model
AMIP	Asset Management Improvement Programme
AMP	Asset Management Plan
ARS	Average Risk Score
ASI	Asset Stewardship Indicator
BAU	Business As Usual
BCMI	Bridge Condition Marking Index
BRE	Buildings Research Establishment
BSI	British Standards Institute
BTP	British Transport Police
CAF	Cost Analysis Framework
Capex	Capital Expenditure
CECOST	Civil Engineering Cost And Strategy Evaluation
CEFA	Civils Examination Framework Agreement
CPPP	Confirmed Period Possession Plan
CP4	Control Period 4
CP5	Control Period 5
CP6	Control Period 6
DfT	Department for Transport
DRAM	Director Route Asset Management
DST	Decision Support Tools
DWWP	Delivering Work Within Possessions
EMS	Environmental Management System
EP	EP
ERTMS	European Rail Traffic Management System
ERM	Executive Review Meeting
ETCS	European Train Control System
FMEA	Failure Modes and Effects Analysis
FMS	Fault Management System
FIIP	Failure Information Improvement Project
FTN	Fixed Telecommunications Network
GRA	Governance, Risk and Assurance

Acronym	Description
GRIP	Governance for Railway Investment Projects
GSM-R	Global System for Mobile Communications - Railway
HAM	Head of Asset Management
HLOS	High Level Output Specification
INCOSE	International Council on Systems Engineering
IAP	Industry Access Planning
II	Intelligent Infrastructure
IIP	Initial Industry Plan
IP	Investment Projects
IRM	Integrated Risk Management
L&E	Lifts & Escalators
LADS	Linear Asset Decision Tool
LDR	Locally Derived Rates
MACRO	Maintenance And Cost Risk Optimisation
M&E	Mechanical & Electrical
MBR	Monthly Business Review
MDM	Master Data Management
MOP	Management of Portfolios
MSP	Managing Successful Portfolios
NCAP	National Core Audit Programme
NDS	National Delivery Service
NRT	Network Rail Telecoms
NOC	Networks Operations Centre
NOS	Network Operating Strategy
OGC	Office for Government and Commerce
OLE	Overhead Line Equipment
OPAS	Operational Property Asset System
Opex	Operational Expenditure
Ops.	Property Operational Property
ORBIS	Offering Rail Better Information Services
OREDA	Offshore REliability DAta
ORR	Office of Rail Regulation
OSS	Operational Support Systems
PARL	Percentage Asset Remaining Life
PAS	Publically Available Specification
PLBE	Principal Load Bearing Element
PLPR	Plain Line Pattern Recognition
QBR	Quarterly Business Review

Acronym	Description
RAB	Regulated Asset Base
RAM	Route Asset Manager
RAMS	Reliability Availability Maintainability Safety
RCM	Reliability Centred Maintenance OR Remote Condition Monitoring
RDG	Rail Delivery Group
RoSE	Reliability Centred Maintenance of Signalling Assets
RSSB	Railway Safety & Standards Board
S&SD	Safety & Sustainable Development
SBP	Strategic Business Plan
SCMI	Structures Condition Marking Index
SECAM	Systems Engineering Capability Assessment Model
SICA	Signalling Infrastructure Condition Assessment
SISS	Station Information and Security Systems
SMART	Specific Measurable Achievable Realistic Timebound
SOFA	Statement of Funds Available
SSADS	Signalling Schemes Asset Data System
TfL	Transport for London
TICA	Telecoms Infrastructure Condition Assessment
TNC	Temporary Non-Compliance
TOC	Train Operating Company
TRaCCA	Tomorrow's Railway and Climate Change Adaptation
WICC	Wessex Integrated Control Centre
WLC	Whole Life Cost
WLCC	Whole Life Cycle Cost

Contents

1 Introduction

1.1
Background

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

In 2006 we conducted a full review, assessing Network Rail's Asset Management capability maturity. 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 we conducted a Best Practice Review Update, which assessed 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 we produced the AMCL Roadmap, which defined the Asset Management capabilities that we 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 (the focus of this assessment); and

- April 2014 as the start of CP5.

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.
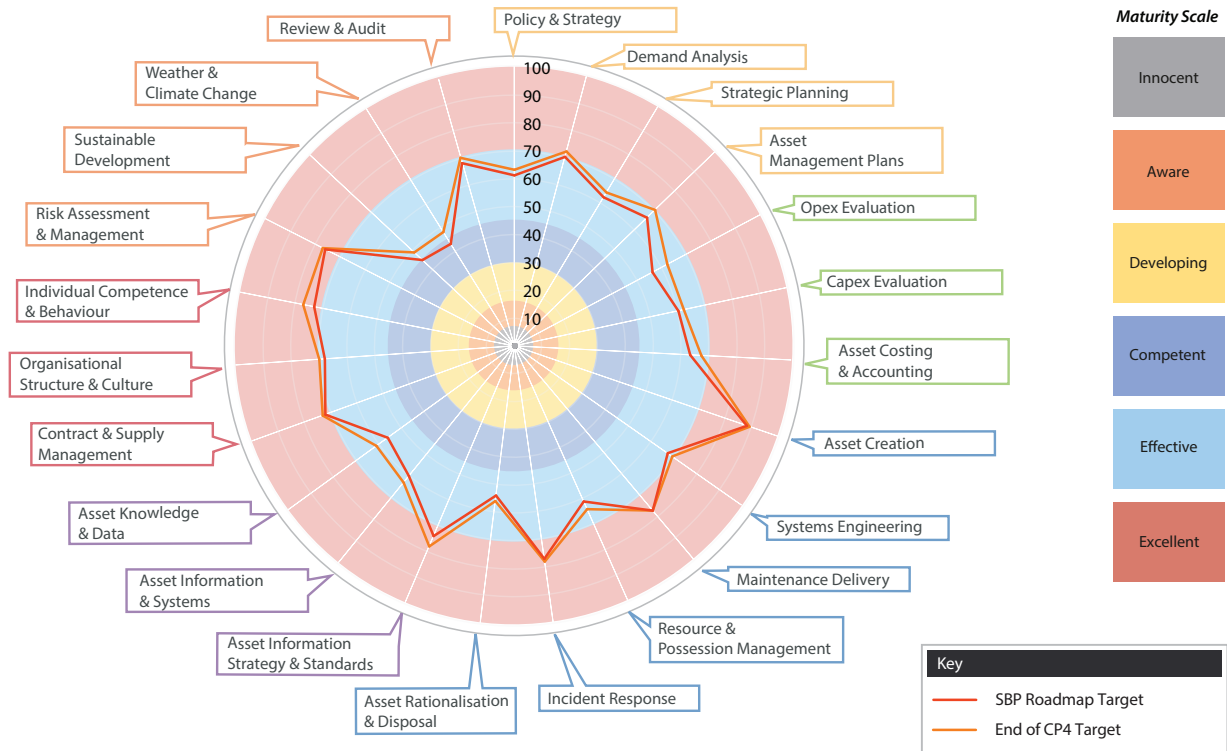
Diagram 1   Asset Management Capability Maturity Scores

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) is now being tracked by AMCL.

A full AMEM assessment was carried out between April and June in 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 achieved its targets for nine of the twenty three AMEM capabilities, and one of the six ORR/Network Rail Board agreed targets. 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.

Since the IIP Network Rail has devolved into ten Routes and this re-organisation is now broadly complete. The risks and opportunities associated with devolution were identified during the IIP assessment and are reviewed in section 11 of this report.

1.2
Objectives of this AMEM assessment

This report contains the findings, conclusions and recommendations of the fourth assessment of Network Rail's Asset Management capabilities using the AMCL Asset Management Excellence Model™ (AMEM). The scope and objectives of the review were defined in the Independent Reporter Mandate 'Update of Network Rail's Asset Management Capability at SBP' (Draft A, October 2012) and are summarised below:

1) Complete a full AMEM assessment according to the methodology and priorities identified in Section 2 of this report. This to include all six disciplines of track, signalling, structures (including earthworks), E&P, telecoms and operational property. Assessments of track, signalling, structures and E&P to be given higher priority to allow separate reporting of these categories if required.

2) Include an assessment of the Asset Management activities that are the responsibility of the centre and those activities that are now the responsibility of the routes, across a sample of routes.

3) Update the AMEM assessment findings and maturity scores for the six Groups and 23 Activities. Present findings on a national and route basis, where possible. Align the findings with the 39 subjects as defined in the IAM's 'Asset Management Anatomy', and present separately.

4) Review capability against the agreed SBP capability trajectory, providing commentary on discrepancies.

5) Report on close-out of any recommendations from the tracker that have been stated as complete, but not yet verified.

6) Assess Network Rail's status in closing out the two outstanding PAS 55 major non-conformances, and if Network Rail is not able to achieve full certification, provide reasons why and recommend a programme of work (including timescales) to achieve compliance.

1.3
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 2011 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. ORR CP4 objectives.

1.4
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 and 2011.

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, environment.
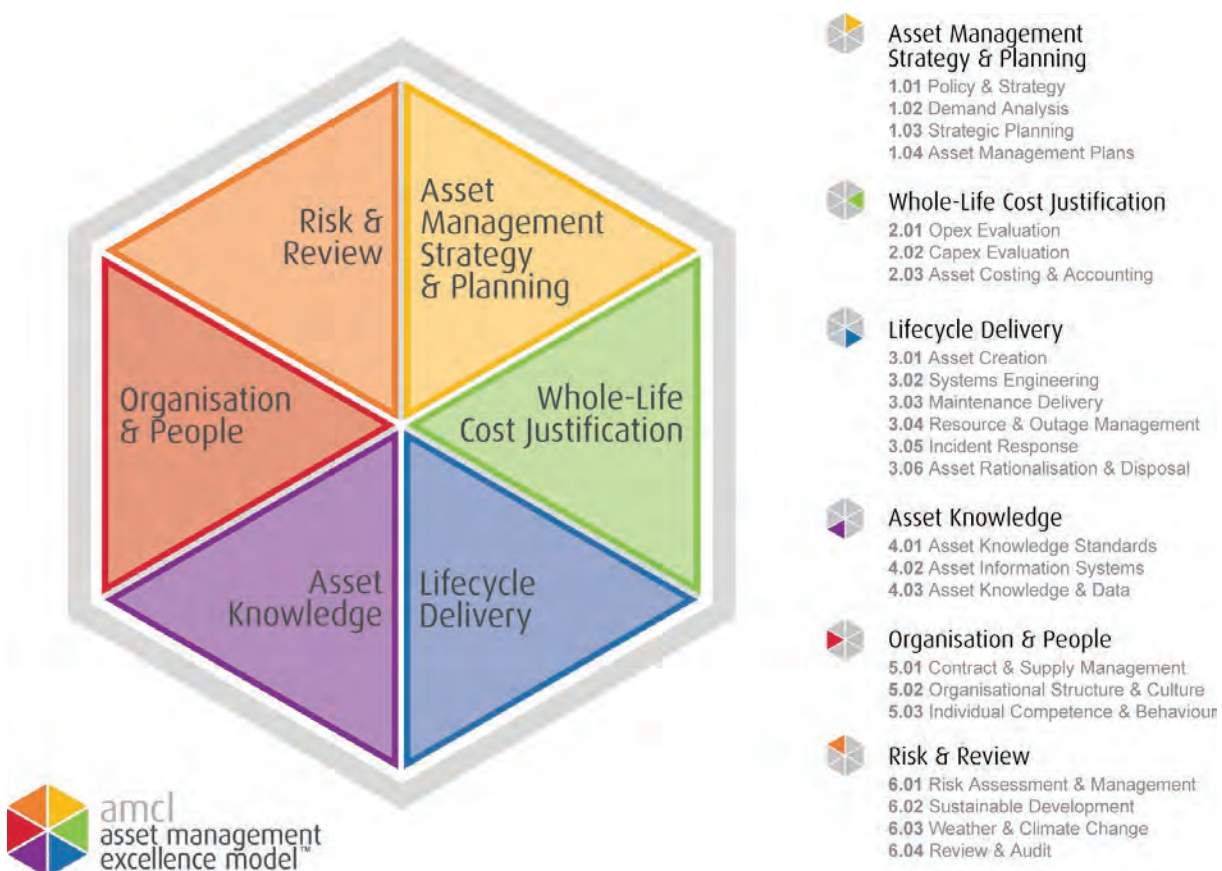
Diagram 2   The AMCL Asset Management Excellence Model™ (AMEM)

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").

Diagram showing the maturity scale with phases Learning, Applying, Embedding, Integrating, Optimising across the top, and states Innocent, Aware, Developing, Competent, Effective, Excellent with percentages from 0% to 100%. Labels: "Compliance with BSI PAS 55", "Beyond PAS 55 Compliance", "Limit of known Asset Management Best Practice".

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

1.5
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 consistently 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 1.4. The Institute of Asset Management (IAM) has also published its free book 'Asset management – an anatomy', which provides a more detailed explanation of the 39 subjects and how these interrelate. The AMEM has been aligned to the 39 subjects as shown in Diagram 4 below, and although this assessment is presented according to the original 23 activities to ensure consistency with the agreed CP4 monitoring process, a 39 subjects view of Network Rail's Asset Management capabilities is provided in Appendix A of this report.
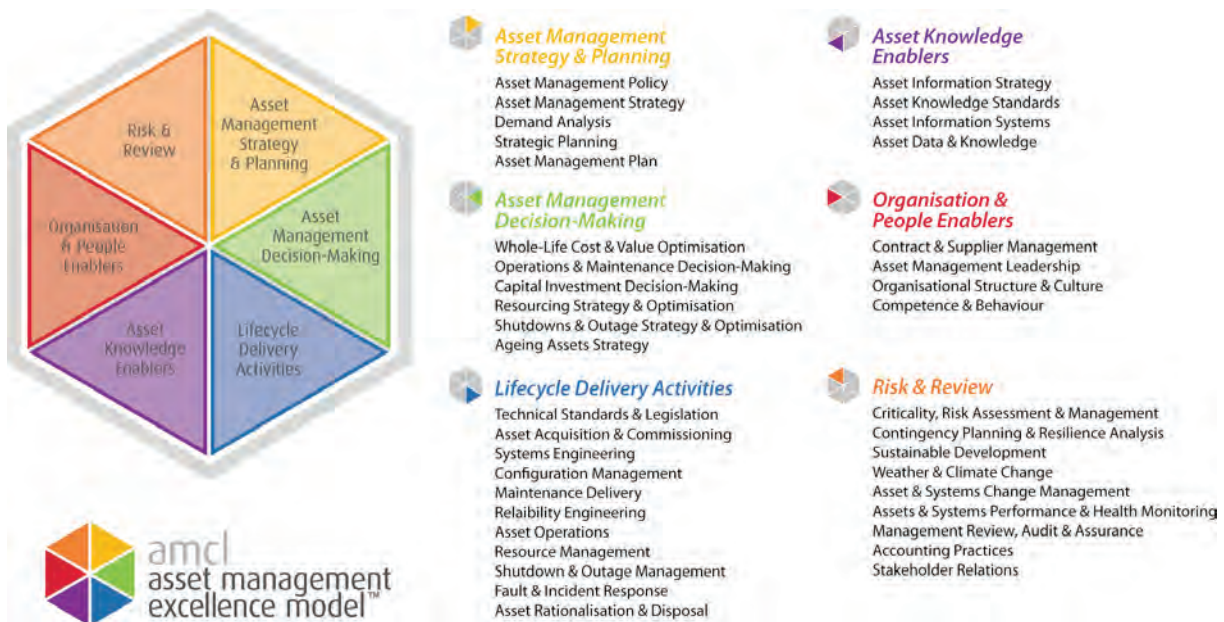
Asset Management Strategy & Planning
Asset Management Policy
Asset Management Strategy
Demand Analysis
Strategic Planning
Asset Management Plan

Asset Management Decision-Making
Whole-Life Cost & Value Optimisation
Operations & Maintenance Decision-Making
Capital Investment Decision-Making
Resourcing Strategy & Optimisation
Shutdowns & Outage Strategy & Optimisation
Ageing Assets Strategy

Lifecycle Delivery Activities
Technical Standards & Legislation
Asset Acquisition & Commissioning
Systems Engineering
Configuration Management
Maintenance Delivery
Relaibility Engineering
Asset Operations
Resource Management
Shutdown & Outage Management
Fault & Incident Response
Asset Rationalisation & Disposal

Asset Knowledge Enablers
Asset Information Strategy
Asset Knowledge Standards
Asset Information Systems
Asset Data & Knowledge

Organisation & People Enablers
Contract & Supplier Management
Asset Management Leadership
Organisational Structure & Culture
Competence & Behaviour

Risk & Review
Criticality, Risk Assessment & Management
Contingency Planning & Resilience Analysis
Sustainable Development
Weather & Climate Change
Asset & Systems Change Management
Assets & Systems Performance & Health Monitoring
Management Review, Audit & Assurance
Accounting Practices
Stakeholder Relations

Diagram 4   The AMEM as aligned to the Asset Management Landscape 39 Subjects

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2 Overview of Assessment Process

2.1
Activity and Asset Discipline Prioritisation

The asset disciplines and AMEM Activities were prioritised as follows:

1) The asset disciplines were identified as high or low priority according to their relative expenditure.

2) Activities were prioritised as 'high', 'medium' or 'low' based on both Network Rail and the ORR's opinion of the impact each Activity is likely to have on the delivery of the CP5 IIP.

3) The sources required to assess each Activity where then determined ('Centre' for those Activities that could be assessed by considering headquarters staff and evidence only, 'Route' for those Activities that required an understanding of how process and procedure is put into effect on the ground).

4) The numbers of sources were determined to ensure that if required, high priority Activities could be reported by individual discipline for those activities that are different for each asset discipline.

The priority of the asset disciplines that were agreed by Network Rail and the ORR are shown in Table 1 below.

Asset Discipline	Priority
Track	High
Signalling	High
Structures	High
EP	High
Telecoms	Low
Buildings	Low

Table 1 Asset Discipline Priority

The prioritisation of AMEM activities is shown in Table 2 below.

Activity	Criticality	Sources Required	Assess by
Policy & Strategy	High	Centre	Generic
Demand Analysis	High	Centre	Generic
Strategic Planning	High	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	Low	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	Low	Centre	Generic
Asset Knowledge Strategy & Standards	High	Centre	Asset Discipline
Asset Information Systems	High	Centre & Route	Asset Discipline
Asset Data & Knowledge	High	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	Low	Centre & Route	Generic
Review & Audit	High	Centre & Route	Asset Discipline

Table 2 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 using the AMEM assessment process.

2.3
Timescales and Sources of Evidence

Evidence was obtained through a number of methods. The primary method was interviewing personnel who had been identified by Network Rail as having the appropriate knowledge of the Activities. The assessment commenced on the 7th January 2013 (the publication date for Network Rail's CP5 SBP) and the final interview was completed on the 12th March 2013, although most of the interviews were completed by the 28th February 2013.

During this time a cross-section of approximately 134 Network Rail staff were interviewed, and over 1,800 pieces of documentary evidence were requested. A number of key stakeholders from the ORR were also interviewed to ensure any areas of concern they had relating to Network Rail's Asset Management capabilities were examined as part of this Assessment. 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.

Of significant importance to the assessment evidence was the full range of SBP documentation published by Network Rail on the 7th January 2013. This was made available to AMCL as part of the documentary evidence base. Due to the extent and availability of this evidence it has not been listed separately, and only those items that are specifically referred to within this assessment report are included in Appendix C.

2.4
Scope

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

1) Timescale – The effective assessment date is the 7th January 2013. 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.

2.5
Activities in this Assessment

In undertaking the 2011 assessment of Network Rail, AMCL has undertaken the following activities:

▪ An assessment of the scope of Network Rail's AMIP deliverables that were available at the time the assessment was completed, including relevant SBP output documentation, compared to the scope of the activities identified in the AMCL Roadmap for SBP.

▪ An assessment of Network Rail's current Asset Management capabilities in each of the 23 activities of the AMEM, taking into account its overall capabilities as well as the improvements delivered through the AMIP.

▪ An assessment of Network Rail's success in clearing the two Major Non-conformances against PAS 55 and confirmation (or otherwise) of full certification to the specification.

▪ An assessment of the extent to which Network Rail is ahead or behind the trajectory in the AMCL Roadmap that will assure Network Rail achieves the goal of Excellence by the end of Control Period 4.

▪ Presentation of the assessment findings according to the 39 Subjects of the IAM's 'Asset Management Anatomy'.

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3 Overall Findings

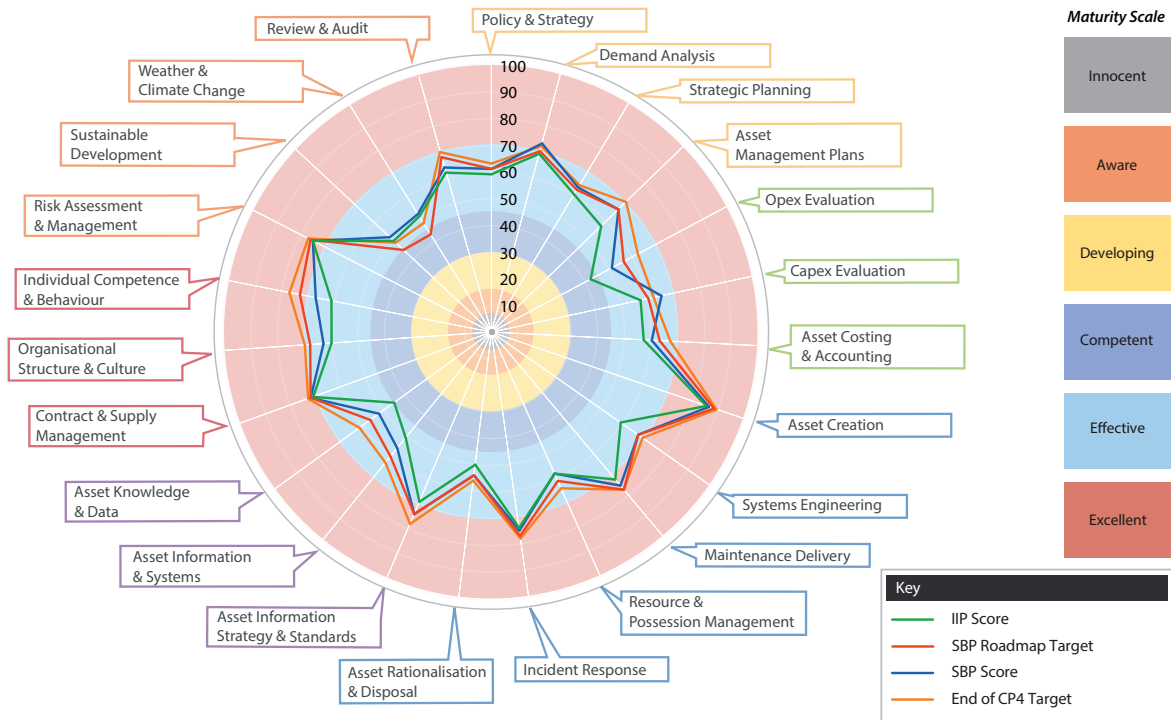The overall assessment scores for Network Rail are shown in the Diagram 5 below.

Diagram 5 Network Rail SBP AMEM Assessment Scores by 23 Activities

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

3.1
Strategy & Planning

The Strategy & Planning Group has exceeded the target at the SBP assessment as shown in Diagram 6 below.
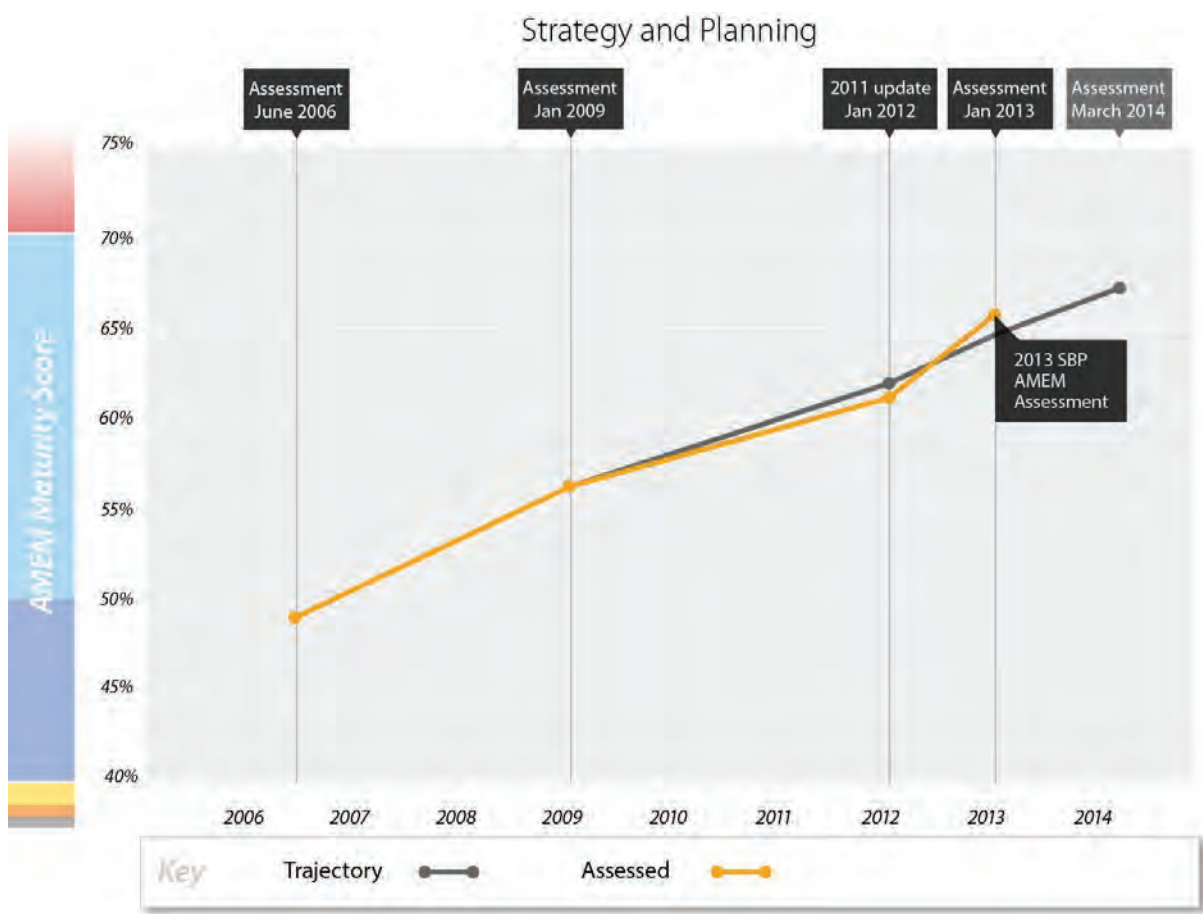

Diagram 6   Network Rail's progress in the Strategy & Planning Group

Network Rail has put a significant amount of effort into the development of its Asset Management policy and strategy and the implementation of its Asset Management framework to develop its SBP documentation. This has resulted in the aggregated score for the four Activities in the Group exceeding the target for the first time, and all the Activities in the Group either met or exceeded the individual targets set.

Central to this achievement is the clarification Network Rail has brought to its Asset Management framework, a six-step approach to strategic planning, implementation and review, which is defined in a new document that describes the organisation's Asset Management System. The Asset Management framework set out in this document appears to have been successfully applied to generate the Route work banks from which the Summary Route Plans and the Strategic Business Plans have been created. There are a number of opportunities to improve the framework further, including bringing further clarity to how the analysis of demand is integrated with the physical planning of Asset Management interventions. The revised LTPP will support this by splitting the RUS documents up into clearer, more focused elements. The final challenge for Network Rail will be to ensure the Asset Management framework is effectively embedded as 'business as usual' once the SBP process is over. The ultimate aim should be that the SBP is a 5 year 'snapshot' output from an on-going Asset Management process.

One concern is that Network Rail's Asset Management policy and strategy documents have not yet been fully revised to reflect these changes, or authorised by the Executive Board. However, once achieved this will be a significant achievement in embedding Asset Management in the organisation. In future, these documents must lead the continual improvement process.

The actual planning documentation (the Strategic Business Plans and Summary Route Plans) are supported by a range of other documentation, including a CP5 Deliverability Review. That review has initially concluded that the SBP is deliverable, but has also identified a number of risks that require mitigation. It is essential that Network Rail puts these mitigations into place before the end of CP4, and supports all efficiency initiatives and savings with well-developed change management plans, as well as running further iterations of the Deliverability Review.

3.2
Whole-life Cost Justification

The Whole-life Cost Justification Group has made rapid progress towards meeting the target at the SBP assessment as shown in Diagram 7 below.

Diagram 7   Network Rail's progress in the Whole-life Cost Justification Group

Network Rail's ten-stage approach for the development of Asset Policies to define the management of the various asset disciplines continues to be fit-for-purpose in our opinion and the Asset Policies have been demonstrably improved since the last assessment. The period has also seen the development of a number of new Asset Policies both for lower overall spend but still critical asset disciplines such as Level Crossings and for asset systems which relate to a number of asset disciplines such as Drainage and its consideration across both Track and Earthworks. These continued enhancements of the Asset Policies, combined with continued and significant development of the associated strategic planning and whole-life cost modelling capabilities

has resulted in a considerable increase in capability maturity for Capex Evaluation, which has exceeded the SBP Roadmap target. The remaining challenges for Network Rail in this area include the continued enhancement of asset information to support the modelling and optimisation of Asset Management decision making defined within the Asset Policies, and the rollout of the models to assure they are integrated and effective throughout the organisation to support Asset Management decision making at Route level.

Opex evaluation has also seen some improvement since the last assessment but has fallen someway short of the SBP Roadmap target. This is due to both the relatively early status of the development programme and the lack of quantifiably justified cost-risk optimisation for maintenance interventions. Network Rail has recently accelerated its maintenance optimisation programme and has developed a number of revised maintenance regimes and implemented a number of pilots utilising the RCM2 (Moubray) process. Clear plans are also in place for the continued application of RCM2 across the asset base on a prioritised basis. However, the development of quantified cost-risk optimisation of maintenance regimes is not currently planned until CP6. Whilst we support the fundamental outputs of the RCM2 process in terms of Failure Modes and Effects Analysis and systematic allocation of mitigations to the failure modes, the current approach relies on engineering judgement to define maintenance frequencies and is not considered to be industry good practice. We have concerns about the currently defined process which is intended to develop national maintenance frameworks for local consideration and application in the future. This could lead to an array of specific and localised maintenance regimes on similar assets across the network which may be more difficult to justify, govern and establish the benefits of, as opposed to the definition of fully cost-risk optimised maintenance regimes for high, medium and low (for example) risk assets and the establishment of appropriate and unambiguous assessment criteria and thresholds which can be managed and controlled across the network.

With respect to Asset Costing & Accounting, while further progress has been made, this is still behind the SBP Roadmap target. Day-to-day unit cost monitoring and tracking continues to improve in terms of coverage and quality of both renewals and maintenance data. The renewal unit costs used for planning have also improved since the previous assessment, including the integration of unit costs and efficiencies in framework contracts with key suppliers for some asset disciplines. However, the approach and associated maturity varies considerably across the asset base, with LDRs still behind a large component of spend for some asset disciplines. Although the use of LDRs may be appropriate and more robust at a local level, it is not clear how easily the SBP rates can be aligned to historic costs, or how comparable unit costs then are nationally. Finally, although a range of MUCs do exist, these have only been used for planning certain activities in the SBP. The use of MUCs and other unit costs in developing the top-down (Tier 1) forecasts was significant, but it was the Routes who ultimately developed the SBP work volumes and costs, in a process which was informed but not driven by the top-down forecast. Therefore any variance in unit costs at these two levels will contribute to uncertainty in the alignment.

3.3
Lifecycle Delivery

The Lifecycle Delivery Group has improved since the IIP assessment, but the gap against the target at the SBP assessment has increased, as shown in Diagram 8 below.
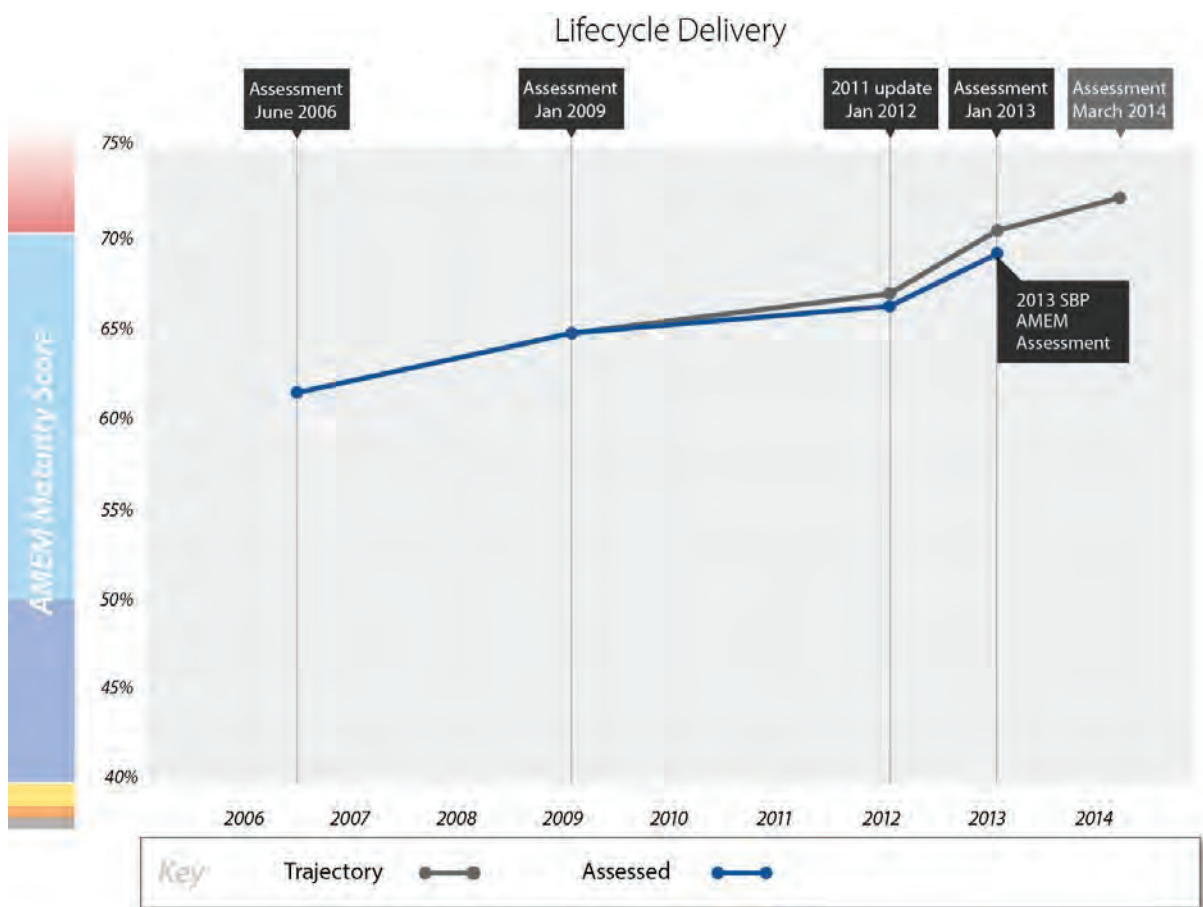

Diagram 8   *Network Rail's progress in the Lifecycle Delivery Group*

Network Rail has not had the same focus on achievement of the AMCL Roadmap Capabilities within Lifecycle Delivery as it has in the previous two Groups, and four of the six Activities in the Group have missed their targets, but only marginally. However, there are a number of areas where progress is evident, and where the development and extension of the integrated Asset Management approach pioneered in the Centre will permeate the rest of the organisation.

Within Asset Creation the Network Rail has created a Head of Programme Integration which is providing a focus for the development and governance of Network Rail's project and programme delivery capability. There is an increasing focus on programme management and the realisation of benefits, and the OGC's MSP and MOP methodologies are now being considered. Systems Engineering is now subject to an overall AMIP and is therefore likely that Network Rail's generally good practice approaches to requirements management and reliability and availability modelling will be better integrated across the organisation in the future. For example, a common understanding of the level of systems assurance applied within a project is still required, and the FMEA approaches undertaken within projects and maintenance should be harmonised to provide through-life support. The RDRH should be expanded to include the broader Network Rail community, and the proposed national strategic level whole-system rail model should be prioritised to support some of the strategic planning challenges identified in the Strategy & Planning Group.

Within the Routes it is evident that the implementation of the RBM initiative is yet to be felt, although its predecessor (the RoSE initiative) is well embedded. The II initiative is far more advanced and there is good support for this in the Routes with 'Flight Engineers' being appointed to ICCs and benefits being clearly tracked, however there is concern that the anticipated benefits are behind expectations. There is significant strategic overlap between the RBM and II initiatives, as identified in the Whole-life Cost Justification Group, and Network Rail should integrate these as soon as possible. Although the FIIP initiative is still at pilot stage, the concepts underpinning this are sound, and will significantly improve the consistent and reliable capture of root cause failure information on the ground.

Within the area of Resource & Possession Management there has been no significant progress, and the responsibilities that were with NDS have now been split between NDS and the Routes, with process documentation yet to catch up. However, there has been improvement in longer-term strategic planning of resources which has fed into the CP5 Deliverability Review. Good progress has been made in the area of Asset Rationalisation & Disposal work with the Network Optimisation initiative, which is currently in pilot, but has significant potential once it becomes business as usual.

3.4
Asset Knowledge

The Asset Knowledge Group has made steady progress towards meeting the target at the SBP assessment as shown in Diagram 9 below.
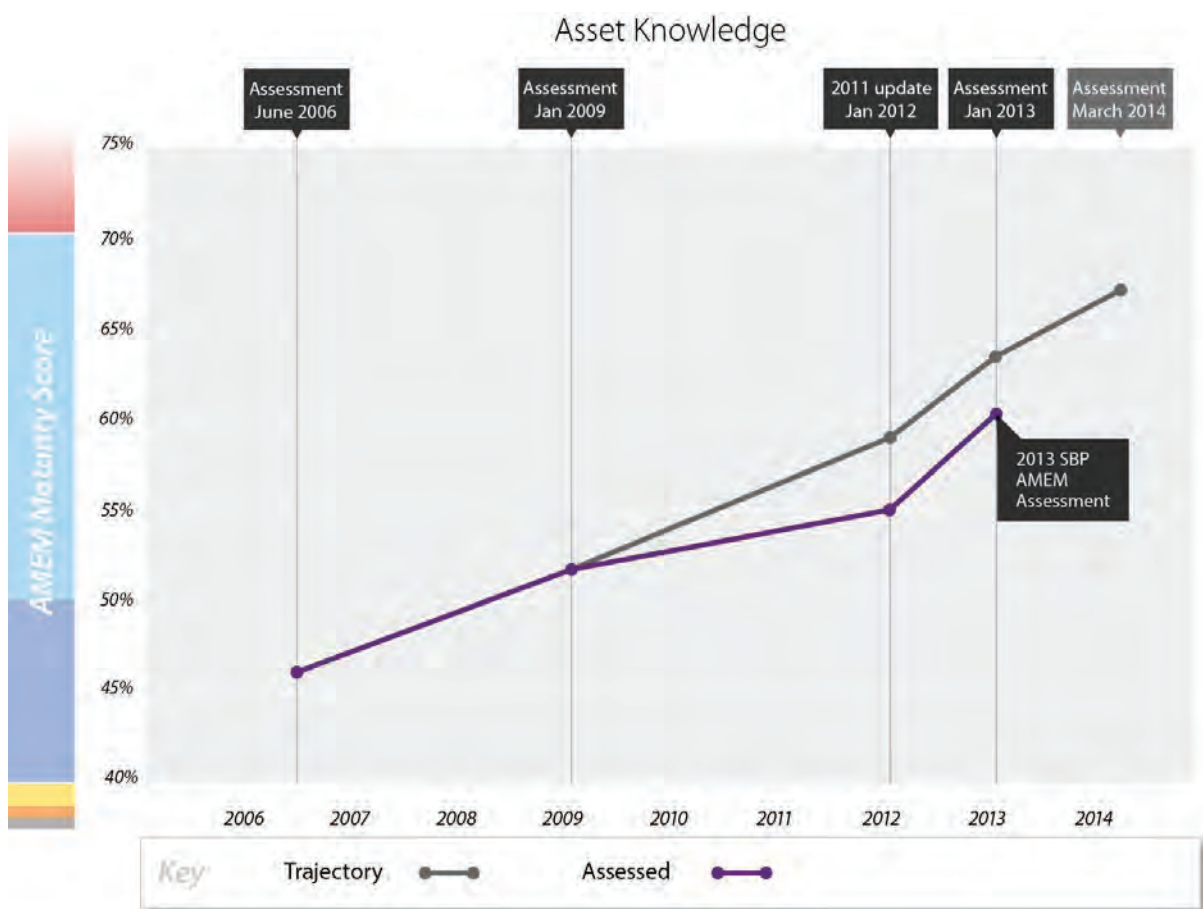

Diagram 9   Network Rail's progress in the Asset Knowledge Group

As per the IIP assessment in 2011, the overall score for Asset Knowledge remains behind the SBP Roadmap target due to the time taken by Network Rail to initiate its new Asset Information Strategy, organisation and transformation programme (ORBIS). As reported in the IIP Update report, the Asset Information Strategy appears to represent a best industry practice approach and is being well controlled and delivered through the ORBIS programme.

However, Network Rail was unable to provide the specific Roadmap deliverables, most critically with respect to the core overall Asset Information Specification and Data Confidence Assessment. Whilst progress has been evidenced on the development of an Asset Information Specification and Asset Knowledge Standards for track as a result of the core Master Data Management element of ORBIS, this was not yet the case across the wider asset base. Consequently demonstration that the asset data and knowledge held by Network Rail is appropriate for the requirements of its Asset Management System has not been fully possible to date. This finding underpins some of the minor non-conformances against PAS 55 (See section 10)

The late initiation of the ORBIS programme is also considered to have impacted the development of asset information systems in accordance with the SBP Roadmap target; while initial individual system improvement projects within ORBIS are making good progress, integration of these projects into an overall systems architecture and plan has only been evidenced at a high level to date.

However, given the progress that has been made since the IIP assessment, if Network Rail continues to develop its capabilities in this area at the same rate, the end of CP4 maturity target should still be achieved.

3.5
Organisation & People

The Organisation & People Group has improved since the IIP assessment, but the gap against the target at the SBP assessment has increased, as shown in Diagram 10 below.
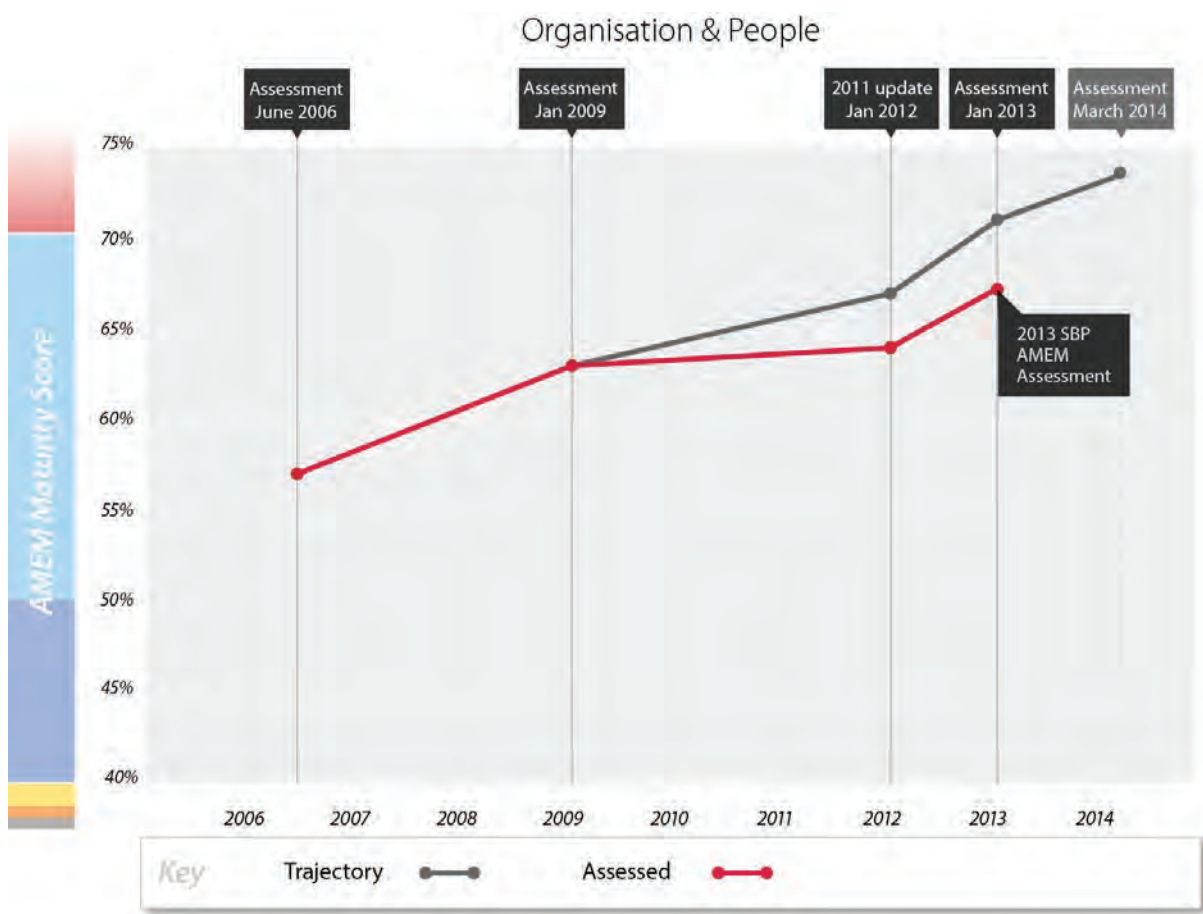

Diagram 10   Network Rail's progress in the Organisation & People Group

Contract and Supply Management has matched the SBP Roadmap target, with clear advances identified where sample interviews took place. The progress seen in previous AMEM assessments has been built on with alliancing, more flexible and adaptive contracting approaches, and the introduction of performance indicators. Areas earmarked for attention include communication on project start dates, and improving handover from major projects. The routes are letting significant contract volumes and recognise the learning curve they are on, and are exploring appropriate contracting strategies.

Organisational Structure and Culture has seen progress but has not met the SBP Roadmap target. The 2011 cultural aims have been revisited and the aims and strategy have been redesigned. The central team has now developed methods for describing and measuring culture but these methods and their results are not yet validated across the organisation. The structural implications of devolution are being managed and trial projects are in place to assess some tensions that remain. Team competence requirement definitions are still outstanding. Plans to improve team alignment and survey culture need better definition.

Individual Competence and Behaviour has seen progress but has not met the SBP Roadmap target. The approach to the management of individual competence has made considerable progress and is being trialled with the holders of key asset management posts. Asset Management training is still at an early stage of development. The integration of the different types of competence requirements across the business remains a challenge.

3.6
Risk & Review

The Risk & Review Group has been significantly ahead of target since the IIP assessment, but this gap has narrowed since the last assessment, as shown in Diagram 11 below.

Diagram 11   Network Rail's progress in the Risk & Review Group

Network Rail continues to make good progress in this area. Creation of the Safety & Sustainable Development (S&SD) function and appointment of the S&SD Director has provided a real focus for Sustainable Development activities in Network Rail. The Sustainable Development Strategy has been produced and promises further improvements in this area that will bring together existing pockets of good practice in the business into an aligned programme of work to improve Network Rail's capabilities over the remainder of CP4 and CP5. However the score in this activity reflects the fact that this strategy is still not fully implemented in the business.

Following recent events, Network Rail is continuing to develop its understanding of short, medium and longer-term weather impacts on its assets. It is supporting this with modelling and analysis both independently and as part of industry-wide programmes. Once again the score in this activity reflects the time taken to embed the outputs of these in its day-to-day business.

In the Risk Assessment & Management and Review & Audit activities, initiatives identified in the IIP assessment such as the IRM framework, Engineering Verification and NCAP have now been implemented and embedded, although in some cases the effectiveness of these processes is under review. Network Rail is in the process of reviewing its overall Assurance Framework, along with its Governance and Risk Frameworks, to provide an overall GRA Framework that aligns existing audit, assurance and governance activities to the management of corporate risks. This is aligning activities across the organisation, although progress in this area is behind the target set in the Roadmap as outputs from the review are required to demonstrate that top-down and bottom-up GRA activities are fully aligned and integrated in the devolved organisation.

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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 :

Summer 2012 Alignment Report

G	AMIP content well aligned to AMCL Roadmap and / or likely to deliver at SBP and end of CP4
A	AMIP content mostly aligned to AMCL Roadmap and / or some risks to deliver at SBP and end of CP4
R	AMIP content not aligned to AMCL Roadmap and / or unlikely to deliver at SBP and end of CP4

SBP Target Achieved

YES	Activity score achieved or exceeded SBP target
NO	Activity score missed SBP target by <=2%
NO	Activity score missed SBP target by >2%

4.1 Review of Roadmap Targets

Table 3 below shows the scores from the 2011 (IIP Update) assessment, the target score from the AMCL Roadmap for the SBP, the actual score from the SBP assessment, the alignment of Network Rail's AMIP with the AMCL Roadmap as of August 2012, and comments on any variance from target.

Activity	IIP Update Score	SBP Roadmap Target	SBP Score	Summer 2012 Alignment Report	SBP Target Achieved	Comments
Policy & Strategy	59%	61%	61%	G	YES	**Roadmap** – 3/5 achieved, 2/5 partially achieved **Target achieved** due to following: Asset Management System framework in place • Asset Management System framework in place • Well developed SBP-related policy and strategy documentation • But - revised top level AM Policy & Strategy in Draft Bnd not yet published
Demand Analysis	69%	70%	73%	G	YES	**Roadmap** – 2/2 achieved, but 1 with minor deficiencies **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 RUSs and scenarios) now being refined • NR's place as the focus for UK national main line demand analysis now well established
Strategic Planning	60%	62%	63%	G	YES	**Roadmap** – 4/4 achieved, but 1 with minor deficiencies **Target exceeded** due to following: • Strategic planning framework and process defined • Asset Policies and Tier 1/2/3 modelling established • CP5 plans aligned with Asset Policies through this and through HAM/RAM reconciliation • However varying levels of maturity (structures still 'worst' but position is at least understood)
Asset Management Plans	57%	66%	66%	G	YES	**Roadmap** – 1/1 achieved with minor deficiencies **Target achieved** due to following: • Route Plans appear to be complete and aligned to strategy / Asset Policies (product of top-down - bottom-up process) with variances understood • CP5 Delivery Plan not yet developed, but CP4 Delivery Plan is being executed and monitored

Table 3   Strategy & Planning Group Targets

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 SBP 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	SBP Success Criteria	Summary of SBP 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 completed and an implementation plan is in place by April 2012	This capability has been achieved. The 'Asset Management System' document (Issue 1), supported by the Devolution Handbook and a detailed RACI (which also appears as an appendix in the 'Asset Management System' document) have been developed.
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.	1. The Asset Management Policy has been updated based on Independent Reporter recommendations and lessons learned from the IIP submission and a draft is in place by April 2012. 2. The updated Asset Management Policy has been signed-off by appropriate Director(s) and it can be demonstrated that it has been effectively implemented and integrated into the wider Asset Management system by January 2013	This capability has been partially achieved. The Draft Asset Management Policy is currently with the Network Rail Executive Board for sign-off. The content has been reviewed by the assessment team, and meets the Improvement Specification with the exception of 1c, where a clear commitment does not appear to have been made. The new Asset Management Policy will therefore be late in meeting the second Roadmap Success Criterion.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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	1. The Asset Management Strategy has been enhanced based on Independent Reporter recommendations and the wider lessons learned from the IIP submission and a draft is in place by April 2012. 2. The updated Asset Management Strategy had been signed-off by appropriate Director(s) and it can be demonstrated that it has been effectively implemented and integrated into the wider Asset Management system by January 2013	This capability has been partially achieved. As with the Asset Management Policy the Asset Management Strategy is in draft. The state of this draft is far more basic than for the Asset Management Policy, and the assessment team do not consider it to be a document that is ready for final review and sign-off. However, it is clear from the work completed so far that all the elements required from the Improvement Specification will be in place, and aligned to the current SBP documentation suite. The new Asset Management Strategy will therefore also be late in meeting the second Roadmap Success Criterion.
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 2012/13 CSR, or other equivalent publication, includes an expanded section on Asset Stewardship as specified	This capability has been achieved. Network Rail has not issued a new CRR since 2011, but this capability has been covered by the 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.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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 the 23 AMEM Activities for the end of CP5 and a Draft Bsset Management Improvement Plan to deliver these forecasts is in place by January 2013	This capability has been achieved, subject to Activity trajectories being agreed as part of Phase 1. Network Rail has set out in its 'Asset management Capability' document how it goes about measuring and improving its Asset Management capabilities. It has not yet defined capability maturity forecasts for CP5, although these are in the process of being developed in conjunction with AMCL.
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.	Ranges in demand for the next 30 years are defined and options for the infrastructure required to meet this demand are documented in the RUS for each Route by December 2012	This capability has been achieved. Network Rail has firmly established itself at the centre of the LTPP, and is developing the process along with all stakeholders. All RUSs have been completed. As part of the LTPP revision, the RUS structure has effectively been clarified through the creation of 'Market', 'Geographic' and 'Cross Boundary' studies and bespoke tools have been and continue to be developed to support demand forecasting. The Network RUS is fully scenario-based, however this remains constrained to the long-distance / high-speed market.
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: 6. Target infrastructure minutes delay 7. Capacity requirements of the infrastructure including headway and timetable 8. Required capability of the infrastructure including gauge, line speed and bridge strength 9. Infrastructure availability including allowance for possessions	The Route Specifications are updated to reflect the requirements of the HLOS and are integrated into the Route AMP development process by September 2012	This capability has been achieved, with minor deficiencies. All Route Specifications have now been published, 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	SBP Success Criteria	Summary of SBP 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: 10. Clear alignment with the Systems, Process and Monitoring document showing 'line of sight' from SBP to Asset Policies, Route AMPs and Delivery Plans 11. How the difference processes, asset information, models and plans are linked 12. The appropriate method to develop work volumes, cost schedules and output measures for different types of asset, where necessary, taking into account asset criticality 13. How demand analysis and required outputs are considered and modelled in the development of the strategic Asset Management Plan 14. How work volumes and costs are developed for different funding scenarios to reflect potential changes in demand, output requirements and available funding. 15. 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 16. The extent to which each component of the framework will be developed and integrated by the time the SBP is published.	17. The strategic Asset Management planning framework and process is fully defined and effectively implemented by April 2012 18. Funding scenarios are agreed by June 2012	This capability has been achieved. Network Rail has developed a strategic Asset Management planning framework, although the detailed process to deliver that framework is effectively being refined as it is implemented. A summary of this process can be found in the 'Renewals Expenditure Summary' document. The development and deployment of Asset Policies, underpinned by Tier 2 models are fundamental elements. This framework and associated processes have been applied in an iterative manner to create the work volumes and costs found in the SBP, and these were created through two-way engagement between the Centre and the Routes. This process was less well defined, but appears to have produced the agreed funding scenarios which underpin the SBP. See main text in this section for a fuller assessment.
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: 19. Able to predict work volumes and costs for all enhancement, renewal and maintenance activities in CP5 for the agreed funding scenarios 20. Work volumes are derived from the application of the asset policies to the asset populations 21. Work volumes and costs for high criticality assets are based on whole-life cost modelling with interfaces to Tier 2 models 22. Work volumes and costs for medium criticality assets are based on service life relationships 23. Work volumes and costs for low criticality assets are based on historical spend 24. Predicts key outputs for CP5 and future control periods	The strategic business model is implemented with the specified capabilities by September 2012 in order to produce the SBP for the agreed funding scenarios	This capability has been achieved. The strategic business model is Network Rail's Tier 1 model (or ICM) which fully models maintenance expenditures. This is supported by the Tier 2 models which are at varying levels of maturity across the asset disciplines. However, in general criticality is applied to the asset types within a discipline and this criticality guides the sophistication of the modelling approach. See main text in this section for a fuller assessment.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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: 25. Work volumes and costs for each key activity and each key asset type for each funding scenario; 26. A preferred scenario that delivers the required CP5 outputs for the lowest sustainable whole life costs; 27. 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 28. An appropriate level of detail and level of confidence to reflect the criticality of the different activities and asset types; 29. 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; 30. The expected outputs and performance that will be delivered by the work defined within each scenario over the next 25 years; 31. The metrics and performance inductors that will be used to monitor these outputs and performance measures; 32. The expected efficiencies that will be delivered over CP5 clearly differentiating between work scope efficiencies from unit costs efficiencies; 33. Different scenarios to reflect different assumptions relating to demand, output requirements and available funding.	The network-wide Strategic Asset Management Plan is issued as part of the SBP in January 2013	This capability has been achieved, with minor deficiencies. The SBP documentation fulfils the requirements of this capability, with the main 'SBP for England & Wales' and 'SBP for Scotland' being the primary documents. Not all the requirements of the Improvement Specification are contained in the primary SBP documents, but see main text in this section for a fuller assessment.
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 submitted as part of the SBP in January 2013	This capability has been achieved. The QRA was published with the SBP in three main documents: 'SBPT3297 Uncertainty Analysis Overall Summary', 'SBPT3283 Uncertainty Analysis Stage 1', and 'SBPT3296 Uncertainty Analysis Stages 2 and 3'. These documents fulfil the requirements of the Improvement Specification.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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 are published for each of Network Rail's 10 Routes that contain the specific content by December 2012 that align with the SBP submission	This capability has been achieved. All Route Plans have now been published, and include all the Improvement Specification requirements at a Route level of detail. The level of resolution of work volumes and costs in the Summary Route Plans does not strictly meet the Improvement Specification requirements in this area fully, but there is full supporting documentation. See main text in this section for a fuller assessment.

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

4.3
Policy & Strategy

4.3.1 Asset Management Policy

At the IIP assessment a revised Asset Management Policy had been signed off by Network Rail's Director of Asset Management and published on the Network Rail website in February 2011. The conclusion of the IIP assessment was that this version of the Asset Management Policy was compliant with the requirements of PAS 55, which is the benchmark for this, with the following exceptions:

- There was no clear definition of the scope of Network Rail's Asset Management System as required by Clause 4.1 of PAS 55.

- It was unclear how the Asset Management Policy linked to other corporate policies and the organisational strategic plan.

- There were inconsistencies between the terminology used in the Asset Management Policy and the Asset Management Strategy (specifically the use of the terms Asset Policies, Asset Strategies and Asset Group Strategies for the same set of documents).

- There were no defined criteria against which the Asset Management Policy would be evaluated and continually improved.

These deficiencies led to the definition of AMCL Roadmap Capabilities 1.1 and 1.2 (see Table 4). These have been addressed through the creation of a document called Asset Management System (NRSBP-SBP27), which has been published as part of the SBP documentation suite, and a revised Asset Management Policy, which has not.

The Asset Management System document describes in more detail how Network Rail's Asset Management System is constructed, implemented, maintained and continually improved. It includes three main sections:

1) **Network Rail and Asset Management** – this section sets the overall context. It contains a slightly revised version of the Asset Management Document Hierarchy which appeared in Appendix 1 of the February 2011 version of the Asset Management Policy. This makes the 'line of sight' from Network Rail's organisational strategic plan to its Route and Delivery Plans clearer. It also contains and expanded definition of the six-stage Asset Management Framework which appeared on page three of the February 2011 version of the Asset Management Policy. These six stages are reproduced in diagram 12
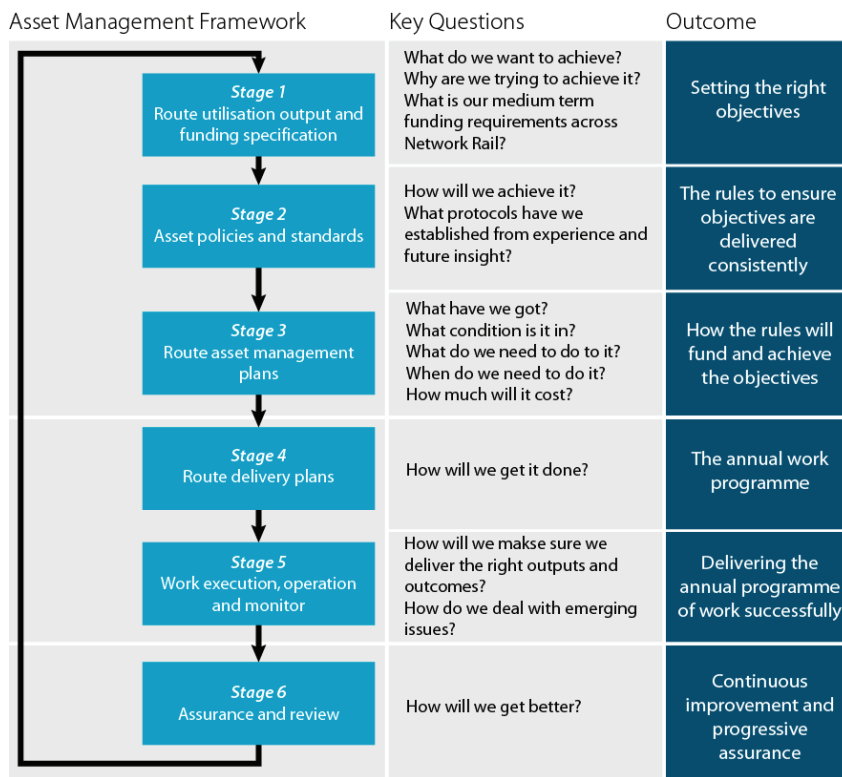
Asset Management Framework   Key Questions   Outcome

Diagram 12   The six-stage Asset Management Framework

2) **The Asset Management System** – this section expands to the next level of detail how each of the six stages of the Asset Management Framework is delivered. These descriptions are at an appropriate level of detail for this document, and a 'Master Flowchart' for the Asset Management System is provided at Appendix 1, with a RACI chart for its implementation at Appendix 2.

3) **Managing the Asset Management System** – this section describes the enablers for implementation of the Asset Management Framework. It includes organisational structure, responsibilities and accountabilities and the competences required.

The Asset Management System document includes all the necessary requirements at a sufficient level of detail to fulfil the requirements of AMCL Roadmap Capability 1.1. Although there is a clear sign-post to the next level of detail (the process level) contained within the Master Flowchart these processes have not yet been written-down and established. This is not to say that the processes have not been implemented in accordance with the Asset Management Framework, and it is a general conclusion of the assessment that they have. However, this first implementation of the Asset Management Framework has effectively helped to define the next level processes in more detail, and has built upon a range of processes at various stages of maturity. This report provides an assessment of how well Network Rail has achieved this.

⦿ CP4 Roadmap Clarification 001

By the end of CP4 Network Rail should complete a review of the effectiveness of the Asset Management Framework implementation across all disciplines and refine the processes accordingly. These processes should be clearly documented to ensure consistency of application and controlled continual improvement in the future.

The revised Asset Management Policy is in Draft and awaiting authorisation by the Network Rail Executive Board. Of particular note is the expansion of the Asset Management Policy to include Asset Operations as follows:

'The scope of Asset Management includes the operation of the network, including capacity planning and timetabling'

This is a demonstration of Network Rail's continued recognition of the importance of its Asset Management approach in integrating its activities, and underpinning the justification for these with the wider national UK rail community. However, because this is the case, the Asset Management Policy published with the SBP was the February 2011 version which is now partially misaligned with the broader Asset Management System described above.

This delay means that Network Rail has missed the specific deadlines for AMCL Roadmap Capability 1.2 (see Table 4), however, the Asset Management Policy has been revised and was made available to the assessment team (NRSBP-SP1). The Draft Asset Management Policy successfully addresses all of the AMCL Roadmap Improvement Specification requirements except for 1c which requires the Asset Management Policy to state that:

'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'

◼ CP4 Roadmap Reiteration 001

Network Rail should ensure that all relevant AMCL Roadmap Improvement Specification requirements are included in the draft Asset Management Policy prior to Executive Board authorisation and publication.

4.3.2 Asset Management Strategy

A revised Asset Management Strategy was signed off by the Director of Asset Management and published on the Network Rail website in February 2011. The conclusion at the time of the IIP assessment was that this strategy was compliant with the requirements of PAS 55, with the following exceptions:

- It was unclear how the core principles set out in the Asset Management Policy were delivered through the implementation of the Asset Management Strategy. Clear linkage between the high-level objectives in the Asset Management Strategy and the principles set out in the Asset Management Policy would help clarify Network Rail's 'line of sight'.

- The Asset Management Strategy did not contain a clearly defined set of Asset Management Objectives as required by PAS 55 Clause 4.3.2. It was suggested that inclusion of measurable objectives within the Asset Management Strategy would again help clarify Network Rail's 'line of sight' from the overall business plan to the discipline objectives in the Asset Policies.

As with the Asset Management Policy, the revised Asset Management Strategy is in Draft and awaiting authorisation by the Network Rail Executive Board, and because of this the Asset Management Strategy published with the SBP was the February 2011 version which is now also partially misaligned with the broader Asset Management System described earlier.

This delay means that Network Rail has missed the specific deadlines for AMCL Roadmap Capability 1.3 (see Table 4). The Asset Management Strategy has been revised and an early draft was made available to the assessment team (NRSBP-SP2). This Draft Asset Management Strategy is a long way from being ready for final authorisation by the Executive Board as it contains the February 2011 Asset Management Strategy text with notes on where the text needs to be aligned with the current SBP documentation. However, if the Asset Management Strategy is revised in accordance with these notes, it is likely that it will address all of the AMCL Roadmap Improvement Specification requirements but this cannot be confirmed until publication.

◻ *CP4 Roadmap Reiteration 002*

Network Rail should ensure all relevant AMCL Roadmap Improvement Specification requirements are included in the draft Asset Management Strategy prior to Executive Board authorisation and publication.

4.3.3 Asset Stewardship

AMCL Roadmap Capability 1.4 sets out the requirements for an improvement to Network Rail's Corporate Responsibility Report (CRR), or other equivalent publication, to provide further details on Asset Stewardship. At the IIP assessment in 2011 Network Rail had included a brief Asset Stewardship summary in its CRR, but this did not meet the full requirements. The CRR has not been re-issued since the IIP but Network Rail has provided a summary document in its SBP suite called Asset Output Measures Summary (NRSBP-SBP20), which somewhat confusingly is titled 'Asset Stewardship Summary' within the document. This document covers to varying degrees most of the AMCL Roadmap Capability 1.4 requirements, with the exception of 1.4(4). However, a range of documents within Network Rail's SBP documentation provides Asset Stewardship information, albeit not in a single, easily digestible format, as shown in Table 5.

AMCL Roadmap SBP Improvement Specification Requirement	Network Rail Source Documents
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.	- A better railway for a better Britain - January 2013 - SBPT101 Network Rail Strategic Business Plan - England and Wales - SBPT102 Network Rail Strategic Business Plan – Scotland - Industry strategic business plan for England and Wales for CP5 - 2014-19 - Industry strategic business plan for Scotland for CP5 - 2014-19
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.	- SBPT101 Network Rail Strategic Business Plan - England and Wales - SBPT102 Network Rail Strategic Business Plan – Scotland - SBPT222 Maintenance Expenditure Summary - SBPT223 Renewals Expenditure Summary - Route Plans

AMCL Roadmap SBP Improvement Specification Requirement	Network Rail Source Documents
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.	• SBPT101 Network Rail Strategic Business Plan - England and Wales • SBPT102 Network Rail Strategic Business Plan – Scotland • SBPT222 Maintenance Expenditure Summary • SBPT223 Renewals Expenditure Summary • Route Plans
4. An explanation of how Network Rail's sustainable development objectives and activities are supporting the overall Asset Management approach.	• Sustainable Development Strategy
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.	• SBPT205 Asset Management Capability

Table 5   Sources of Information for Asset Stewardship

Whereas it is clear that Network Rail has set out all the Asset Stewardship information necessary to fulfil the Improvement Specification requirements, this information is still not easily available in a summary Asset Stewardship statement.

> ⊙ *CP4 Roadmap Clarification 002*
>
> *By the end of CP4 Network Rail should further develop SBPT232 (the Asset Output Measures Summary) to include to the correct level of detail for all the information specified in AMCL Roadmap Capability 1.4 and provide appropriate monitoring and review.*

4.3.4 Asset Management Capabilities

Network Rail published the document Asset Management Capability (NRSBP-SBP3) in support of its SBP. This sets out the organisation's approach to the development and measurement of its Asset Management capabilities as defined by the AMEM, the maturity model used to underpin the findings of this assessment. It describes the Asset Management challenge, how Asset Management is measured using the AMEM, and provides some further detail on Network Rail's progress in CP4 and plans for the development of capabilities in CP5 in the following six areas:

- Optimising Asset Policies;

- Risk-based Maintenance;

- Weather Resilience & Climate Change;

- Asset Information;

- Asset Management Services (an organisational enabler); and

- People, Competence & Culture.

Finally, the document discusses the potential future rate of improvement for Asset Management capability overall throughout CP5, which is reproduced in Diagram 13 below. The reduction in the rate of improvement reflects the diminishing return of approaching frontier performance. The Asset Management Capability document clearly sets out Network Rail's commitment to improving its Asset Management capabilities and, along with the specific CP5 Activity-level trajectories AMCL will support Network Rail in developing for CP5 fully meets Roadmap Capability 1.5.
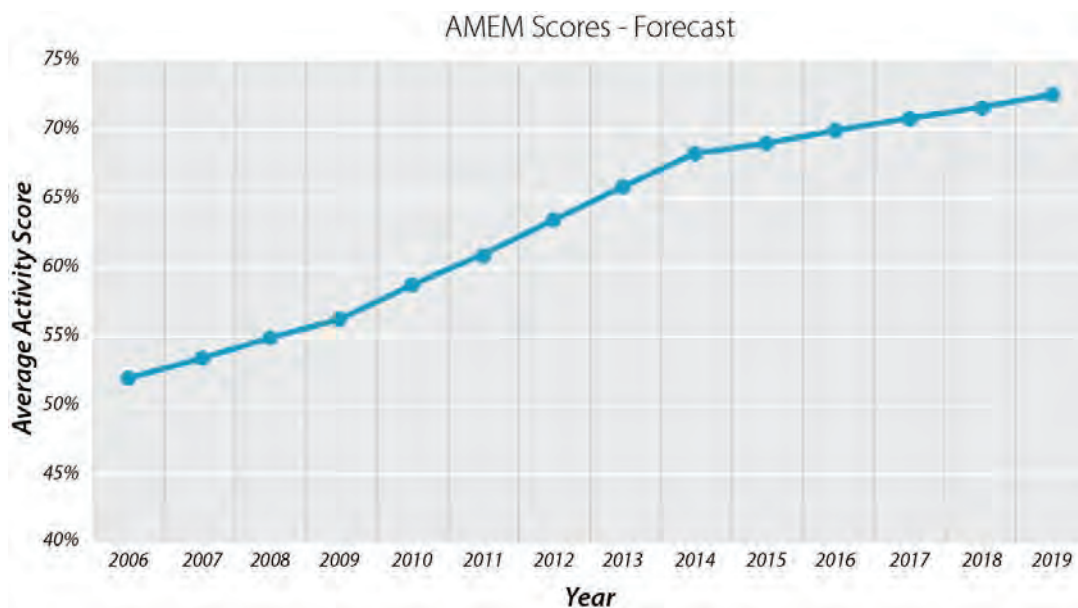

Diagram 13   Network Rail's Forecast Average AMEM Activity Scores

4.4
Demand Analysis

It was reported at the IIP 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 Long Term Planning Process (LTPP), which is the industry-wide process for long term planning governed by the Rail Industry Planning Group (RIPG) which Network Rail chairs. Through this, Network Rail has made good progress on both these capabilities, most of which was reported at IIP:

- The main output from the RIPG is the publication of Route Utilisation Specifications (RUSs) which as reported at IIP is complete, with 24 now published and accepted by the ORR (NRSBP-SP3);

- The use of scenario planning to inform the LTP is now well established and described in the Network RUS (NRSBP-SP4), although this approach is still constrained to the long-distance / high-speed market;

- Demand forecasting models for rural routes are generally developed in-house with the Passenger Demand Forecasting Handbook (PDFH), with commuter routes serviced by the RailPlan model in conjunction with TfL.

Since the IIP assessment the understanding of the factors that influence demand has improved, supported by the ATOC Board committing to share TOC passenger information with Network Rail for its specific use in national, industry-wide forecasting. This development is another example of how the industry approach to long-term planning has matured since 2005, and will allow more accurate demand models to be produced by Network Rail on behalf of the industry. This can also be validated by the TOCs own commercial models and forecasts, thus improving confidence in forecasts further.

Network Rail has also re-organised internally to bring greater clarity to the processes of strategic planning and network development. An example of how Network Rail is beginning to influence these processes at the national level is through the adoption of new electrification schemes by the Government, which was initially triggered by the Electrification RUS (NRSBP-SP5, NRSBP-SP6).

The output from the LTPP externally informs the Government with respect to its options and choices, and internally informs the Asset Managers with respect to the capability and capacity

changes required to the infrastructure over time. It was reported at IIP that the LTPP itself was going to be revised, and this has been achieved in consultation with the wider industry through the RIPG (NRSBP-SP7 – section 4.1). The ORR has endorsed the change (NRSBP-SP8) which will replace 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;

- 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; and

- 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.

The Market Studies will effectively replace the front end of the RUS document dealing with demand forecasting, with the Route and Cross-boundary Studies replacing the back end dealing with gap analyses against current capability and options. The revised LTPP is now underway, and it is hoped the new structure will bring greater clarity to the process of understanding and forecasting demand, as well as presenting strategic options to deal with it, which have traditionally been combined within the RUS studies. The SBP documentation summarised these changes in the document Capacity & Performance Planning Framework (NRSBP-SBP4).

The challenge identified at IIP of the lack of clarity about how the LTP is translated to support the development of strategic Asset Management Plans has been addressed through the publication of Network and Route Specifications (see Section 4.5), and also through the re-organisation mentioned earlier. All Network and Route Specifications have now been published. The terminology here is slightly confusing as Network Specifications describe the specification for a Route at a summary level, and the Route Specifications describe the specification for a Route at the SRS level. The combined effect of these documents generally improves the link between Network Rail's understanding of demand and the forward-looking requirements for capability and capacity of the infrastructure to meet that demand. The Network and Route Specifications include all the AMCL Roadmap Improvement Specification requirements with the exception of target minutes delay and allowances for possessions, although basic timetable information is provided. AMCL is aware of documents called Route Output Specifications in the Routes which provide another level of detail, but it was not clear how these are incorporated into the process. These deficiencies have consequential effects on the effective integration of these documents into Network Rail's strategic planning framework as described in Section 4.5.2, because they fail to provide information

on the required Reliability, Availability and Maintainability elements of a full RAMS requirements specification.

> ✳ *CP5 Roadmap Recommendation 001*
>
> *During CP5 Network Rail should include sufficient information in the Route Specifications to enable a RAMS requirements specification for the Route to be defined.*

The reorganisation has provided further clarity on the process for handing over schemes from the Strategy & Planning Directorate to the delivery arm of Network Rail – usually IP. Within the Strategy & Planning Directorate there is now more clarity around the traditional 'client' and 'sponsor' roles, with Programme Development Managers assuming the latter role. The aim is to hand projects over as early as possible for delivery, although to date most have typically been handed over at GRIP stage 3. There is also current concern that the client role may need refining further, with the recognition that there are Centre (national) and Route (local) client roles to be fulfilled (for example, to deal with the national electrification strategy as opposed to local manifestations of that strategy).

> ◉ *CP4 Roadmap Clarification 003*
>
> *By the end of CP4 Network Rail should clarify the roles and responsibilities of the Route and Centre level clients.*

4.5
Strategic Planning & Asset Management Plans

4.5.1 Overall Findings

This section examines Network Rail's strategic planning framework (as introduced in Section 4.3.1), 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 includes an assessment of how Network Rail's Asset Policies have been applied but the Asset Policies themselves and the justification underpinning the Asset Policies is examined in Section 5 on Whole-Life Cost Justification.

Network Rail has made significant progress in Strategic Planning and Asset Management Plans since the IIP. In general, with only a few exceptions, its assessment scores and performance in this area are as planned. Some notable good practice was evident, particularly in the area of modelling and the use of the Tier 1, 2 and 3 models to support the selection of appropriate, whole-life cost justified plans across a wide range of Network Rail's asset base. As mentioned in Section 4.3.1 there is still some work to do to ensure the approach is fully embedded within the organisation and to ensure it becomes business as usual, particularly within the devolved structure.

There are some concerns over the status of the CP5 Deliverability Review and Plan, which is presented in the SBP as confirmation of the deliverability of the CP5 plan, but is in AMCL's opinion a high-level risk assessment which requires further work to effectively plan and implement the identified mitigations. Elements of this are also addressed more specifically within the Lifecycle Delivery group commentary (Section 6). The following sections detail further the overall findings across the following areas:

1)   Strategic Planning Framework, Process & Model

2)   The Strategic Business Plan

3)   The CP5 Deliverability Plan and the Quantified Risk Assessment

4)   Route Plans

5)   Discipline-specific findings

4.5.2 Strategic Planning Framework, Process & Model

Network Rail has developed a six-stage Asset Management framework as introduced in Section 4.3.1, which is described in the Asset Management System document (NRSBP-SBP27). The detailed process to deliver that framework has been mapped to a generic level of detail as also described in Section 4.3.1 (NRSBP-SP9). A summary of this process can be found in the 'Renewals Expenditure Summary' document (NRSBP-SBP14) and is reproduced in diagram 14. The clearly programmed and timely development and deployment of Asset Policies, underpinned by Tier 2 models, are fundamental elements (see Section 5) of the success of this process.
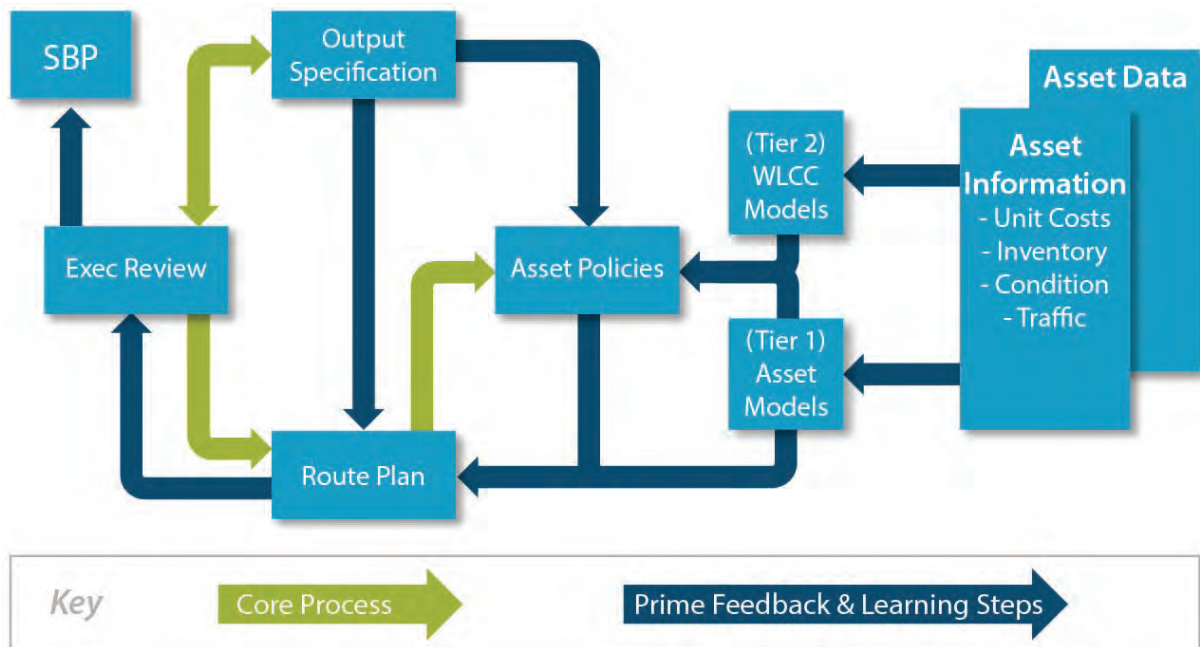
Diagram 14   Network Rail's Strategic Planning Process

This strategic planning process has been applied to create the work volumes and costs found in the SBP, which were created through two-way engagement between the Centre and the Routes. This iterative process is considered less well defined, as described in Section 4.3.1, but appears to have produced the agreed funding scenarios which underpin the SBP (NRSBP-SBP1 and NRSBP-SBP2). Evidence was presented during the assessment which indicated the framework and process is gradually being refined based on continual implementation of the process (NRSBP-SP10 and NRSBP-SP11).

Diagram 15 is updated from the IIP assessment report and shows AMCL's view on Network Rail's strategic planning framework at SBP. At the time of that assessment the framework was considered by the assessment team to be incomplete, with deficiencies specifically in the 'Infrastructure Capability' and 'Route Specification' processes / documents. Both these areas have been addressed through the development of the Network and Route Specifications and the completion of the RUS programme respectively, as described in Section 4.4.
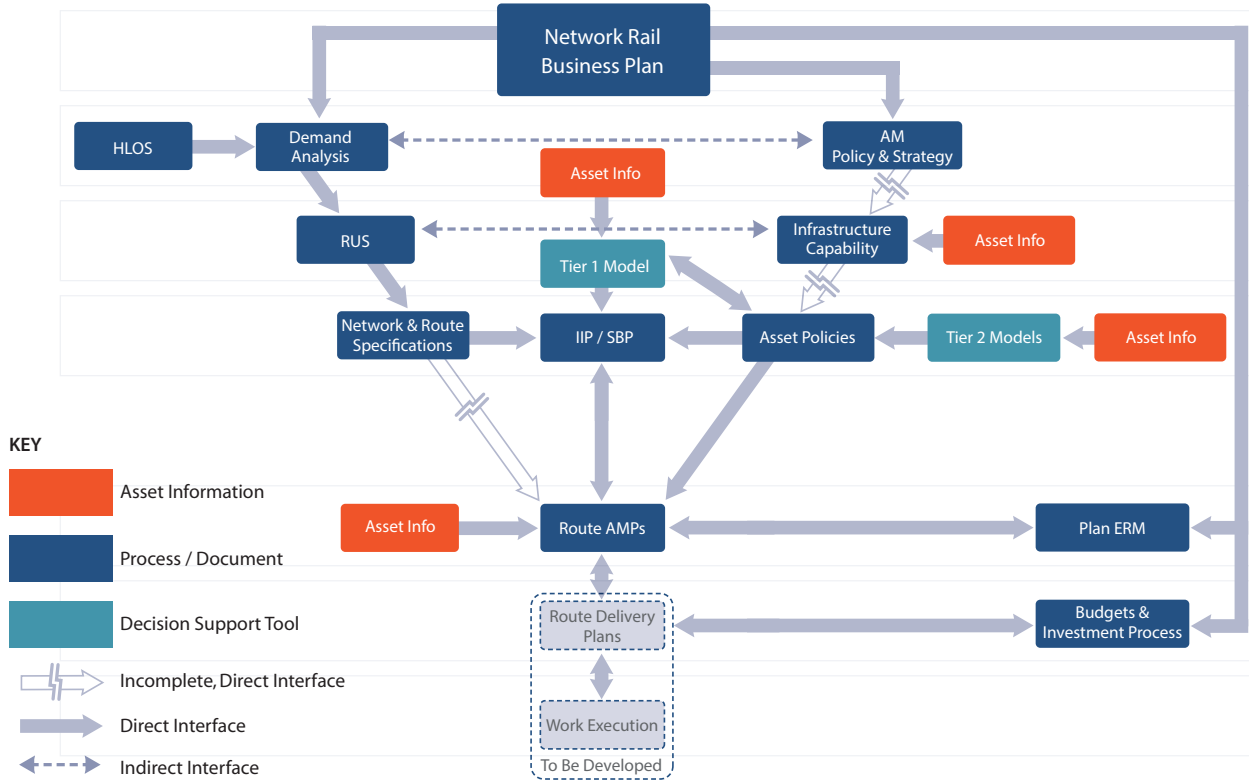
Diagram 15   AMCL View on Strategic Framework at SBP

However, as also introduced in Section 4.4, the level of integration is not yet complete for two main reasons:

- 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.

Despite these remaining concerns Network Rail's six-stage Asset Management Framework overlays all aspects of Diagram 15 as shown in Diagram 16. From this it becomes evident that the scope of Phase 1, Stage 1 of Network Rail's Asset Management Framework appears potentially too large

and complex, and would benefit from a clearer delineation between the left-hand 'demand' driven process and the right-hand 'asset' driven process. The new LTPP will help with this clarity with its three new products that replace the combined RUS documentation, but it is likely that even then there may still be a level of infrastructure capability definition missing.
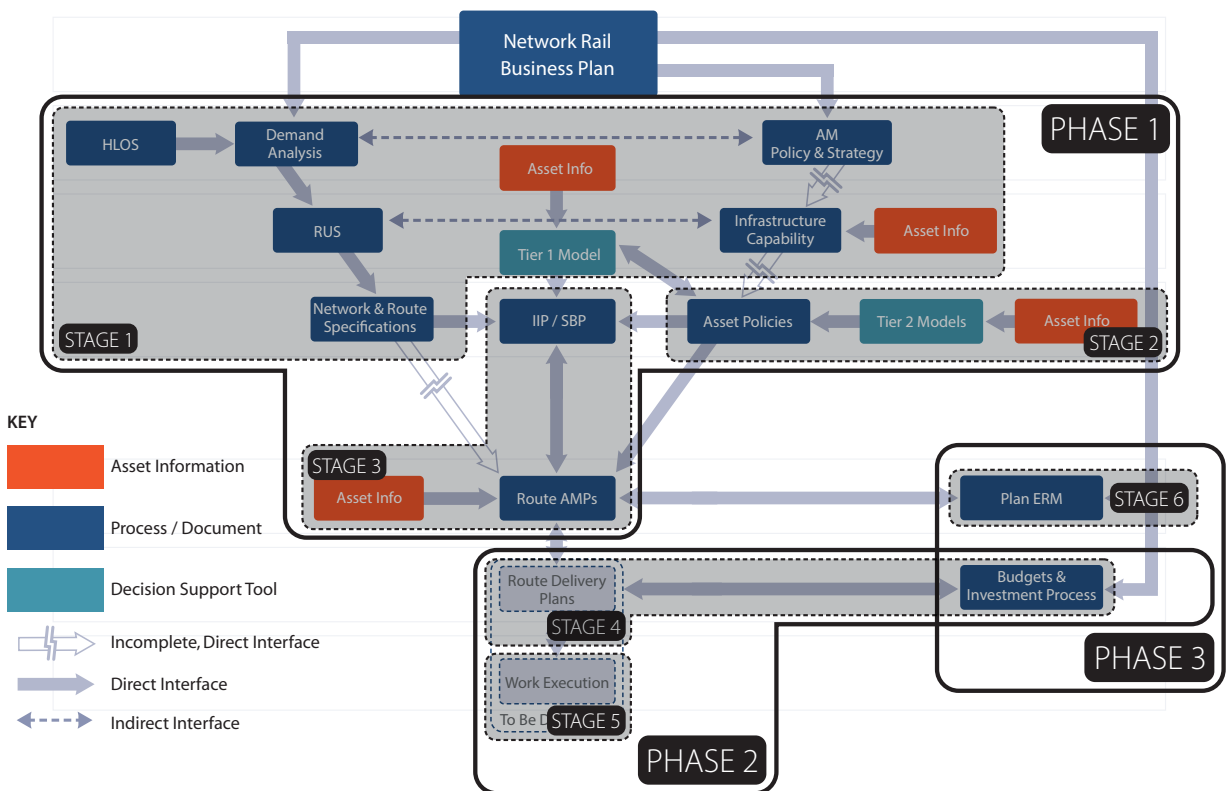

Diagram 16   Network Rail's 6-stage Asset Management Framework overlaid on Diagram 15

⦾ CP4 Roadmap Clarification 004

Within the timescale for implementing the revised LTPP, Network Rail should ensure that the revised LTPP and the disaggregation of RUS documentation into market, geographic and cross-boundary studies is fully aligned with and supports delivery of the strategic planning framework.

✳ CP5 Roadmap Recommendation 002

During CP5, Network Rail should develop a formal mechanism to assess appropriate overall funding scenarios at a National and Route level which model potential alternative HLOS compliant options.

To support the development, validation and application of Asset Policies and to facilitate the central forecasting of longer-term asset intervention volumes, costs, efficiencies and outputs Network Rail has used a three tier approach to modelling which is described in more detail in Section 5.4 on Capex Evaluation. The tiered approach, although recently developed and still being refined, is considered by AMCL to represent good practice, although the full integration and effectiveness of the models within the overall organisation and processes is still evolving. The Tier 2 models are at varying levels of maturity across the asset disciplines, but criticality has been applied to the asset types within a discipline, and this criticality guides the sophistication of the modelling approach.

Although it did vary by asset discipline, particularly for telecoms and structures, a generic summary of the typical application of Network Rail's strategic planning process, which ultimately derived the work volumes and costs within the Route Plans, is as follows:

1) Iterations of the Asset Policy and associated modelling tools were used to develop baseline 'top-down' CP5 costs and volumes for each asset discipline which were provided to the RAMs;

2) The RAMs reviewed the outputs from the central organisation against their existing 'bottom-up' work banks and prioritised plans based on criticality, funding constraints and significant enhancements or network strategies, such as Electrification and NOS respectively;

3) The RAMs continued to iterate the work banks, in conjunction with the HAMs in the central organisation through a change control process and briefings on changes to Asset Policy;

4) Any variations or deviations that could not be approved or endorsed by the HAM were reviewed with the DRAMs for final sign-off;

5) Revised Route work banks were aligned with unitised costs where available, with LDRs developed by the RAM teams in conjunction with Investment Project teams where unitised costs were not available or LDRs were considered more appropriate; and

6) Revised, nominally 'bottom-up' costs and volumes were resubmitted to the central organisation for inclusion within the strategic modelling tools to define the final SBP submission.

The above is a very simplistic representation of a long-term and highly iterative process which is understood to have been subject to degrees of parallel working between the key steps identified above. The assessment team has concluded that the approach fulfils the requirements set out for a strategic business model in the AMCL Roadmap Capability 1.9.

4.5.3 The Strategic Business Plan

Network Rail's Strategic Business Plan was published on the 7th January 2013 and comprised a number of summary and detailed documents. An evaluation of how well these documents meet the requirements of AMCL Roadmap Capability 1.10 is summarised in Table 6 below.

Capability Element 1.10 (Network Strategic Asset Management Plan)	SBP Documents	Comment
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.	• Strategic Business Plans for England & Wales, and for Scotland • Renewals, Maintenance, Enhancements and Investments Expenditure Summaries	Work volumes are shown for each key activity and each key asset type for selected funding scenarios, which have been evaluated in the Asset Policies.
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.	• SBPT3297 Uncertainty Analysis Overall Summary • SBPT3283 Uncertainty Analysis Stage 1 • SBPT3296 Uncertainty Analysis Stages 2 and 3	The Uncertainty Analysis includes an assessment of the uncertainty of work volumes, efficiencies and unit costs for CP5 only. It is an indicative study, but does provide information on the disciplines which contribute the most uncertainty.
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.	Asset Policies for all disciplines	Sections 1 & 2 in each of the discipline-specific Asset Policies present most of this information.
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.	• Strategic Business Plans for England & Wales, and for Scotland • Renewals, Maintenance, Enhancements and Investments Expenditure Summaries • SBPT232 Asset Output Measures Summary	The expected outputs are published within a range of documents, and cover a variety of timescales from CP5 only to all control periods up to CP11.
8. The expected efficiencies that will be delivered over CP5 clearly differentiating between work scope efficiencies from unit costs efficiencies.	• SBPT220 Efficiency Summary • SBPT3090 Master Efficiency Handbook • SBPT3091 Scope for efficiency savings in CP5 - evidence from other regulated industries	Network Rail has provided a significant amount of information on how it will achieve its stated 18% efficiency target for CP5, including the core documents listed left and a further 51 discipline-specific explanations.
9. Different scenarios to reflect different assumptions relating to demand, output requirements and available funding.	• Strategic Business Plans for England & Wales, and for Scotland • Renewals, Maintenance, Enhancements and Investments Expenditure Summaries	Different scenarios are not presented in the strategic business plans, but do underpin the works volumes and costs presented there.

Table 6   How Network Rail's SBP documentation meets AMCL Roadmap Capability 1.10

In summary, Network Rail's SBP documents present a very comprehensive picture of the organisation's strategic plans for CP5 and beyond. It is clearly aligned with the requirements set out in the HLOS, and is underpinned by whole-life cost analysis and scenario planning, although the maturity of these approaches varies across the asset disciplines (see Section 5 on Whole-life Cost Justification). Not all of the AMCL Roadmap requirements have been met to the letter (for example

for assessing confidence levels, or the presentation of scenarios in the main documentation) but the majority of the requirements have been covered.

In addition, the AMCL Roadmap requires that 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), and that these review processes require the monitoring of performance and condition compared to the expected outcomes described in the SBP and the Delivery Plans. These processes were established during CP4 and it is anticipated that they will continue throughout CP5.

4.5.4 The 10 Route Plans

Network Rail's ten Summary Route Plans were published on the 7th January 2013 as part of the overall SBP documentation. An evaluation of how well these documents meet the requirements of AMCL Roadmap Capability 1.12 is summarised in Table 7 below.

Capability Element 1.12 Route Asset Management Plans	Comment
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	Proposed enhancement, renewal, refurbishment and maintenance activities are described in summary in the Summary Route Plans. These activities are a combination of the top-down and bottom-up evaluations described elsewhere in this section. The work activities are confined to CP5 only in the 'Asset Management Plan' section, but do consider the remainder of CP4 in the remainder of the documents. The detail that backs up these plans is held in the individual discipline work banks.
3. Explanation on how the top down work volumes and costs were derived	There is a qualitative description of how all work volumes have been derived throughout the Summary Route Plans.
4. Costs for low criticality activities for each year of CP4 / CP5	Costs are provided at a summary level by activity type (renewals, operations, maintenance etc.) split down by discipline. A split of the expenditure by criticality is not provided, although this information should be available within the detailed work banks, even if it requires deriving according to the criticality rules presented in the Asset Policies.
5. Commentary on any discrepancy between top down and bottom up volumes and costs (high and medium criticality) - including discrepancy between proposed activity types	There is no commentary on any discrepancy between top down and bottom up volumes and costs for high and medium criticality assets. A commentary on this is provided within the Renewals Expenditure Summary document, although for renewals only.
6. Justification for any deviation from Asset Policy	Some justification for deviation from the Asset Policies is provided, although this is not completed in a consistent fashion throughout the documents. In some documents the importance of alignment to the Asset Policies is acknowledged, but this is not always the case. For example, from the Kent Summary Route Plan, it is acknowledged as follows: *'The work banks have been produced in alignment with asset policy and validated by the central Asset Management team. Where local circumstances dictate a variation to asset policy this has been documented and agreed as appropriate.'*
7. Analysis of CP5 proposed work volumes with CP4 work volumes and commentary on key differences	There is some comparison between the CP4 and CP5 work volumes, but this is not consistently presented.

Capability Element 1.12 Route Asset Management Plans	Comment
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	These are presented within the 'Route Performance & Capability Improvement Plan' section.

Table 7   How Network Rail's Summary Route Plans meet AMCL Roadmap Capability 1.12

The Summary Route Plans present a high level view of each Route's plans for delivery of the HLOS and other corporate requirements for the balance of CP4 and throughout CP5. All ten documents have been produced according to a defined format and the level of detail is generally comparable but does contain Route and asset discipline specific variations. They provide an effective description of how each Route is planning to achieve the requirements placed upon it.

However, it is apparent that the level of influence of the Asset Policies on the work volumes is not necessarily consistent across the Routes. This tends to be stronger in some disciplines such as signalling where work volumes for maintenance are cyclic, and renewal volumes are driven more closely by strategic initiatives such as ERTMS and NOS. Here, the Asset Policy appears to be acknowledged more clearly, and the Tier 2 scenario modelling more influential. For structures, in contrast, the commentary appears to be driven very much from local Route understanding of the condition of the assets.

✳   *CP5 Roadmap Recommendation 003*

Network Rail should develop a comparable format for Route Plans in terms of the degree of justification for any deviation from Asset Policy and modelled work volumes and costs prior to the publication of the next IIP

✳   *CP5 Roadmap Recommendation 004*

During CP5 Network Rail should establish long-term Asset Management planning processes, which enable production of strategic business plans as snapshots of a continuously managed long-term plan (i.e. business as usual). This should include a standardised and consistent format for data and information to enable comparability between control periods.

4.5.5 Delivery of the CP5 SBP and the Uncertainty Analysis

The generic approach to deliverability assurance at this stage is understood to be that the Route RAM teams liaise 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. Issues are then managed on an iterative basis. In practice, it was noted that tripartite reviews involving Route teams, IP and suppliers were relatively common place and would appear to represent good practice. Network Rail has also completed some work as part of the SBP submission which examines the uncertainty, risks and assumptions underlying delivery of the plan. This comprises three main elements – a qualitative risk assessment (NRSBP-SBP24), an uncertainty analysis (or quantified risk assessment) (NRSBP-SBP42), plus a 'Deliverability Review' (NRSBP-SBP43). The last two of these documents appear to be indicative studies only at this stage:

1) **Assumptions and Risks** (NRSBP-SBP24) – This document provides a qualitative assessment of the assumptions and risks which underpin the SBP, and includes assumptions about corporate policies and strategies, the external environment (economic, environmental and regulatory), technology and output requirements.

2) **Uncertainty Analysis** (NRSBP-SBP42) – The uncertainty analysis includes an assessment of the uncertainty of work volumes, efficiencies and unit costs for CP5 only. It is an indicative study, but does provide information on the asset disciplines which contribute the most uncertainty, and attempts to link expenditure to planned performance.

3) **Deliverability Review** (NRSBP-SBP43) – The deliverability study is effectively a qualitative risk assessment of the ability of Network Rail to deliver CP5 plans. Its conclusion is that there are some significant risks, however, there is also time between SBP and the start of CP5 in March 2014 for these risks to be mitigated.

The overall conclusion from reviewing these documents is that Network Rail's SBP plans are at the present time reasonably well defined, but are not yet fully understood with respect to whether Network Rail or the wider rail industry will be able to deliver them on the ground. Network Rail has recognised and identified that there are challenging issues that will impact deliverability in CP5. Examples include increased access requirements, signalling tester constraints, shortfall of competences required for the significant Electrification workload, etc. Notably, there seems to be a lack of alignment on the issue of Structures deliverability in CP5 between the overall review document and other key SBP documentation (NRSBP-SBP14). Network Rail has identified a number of actions that it will need to complete between now and March 2014, as described in an internal briefing to ORR:

- *People – A working party to explore the route to creating sufficient E&P capability has been established and is working with RIA, NSARE and the supply chain to develop.*

- *Plant & Equipment – Discussions have commenced on the procurement strategy for plant and equipment, including engagement with the supply base.*

- *Access – An enhanced central planning capability is being established to smooth the overall workload and provide single point liaison with Network Operations, Infrastructure Projects, DFT and ORR and other industry stakeholders. The current plans to improve access efficiency also need to be prioritised.*

- *Design & Planning – The case for CP5 funding and business cases in advance of the full determination is being finalised. CP6 development will also commence in CP5.*

Additionally, for each risk and issue that has been identified, while Network Rail has made recommendations on how to mitigate each of these risks and issues, there appears to be no real consideration of:

- Whether these are the only mitigating actions for the set of risks & issues that have been identified?

- To what extent will these mitigating actions address the risks, e.g. by what percentage will these risks be reduced?

The purpose of the uncertainty analysis is two-fold:

- How likely are Network Rail to achieve all their planned activities and interventions?

- What is the impact on PPM if Network Rail over/underachieve their activities & interventions?

In order to answer those questions, Network Rail has used a structured methodology for the uncertainty analysis which has been broken into 3 stages as below:

- Stage 1 – Renewals expenditure

- Stage 2 – Total company expenditure

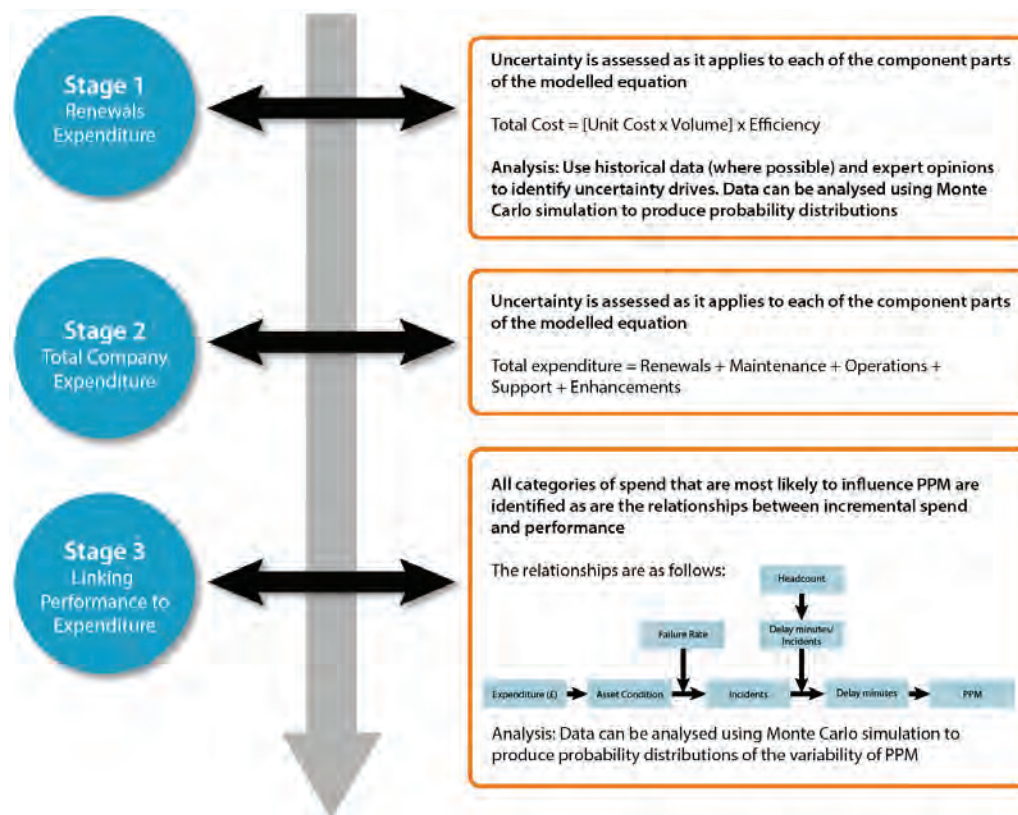- Stage 3 – Linking performance to expenditure

Diagram 17   Network Rail Uncertainty Analysis Methodology

Overall it would appear that the structure used in the uncertainty analysis process is comprehensive, robust and produces some useful output for all asset disciplines. However, there are varying levels of output across the asset disciplines. It is also caveated that all stages of the methodology are under development and it is made clear that the results should be considered as "indicative" only. Under each asset discipline section, Network Rail has specified areas for further developments to improve the uncertainty analysis. However, it is unclear:

- Why Network Rail only considers the high level of analysis conducted as "indicative" (discounting the lack of alignment with SBPT3302),

- Why Network Rail hasn't taken its quantified uncertainty analysis further at this stage,

- Whether future uncertainty analysis will be consistent with the method currently used.

It is also worth noting that the current uncertainty analysis is based on a 'top-down' view of uncertainty for each part of the expenditure plan. As Network Rail's SBP submission 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.

> **⊙ CP4 Roadmap Clarification 005**
>
> *Network Rail should review and revise the CP5 deliverability assessment and uncertainty analysis to assure that all risks have effective mitigation plans in place prior to the production of the CP5 Delivery Plan.*

An additional observation with respect to this is that Network Rail's plans are considered by AMCL to be ambitious in all areas, including organisational development and capability. This raises a concern that the benefits or efficiencies within the plan, particularly when they are associated with headcount reduction, need to be backed up by a robust change management plan. This does not appear to be evident amongst the SBP documentation or the evidence provided as part of this assessment.

> **⊙ CP4 Roadmap Clarification 006**
>
> *By the end of CP4 Network Rail should develop a clear change management plan which assures the risks associated with identified CP5 benefits and efficiencies are robustly managed.*

4.5.6 Strategic Planning Alignment by Discipline

As described in Section 4.5.2 Network Rail has developed and implemented a consistent strategic planning framework based on the application of nationally agreed Asset Policies. For renewal expenditure, these Asset Policies have been modelled at the centre to produce a 'top-down' assessment of the work volumes and costs required. They have also been applied at the Route level in a 'bottom-up' assessment, with work volumes adjusted according to Route-level needs and priorities. This has been completed within a formal change-control process. This process of alignment has been achieved to a varying degree of maturity across the asset disciplines, and Table 8 provides a summary of these differences.

Discipline	Maintenance & Statutory Inspections	Renewals	Enhancements & Investments	Comments on alignment process
Track	Maintenance costs were modelled in the Tier 1 model only.	Policy is to move to greater plain line and S&C refurbishment rather than full renewal. Tier 2 models define optimised refurbishment intervals.	Overlaid on the work bank.	Modelled top-down volumes were revised by the Routes to account for local issues and conditions.
Structures	Maintenance costs were modelled in the Tier 1 model only.	Policy aim is to reduce safety risk through focusing on PLBEs for each asset sub-group. Renewals are prioritised using condition trigger thresholds determined by an expert panel.	Overlaid on the work bank.	It is recognised that the full backlog will not be cleared in CP5, and so has been scheduled over CP5 and CP6. This means approximately 50% of the work bank is derived top-down, with the other 50% bottom-up.
Buildings	Maintenance costs were modelled in the Tier 1 model only.	Policy aim is to maintain condition and performance while minimising costs over the long-term. Achieved through modelling optimised interventions based on ARS and PARL.	Overlaid on the work bank.	Central planners worked with local Route teams to validate policy assumptions and understand key variances.
Signalling	Maintenance costs were modelled in the Tier 1 model only.	Policy is to develop targeted renewals to achieve lowest WLC given the strategic requirements of ERTMS and NOS.	ERTMS and NOS strategies drive enhancement and investments. They are also key factors in determining the shape and rate of the targeted renewals.	Policy scenarios are jointly developed by Route and Centre and tested in the Tier 2 model. So far 40% of anticipated capital expenditure has been justified in this way. Route work banks are directly used in the Tier 1 model.
Telecoms	Maintenance costs were modelled in the Tier 1 model only.	Policy is to renew specific items at lowest WLC based on Tier 2 modelled intervals optimised to maintain service levels.	ERTMS, NOS and FTN-X will influence telecoms renewal volumes.	There is no Centre / Route alignment required as the Centre developed the work volumes based on Tier 3 DST information collated in the Routes.
E&P	Maintenance costs were modelled in the Tier 1 model only.	High-criticality assets (mainly EP) have been modelled and like-for-like renewal frequencies optimised to maintain outputs over time. Policy is moving from age-based to condition-based.	Asset Policy aims to reduce electrical safety risks, and takes account of new electrification and potential DC to AC conversion.	Route teams reviewed Centre modelled work volumes for high-criticality EP assets and modified for local need. The remaining work banks were developed bottom-up.

Table 8   Strategic Planning Alignment by Discipline

Whilst degrees of maturity variation and discrepancies in approach are to be expected given the variety of assets and asset criticalities considered across the asset base, optimised strategic planning alignment would consider the management of normalised risk across the asset base via consistent alignment and validation processes (see CP4 Roadmap Clarification 007 in Section 5.4.2 on Capex Evaluation).

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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:

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

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

- 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 Targets

Table 9 below shows the scores from the 2011 (IIP Update) assessment, the target score from the AMCL Roadmap for the SBP, the actual score from the SBP assessment, the alignment of Network Rail's AMIP with the AMCL Roadmap as of August 2012,and comments on any variance from target.

Activity	IIP Update Score	SBP Roadmap Target	SBP Score	Summer 2012 Alignment Report	SBP Target Achieved	Comments
Capex Evaluation	57%	60%	65%	G	YES	**Roadmap** – 5/7 achieved, 2/7 partially achieved **Target exceeded** due to following: • Tier 1/2/3 models in place and aligned to revised Asset Policies • Modelling has exceeded Roadmap expectations • Route Plans generally aligned with Asset Policies with variances understood via initial central modelling and subsequent HAM/RAM reconciliation and change control processes
Opex Evaluation	42%	56%	51%	A	NO	**Roadmap** – 2/7 achieved, 4/7 partially achieved, 1/7 not achieved **Target not achieved** due to following: • 'RBM' process defined with maintenance strategy in place - but this is still RCM based • Limited pilots completed to date • Training in progress for local adoption, but concerns remain about competence and ability to roll out • Risks associated with multiple local regimes • Process for justifying benefits realisation unclear
Asset Counting & Accounting	57%	63%	60%	R	NO	**Roadmap** – 1/2 achieved, 1/2 partially achieved **Target not achieved** due to following: • Different fit for purpose unit costing mechanisms and unit costs within disciplines, but these are not fully integrated • Completeness of unit costs and provenance of LDRs varies across disciplines

Table 9 WLC Justification Group Targets

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 10 and Table 11 below show a summary of the SBP assessment findings against each of the AMCL Roadmap capability statements within the Whole-life Cost Justification Group. These are split into maintenance (Table 10) and renewal (Table 11) elements.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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	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 Asset types are categorised into different risk categories, e.g. high, medium or low criticality asset types from a maintenance perspective	The maintenance criticality analysis has been undertaken and documented by March 2012 and is consistent with Network Rail's Risk Management Framework and Asset Policies. A sample of asset types has been identified in each risk category for inclusion in the pilot of the risk-based maintenance analyses programme by March 2012	This capability has been achieved. SBP Capability Statement considered closed against both the asset criticality analysis undertaken in each of the relevant Asset Policies and the detailed prioritisation analysis completed in the 'Optimising Maintenance Regimes' document published as part of the SBP. It should be noted that the work was completed post the date identified in the Roadmap and that there remains a continuing opportunity for better alignment with Network Rail's Risk Management Framework.
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 type 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 is complete and effectively directing the development of new maintenance regimes by March 2012	This capability has been partially achieved. This Capability Statement is largely covered by a combination of the SBP Infrastructure Maintenance Strategy, Optimising Maintenance Regimes and the high-level business cases for the Maintenance Efficiencies, such as risk based maintenance. However, there is no overarching Maintenance Strategy which considers the best blend of approaches for relevant asset types, regions, criticalities, etc. There is also a limited, in AMCL's opinion, approach to the consideration of probability and consequences.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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 is complete by April 2012.	This capability has been partially achieved. Whilst a number of the Capability Statement specification requirements are covered by the Optimising Maintenance Regimes document, it is considered by AMCL that the approach to items 4-8 inclusive are currently too immature to warrant closure.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP Assessment Findings
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 the risk-based maintenance regimes for the sample asset types within the pilot is in place by April 2012	This capability has been achieved. This Capability Statement is largely covered by a combination of the SBP Infrastructure Maintenance Strategy and the Optimising Maintenance Regimes and associated programme, although it is still at an early stage of development and implementation.
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 sample of asset types in the pilot by January 2013	This capability has not been achieved. The Barnstaple track pilot documentation shows robust revision of existing standards in line with specific trial requirements, but there is no evidence of quantified cost-risk optimisation.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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	An agreed corporate approach to the update of standards for new maintenance regimes is in place by January 2013	This capability has been partially achieved. Updated documentation evidenced for Barnstable and other pilots, including peer review and Professional Head review. However, overall updates to standards are at an early stage only and the corporate approach is currently being reviewed (100 Executive Rules) which may impact timescales.
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 sample asset types in the pilot is in place by January 2013	This capability has been partially achieved. A fully resourced is in place for the Barnstaple track and other pilots and the wider development programme, but does not yet consider the quantified cost-risk optimisation to achieve risk-based maintenance regimes.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP Assessment Findings
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 sample asset types in the pilot by April 2012	This capability has been achieved.

Considered to be closed against the specific SBP Success Criterion in terms of availability of MUCs for the Barnstable and other pilots and as part of the overall opportunity criticality analysis in the Optimising Maintenance Regimes document and further considered at a high-level in the overall RBM Business Case.

However, Network Rail will have to continue to review and assure appropriate unit costs are utilised as the programme moves forward. 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 planned and those stretch efficiencies which are not yet defined. |

Table 10   Summary of assessment findings for the WLC Justification Group (Maintenance)

Table 11 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	SBP Success Criteria	Summary of SBP 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	1. The Capex criticality analysis has been undertaken and documented by July 2012 and is consistent with Network Rail's Risk Management Framework. 2. The method of grouping assets within an asset type into risk categories has been documented by July 2012	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	A draft strategy is in place by June 2012 that defines how the Asset Policies and Decision Support Tools will be deployed across Network Rail's Routes	This capability has been partially achieved. Network Rail has evidenced a number of development strands and high-level plans but there is no coherent and integrated approach currently documented for further DST deployment.
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	1. Asset Policy funding and technical scenarios are agreed by June 2011. 2. Revised funding and technical scenarios are agreed after the HLOS publication in August 2012.	This capability has been partially achieved. Technical scenarios are generally considered in the relevant Asset Policies. However, there is a lack of clarity regarding overall funding scenarios considered, with the SBP focusing purely on alignment to HLOS.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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);	1. Asset Policies for renewal and enhancement are segmented by risk category to include the specified improvements by January 2013 for all high and medium criticality asset types. 2. System or route-wide opportunities for further policy enhancement are identified by January 2013.	This capability has been achieved. Considered to be closed against the relevant Asset Policies and associated DSTs.
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 evaluation of the CP4 Asset Policy expected outcomes has been undertaken for all high criticality asset types by June 2012 and lessons learned incorporated into the CP5 Asset Policy development process	This capability has been achieved. Anticipated outputs for CP5 identified in SBP and longer term via the models. Asset output measures and targets have recently been developed and provided although it is noted that these are at an early stage of development and maturity. The overall process is captured in the new Asset Management System, although again this is also at an early stage of implementation.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP Assessment Findings
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 CP4 Asset Policies is complete and effective from March 2012	This capability has been achieved. Considered complete against the Network Rail identified evidence and through discussions with the Route RAM teams. Clear evidence was provided of extensive communication with HAMs, although no specific dates were identified for the CP4 policy implementation.
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.	Appropriate Decision Support Tools are complete and are being used to inform the CP5 Asset Policy development by June 2012	This capability has been achieved. Considered complete and evidenced by the relevant Asset Policies and Tier 1 and Tier 2 models reviewed as part of Progressive Assurance and during the AMEM Assessment. However, it is noted that the tool development occurred largely simultaneously with the Asset Policy development so the benefits of potentially driving, rather than validating, the Asset Policies from the completed tools may have been constrained.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP Assessment Findings
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 criticality asset types by April 2012 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 SBP, the achievement of efficiencies and the establishment of Framework Contracts, where applicable. However, there is still significant development required to optimise the unit costs, with the use of LDRs still frequent and often significant/material in the development of Route Plans for some asset groups. Therefore any variance in unit costs at the national and Route levels will contribute to uncertainty in the alignment. Also, the application of confidence ratings currently appears variable.

Table 11   Summary of assessment findings for the WLC Justification Group (Renewal)

5.3
Opex Evaluation

5.3.1 Overall Maintenance Strategy

Opex Evaluation has not achieved the SBP Roadmap target. Network Rail's current maintenance requirements for its diverse asset base are based on historical approaches that have evolved over many years. Network Rail notes (NRSBP-SBP39) that the majority of changes that have been applied to the current maintenance requirements are the result of accidents, incidents and new technology. This is not uncommon in large infrastructure managers across a variety of industry sectors but falls some way short of current best and even good practice.

Under the newly devolved organisation the accountability for definition of maintenance requirements remains with the asset discipline Professional Heads in the Central organisation and are developed in consultation with other stakeholders. The Professional Heads are also accountable for the subsequent production and governance of maintenance standards in accordance with the relevant Asset Policies.

The maintenance standards are implemented by the maintenance teams within the devolved Route organisations, using in-house resources for the majority of rail specific activities. External contractors are used to support non-rail specific activities, including within the Civils and Telecoms asset disciplines. The chart below summarises the in-house activities (in blue) and the externally contracted activities (in red). The chart also shows the split of maintenance expenditure within Network Rail (NRSBP-SBP39) and that the combination of Track, Signalling and Route/HQ management costs account for almost 80% of total spend. Further details on the current delivery of maintenance within Network Rail can be found in Section 6 on Lifecycle Delivery.
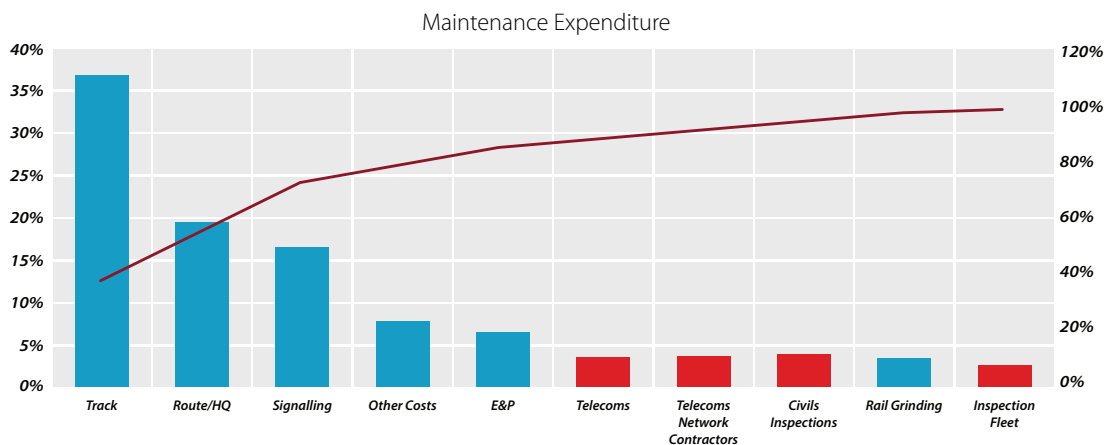

Diagram 19   Network Rail Maintenance Expenditure by Activity (source – SBPT3169)

Network Rail did initiate the development of quantified risk-based maintenance regimes in the early 2000s but since then has focused on the development of Reliability-Centred Maintenance (RCM) using the RCM2 methodology. The acronym RCM in this sense should not be confused with Remote Condition Monitoring (also RCM) which Network Rail aligns with its Intelligent Infrastructure (II) initiative. The majority of the maintenance review work over the last decade has therefore focused on the development of RCM-based maintenance regimes within the Signalling asset discipline under the RoSE (Reliability-centred maintenance of Signalling Equipment) programme. AMCL has previously commented on the technical process and overall progress of the RoSE programme[1].

Network Rail's overall Infrastructure Maintenance Strategy (NRSBP-SBP39) passes comment on the development of RCM and the RoSE projects to date and also notes that there are a number of remaining opportunities to improve the efficiency and effectiveness of maintenance regimes within the organisation. The company's actual approach to developing its maintenance regimes in a risk-based direction is encapsulated in a separate document (NRSBP-SBP28) entitled 'Optimising Maintenance Regimes' which is discussed further below.

It is however worth noting that Network Rail's 'Risk-based Maintenance' (RBM), as focused on in the Optimising Maintenance Regimes document, is just one of a number of maintenance efficiency initiatives identified by Network Rail in the SBP, as shown in Diagram 20.

Initiative	Total saving CP5 £m		
	E&W	Scotland	GB
Risk-based maintenance	30.2	4.7	34.9
Working practices	26.1	4.1	30.2
Indirect organisation	20.5	1.0	21.5
Mechanisation	17.5	3.6	21.1
Asset information – ORBIS	25.1	2.6	27.7
Intelligent infrastructure	10.9	2.0	12.9
Rapid response	3.6	0.2	3.8
Recycling of materials	6.0	2.3	8.3
Contract strategy	8.8	2.4	11.2
Multi-skilling	11.9	2.7	14.6
Standardisation	6.9	0.8	7.7
Total	167.4	26.4	193.8

Diagram 20 Network Rail's National Maintenance Efficiencies (source – SBPT222)

1   *Review of RoSE, Version 1.0, AMCL, 29th July 2011*

National business cases have been developed for each of the identified initiatives and it is understood that the devolved Routes considered the national business case and identified the scale of gains applicable to the specific context of the Route for CP5. However, there is limited detail of this available within the Route Plans and associated evidence.

> ✳ *CP5 Roadmap Recommendation 005*
>
> *Network Rail should develop Route level business cases and delivery plans for maintenance efficiencies for implementation and monitoring during CP5.*

Furthermore, the suite of initiatives identified, although clearly beneficial to some degree on a stand-alone basis have not been demonstrated, in AMCL's opinion, to be part of a formal policy or strategy for the optimised and integrated application of the initiatives to the asset base. For example, specific failure modes, identified via formal FMEAs or other appropriate techniques, may best be mitigated by the II initiative, a mechanised approach, or a risk based maintenance task(s), but not necessarily all. As a further example, there is a statistically accepted optimal balance between the percentage of assets fitted with remote condition monitoring (II initiative) and the dis-benefit incurred from the number of false alarms produced. The implementation of the II initiative is explored more in Section 6 on Lifecycle Delivery.

This level of definition or an overall strategy across the initiatives suite based on Route Criticality or other appropriate assessment does not appear to be currently established. An integrated approach such as this is likely to achieve more optimal efficiencies.

> ◼ *CP4 Roadmap Reiteration 003*
>
> *Network Rail should develop an overall maintenance strategy, for incorporation within the CP5 Delivery Plan, which clarifies how the various maintenance initiatives will be optimised and integrated across the asset base.*

5.3.2 Optimising Maintenance Regimes

Although colloquially termed 'risk-based maintenance', Network Rail's approach to optimising maintenance regimes (defined in SBPT3004) is considered by AMCL to be a phased programme of development from the current largely historical maintenance regimes, through multiple iterations of RCM development, supported by increasing quantitative asset information, to locally defined and ultimately 'complex' risk-based regimes. The 'complex' risk-based regimes will be achieved in the final stage only.

Whilst this represents a common approach to the first stage of optimisation of maintenance within an organisation, with the development of FMEAs and subsequent task allocation (as shown in Diagram 21) providing justified maintenance tasks prior to the development of cost-risk optimised maintenance intervals, the terminology used in the earlier phases of Network Rail's programme should be carefully considered. In discussions with the Routes the development status of the 'risk-based maintenance' initiative was considered to be relatively immature and the Route teams were only just beginning to see the initial outputs of the centrally led work stream during the assessment period. It was also suggested that the nomenclature 'risk-based maintenance' was potentially misleading and the current outputs were more akin to a 'criticality based maintenance' approach.
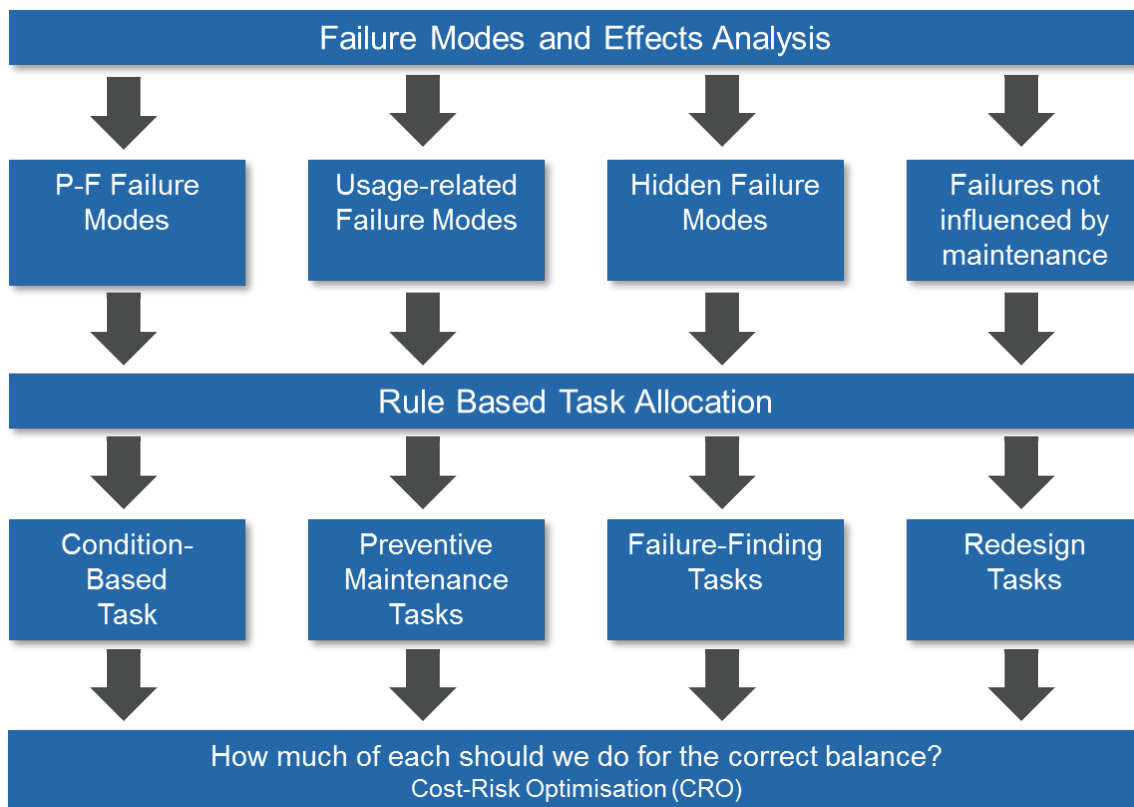

Diagram 21 Alignment of Maintenance Tasks to Failure Modes

It should be noted that the appropriate task(s) to mitigate a failure mode risk may not be simply 'classic' inspection or maintenance interventions and could be selected from a range of options including remote condition monitoring, mechanised inspection or redesign. This tactical alignment of mitigation options to failure modes should be considered as part of CP4 Roadmap Reiteration 003 in the previous section.

The Optimising Maintenance Regimes document introduces the theory that Network Rail will adopt to achieve the ultimate stage of complex cost-risk optimised maintenance intervals, shown in Diagram 22 below.
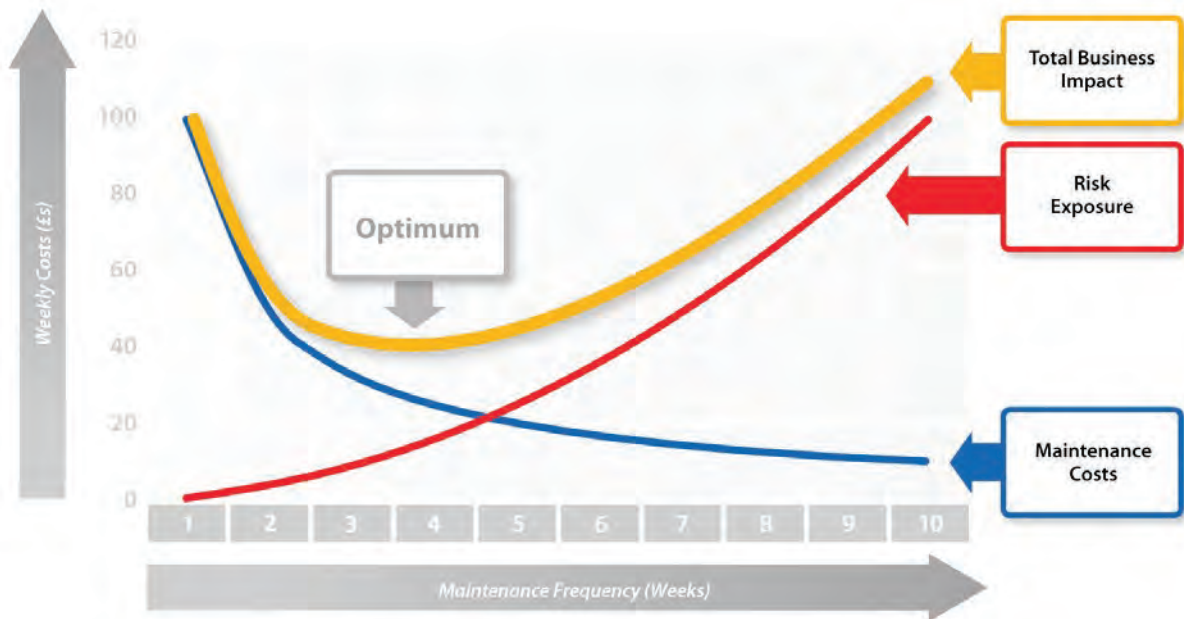
Diagram 22   *Fully Quantified Cost-Risk Optimisation of Maintenance Frequencies*

This degree of quantified cost-risk optimisation is understood to be aligned only with the 'complex regimes' element in Stage 5 of Network Rail's progressive programme of work, the previous stages being iterations of RCM development and application. Network Rail's high-level programme is summarised in Diagram 23, including the progressive requirement for enhanced asset information from the current status to support its development.

Diagram 23 Network Rail's Strategy for Developing Complex Risk-based Maintenance Regimes (source – SBPT3004)
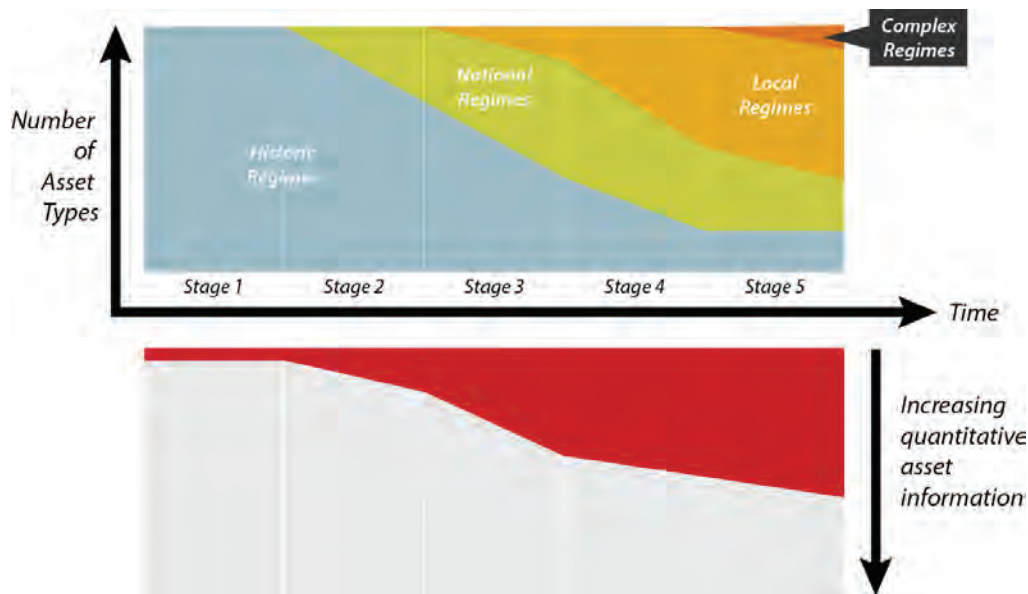
The specific stages of the programme are understood (NRSBP-SBP28) to be:

- Stage 1 – Baseline of routine and cyclical 'one-size-fits-all' historical maintenance regimes including the intuitive consideration of risk parameters identified over time.

- Stage 2 – National regimes based on RCM techniques with consideration of consequences and cost effectiveness of control measures analysed on a qualitative basis with limited asset information.

- Stage 3 – Local regimes based on RCM with consideration of consequences and cost effectiveness (including relevant Schedule 8 payments, i.e. criticality) of control measures analysed on a qualitative basis at a local level. This will require enhanced asset information at a more granular level than Stage 2.

- Stage 4 – Maintenance regimes fully supported by data including failure characteristics and deterioration curves for all major assets.

- Stage 5 – Complex risk-based maintenance regimes developed using a series of analysis tools to understand complex trade-offs of cost and risk which, due to the complexity of the analysis and supporting asset information requirements, are only likely to be of demonstrable value on the most critical assets.

Network Rail does note in SBPT3004 that the intention is not to develop all maintenance regimes through the five-stages which is in accordance with AMCL's view of good practice maintenance optimisation shown in Diagram 24.
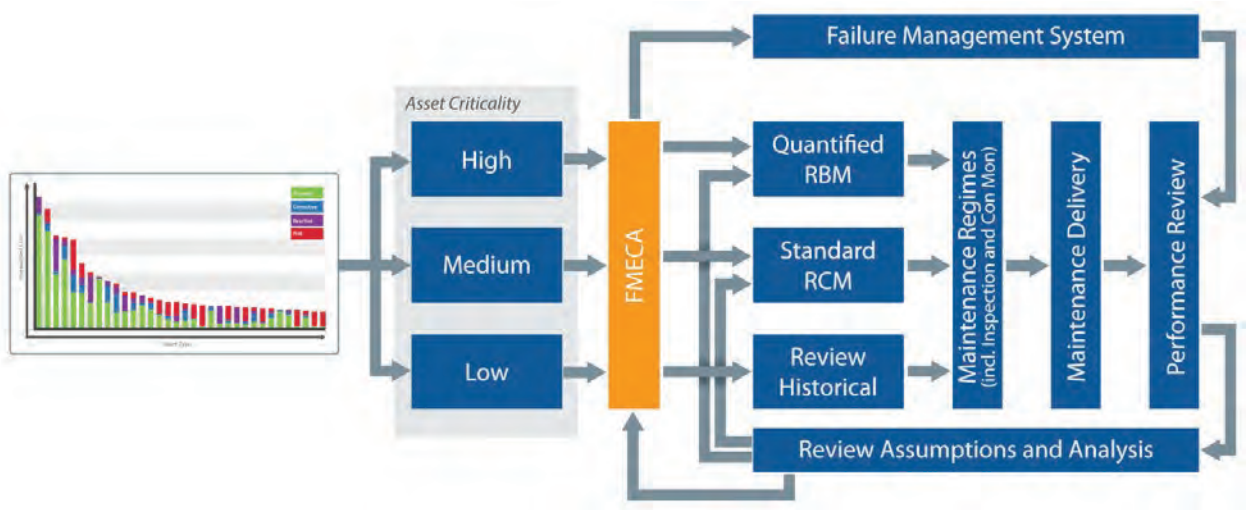
Diagram 24 AMCL's Good Practice Opex Optimisation Process

A summary of Network Rail's high-level progressive programme milestones for optimising maintenance regimes and the current status of the programme are shown in Diagram 25.
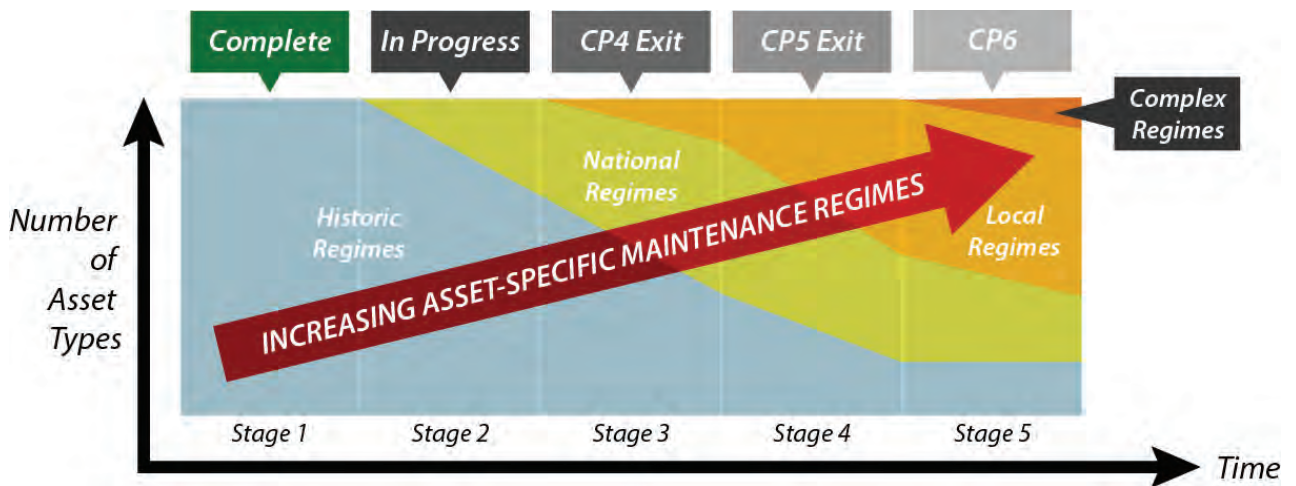
Diagram 25 Network Rail's Progressive Programme Summary (source – NRSBP-WLC1)

Network Rail's progressively developed approach should assure that appropriate and justified maintenance tasks are developed over time, prior to the establishment of best practice cost-risk based justifications of maintenance intervals and potential efficiencies for key assets. However, the true efficiencies of risk-based maintenance, gained via quantified cost-risk trade-offs to establish justified maintenance intervention frequencies, are not planned to be realised until CP6. It should also be noted that in AMCL's experience the process of developing fully quantified risk-based maintenance regimes can lead to increases in the total quantity of maintenance as well as decreases.

Prior to Stage 5 the consideration of revising maintenance intervention frequencies and missed maintenance tolerances is understood to be undertaken on a qualitative basis. These engineering judgement based proposals from the analysis team(s) are subject to review by the relevant Professional Head before authorisation for implementation is formalised. In the case of 'pilots' undertaken prior to wider implementation the authorisation may consist of a temporary non-compliance against the existing Engineering Standard for a specified set of assets. Those revised regimes that are authorised are subsequently made available to the Route delivery teams via updates to the relevant work management systems, such as Ellipse. This approach to maintenance regime change authorisation has been previously utilised by Network Rail for a number of years, including the authorisation of the outputs from the long-running RoSE programme.

However, good practice generally dictates a more quantified approach to maintenance regime alteration is appropriate, particularly as the outputs of the programme develop and start to facilitate a more quantified justification. This quantified approach is important to Network Rail for two reasons:

1. To ensure the risks associated with 'local maintenance regimes' regimes are fully understood and documented.

2. To ensure efficiencies can be justified where current maintenance is over-mitigating the risks associated with the failure of particular assets.

It is difficult to see how Network Rail can move forward from its standard national RCM maintenance regimes without introducing this quantified approach.

◪ CP4 Roadmap Reiteration 004

Network Rail should develop a formalised and quantified safety and reliability analysis process to justify that the risk associated with revised maintenance regimes is demonstrably as low as reasonably practicable prior to the start of Stage 3 of the 'Optimising Maintenance Regimes' programme.

How the future development and implementation of revised maintenance regimes is going to be managed was not clear to AMCL following the assessment. The current approach (NRSBP-SBP28) of review, modification of current Engineering Standards, or development of temporary non-compliances by peers and ultimately the relevant Professional Heads utilised for the pilots is likely to be difficult to manage and govern given a multiplicity of future 'local regimes' which will be developed under Network Rail's current process. It is understood (NRSBP-WLC1) that at a Route level the revised maintenance regimes will be in effect 'owned' by the relevant Route Asset Management teams whilst delivery accountability sits with the Route maintenance teams. Whilst

it is considered that this approach appears to align with what AMCL regards as good practice in the specification and delivery of maintenance to support continuous improvement, as shown in Diagram 26, it is not clear how ownership relates to the authorisation and governance of revised maintenance regimes.

◘ CP4 Roadmap Reiteration 005

By the end of CP4 Network Rail should develop a clearer definition on what level of authority a RAM has with respect to tailoring maintenance regimes and how the risks of such tailoring are controlled.
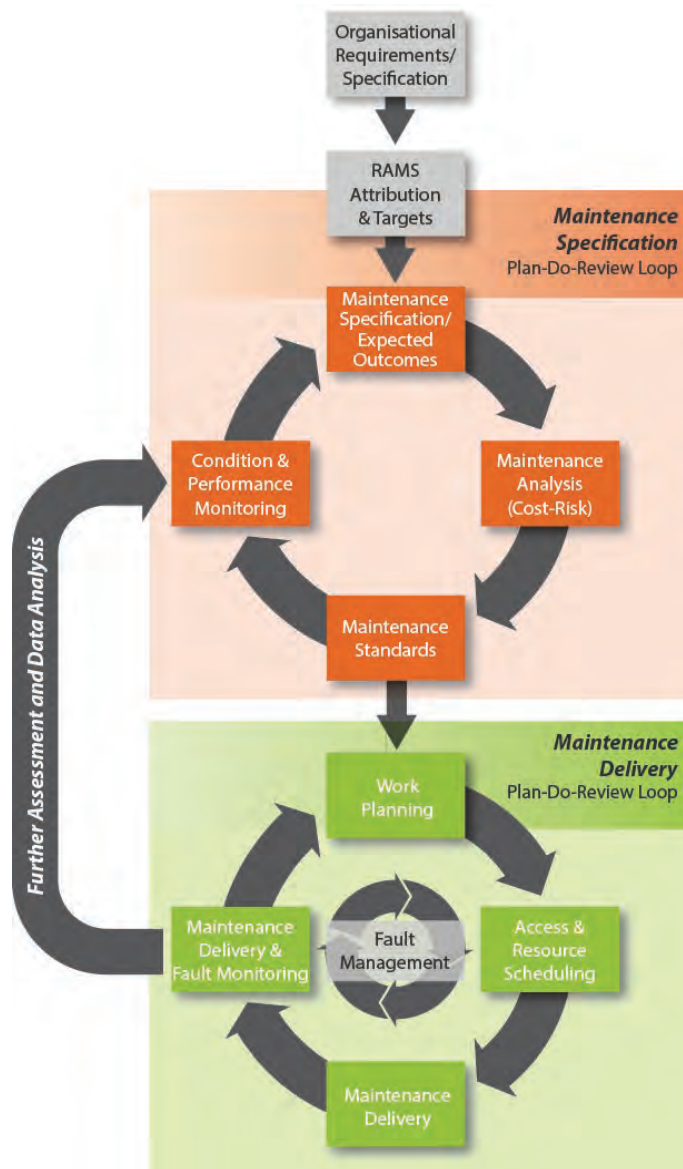

Diagram 26 Good Practice Continuous Improvement Plan-Do-Review Maintenance Cycles

5.3.3 Track

Although only recently subject to any form of formal risk-based review process (see discussion below of the Barnstaple pilot) the Track asset discipline is considered by Network Rail to have evolved a number of risk based parameters within its existing maintenance regimes. This consideration is based on a number of factors including the frequency of some interventions being defined by the Track Category Matrix, the close correlation between Track category and business criticality of the route and the current range of basic visual inspection intervals which are derived from a combination of track category and construction type. On this basis the approximate percentage of currently implemented maintenance expenditure derived using considerations of risk is shown in the diagram below.
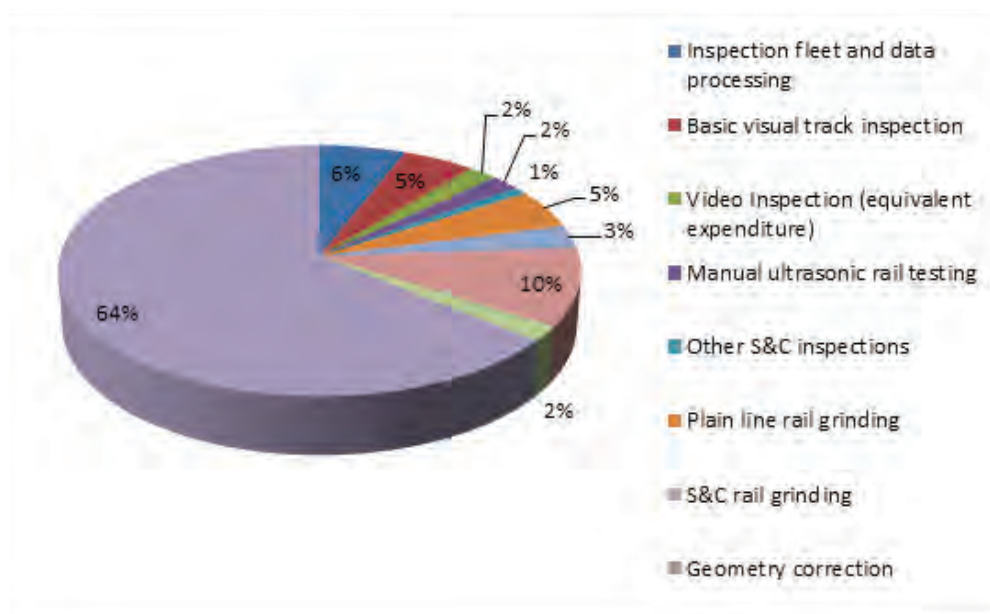
Diagram 27 Track Maintenance Activities Derived using Considerations of Risk

In terms of the optimisation of maintenance regimes using a risk-based approach the Track asset discipline has been subject to one of the earlier trials of a new Reliability-Centred Maintenance regime in the Barnstaple area (NRSBP-WLC2 to NRSBP-WLC5). The definition of the pilot was well evidenced by Network Rail including the outputs of the Reliability-Centred Maintenance process, the range of modules governing and defining the revised maintenance, including relevant pilot specific alterations to NR/L2/TRK/001 and the temporary non-compliance arrangements against current Engineering Standards for the pilot.

The pilot was also subject to weekly monitoring on a passive basis by competent Maintenance Services personnel to confirm degradation rates and that line was still fit for traffic. The outputs of these inspections were used to inform the overall maintenance optimisation programme for Track as the current data is considered subjective and hard to drive quantified maintenance optimisation with.

Although the Barnstaple pilot was the most advanced of the Track pilots at the time of the assessment two further trials were also noted as on-going: Bletchley to Bedford which included S&C in the scope, and Taunton to Exeter.

Following the monitoring of the Barnstaple pilot, Network Rail identified that the analysis and processes established had been very localised and specific and the organisation now faced the issue of developing more generic regimes to be applied nationally using more generic risk thresholds rather than developing specific maintenance regimes and associated Engineering Standards (or TNCs) for every variation of the asset base and environment.

5.3.4 Structures

The Structures asset discipline is considered by Network Rail in SBPT3004 to include features or parameters of risk for all maintenance expenditure. However, this does not appear to demonstrably be the case for visual inspections of Structures which are generally aligned to an interval frequency of one-year by Network Rail Standard NR/L3/CIV/006 which states:

'In so far as is practical, the interval between Visual Examinations of a Structure shall be 12 months unless:

- *The timing of a Visual Examination would coincide with a Detailed Examination of that Structure, in which case a separate Visual Examination is not required.*

- *A shorter interval is required because of the nature of the Structure; for example, non-operational Structures where frequent informal observations do not occur.'*

However, detailed examinations are scheduled on a simplistic risk basis in NR/L3/CIV/006 which defines the approach for the compound assessment of risk on a 'Lower', 'Medium' and 'Higher' categorisation basis for the majority of critical asset types. An example of one element of the assessment for bridges is shown in Diagram 28.

Attribute	Risk Category		
	Lower	Medium	Higher
BCMI overall score	>75	45≤ score ≤ 75	<45
Capability	Spare capacity		Discrepancy and Marginal

Diagram 28   Risk category Overline Bridges, Viaducts and side Bridges (source – NR/L3/CIV/006)

The highest risk category resulting from the compound assessment is then considered against the asset construction type to identify a detailed examination shown in Diagram 29 below (for bridges).

Primary Material	Maximum interval between Detailed Examinations (years)		
	Lower	Medium	Higher
Brick	18	12	6
Cast Iron	3	2	1
Cast in-situ reinforced concrete	12	6	3
Early steel	6	6	3
Fibre reinforced polymer	12	6	3
Mass concrete	18	12	6
Post tensioned concrete	6	3	1
Pre-cast concrete	12	6	3
Pre-tensioned concrete	12	6	3
Steel	12	6	3
Stone - single ring arch	12	6	3
Timber	3	2	1
Wrought iron	6	6	3

Diagram 29   Examination Intervals Bridges (source – NR/L3/CIV/006)

The compound risk categorisation process pertaining to bridges in NR/L3/CIV/006 represents the most complex approach taken within the asset discipline, with other asset types having generally simpler methods for defining the risk based interval for detailed examinations.

Whilst this approach does represent some degree of risk consideration in the definition of maintenance regimes for Structures and includes consideration of tonnage for under bridges, the risk element is defined by civil engineering factors and does not consider business criticality. The various thresholds, categorisations and intervals utilised in the process are also based on qualitative engineering judgement, so do not represent good practice quantified cost-risk optimised maintenance regimes. Network Rail has stated in SBPT3004 that it is currently unclear if any further opportunities for optimisation of Structures maintenance regimes will be afforded by the current progressive programme of reliability-centred maintenance or the potential, more complex, risk-based maintenance regimes in the future.

No recommendations have been made in this section due to the continued scrutiny and development of the maintenance of Structures under the BCAM (Buildings and Civils Asset Management) programme.

5.3.5 Signalling

Signalling is the asset discipline that has been the most impacted by maintenance regime review to date following the application of the RoSE programme to develop and implement a number of Reliability-Centred Maintenance regimes over the past decade. The RoSE programme utilised the RCM2 (after Moubray) process to undertake FMEAs, assign maintenance tasks, and in some cases alter maintenance intervention frequencies on a qualitative engineering judgement basis. AMCL has extensively reviewed and commented on the RoSE process and programme previously[2] so that is not repeated here.

As a result of the activity to date Network Rail has identified that the approximate percentage of currently implemented maintenance expenditure derived using considerations of risk is as shown in Diagram 30.
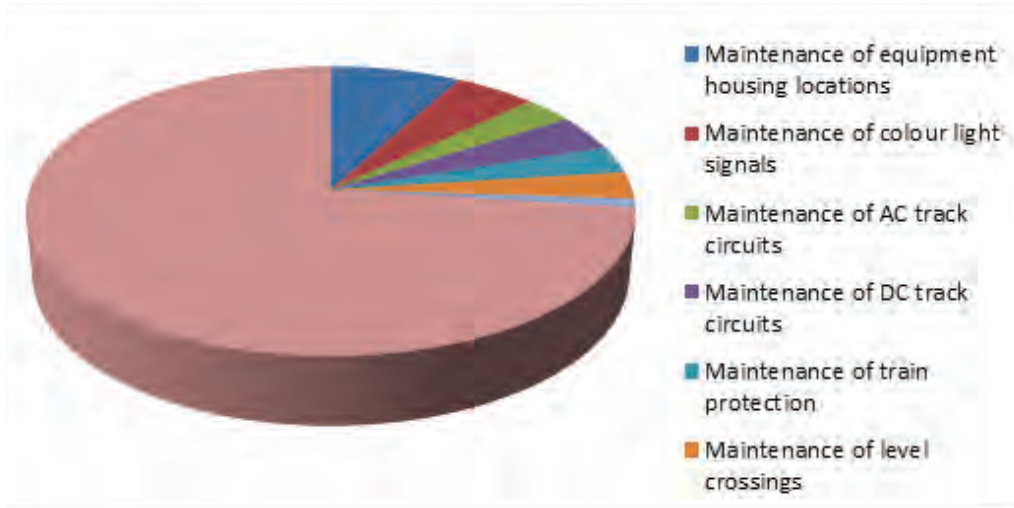
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2   *Review of RoSE, Version 1.0, AMCL, 29th July 2011*

Diagram 30   Signalling Maintenance Activities Derived using Considerations of Risk

This highlights that despite the work to date of the RoSE programme there may be significant opportunity for efficiency remaining, particularly with respect to critical assets such as interlockings and via the development of cost-risk opportunities to enhance the RCM2 work to date, as and when asset data quality is enhanced to a suitable level.

It is also noted that the latest Stage 2 (Reliability-Centred Maintenance) revised maintenance regimes were released for implementation shortly prior to publication of this report (NRSBP-WLC1) and included the following Signalling maintenance regimes:

- AC Track Circuit;

- Locs revision;

- MSL Crossings; and

- Points Operating Equipment.

In change control:

- RCM Maintenance Regimes:

- Train ready to start plunger;

- Train describers; and

- FS2 600 TC (PM).

This evidences the continued and accelerated rollout of Reliability-Centred Maintenance regimes based on current asset data and engineering judgement, although it should be noted that AMCL has not reviewed the regimes or their application as part of this assessment.

5.3.6 Telecoms

The Telecoms asset discipline has also been subject to some development under the RoSE programme (sometimes referred to as RoTE – Reliability centred maintenance of Telecoms Equipment) where the assets were generically similar to Signalling assets. As a result of that work Network Rail has identified that the approximate percentage of currently implemented maintenance expenditure derived using considerations of risk is as shown in diagram 31.

Diagram 31 Telecoms Maintenance Activities Derived using Considerations of Risk

Again, the analysis identifies that there may be future opportunities via the development of cost-risk opportunities to enhance the Reliability-Centred Maintenance work to date, as and when asset data quality is enhanced to a suitable level, and from the extension of the current Reliability-Centred Maintenance approach to the wider asset base. Network Rail has evidenced the continued application to the wider asset base via the latest Stage 2 (Reliability-Centred Maintenance) revised maintenance regimes released for implementation shortly prior to publication of this report (NRSBP-WLC1), which included the following Telecoms maintenance regimes:

- Telecoms PETS;

- DOO CCTV;

- Radio masts, antennae, fall arrest systems and feeder cables;

- GSM-R, BTS, TCU and BSC; and

- IVRS (light touch).

In change control:

- RCM Maintenance Regimes;

- FTN Transmission.

5.3.7 E&P

The OLE asset type within the Electrical Power and Fixed Plant asset discipline is the only asset type within the diverse asset base which currently considers risk as part of its maintenance regime. The approach was developed prior to the RoSE project using the MACRO model as part of a multi-industry, UK government supported joint venture. This approach considers line speed and the number of pantograph passes per day to establish a degree of risk categorisation for OLE inspection.
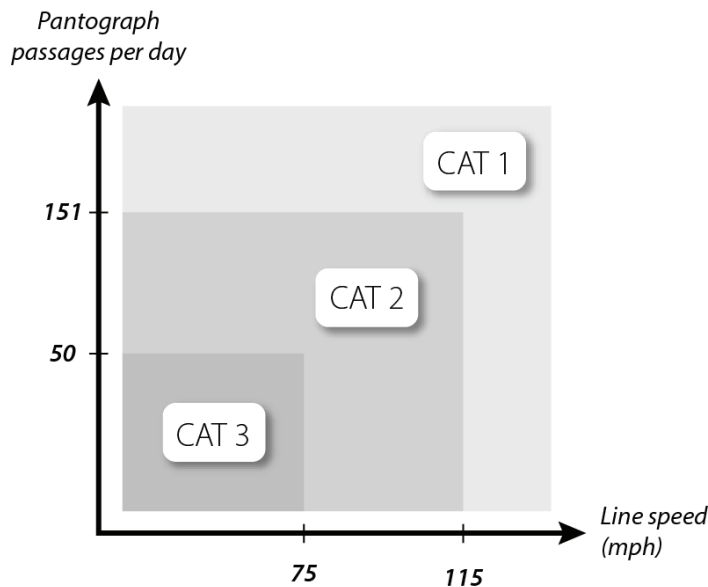
Diagram 32 OLE Inspection Categorisation Grid

Since the MACRO update to the OLE maintenance regimes, they have been subject to one further review during Stage 2 of the Reliability-Centred Maintenance initiative. It was reported that this did not trigger major changes to the OLE regime, although it did clarify an overall maintenance strategy for OLE made up of the following:

- Mandatory tasks, which are primarily safety-related backstops;

- Risk-based tasks, which are primarily reliability or performance related; and

- Technical tasks for off-line technical evaluation.

It was also reported that there is no specific implementation plan for this, and that the regime will be issued once the current moratorium on standards is lifted. As a result of this Network Rail has identified that the approximate percentage of currently implemented maintenance expenditure derived using considerations of risk is as shown in Diagram 33.
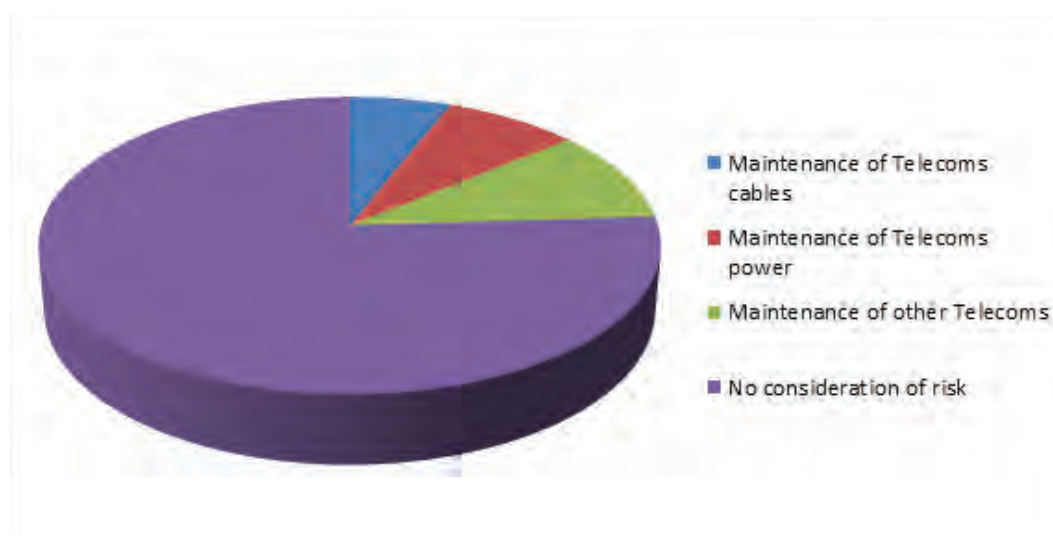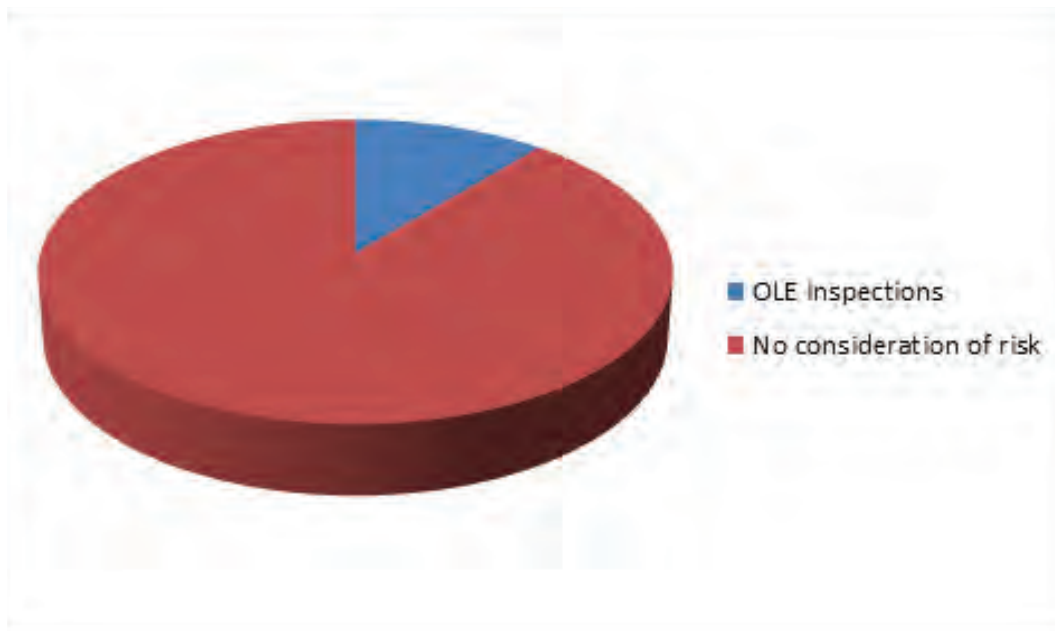
Diagram 33 EP Maintenance Activities Derived using Considerations of Risk

5.3.8 Ops Property

Network Rail's Optimising Maintenance Regimes document makes no mention of the Operational Property (Buildings) asset discipline and AMCL is not aware of any current plans to develop basic reliability-centred or more complex risk-based maintenance regimes for the asset discipline. However, the Asset Policy for Buildings Fabric (NRSBP-SBP35) does identify that:

'…a number of on-going initiatives may improve how risk is incorporated into future decision making processes for buildings. These include risk based maintenance (reliability centred maintenance, FMEA, etc) and further development of the buildings asset policy and modelling approach (i.e. use of more targeted risk bands rather than single thresholds).'

The new Asset Policy for Mechanical & Electrical assets (NRSBP-SBP36) considers 'risk-based maintenance' as one of its key asset maintenance strategies (Diagram 34) in accordance with relevant legislation (BS 8544 – Guide for LCC of maintenance during the in use phases) as shown in Diagram 34, however, there was no evidence of a cost-risk optimised and quantitatively justified maintenance regime being utilised or developed.

Diagram 34 Buildings (M&E) Asset Maintenance Strategies (SBPT3016)

5.3.9 AMEM Opex Evaluation Criteria Assessment

In summary, this assessment has shown that Network Rail has made some progress since the last assessment in the development of an overall strategy for optimised maintenance regimes (including considering the requirements and input of relevant stakeholders), prioritisation of maintenance analyses and the use of a systematic methodology for the linking of tasks to failure modes, but that the methodology being utilised still falls short of established good industry practice. It was also noted that the identification of deterioration characteristics and completion of hazard analyses had progressed for assets which had been subjected to the RCM (Moubray) analysis process.

Areas of the Opex Evaluation Criteria where greater opportunities remain include the quantitative determination of loss and consequences, the quantitative establishment of maintenance intervention frequencies and the development of maintenance regime safety and reliability justifications (see CP4 Roadmap Reiteration 004).

In light of the above, what's been learned from the pilots undertaken to date by Network Rail and the consideration of Network Rail's process (NRSBP-WLC1) against good practice it is considered that Network Rail should revisit its approach to the optimising of maintenance regimes.

◻ *CP4 Roadmap Reiteration 006*

Network Rail should review its approach to risk-based maintenance, particularly with respect to quantified cost-risk optimisation, and subsequently undertake an accelerated programme to implement the revised approach for the three most critical asset types by the mid-point of CP5 to test and validate the process.

5.4
Capex Evaluation

5.4.1 General Overview

Network Rail's score for the Capex Evaluation criteria has increased considerably since the last assessment and has exceeded the SBP Roadmap target. A significant amount of work has been completed, particularly with respect to Asset Policies and associated models. However, there are some areas of Capex Evaluation capability that are not fully developed or fully effective at the SBP stage:

1) Progress has been made in linking capex interventions to Route Specifications, however, the link is currently considered by AMCL to be high-level and largely engineering judgement based. With the notable exception of TRAIL modelling undertaken for Western Route and the Crossrail and Thameslink projects, there are no asset specific Route level RAMS targets aligned with overall output requirements that AMCL is aware of. This makes 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).

2) Additionally there appears limited empirical evidence to support the understanding of the direct impact of the capex interventions on asset performance or other appropriate Asset Management measures.

3) It is understood that planned outputs for the Routes are essentially 'flat-lined' at CP4 exit rate, but if CP5 funding was constrained it would currently require a reworking of the modelling, Asset Policy (and associated work bank rules where relevant), and the required outputs of the Route.

The following sections provide an overview of Network Rail's progress against the key aspects of the Capex Evaluation criteria at the time of this assessment and with a particular focus on the Capex evaluation process leading up to the publication of the recent SBP. For further related findings please refer to Section 4.5 on Strategic Planning & Asset Management Plans.

5.4.2 Asset Policies

As previously mentioned, the Asset Policies have continued to improve since the last assessment supported by the concurrent development of enhanced WLCC and strategic planning models. Ideally the models, particularly the WLCC models, would have been developed prior to the main revision of the Asset Policies for CP5. This would have allowed the WLCC models to more directly

drive the development of the Asset Policies. In practice it is understood that although this was the case in some elements of some Asset Policies in general terms the WLCC models were used to validate rather than drive the Asset Policies.

With respect to the Asset Policies themselves, Network Rail's ten-step development process, shown in Table 12 below, remains fit-for-purpose in the assessment team's opinion.

Development Step	Description
1. Asset Description	Asset types, location, volumes, configuration, interfaces
2. Historical Analysis	Trends in asset age, cumulative duty, remaining life, condition, failures, service impact, historical work volumes and costs
3. Asset Criticality	Prioritisation – so rigour of analysis is proportionate to impact of assets on safety, train performance, costs
4. Route Criticality	Basis for differentiation of policy according to location of asset on network
5. Asset Degradation	Analysis and quantification of degradation mechanisms, links to asset failure and service impact
6. Intervention Options	Existing and potential intervention types, effectiveness of interventions, unit cost
7. Output and Intervention Scenarios	Specification of infrastructure service requirements and range of intervention options to be analysed
8. Modelling / Decision Support Tools	Whole lifecycle costing models and models for forecasting activities, expenditures and outputs at portfolio level
9. Investment Optimisation	Comparison of results from analysis of range of intervention options and output scenarios
10. Policy Selection	Preferred intervention regime based on lowest whole life cost and other factors; specification of intervention rules to support development of route Asset Management plans

Table 12 Network Rail's Ten-Step Asset Policy Development Process

Combined with the supporting models the process provides a logical and sequenced approach for the development of justifiable whole-life cost based asset intervention policies. Because of the scale and complexity of the analysis involved, capturing all the relevant outcomes tends to result in large documents which may be unwieldy or impracticable for use on a day-to-day basis. This is a simple production factor which Network Rail has considered different options for in the past but could impact the essential understanding, acceptance and integration of the Asset Policies throughout the organisation.

The availability and quality of historical failure rates, condition data and subsequently degradation rates varies across the asset disciplines. Where one or more of these is poor it is considered a constraint on the demonstrable robustness of the Asset Policy. Another general area of variance across asset disciplines is the robustness of the asset criticality approach which is considered to constrain the optimisation of capex evaluation and prioritisation at a network or system level.

> ⊙ *CP4 Roadmap Clarification 007*
>
> *Network Rail should develop and implement a consistent and comparable approach to determining asset criticality across the asset base, to facilitate optimised capex identification, validation and prioritisation, prior to the next SBP.*

5.4.3 Whole-life Cost Modelling

To support the development, validation and application of Asset Policies and to facilitate the central forecasting of longer-term asset intervention volumes, costs, efficiencies and outputs Network Rail has used the following three tier approach to modelling:

- Tier 1 – Strategic planning models (formerly known as Infrastructure Cost Models (ICMs)) which forecast work volumes, outputs and expenditures for an asset discipline, such as Signalling or Telecoms;

- Tier 2 – Strategic WLCC models which calculate the whole life cost for single asset types within an asset discipline, such as Point Machines within Signalling or Concentrators within Telecoms, for a range of asset intervention options and utilisation scenarios; and

- Tier 3 – Tactical models that support the specification and prioritisation of asset interventions in Asset Management plans, such as the Route Plans.

The tiered approach, although recently developed and still being refined, is considered by AMCL to represent technical good practice although the full integration and effectiveness of the models within the overall organisation and processes is still evolving. The development of the models has largely filled what was identified by AMCL as a significant gap in the whole-life cost justification of asset intervention plans in CP4.

Key to this is the improved justification of a whole-life cost approach at the asset level (see Diagram 35 for a Signalling example) provided by the Tier 2 models and the high-level forecasting of long-term outputs (see Buildings example in Diagram 36) through to CP11 by the Tier 1 models.

A number of the models for different asset disciplines can also model over much longer time horizons if required, although the confidence in the forecast diminishes over time as would be expected.
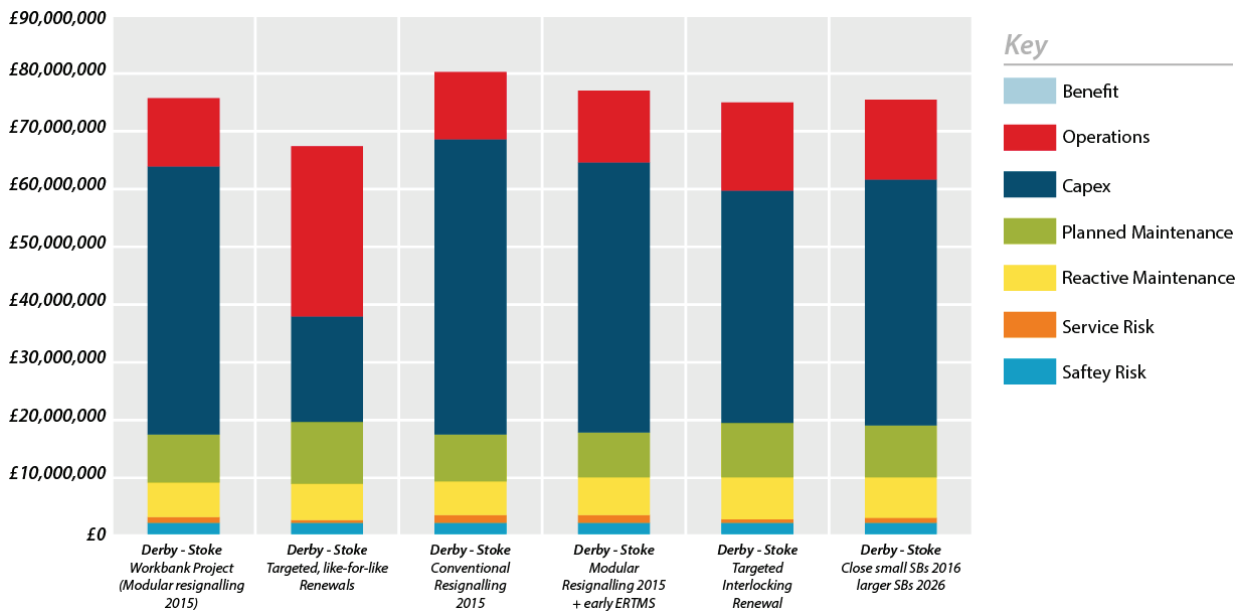
Diagram 35   Signalling Net Present Value Whole Life Cost Example (source – SBPT3011)
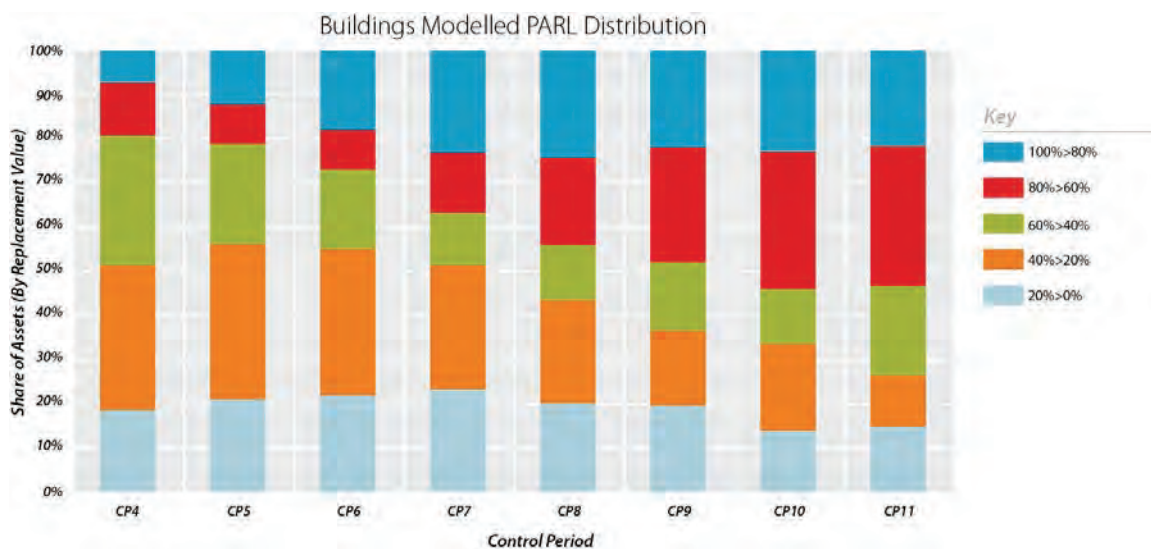
Diagram 36   Buildings Percentage Asset Remaining Life Example (source – SBPT3016)

Whilst a number of the inputs to the models currently rely heavily on engineering judgement the recently developed Tier 1 and Tier 2 models represent powerful tools for the purposes of systematic capex identification, options and whole-life cost analysis and the forecasting of long-term outputs.

They provide a sound basis for the continuous improvement and integration of the models themselves and increasing confidence in long-term capex forecasts as the asset infrormation input data quality increases and further emprical evidence is gathered of the direct impacts of capex interventions on the asset base.

> ✱ *CP5 Roadmap Recommendation 006*
>
> *During CP5 Network Rail should develop a Route-by-Route asset information specification, suite of knowledge standards and data collation plan to support the use of the three Tiers of modelling and Asset Management decision making at Route level.*

5.4.4 Impact of Devolution

Devolution has seen a significant organisational restructure and reassignment of roles and responsibilities within Network Rail. The capex intervention element of the SBP is a nominally 'bottom-up' plan, although this does vary by asset discipline, which relies on the DRAM and RAM teams within the Routes to assure the application of and alignment with Asset Policies and centrally modelled forecasts.

There has been evidence during this assessment process of the benefits of this approach, including application of the Asset Policies with greater and more direct knowledge of the particular circumstances at Route level and direct ownership of the capex interventions in the Route Plans.

The devolved structure has also seen a 'healthy tension' between the central organisation, responsible for the development of Asset Policies and the Route organisations which are now responsible for implementation of the Asset Policies. There has been evidence of both direct involvement of the RAM teams with Asset Policy development and direct challenge from the RAM teams to the Asset Policy.

However, there have been a number of deviations from Asset Policies and centrally modelled forecasts across a number of Routes. Whilst this is healthy and to be expected, the impact of devolution is that the final decision as to whether to comply with Asset Policy or not comes down to the Routes. Ultimately the DRAM makes the final decision on the maintenance and renewal costs, volumes and efficiencies within the Route Plan. Whilst this is a logical approach, it highlights the issue that tardy production or communication of Asset Policies could lead to misalignment of Route based asset intervention plans. This risk appears to have been mitigated in the build-up to the recent SBP by regular communication between HAMs and RAMs of Asset Policy developments and their implications prior to formal provision of the revised Asset Policies.

Devolution has also increased the need for Asset Management knowledge and decision making capability across the Routes as well as the central organisation. To assure value for money a whole life cost approach is required. As discussed above, Network Rail has made significant progress in the development of the Tier 2 WLCC models across the asset disciplines, however, there has been limited deployment to date of the resulting WLCC models to the Routes for use in their own planning processes, although this varies by asset discipline. Signalling in particular has developed a wide range of Route specific case-studies to support the Route level decision making and demonstrate greater robustness of CP5 plans. This has not been so evident across other asset disciplines, and even for Signalling the modelling process itself is understood to have been undertaken by the modelling experts within the central organisation.

AMCL understands that Network Rail is in the process of deploying the Tier 2 models to the Routes and a number of the RAM teams had recently undergone initial training at the time of the assessment. This represents a developing opportunity to improve the consistency of decision making within the Routes and the alignment of 'top-down' and 'bottom-up' plans. This is Network Rail's strategic planning framework and process as described in Section 4.5 on Strategic Planning & Asset Management Plans.

◾ CP4 Roadmap Reiteration 007

Network Rail should complete the rollout and integration of Tier 2 WLCC models to the devolved Routes to support better Asset Management decisions at the 'local' level by the end of CP4.

The following sections provide a summary current status of capex evaluation by asset group.

5.4.5 Track

The Track Asset Policy (NRSBP-SBP49) has been consistently the most mature across the various Network Rail asset disciplines and is considered to have continued to improve and maintain this position since the last assessment. The key changes include an apparently logical evolution of the previous policy to place a much greater emphasis on refurbishment of plain line and S&C rather than renewal.

Two types or degrees of refurbishment have been identified:

▪ Medium refurbishment – provides a 20% extension in asset life and either 'good' or 'satisfactory' track geometry quality (see Track Policy Statement 10 for further details); and

▪ Heavy refurbishment – provides a 50% extension in asset life and 'good' track geometry quality (see Track Policy Statement 10 for further details).

The anticipated impact on life extension has been analysed using a series of case studies applied in the Tier 2 model to establish average results which include consideration of variables such as the underlying track condition. An example is provided for plain line track in Diagram 37. This demonstrates the maturity of the Track Asset Policy and associated models in the analysis of capex interventions relative to other asset disciplines, although it is considered that the modelling process is only as accurate as the input data or engineering judgement applied.
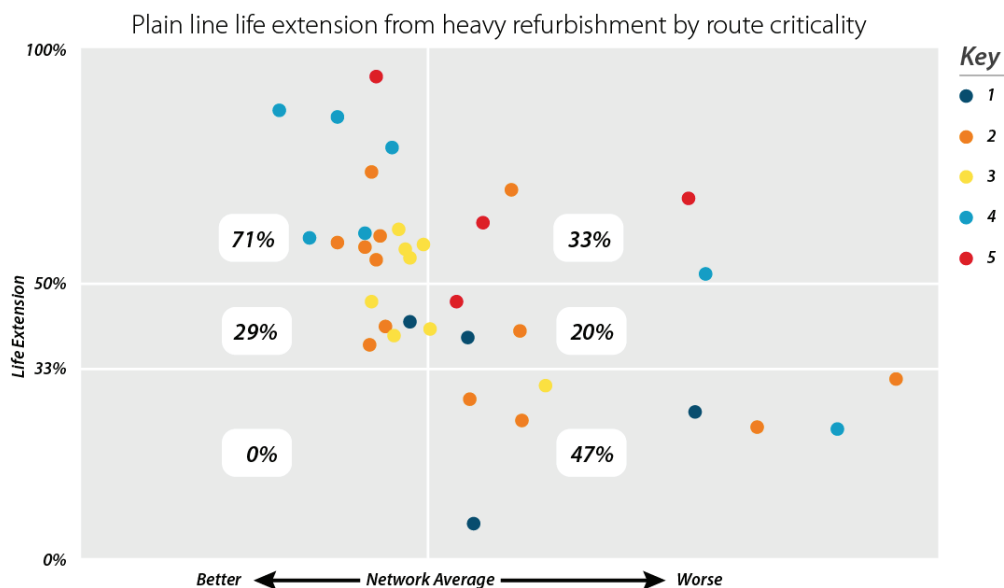
Diagram 37   Plain Line Heavy Refurbishment Case Study Results (SBPT3010)

Refurbishment is undertaken on a 'targeted' basis with renewals more likely to be applied on high criticality routes. The route criticality methodology introduced in CP4 has been further developed in the latest Track policy to include five route criticality bands, based on vulnerability to track failures, as shown in Diagram 38.
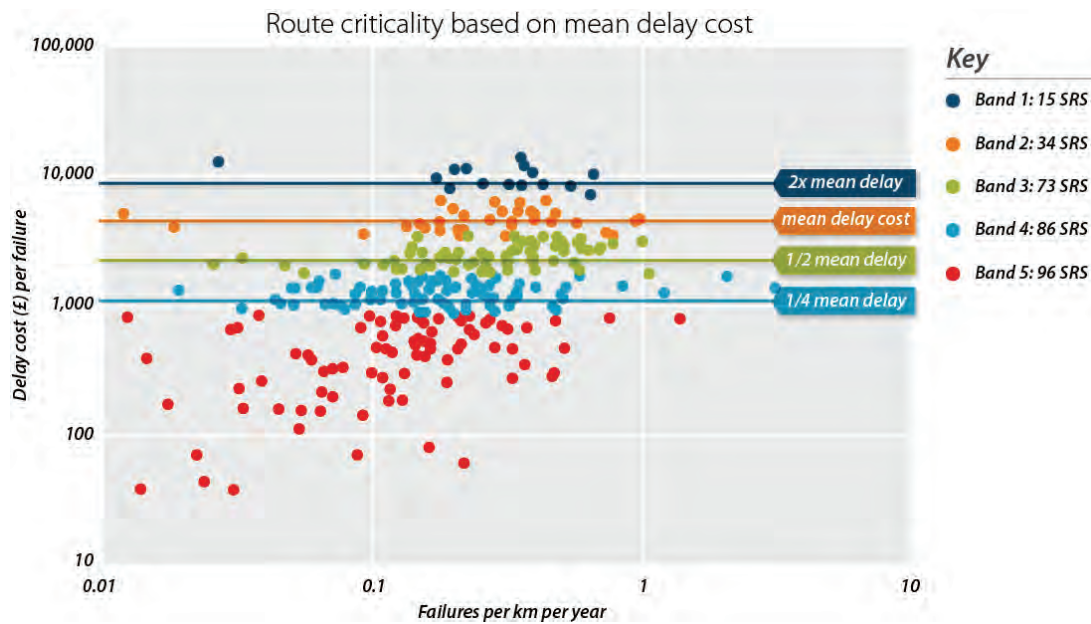
Diagram 38   Allocation of SRS to Criticality Bands (SBPT3010)

Delivery of the policy in CP5 is identified in the Renewals Expenditure Summary as dependent on the ORBIS programme's further development of the LADS tool to link asset inventory and condition information, achieving the skills and competences necessary to deliver the increased workload and provision of sufficient and appropriate plant to support renewals and refurbishment.

5.4.6 Structures

The Structures Asset Policy (NRSBP-SBP33) has been largely rewritten since the last assessment with lifecycle modelling now taken into consideration and a more risk based approach applied, although the degree of risk consideration varies across the sub-asset types. For the key under-line and over-line bridge sub-assets this is considered at a PLBE using BCMI score thresholds as triggers for condition based interventions.

Diagram 39   BCMI Likelihood Scores (SBPT3013)

Route Criticality is used as a proxy for risk and interventions targeted as a result of the combination of the two factors, as shown in Diagram 40.

Diagram 40   Intervention Matrix for Underline and Overline Bridges (SBPT3013)

Whilst this represents a significant improvement in the Asset Policy since the previous IIP assessment, the definition of relevant thresholds is still largely based on engineering judgement. The example provided for bridges also represents one of the more sophisticated capex evaluation

processes identified for the various sub-assets within the Structures asset discipline. It was also noted that a significant number of Bridges currently have PLBE BCMI scores which are lower than 40.

Although the Asset Policy has made significant progress, this has occurred over a relatively short period of time and the application of the significantly revised policy has been variable across both Routes and sub-asset types within the discipline. Although there is a blend of top-down and bottom-up capex intervention development a large proportion of the SBP outputs are derived from top-down Tier 1 models and not yet reconciled to bottom-up Route level plans to the same degree as the other asset disciplines.

Network Rail has also itself noted in the Renewals Expenditure Summary that the SBP Route Plans and the Structures Asset Policy are misaligned as it is considered by Network Rail that full application of the revised Structures policy during CP5 would require an undeliverable level of expenditure due to the backlog of work that has built up over previous control periods. The capex interventions identified by the revised Structures Asset Policy have therefore been proposed by Network Rail over both CP5 and CP6.

5.4.7 Signalling

The CP5 Signalling Asset Policy (NRSBP-SBP29) is based around three core themes:

1) Alignment with Network Rail's NOS which intends to reduce operational costs by consolidating control centres and installing new technology, such as traffic management systems, to reduce operational headcount. The NOS acts as a key driver for increased Signalling renewals during CP5.

2) Alignment with the industry-wide move towards the ERTMS via the initial migration of Signalling systems to the ETCS. This also acts as a key driver for Signalling renewals during CP5, although a number of Routes are not scheduled to install ETCS for a number of decades.

3) Where appropriate, application of 'targeted renewals', e.g. renewal of specific assets rather than major interventions on asset-systems, to achieve greater whole-life cost optimisation in the current asset base.

There is also a move towards the use of modular signalling as a more cost-effective option on lower criticality network routes, although AMCL understands from interviews that there are issues getting approvals to use new modular signalling technology on the GB railway.

Although devolution has changed the organisational structure and strategic planning process of Network Rail, the asset intervention plans for Signalling remain based on 'bottom-up' work banks at both the Route and strategic modelling levels.

The Routes are provided with all relevant modelling output from the central organisation, based on SICA derived condition renewal requirements. The RAMs then consider the specific contexts of the Route and its asset base to establish engineer's renewal dates, where appropriate, and continue through an iterative work bank development process as shown in diagram 41.
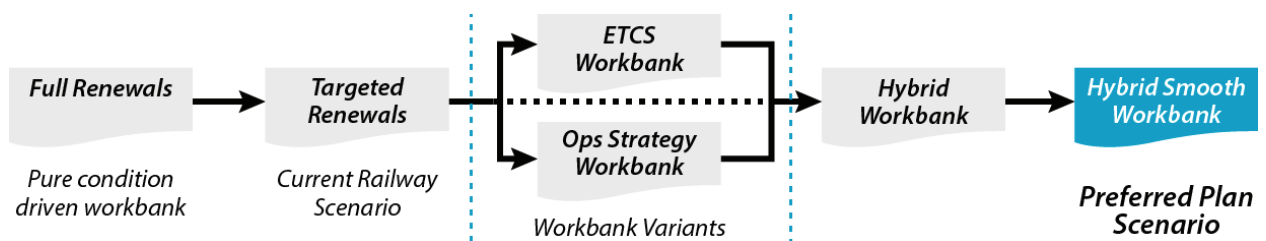
Diagram 41   CP5 Signalling Work bank Iteration

The work bank development process progresses from a full work bank, through targeted (renewals) work bank, ERTMS work bank (driven by ERTMS train fitment), NOS work bank (driven by the national business case), Hybrid work bank (merging the targeted ERTMS and NOS work banks) and finally a Hybrid Smoothed work bank. The Hybrid work bank is reviewed and refined with the relevant Network Rail Investment Projects (IP) team, who in turn work with the relevant Framework Contractor.

The consistent alignment of bottom-up work banks in the top-down models is considered by AMCL to provide good assurance of the alignment of capex interventions with Asset Policy and clear and demonstrable reconciliation between top-down and bottom-up capex costs and volumes.

For CP5 Network Rail has developed a separate Level Crossings Asset Policy for the first time. This is considered to be a significant advance in the management of Level Crossings as a system and includes consideration of:

- Safety - achieving the most efficient management of the road/rail interfaces at Level Crossings; and

- Performance - determining the most efficient and effective way to manage Level Crossings as a system within Network Rail.

The overall approach to development of the Level Crossings capex work bank and application of Asset Policy is similar to the approach for Signalling as a whole. Condition intervention timing and options remain largely as per the overall Signalling asset discipline, with opportunities to reduce risk incorporated into the decision criteria. This in turn is supported by a Level Crossings specific Tier 1 model, which brings together safety and economic considerations.

5.4.8 Telecoms

The Telecoms Asset Policy (NRSBP-SBP34) and its application have both been managed by Network Rail's central organisation for CP5, resulting in the SBP cost and volumes submission being essentially the 'top-down' modelled numbers. In general this is considered to assure good alignment of the SBP plan with The Asset Policy.

The key changes to the Asset Policy for CP5 are the introduction of service levels and interventions linked to asset criticality and the management of customers in three service groups.

Service levels are intended to provide formal agreements between customers and the service provider and revised maintenance intervention regimes have been developed to support each service level. This revised approach, although logical and seen in practice in other industries, remains untested in the GB railway context.

The three service groups (Customer Services, Network Services and Railway Operational Services) are intended to inform technology strategy and focus the requirements of network management, people competence and skills. Customer Services is the most significant in terms of renewal volumes and costs for CP5, particularly with respect to SISS renewals. Network Services includes the construction of the NOC and integration with Network Rail's NOS, Traffic Management and Electrification programmes. With the planned completion of the FTN and GSM-R technology rollouts within CP4 the Railway Operational Services has less impact on CP5 renewals costs and volumes.

A key capex driver stated in the Telecoms Asset Policy for CP5 is the management of system obsolescence. Network Rail noted directly that obsolescence is a specific risk area in the FTN and GSM-R infrastructure, which it also identifies as 'very high' criticality Telecoms infrastructure. Furthermore, Network Rail also identified that should earlier than forecast replacement of FTN and GSM-R infrastructure be required as a result of obsolescence (or any other factor), investment currently planned for CP6/CP7 would have to be bought forward. AMCL notes some degree of

obsolescence risk is considered in the 'Uncertainty Analysis' provided as part of the SBP publication and in the Asset Policy for a limited number of targeted renewals, however, it is AMCL's opinion that in general there is very limited linkage between the 'key' issue of obsolescence and the costs and risks considered in the Asset Policy and the associated modelling. This concern is augmented in our view by the fact that the most critical Telecoms assets – FTN and GSM-R – have not yet been modelled within the Tier 2 WLCC model.

Overall development of the Asset Policy and management of the Telecoms asset portfolio within Network Rail now sits with the recently formed (2011) NRT, as part of the central organisation. Unlike other asset disciplines, Telecoms does not have a Route-based RAM structure and DRAM team who are independently responsible as end clients for sign-off of the scheme specification and acceptance of the finalised scheme into the Route system. NRT is therefore responsible for capex identification, capex evaluation and capex validation which in AMCL's opinion could lead to perverse incentives in terms of the balance of capex costs and outputs.

5.4.9 E&P

Network Rail's Asset Policy for Electrical Power and Fixed Plant (NRSBP-SBP30 to NRSBP-SBP32) has been substantially revised since CP4. The core change has been a move from an aged-based Asset Management approach to a condition-based approach. However, where condition data is unavailable age is used as an intermediate proxy for condition. The use of age as a proxy for condition is an approach used across the EP asset base where necessary. This factor combined with the currently untested outputs of the revised Asset Policy, is considered by AMCL to be a risk to the robustness of the CP5 SBP for the asset discipline.

The application of the revised CP5 Asset Policy for EP and Fixed Plant was driven by 'top-down' modelling which was subsequently reviewed by the RAM teams to validate and revise the proposals in line with local contexts. The overall approach is captured in Diagram 42, as provided by Network Rail.
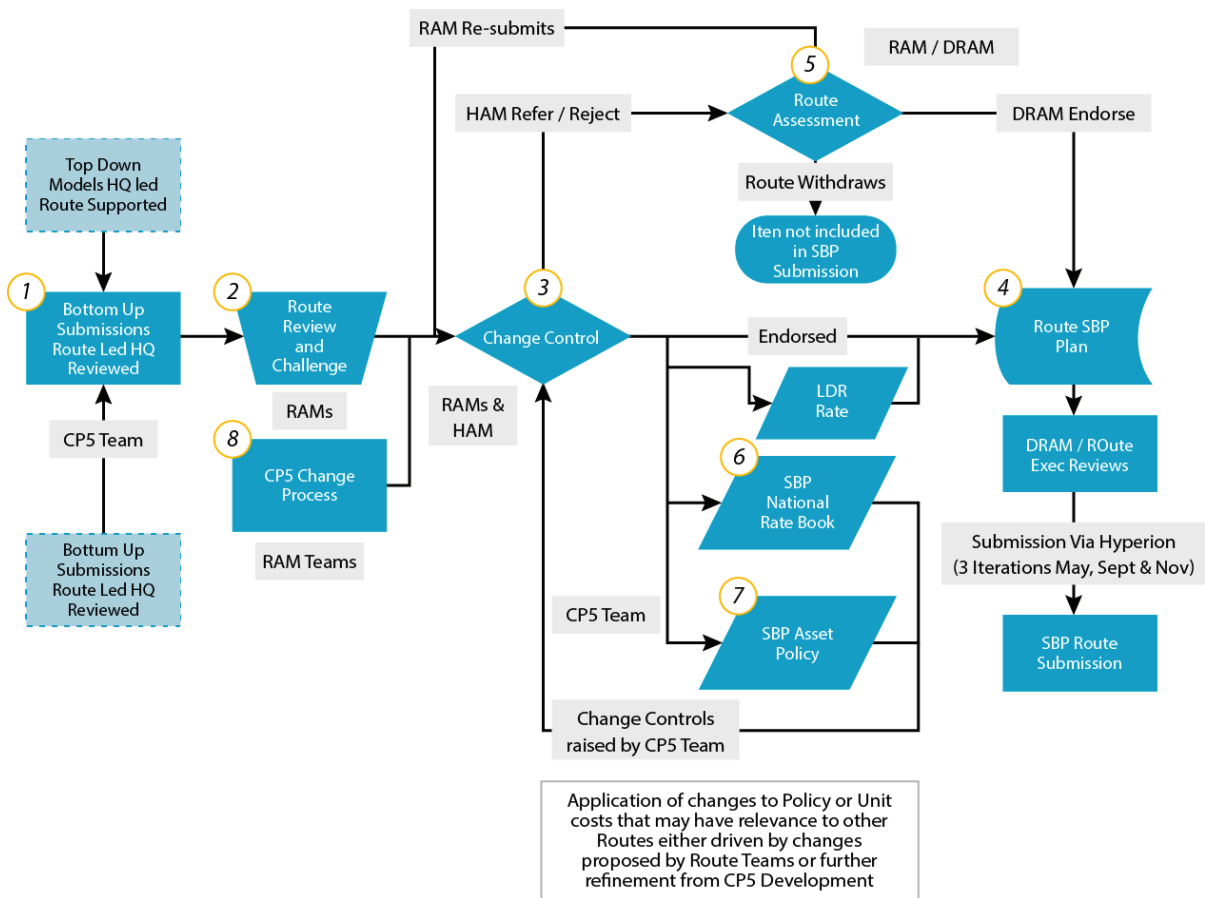
Diagram 42   Network Rail's EP & Fixed Plant Route Plan Development Process

The 'bottom up' plan is understood to have originally been an unconstrained work bank based on condition data for key assets where available. For example, points heating and DC sub-stations have a condition scoring methodology but this represents only a portion of the asset base.

Criticality to service was considered for assets in the work bank and was subsequently used, together with engineering judgement and modelling, to produce the final submitted Route Plans. However, it was noted that due to the variance in the asset base included within the asset discipline and the range of maturity of the associated asset condition and criticality measures, the prioritisation of work across the asset discipline was limited to engineering judgement by the RAM teams.

Overall, the application of Asset Policy and its management via HAM/RAM interaction for SBP is considered sound by AMCL. However, in AMCL's opinion, the lack of comparable asset condition and prioritisation data in a consistent manner across the asset discipline, combined with the

current model development being limited to the most critical asset types[3], induces risks relating to the overall optimisation of the work bank.

Network Rail has noted that the successful implementation of the revised Asset Policy and further confidence in the delivery of the required CP5 outputs is dependent on several enabling activities, including a number relating to asset information.

5.4.10 Ops Property (Buildings)

The Asset Policy for the Buildings asset discipline (NRSBP-SBP35) is one of the least changed since the last assessment, although there are considered to be improvements in the associated modelling and some aspects of asset data in the interim.

There is also understood to be a newly developed Buildings M&E equipment Asset Policy (NRSBP-SBP36) which is due to be rolled out and is considered a logical development by AMCL given the diversity of the asset types included within the overall Buildings asset discipline. It was also noted that the management and renewals of L&E is contracted out.

Due to the variable asset base and associated asset information a number of assumptions are required, along with a focus on critical asset types which are the key drivers of renewal costs, such as station platforms, footbridges, buildings, canopies, etc.

The capex evaluation process varies across each of the key sub-asset types. The most sophisticated approach is for franchised stations and involves the modelled prediction of PARL and costs over time, including the consideration of key inputs such as ARS, as assessed PARL scores and relevant unit costs.

The ARS – see Diagram 43 – is used to understand the asset criticality rating based on a one-to-five score for safety and a one-to-five score for performance, which are subsequently combined to provide the overall ARS.

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3   *IIP 2011 review - Tier 2 Model for Electrical Power, Version 1.0, AMCL, April 2012*

Impact Description	OPAS Consequence Rating				
	1	**2**	**3**	**4**	**5**
Safety	Single minor injury	Multiple minor injuries	RIDDOR reportable injury (3 days lost time)	Single serious injury	Single fatality or multiple serious injuries
Performance	Restriction on movement in staff area	Restriction on movement in public area	Partial closure of station	**Speed restriction**	**Line or station closure**

Areas impacting on route performance

Diagram 43 Buildings Average Risk Score Matrix (source – SBPT3016)

These inputs are subsequently modelled using BRE defined deterioration curves and various PARL intervention thresholds and degrees of intervention are used to understand indicative costs for movements in PARL or the most suitable intervention plan to maintain PARL at its current baseline, as indicated by the red line in Diagram 44.
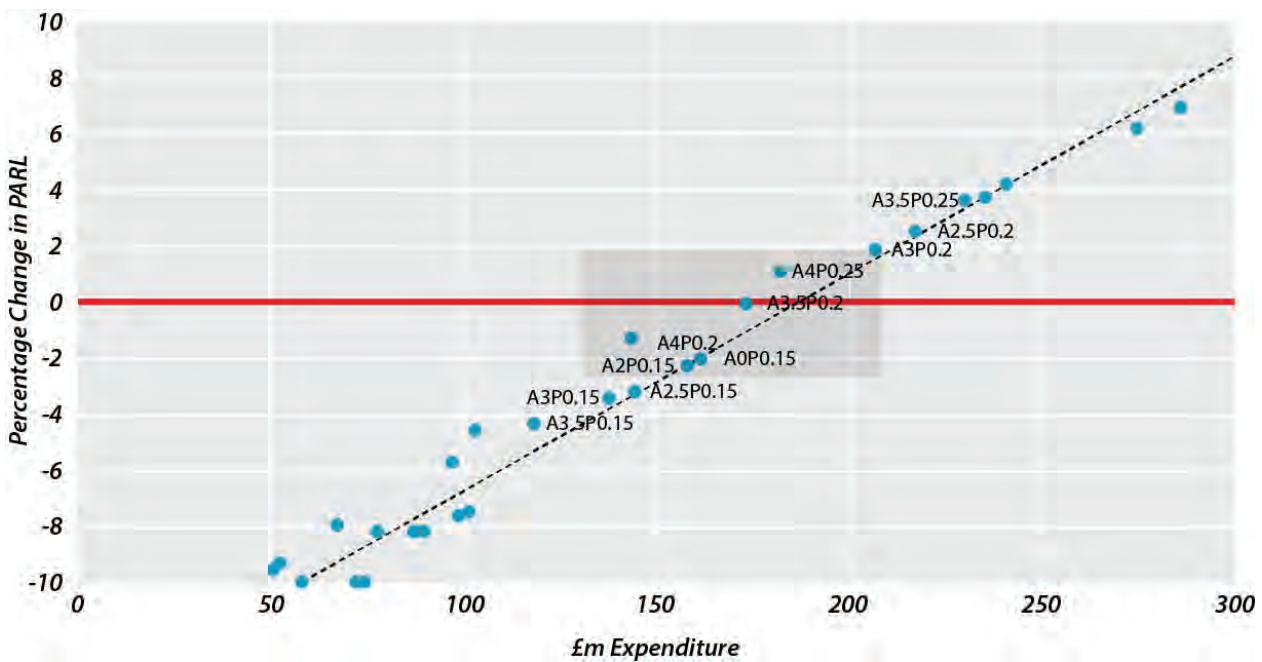
Diagram 44   Indicative Cost vs. Percentage Change in PARL – Canopies (SBPT3016)

This approach appears sound and is supported by reasonable asset data and modelling capability for the key asset types of franchised stations and light maintenance depots, although the sophistication and available asset information does vary across other sub-asset types. Continued improvement of asset information has been noted as a key risk for Buildings and is identified for

improvement in the Renewals Expenditure Summary for CP5. Another potential issue identified by Arup, (NRSBP-WLC6) was that the deterioration curves utilised may be conservative. Network Rail has noted this for consideration but due to the nominal asset lives of the Buildings discipline this is not considered to have a material impact on CP5.

5.5
Asset Costing & Accounting

5.5.1 General

Network Rail has continued to use and improve the Unit Cost frameworks in place for the IIP and has evidently made progress. The centrally-driven unit costs used for planning purposes in the IIP were taken as the starting point for the Unit Costs to be used in the development of the Route SBPs. 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. However, this has led to stronger agreement on the final versions of the unit costs to be used in the SBP.

5.5.2 Renewals Unit Costs

The systems for specifying, capturing and calculating renewals unit cost information remain broadly unchanged from those observed at IIP. CAF continues to be the main estimating tool within Network Rail as a whole and the unit cost models provided from CAF are used to test and verify cost estimates for individual projects at the appropriate GRIP stages. However discussions with representatives from the different asset disciplines suggested that the extent to which CAF covers all estimating requirements varies by discipline. The coverage of the unit costs has improved, both in terms of the number of activities covered and the number of projects that can be allocated to an appropriate category, as observed in Arup's latest report (NRSBP-WLC7). This method of monitoring and estimating is owned by IP and has a dedicated team of Estimating Managers across major programmes and regions who meet regularly to discuss progress and potential improvements. This is very much focused on project costing and estimation.

The unit costs available for planning purposes (such as by RAMs, HAMs and the Group Strategy Modelling team) have also improved, through agreement of standard definitions and rates for activities that appear to be used in the Tier 1 models and Tier 2 models. A 'data book' of unit costs

has been provided which demonstrates progress in this area and the position at SBP. However, the level of granularity will vary between models as the options that exist for modelling at Tier 2 (say for example replacing a component) can often be more specific than those at Tier 1, where an average cost of the overall activity is required.

At the high-level, for financial control purposes of monitoring spend and measuring efficiency, Network Rail is still using relatively high-level metrics for year-on-year comparisons (such as cost per track km) and these appear to be fit-for-purpose.However there does not appear to be a single unifying framework that can be used to cut the unit cost data in different directions for the three purposes listed above.

From discussions with RAMs it was clear that significant progress had been made in agreeing a set of unit costs to be used for CP5 planning. However, there are now opportunities to review and refine the taxonomy for the activities defined for Tier 1 and 2 modelling purposes to determine appropriate unit cost definitions and any overlaps or differences for different users.

> ## ◉ *CP4 Roadmap Clarification 008*
>
> *By the end of CP4 Network Rail should align the three existing taxonomies for Renewals Unit Costs (planning, delivery and control / review) to show the link between planned and reported costs mapped to an appropriate level within of the organisation for the purposes required.*

5.5.3 Maintenance Unit Costs

As for renewals unit costs, the systems for specifying, capturing and calculating maintenance unit cost information are consistent with those observed at IIP. 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. Again, the coverage of the unit costs has improved, particularly given the number of activities covered and hence the amount of resources that can be allocated to an appropriate unit cost category. Arup has also observed this in its report. This method of monitoring and estimating is owned by Finance and carried out by Route Financial Controllers and has largely been automated. The outputs are used to allow Delivery Unit comparisons in line with the internal benchmarking programmes that have been established for several years.

However, maintenance unit costs appear to play less of a role in planning purposes as the cost estimates have been resource-based and focused on looking at changes to the current resource

profile rather than a bottom-up view of what activities are required to deliver a given level of output. Some activities have been based directly on cost information (where these are clearly volume-based, such as tamping). The SBP 'data book' includes MUCs providing the position at SBP. However, it is known that the RBM analysis is still underway so it is not clear to what extent these costs have informed the optimal intervention strategies discussed in Section 5.3 on Opex Evaluation.

At the high-level, as for planning, for financial control purposes Network Rail focuses on resource-based metrics for year-on-year comparisons. These are cross-checked against MUC performance to see where these align and where differences exist. As the data sources for both the top down and bottom-up purposes are all based on the same systems (Ellipse and Oracle HRMS) these are more closely aligned than the renewals activities. Network Rail tries to understand the link between activities, resources, outputs and other outcomes through these financial control and internal benchmarking activities, though it is not clear how easily Network Rail could produce a 'should cost' bottom-up maintenance forecast based on activities alone.

RAMs are less involved in MUC calculations, although they take an interest for the purpose of understanding intervention strategies and the costs of different regimes, as modelled at the Tier 2 level.

> ◉ *CP4 Roadmap Clarification 009*
>
> *By the end of CP4 Network Rail should demonstrate where the resource-based approach and activity-based costing approaches agree and where they differ to identify any opportunities to rationalise or improve these.*

5.5.4 Asset Valuation

Limited evidence was available from Network Rail on how asset models are used in valuation, as this is not an activity which the Routes generally get involved in and instead it sits with the central Finance function. The economic valuation of the railway (in terms of future income generated as a percentage of the RAB) is sufficiently lower than any discounted replacement cost as to mean that the valuation of Network Rail's assets is largely an economic calculation rather than a direct valuation of the remaining life of its asset base. However, the longer-term forecasts arising from the Tier 1 and 2 models are used to support this calculation. Operational risks associated with assets are reflected in the amount of income Network Rail is allowed to generate based on the cost of capital for a company working in a comparable industry. Should these risks change materially, Network Rail would reflect this in its funding submission. It is unlikely that short-term Asset Management decisions would impact on this and longer-term these assumptions are reviewed on a regular basis to see whether any parameters have changed.

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 – the processes that govern the implementation of the maintenance and inspection regimes created in Opex Evaluation.

- Resource & Possession 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 Targets

Table 13 below shows the scores from the 2011 (IIP Update) assessment, the target score from the AMCL Roadmap for the SBP, the actual score from the SBP assessment, the alignment of Network Rail's AMIP with the AMCL Roadmap as of August 2012, and comments on any variance from target.

Activity	IIP Update Score	SBP Roadmap Target	SBP Score	Summer 2012 Alignment Report	SBP Target Achieved	Comments
Asset Creation	85%	88%	86%	A	NO	**Roadmap** – 1/3 achieved, 1/3 partially achieved, 1/3 not achieved **Target not achieved** due to following: • No defined programme management approach - although being developed • Monitoring of hand back not fully demonstrated
Systems Engineering	59%	67%	67%	A	YES	**Roadmap** – 1/2 achieved, 1/2 partially achieved **Target achieved** due to following: • Evidence of good systems engineering approaches across Network Rail • AMIP Systems Engineering Capability Development plan now established
Asset Counting & Accounting	72%	77%	75%	A	NO	**Roadmap** – 1/2 partially achieved, 1/2 not achieved **Target not achieved** due to following: • Maintenance tolerances not defined and established in standards
Resource & Possession Management	58%	61%	58%	R	NO	**Roadmap** – 1/2 achieved, 1/2 not achieved **Target not achieved** due to lack of clarity over disaggregation of withdrawn standard NR/L3/NDS/302. Specific SBP Roadmap Capability 3.9 is superseded.
Incident Response	74%	77%	75%	G	NO	**Roadmap** – 1/1 partially achieved, **Target not achieved** due to the roll-out of FIIP not yet complete – pilot stage only.
Asset Rationalisation & Disposal	50%	54%	54%	G	YES	**Roadmap** – 1/1 partially achieved **Target achieved** due to following: • Systematic, pro-active application of network change procedure evident (Network Optimisation initiative) but in pilot only. • Non-consistent evidence in Summary Route Plans of asset rationalisation requirements

Table 13   Lifecycle Delivery Group Targets

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 14 below shows a summary of the SBP 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	SBP Success Criteria	Summary of SBP 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 programme and project management methodology is defined by January 2013.	This capability has not been achieved. Halcrow made similar recommendations at IIP (Report Reference 'Project & Programme Management Capability'). This called for a higher level industry-wide programme management approach which linked final benefits more closely with front-end decision-making.
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.	The number of projects handed back in accordance with the handback criteria is established as a baseline measure by December 2012.	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 all new start work for SBP is aligned with the Route AMP and Delivery Plan by January 2013 across all Routes.	This capability has been achieved. The alignment to the Route Plans has been demonstrated in Section 4 of this report. The CP5 Delivery Plan has not yet been created, but Network Rail monitors against the CP4 Delivery Plan on a period basis.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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.	A coherent plan which links RAMS analysis, reliability & availability modelling, and the setting of strategic planning targets, is in place by December 2012.	This capability has been achieved.\n\nThe individual elements are in place, and gaps have been identified. The overall improvement of the management of RAMS requirements within Network Rail is now subject to the AMIP 'Systems Engineering Capability Development' plan.
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:\n\n1. Identify and prioritise changes in infrastructure capability necessary to deliver changes in output specification, for example PPM;\n2. Analyse enhancement projects, including different design options, to determine their impact on different outputs measures;\n3. Quantify the financial benefits of different enhancement projects and to develop more robust business cases;\n4. Identify the critical drivers of performance and to prioritise improvement initiatives accordingly;\n5. 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 justify enhancements and learning is fed back into asset policies for high criticality assets by December 2012	This capability has been partially achieved.\n\nEvidence was provided of the application of modelling within WCML, CrossRail and Thameslink programmes. However, there is no evidence that learning is being fed back into Asset Policies at the moment.\n\nThis area is also subject to AMIP 'Systems Engineering Capability Development' plan.
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.\n2. If a business case is evident the use of hand-held devices is extended accordingly.	Business cases for the extension of maintenance and inspection work control management are identified and developed by March 2013.	This capability has partially been achieved.\n\nORBIS has completed a Handheld Device Deployment Analysis which focuses on iPhone and iPad deployment rather than CMMS handhelds, but elements of the benefit are related to maintenance management.
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 exceedances.	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.\n2. These revised maintenance and inspection specifications are underpinned by Opex Evaluation analyses.	First tranche of new standards on maintenance and inspection tolerances are developed by December 2012.	This capability has not been achieved, however maintenance backlog is monitored.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP Assessment Findings
Resource & Possession 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	A 'long-term' resource forecast is in place that informs a range of identified stakeholders by December 2012.	This capability has been achieved. Network Rail is completing a Deliverability Assessment for CP5. There is specific evidence from IP (Head of Programme Integration) and NDS to support this. The approach is WIP but at SBP all key factors and stakeholders have been identified.
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 updated to include formal review and update of the possession & resource planning process at a national level by September 2012.	This capability has not been achieved – although it has been superseded. After devolution the responsibilities for NDS were split between NDS and the Routes. NR/L3/NDS/302 has been withdrawn. NDS retains a work instruction (NDS/PLN/LP/070) to govern resource planning. The Director Asset Operations, where the Access Planning Teams now report, covers possession planning.
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)	The root cause process is designed and implemented, and information sufficient to support this process is being routinely captured in FMS or other appropriate systems, by January 2013.	This capability has been partially achieved. The Failure Information Improvement Project (FIIP) has developed an iPhone application which provides technicians with standard failure codes structured from the RoSE and RBM FMEA analyses. This application is part of a wider set of applications which will cover mobile tasking, diagnostics, and component tracking. Covers Improvement Specifications 1 to 3. The Route Reliability Plans as facilitated, defined and monitored through Route Reliability Meetings and the NIRG structure. Covers Improvement Specifications 4 to 7. Although all Improvement Specifications are being addressed, FIIP is still at the pilot / implementation stage and the two aspects described above are not yet integrated.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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.	An asset rationalisation analysis has been undertaken on each Route and any proposals for removal of assets are included in the Route AMPs and Delivery Plans by January 2013	This capability has been partially achieved. The Network Optimisation RDG project has been initiated and a pilot completed for Wessex Alliance only. The Summary Route Plans contain inconsistent information on asset rationalisation requirements.

Table 14   Summary of assessment findings for the Lifecycle Delivery Group

6.3
Asset Creation

Asset Creation continues to be a well developed activity within Network Rail, based on the strength of its core project delivery processes, and the evidence provided during the assessment. Although there is some evidence from projects visited during the assessment that the process is not entirely coherent, there was also evidence that projects are, more often than not, still managed effectively. The basis of this view is the Project Management Framework which is how Network Rail has presented its overall methodology for managing projects since 2004, and is reproduced in Diagram 45 below. This includes many well established elements, such as GRIP and the Investment Management System which have been examined in this and previous assessments.

Diagram 45   Network Rail's Project Management Framework

The Project Management Framework was introduced in 2004 with the objective of bringing together a number of project management elements into a more coherent delivery framework. Perhaps the most significant element was GRIP. GRIP was introduced in 2003, and its application within Network Rail has been assessed at each of the previous AMEM assessments, with the following summary findings:

- 2006 assessment – The 'Guidance for Railway Investment Projects' is reviewed. The conclusion is it is a good practice framework, but there is evidence that its adoption within Network Rail patchy and inconsistent due to its complexity and the fact it is not mandatory.

- 2009 assessment – Network Rail introduces 'GRIP-lite' to address patchy and inconsistent adoption of GRIP. This is a less complex version for less complex projects.

- 2011 IIP assessment – GRIP is made mandatory, and re-titled 'Governance for Railway Investment Projects'. It is also rationalised and process-mapped, and the Level of Control procedure (NRSBP-LCD1) provides a framework to make it scalable for different project complexities. The reaction was for certain disciplines to seek derogations against its use. One of these processes, the track 'End to End' process, was authorised at the time.

The main conclusion from the 2011 assessment, which led to the AMCL Roadmap capability 3.1, was that Network Rail should define its overall programme and project management requirements in a way that all disciplines can use. Ideally, this would combine the best elements of GRIP and the E2E process, plus appropriate external best practice, into a scalable programme and project management methodology that was consistently and robustly applied.

In March 2012 the Independent Reporter Halcrow produced a report titled 'Network Rail – Project and Programme Management Capability' (NRSBP-LCD2) which provided a detailed assessment of Network Rail's project and programme management capability using the P3M3® 'process perspectives' framework. The report supports AMCL's consistent view that GRIP is a good practice project delivery methodology, which Halcrow compares favourably to the comparator organisations it identifies in its report: OGC Gateway, RIBA, and TfL CIMM etc. However, Halcrow also calls for Network Rail to adopt a programme management approach, although for a different reason to that originally proposed by AMCL in the 2011 IIP assessment:

'GRIP is founded in the management of projects rather than programmes and focuses attention on the sequential achievement of progressive Stage Gates… Although much of Network Rail's approach is scalable and flexible to meet the demands of different projects – and programmes – we consider that the link between business benefits and front-end decision making should be made explicit in Network Rail's approach and this should incorporate its closer ties with its customers.'

This premise is entirely consistent with good practice Asset Management and could support and enable the overall evaluation, verification and validation of programmes and projects on a whole-life cost basis, ensuring they are clearly linked into corporate objectives, and that the achievement of these objectives can be easily tracked and demonstrated to sponsors of the project. This would help improve Network Rail's 'line of sight' from its corporate objectives to its desired outputs, is a requirement of PAS 55, and will be revisited again in Section 6.4 on Systems Engineering with specific respect to the specification of major investments and enhancements.

Since the IIP assessment, Network Rail has continued to develop its project and programme management capabilities. The Level of Control procedure has been made mandatory, which it was reported led to problems of interpretation by project managers. This subsequently led to the creation and deployment of the Level of Control assessment tool, briefing pack and control matrix (NRSBP-LCD3, NRSBP-LCD4, NRSBP-LCD5 and NRSBP-LCD6). However, it was reported that even with these tools, project managers tend to favour a higher Level of Control than might be necessary or justified (NRSBP-LCD4).

◪ CP4 Roadmap Reiteration 008

By the end of CP4 Network Rail should confirm why the Level of Control procedure is not being applied consistently and objectively, and implement further controls to improve the identification of the correct Level of Control.

Despite this, the assessment revealed that project management within Network Rail continues to be reasonably consistently applied. GRIP was observed to be adhered to and good evidence that

project managers understood requirements with respect to level of control, risk management, and the monitoring and administration of programme, project and financial authorities and controls. All projects are monitored for performance every period and any issues are highlighted in this process to avoid any delays to programme.

Project managers interviewed during the assessment stated that hand back of projects into maintenance and operations has improved, however, following the closure of a project recommendations are not always followed through to the next project and same mistakes are being made. In general, IP provides a 'live' report of all works at GRIP 3 and GRIP 6 to Asset Management through the DWWP system. Asset Management have access to the system and can obtain the report at their required timescales. The further challenge for Network Rail here is to effectively integrate GRIP into Network Rail's wider business case generation and validation processes pre- and post-GRIP, and reflects at a more detailed level the concerns raised by Halcrow (see Diagram 46). This is picked up in more detail in Section 6.4 on Systems Engineering.
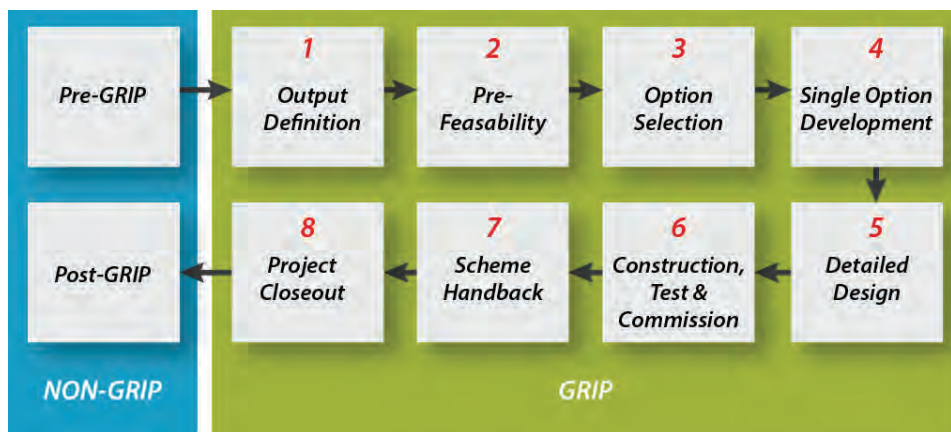
Diagram 46   How GRIP Interfaces with Network Rail's Business Requirements

IP has also now set up a new and evolving Programme Management Group, which will begin to drive improvement in Network Rail's programme management capabilities, and is led by the **Head of Programme Management**. The Programme Management Group provides the *'the single point accountability for the governance, assurance and development of the PM capability within Network Rail Infrastructure Projects'* (NRSBP-LCD7). There are currently three main elements to the Programme Management Group:

- The **Head Of Risk & Value** is responsible for the development of Network Rail's assessment of programme risk and value.

- The **Head of Programme Standards & Planning** is responsible for the maintenance and development of planning and document management capabilities for programme and project management, and is the corporate owner of GRIP.

- The **Discipline Manager** is responsible for maintaining and improving the capability of the people within the Programme Management organisation.

A new post, the **Head of Programme Integration**, will be tasked with establishing a five-year critical resources plan to support the delivery of the CP5 programme of work (NRSBP-LCD8). This post will work closely with NDS and will support the Deliverability Review and the creation of the CP5 Delivery Plan (see Section 4.5.5 on the Deliverability Review). Network Rail's approach to longer-term resource planning will be considered in more detail in Section 6.6 on Resource & Possession Management. This situation means that the achievement of AMCL Roadmap Capability 3.3 has only been partially achieved, however it is apparent that clear plans are in place to complete this.

In response to devolution, the Programme Management Group has set up Discipline Review Groups (DRGs) (NRSBP-LCD9 and NRSBP-LCD10). DRGs provide the personnel within IP with a mechanism for planning ahead and sharing current best practice, and for ensuring current governance arrangements are supported and observed. According to the DRG Terms of Reference:

'The Discipline Review Groups were introduced to develop and enhance the capabilities of the discipline & its members to improve Infrastructure Projects performance, efficiency and value for money.

They also facilitate a communication flow from the individual Regions & Programme'

Initial reports suggest that the DRG approach is working well, with a number of initiatives underway, including improvements in the definition and deployment of project management competences, and the development and implementation of a graduate intake strategy (NRSBP-LCD11). With respect to introducing an overall programme management methodology, as highlighted at the beginning of this section, there has been less movement. It was reported that both the OGC's MSP and MOP approaches are being examined. However, the specific AMCL Roadmap Capability 5.3 has not been achieved. The Halcrow report states that:

'MSP considers that "best practice programme management aligns everything towards satis-fying strategic objectives by realising the end benefits" and "the ultimate success of a pro-gramme is judged by its ability to realise these benefits and the continuing relevance of these benefits to the strategic context". Thus, benefits management is concerned with focussing on benefits and the threats to them.'

◾ CP4 Roadmap Reiteration 009

By the end of CP4 Network Rail should implement a programme management methodology which considers the relevant recommendations made by Halcrow with respect to programme management requirements.

6.4
Systems Engineering

The general conclusions of the IIP assessment for Systems Engineering were that it had not changed significantly since 2005) and that the management of requirements was embedded in the GRIP and track End-to-End processes to an appropriate degree, although this 'appropriate' level of application was not systematically defined because GRIP was guidance only. Re-defining GRIP as a mandatory governance process was seen as a trigger for a more systematic approach (see Section 6.3 on Asset Creation). Issues with the hand back of projects were also identified but these have been dealt with in this report in Section 6.3.

The AMCL Roadmap Capabilities 3.4 and 3.5 both proposed building on the GRIP development and raising significantly Network Rail's capability and integration of its Systems Engineering activities to better support the whole-life management of its assets. This would not only support investment and enhancement work, but also the maintenance and operations stages of the lifecycle. For example, FMEAs are completed for new infrastructure and also within the Reliability-Centred Maintenance (now RBM) initiative (see Section 5.3 on Opex Evaluation) but these are not integrated. There is also evidence from this assessment's examination of Network Rail's strategic planning framework that the flow down of RAMS requirements for translating Network and Route Specifications into Route Plans is also not established, and is a contributory factor in the broken 'link' between these documents (see Section 4.5.2 on Network Rail's strategic planning framework, process and model).

Network Rail has demonstrated during this assessment that AMCL Roadmap Capabilities 3.4 and 3.5 are now formally recognised within the organisation, and are included in a coordinated AMIP plan for improvement (NRSBP-LCD12). One of the key elements of this plan is the establishment of a clear Systems Engineering governance structure and the effective horizontal integration of Systems Engineering activities across the organisation. This is underpinned by a continual improvement process as reproduced in Diagram 47 below.

Continual Improvement Process

Technical Services All Engineering

Infrastructure Projects Delivery Team

Customers

In-service support: Maintenance & Analysis

Whole Life Cost
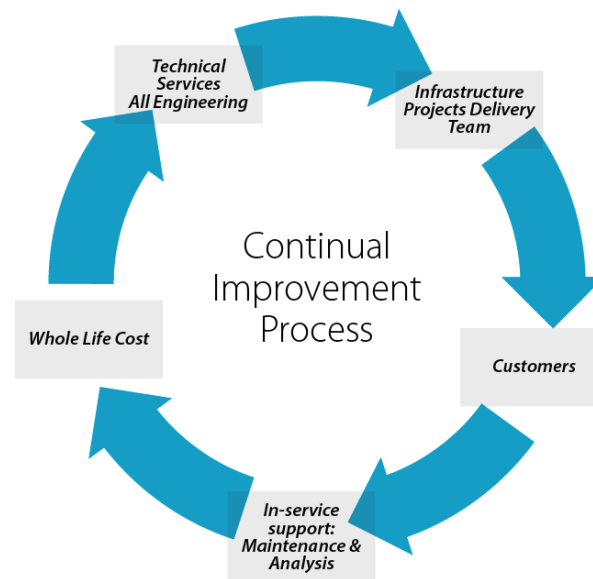
Diagram 47   Feedback Loop for Continual Improvement across Network Rail (source – Systems Engineering Capability Development AMIP Plan)

Due to this AMCL Roadmap Capability 3.4 has been achieved but Capability 3.5 remains partially achieved, mainly due to the lack of a clearly defined systems assurance approach within Network Rail and the lack of the effective horizontal integration which is aspired to. The remainder of this section addresses the current status of each of these Roadmap Capabilities in turn, with these specific issues in mind.

6.4.1 Management of Project Requirements (including RAMS)

Good evidence was presented during the assessment that the minimum management of project requirements through the project lifecycle required by GRIP continues to be applied. These minimum requirements include:

- Engineering Management Plan – defines the accountabilities, responsibilities, roles and processes applicable to engineering staff working within a particular project and ensures project compliance to Network Rail and national regulations.

- Project Management Plan – defines how the project is managed with respect financial, risk, change and document control, and also defines detailed responsibilities.

- Risk and Value Management Plan – defines at what level the project shall be managed (following the LoC assessment) and when QRSA and QRAs shall be held for the project.

- Environmental Management Plan – defines how the project shall assess any environmental issues and how they will be managed.

- Project Safety Strategy – defines how the project shall manage safety and adherence to Health and Safety legislation.

All documents for each relevant project are managed via Network Rail's internal CCMS2 system. This is an effective system for the management of large volumes of documents, however it is only available on Network Rail IT equipment and does not allow for a more open and collaborative working arrangement now favoured for the execution of projects. This can lead to mis-information and delays within a project if all parties do not have the up to date version of project documents.

⊙ CP4 Roadmap Clarification 010

By the end of CP4 Network Rail should define its plan for supply chain access to CCMS2 through CP5.

There was specific evidence presented during the assessment that in some specific areas the management of technical requirements (RAMS) are effectively and appropriately managed throughout project lifecycles. For example, within NRT the Project Engineering Manager was able to demonstrate an effective process compliant with NR/L2/INI/02009 – Engineering Management for Projects (NRSBP-LCD13 through to NRSBP-LCD20), although this example was operating to deliver specific telecoms capabilities within larger projects and programmes. The level of systems assurance within these projects is consistent and well understood, however for other projects the required level of systems assurance is defined at the discretion of the project manager. The Level of Control procedure does not provide specific guidance in this area. It was also reported during the assessment that there was a challenge in defining clearly who within Network Rail owned project requirements, with the view expressed that the DRAMs need to become clients of this process, with IP supporting the development of, and ultimately delivering project requirements. At the moment IP tend to undertake both roles. The intent of the AMCL Roadmap Capability 3.4 was to improve this capability.

⊙ CP4 Roadmap Clarification 011

By the end of CP4 Network Rail should establish clear guidance linked to the identified level of control on the scale of systems assurance activities required for projects throughout their lifecycle (including RAMS requirements management), ensuring this is also effectively linked into the whole-life management of the assets involved.

Network Rail has begun to address this in two ways:

1) The AMIP plan for Systems Engineering Capability Development (NRSBP-LCD12) explicitly recognises the need to improve the lifecycle management of projects and introduces the systems engineering V lifecycle for the management of requirements as a model. This is consistent with the approach defined in BSEN50126 as specified in AMCL Roadmap Capability 3.4. The plan includes an assessment of Network Rail's capability against the INCOSE SECAM and assesses Network Rail at Level 1-2 (Performed) with limited areas that are Level 3 (Managed). This assessment is consistent with AMCL's findings in this area during this and the previous IIP assessment. The AMIP plan provides a framework for achieving this, with the 'preliminary implementation plan' including the actions necessary to achieve compliance with AMCL Roadmap Capability 3.4 by December 2013.

2) Network Rail has introduced an initiative called 'Total Value' which includes a Systems Engineering technical competency matrix and a range of training courses (NRSBP-OP4). This approach is discussed in more detail in Section 8.5 on Individual Competence & Behaviour. It appears that this initiative is now well established, but not complete. It is notable that this initiative is not clearly referenced within the Systems Engineering Capability Development AMIP plan, and suggests that a coordinated approach to the definition, integration, embedding and continual improvement of Network Rail's Systems Engineering capabilities is still not as coordinated as required by AMCL Roadmap Capability 3.4.

◉ CP4 Roadmap Clarification 012

By the end of CP4 Network Rail should review the AMIP plan for Systems Engineering Capability Development to ensure that all activities within the scope of Systems Engineering across the organisation are incorporated. This should explicitly address the current interface between the IP and the rest of Network Rail to ensure clarity around roles and responsibilities is achieved.

6.4.2 Reliability & Availability Modelling

The Halcrow recommendation to introduce a programme management approach to improve the link between business benefits and front-end decision making is entirely consistent with good practice Asset Management. Using Systems Engineering to support and enable the overall evaluation, verification and validation of programmes and projects on a whole-life cost basis, ensuring they are clearly linked into corporate objectives, would fit into this. Good evidence was presented during the assessment that the use of TRAIL modelling is very successfully applied for major programmes such as WCML, CrossRail and Thameslink, (NRSBP-LCD21 through to NRSBP-LCD28).

However, below this level of complexity availability modelling and Systems Engineering approaches are not systematically applied. Examples of the lack of a Systems Engineering and whole-life cost approach can be seen in the following Independent Reporter Quality Reviews with specific respect to a selection of CP4 enhancement works:

Bletchley Remodelling Project (Nichols):

'There is insufficient evidence that the project will deliver an overall minimum whole life cost solution. The project scope of work was constrained to identify a scheme that could be delivered within the available budget rather than identify the minimum whole life cost solution. Similarly, the option selection report in March 2009 did not include whole life cost analysis of the options considered.'

Glasgow-Kilmarnock Line (Nichols):

'Requirements definition and acceptance processes consider future impact on maintenance and performance, but do not provide guidelines for the financial assessment of whole life cost impact.

Value management and change control processes do not provide guidance as to the assessment of impact upon whole life cost.

Network Rail is able to exercise most influence over the assets' whole life costs during the project lifecycle up to the conclusion of single option development (the end of GRIP Stage 4). Therefore the contractor's and its designer's ability to influence the whole life cost of the asset after this, during the detailed design phase, is limited.'

North London Line Project (Halcrow):

'Network Rail should develop a Whole Life Methodology which includes a standardised template for estimating whole life costs.

Network Rail should ensure that future projects do comply with the Programme Remit and its requirements for "whole life" cost estimates at GRIP 3 and beyond.'

Network Rail's response to these challenges is again provided by the Systems Engineering

Capability Development AMIP plan (NRSBP-LCD12) which recognises that Network Rail has good capabilities in this area, but that they are not necessarily coordinated across the organisation. Network Rail has a good understanding of its capabilities in this area, and understands the gaps that need to be addressed (NRSBP-LCD29).

Section S3 of the Systems Engineering Capability Development AMIP plan, on whole systems modelling, specifically addresses this issue. It identifies that whole systems modelling is an iterative modelling process that can be used to optimise scheme design and provide decision support, as shown in Diagram 48 below.
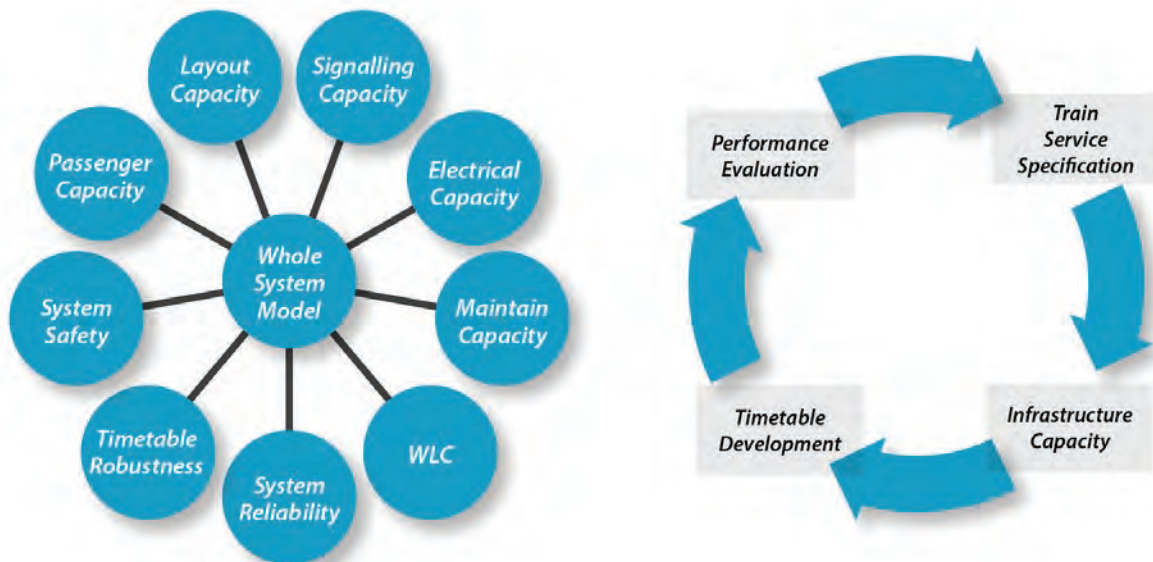
Diagram 48   Whole System Modelling Approach (source – Systems Engineering Capability Development AMIP Plan)

Three areas for action are proposed:

- Horizontal integration across model owners to help improve consistency, efficiency, quality, the sharing of best practice, software development and mathematical modelling skills, and the verification and validation of models.

- Modelling support to projects at the local level to ensure that models are consistently applied but also take account of the systems level issues which might not be appreciated at the local level.

- Research and development to create a whole-system rail model at the national strategic level. This would probably integrate existing models, and would provide the facility to understand at a national level the impact of various scenarios.

Crucially, this last proposed action (the development of a whole-system rail model at the national strategic level) would help fix the broken 'link' between the Network and Route Specifications and the Route Plans documents (see Section 4.5.2 on Network Rail's strategic planning framework, process and model).

> ✳ *CP5 Roadmap Recommendation 007*
>
> *During CP5 Network Rail should establish a formal programme for the development of the national strategic whole-system rail model, ensuring the model effectively integrates Network Rail's Strategic Planning Framework.*

6.5
Maintenance Delivery

6.5.1 General

The IIP assessment concluded that Network Rail was successfully building on the embedment of Ellipse and of common approaches to the maintenance planning, scheduling, reporting and assurance of maintenance activities across the Delivery Units. Of particular note was the impact of the Director Infrastructure Maintenance on the coordinated management of performance, and the development and benchmarking of the Delivery Units on a national basis. It is of note that the key coordinating mechanisms that were put into place at the time to facilitate this (the NIRG, NTF and RIRG structures) are still in place and continuing to provide national coordination in the devolved organisation. Recommendations were made at the time of the IIP assessment to explore the business case for extending handheld devices beyond the signalling discipline, and to provide clearer guidance on maintenance tolerances and what to do if maintenance activities were missed.

The SBP Maintenance Expenditure Summary document (NRSBP-SBP13) summarises the changes to maintenance within Network Rail as follows:

- Centralised control and Phase 2B/C maintenance restructure and Maintenance productivity – both these items were clearly evidenced in the previous assessments, the impact of which is summarised in the leading paragraph of this section.

- New Technology – the introduction of such technologies as PLPR and LADS (see Section 5.4.5 on Capex Evaluation in Track).

- Risk based approach to maintenance and intelligent infrastructure – delivered through the on-going RBM initiative (see Section 5.3 on Opex Evaluation) and the remote condition monitoring II initiative.

- Devolution and maintenance structure – movement to the devolved organisation and the risks and benefits related to that.

Within the same document, Network Rail identifies a number of maintenance efficiency initiatives and the savings anticipated during CP5, which are reproduced in Table 15 below. The remainder of this section examines the achievement of AMCL Roadmap Capabilities 3.6 and 3.7 specifically, the assessed impact to date of the RBM and II initiatives from Table 15, and also provides some general comments and observations from the assessment.

Initiative	Total saving CP5 £m		
	E&W	Scotland	GB
Risk-based maintenance	30.2	4.7	34.9
Working practices	26.1	4.1	30.2
Indirect organisation	20.5	1.0	21.5
Mechanisation	17.5	3.6	21.1
Asset information – ORBIS	25.1	2.6	27.7
Intelligent infrastructure	10.9	2.0	12.9
Rapid response	3.6	0.2	3.8
Recycling of materials	6.0	2.3	8.3
Contract strategy	8.8	2.4	11.2
Multi-skilling	11.9	2.7	14.6
Standardisation	6.9	0.8	7.7
Total	167.4	26.4	193.8

Table 15   Maintenance Efficiency Initiatives for CP5 (source – SBP Maintenance Expenditure Summary)

6.5.2 Handheld Technology

At the time of the IIP assessment it was noted that the Signalling discipline 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. During the SBP assessment it was observed that maintenance systems for both Structures and Track still seem to be largely paper based. There was much evidence that the use of iPhones was increasing for fault recording (see Section 6.7 on Incident Management for more detail). ORBIS has completed a Handheld Device Deployment Analysis which focuses on iPhone and iPad deployment rather than CMMS handhelds,

but elements of the benefit identified are related to maintenance management, but no evidence was provided that handheld technology to facilitate the maintenance management work cycle from and to Ellipse, as is done in Signalling, was provided.

6.5.3 Maintenance Tolerances

At the time of the IIP 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 the assessment this finding was again reinforced. For example, OPAS was observed to monitor out of tolerance maintenance but the tolerance levels are mainly driven by legislation and are not a risk based measure. There was no evidence of clearer guidelines on missed maintenance or inspection activities. One Track Maintenance Engineer reported that he defined when maintenance was deemed out of tolerance, but for out of tolerance condition defects (such as a track twist) the guidance in NR/L2/TRK/001, which varies depending on speed and usage of the track, was followed. It was noted that there is a moratorium on new standards so that achievement of AMCL Roadmap Capability 3.6 would be a challenge, and that in general maintenance backlogs were monitored through the ERM process.

However, understanding the tolerance on the frequency of a maintenance or inspection activity is an essential aspect supporting the safe and effective implementation of RBM. For example, if a maintenance activity is missed that now has a more relaxed frequency compared to a non-RBM regime, it may be unacceptable to leave it until the next visit as the asset may run an unacceptable risk of failure before then. In this instance, clear guidance on the tolerance and what to do if the visit is missed should be provided. This was the rationale for AMCL Roadmap Capability 3.6. Since this Capability was defined, Network Rail has published its Optimising Maintenance Regimes document (NRSBP-SBP28) which provides this guidance on how Network Rail's RBM approach deals with missed maintenance:

'A maintenance interval of half the P-F interval also provides contingency in case one inspection is missed or not carried out thoroughly, although in this case the subsequent repair time will be less. The default maintenance interval is therefore set as half of P-Fmin.'

This demonstrates that Network Rail's approach to RBM manages the setting of maintenance intervals and missed maintenance purely through a qualitative assessment of the risks involved, and includes a contingency within the frequency which makes the requirements for an explicitly stated tolerance less important. This approach is acknowledged by Optimising Maintenance Regimes as sub-optimal:

'This maintenance regime provides a planned contingency to cater for sudden deterioration and missed or poor quality maintenance activity. Again, it is a suboptimal regime from a theoretical perspective but it may be appropriate for local business needs.'

The guidelines for the tailoring of maintenance regimes at the local level continue this approach, allowing frequencies to be adjusted locally according to the business criticality of the route, as demonstrated in Table 16 which is reproduced from Optimising Maintenance Regimes.

Business criticality	Maintenance regime interval (expressed as percentage of P-F interval)
Default *	50%
Very low *	0%
Very high **	≤50% and ≥25%
Low **	≥50%

*   Output of RCM2 decision process

**   Local assessment over-riding the RCM2 decision process

Table 16   *Permitted adjustment of maintenance regime interval to reflect business criticality (source – Optimising Maintenance Regimes)*

◘ CP4 Roadmap Reiteration 010

By the end of CP4 Network Rail should revise the approach in Optimising Maintenance Regimes to include a quantitative definition of maintenance frequency tolerances.

6.5.4 Implementation of RBM and II

The implementation of the RBM initiative has already been described in Section 5.3 on Opex Evaluation. It has been structured into four phases with some early pilots underway (NRSBP-LCD30 through to NRSBP-LCD33), although it is anticipated that the initiative will be fully rolled out by March 2014. Evidence from within the Routes suggested a very limited knowledge of the initiative, and a continued reliance on traditional standards and regimes, although within Signalling most have heard of the RoSE initiative and have experience in implementing the revised standards that have come from that.

The implementation of the II initiative is more embedded, with a higher level of awareness within the Routes with the appointment, for example, of 'Flight Engineers' in the control centres. It was reported that the implementation is proceeding in four phases:

- Phase 1 – pilot in Scotland

- Phase 2 – programme implementation for track circuits, points and points heating.

- Phase 3 – continued implementation with wider scope.

- Phase 4 – targeted implementation in consultation with Routes (TBD).

The implementation and benefit tracking for the II initiative is in place but there is evidence that the anticipated benefits are not being realised as quickly as hoped, and are as much as 50% behind the planned expectation. This includes evidence that there are almost as many genuine alarms missed as are counted towards the II benefit (NRSBP-LCD34). It was reported during the assessment that this has been attributed to the slower than anticipated appointment of the 'Flight Engineers', an optimistic benefits expectation, and some specific technical challenges with track circuits in particular. However, despite this there appears to be a genuine interest and belief that the process of interpreting information and alarms from the II initiative will improve over time.

Of concern is the loosely integrated nature of the RBM and II initiatives. Although they are described together within the SBP Maintenance Expenditure Summary document and are presented as being implemented in a coordinated fashion, this is not borne out by the evidence presented within the assessment. Both initiatives are being managed separately, and there is no technical integration between them, although it was reported during the assessment that Phase 4 of the implementation would include a stronger link to the RBM initiative. A truly optimised maintenance regime would identify the opportunities for traditional maintenance and inspection, or automatic condition monitoring, from a common base (usually an FMEA) using a common logic (such as the RCM 'Decision Diagram') as has been described in Section 5.3.2 on optimising

maintenance regimes. This integrated approach is becoming more common within Network Rail (for example, see the FIIP initiative described in Section 6.7 on Incident Management), but it does not appear to apply to II and RBM at the present moment.

> ⊙ *CP4 Roadmap Clarification 013*
>
> *By the end of CP4 Network Rail should ensure that the II Phase 4 implementation plan effectively integrates the II and RBM initiatives for the long term, in accordance with CP4 Roadmap Reiteration 003, through the adoption of common processes to identify the optimal mix of risk mitigation for each asset type considered.*

6.5.5 General Comments and Observations

The following general comments and observations were made during the Route assessment:

- On the whole maintenance organisations are continuing to develop their use of asset data tools such as FMS and Ellipse to determine maintenance plans. The use of these tools has become a routine, well established and understood process across all maintenance delivery units, with most taking ownership of the data input themselves and not relying on third parties such as project teams. This has meant a much greater ability to plan strategically over longer time scales and target maintenance activity more effectively. Furthermore, in most cases the Delivery Units have engaged specific resources to interface directly with project/engineering teams in an effort to improve Asset Management during hand over.

- Maintenance management processes appear to be well established and reasonably uniform across all Delivery Units assessed. Regular reviews are being undertaken at all levels into the root causes of faults or incidents in an effort to improve asset reliability or to determine investment priorities, although this process is not consistent nationally (see Section 6.7.1 on root cause analysis).

- In several Delivery Units work plans are reviewed on a weekly basis with a four week look ahead by all interested parties. In one area, structures information was displayed on white boards detailing resource, materials, plant and possession. This was seen as a positive development.

- In one Route the reporting of maintenance related statistics to Train Operating Companies and other key customers is very mature in the form of a dashboard reporting measures such as late attendance, completions and late completions and planned possessions. The presence of TOC staff in control rooms showed an extremely mature approach to the customer interface.

- Logistics and safety information for both internal and contract site workers was observed to be very good in the areas assessed. The track discipline use the Safe System of Work v2.0 (SSoW)

planning tool that creates a comprehensive summary of all aspects of the job that everyone should adhere to.

- The 'Copy with Pride, Share with Pride' philosophy identified at the IIP assessment was not as evident from the Route assessments, and beyond the core maintenance and inspection processes described above there appeared to be a greater amount of variation in how things are done between different Routes.

- For example, whereas track seemed only to look ahead about eight weeks for tactical planning purposes, structures had a more methodical and long term approach in planning, prioritising and packaging up work in six month batches, to be tendered to outside contractors where necessary.

- Inventory appeared to be reasonably well controlled by OPAS for Structures and Ellipse for track, with the tactical planning of track inventory and plant managed through the weekly Plan, Do, Review output from SSoW.

- Structures demonstrated a 'maintenance in design' philosophy and the maintenance function are involved in the specification of new structures. A series of Standard Design Specifications for Structures make work packaging and the process for tendering the work simpler. Additionally The Certificate of Design and Check (Form 3) (NRSBP-LCD35) for Structures projects states the maintenance requirements, these do however from the evidence seen still seem to be periodic rather than risk based.

- Control of Contractor competency seemed to be well managed with clear requirements and checks in place. Structures used the Achilles Linkup system and track required the relevant contractor competences to be stated on Sentinel Card before agency staff were permitted to attend site. All areas assessed could demonstrate good practice in contractor risk assessment.

- During the EP Route assessment, it became apparent that the interviewee was involved in maintenance planning of assets as yet not installed and not to be commissioned for another five years. This demonstrates that Network Rail are proactively preparing for the introduction of new assets. Tasks included identifying the assets to be installed, the identification of staff requirements, and determining the anticipated level of maintenance and training.

6.6
Resource & Possession Management

At the time of the IIP assessment the Head of Planning within NDS had taken over the planning of both possessions and national on-track resources into a combined planning process described in NR/L3/NDS/302. At SBP this has changed again to accommodate devolution, with possession planning now devolved to the Routes and the management of national resources retained by NDS. This change has been completed through a change in reporting lines, with the Access Planning Teams now reporting into the Network Operations within the Routes rather than NDS.

The effect on AMCL Roadmap Capability 3.9 is that this has effectively been superseded by events. After devolution the responsibilities for NDS were split between NDS and the Routes. NR/L3/NDS/302 has been withdrawn and NDS retains a work instruction (NRSBP-LCD36) to govern resource planning. The Director Asset Operations, where the Access Planning Teams now report, covers possession planning. It was reported that although Section 5.1 of NR/L3/NDS/302 on access planning still applies to how Network Rail operates day to day, it doesn't appear to have been re-introduced as an internal instruction or guideline. In summary, the overall process for planning is still the same, with a two-year forward looking plan gradually refined until it is confirmed at 26 weeks as the CPPP against which Schedule 4 payment are finalised, through to the publication of the temporary timetable under Informed Traveller, but the written procedure that used to underpin this is no longer clear.

◻ *CP4 Roadmap Reiteration 011*

By the end of CP4 Network Rail should ensure all the process requirements for the planning of possessions and resources on a national basis captured in NR/L3/NDS/302 have been unambiguously split between NDS and the Route based Access Planning Teams.

AMCL Roadmap Capability 3.8 has been achieved. The requirement was for a long-term resource forecast to be put into place which informed a range of identified stakeholders. The Deliverability Review for CP5 (NRSBP-SBP43) already described in Section 4.5.5, which has been supported by IP (Head of Programme Integration – see Section 6.3 on Asset Creation) and NDS. The NDS contribution has extended the approach defined within NR/L3/NDS/302 to extend over the 2014 to 2019 time period (NRSBP-LCD37 through to NRSBP-LCD41). It was reported that the granularity of information at end of CP5 is not very accurate, but that CP5 had similar volumes and fluctuation when compared to previous periods. It was also reported that the move to midweek working and the role of the IP Integrated Planning Manager (see Section 6.3 on Asset Creation), which is a new post to refine requirements before taking them to NDS, give confidence in the deliverability of the

plan. Despite this, there remains the challenge that the CP5 Delivery Plan is not yet in place, but the factors that will influence its deliverability are at least understood.

Once CP5 is funded it was reported that the process for longer term planning should be made part of Network Rail's business as usual – however, this process had not yet been defined. The role of RDG in seeding efficiency initiatives and shaping the processes for optimising resource and possession management – both in the long and short terms – was reported (NRSBP-LCD42), and the effect of these initiatives in the Routes was acknowledged. For example, the Kent Route DRAM identified access to the railway as the primary risk to delivery of its CP5 plans, and is actively engaged as the pilot site for the IAP initiative being coordinated by RDG. The Kent Route also provided a range of Service Group Strategies that it is testing which aim to more closely connect the requirements of the RUS to the way the local Route organisation manages each train service group.

> ◉ *CP4 Roadmap Clarification 014*
>
> *By the end of CP4 Network Rail should review the success of the Kent Service Group Strategies and consider these for national adoption.*

6.7
Incident Management

At the time of the IIP 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 SBP, 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 establishment of Integrated Control Centres and the adoption of II technology into these. In addition, some concerns over contingency planning were identified.

6.7.1 Root Cause Analysis

An effective Asset Management system will ensure that the basic information on the assets under care is consistently defined, collected, analysed and utilised in continual improvement. Network Rail's general approach in this area is described in more detail in Section 7 on Asset Knowledge. 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 has been addressed through the FIIP, which has developed an iPhone application that provides technicians with standard failure codes structured from the RoSE and RBM FMEA analyses (NRSBP-LCD43 through to NRSBP-LCD47). This application is part of a wider set of applications which will cover mobile tasking, diagnostics, and component tracking; however at this stage only the fault coding application had been developed and trialled, with roll-out planned for April 2013.

The second area has already got a firm foundation within Network Rail in the form of the NIRG, NTF and RIRG structures (NRSBP-LCD48 and NRSBP-LCD49), which were described in more detail in the IIP assessment report, and were mentioned in Section 6.5 on Maintenance Delivery. Each Route has a Route Reliability Plan which is facilitated, defined and monitored through Route Reliability Meetings and the NIRG structure (NRSBP-LCD50 and NRSBP-LCD53). Reliability Alerts are routinely issued (NRSBP-LCD55 through to NRSBP-LCD57). In addition to this Network Rail has introduced 'Campaigns', which have run at approximately one per period since April 2012, and are the mechanism for facilitating performance, safety or efficiency changes consistently on a national basis within the devolved organisation (NRSBP-LCD58 through to NRSBP-LCD67). These frequently involve root cause analysis to identify the correct risk mitigation measure. Therefore it is apparent that Network Rail has a growing capability to be able to assess root cause in a consistent fashion, and to effect change through the pro-active management of reliability, but that the information from the FIIP is not yet fully integrated into this.

This was reflected in the Route level assessment, where root cause analysis still seems to be variable and interviewees could not describe any consistent process that detailed how root cause analysis is managed and how lessons learnt were fed back into the operational system (see Section 6.5.5 general comments and observation in Maintenance Delivery). For example, Structures stated that lessons were fed back into the design of systems but there did not seem to be any formalised channels for doing this.

It is also apparent from the assessment of Network Rail's Systems Engineering approaches that improvements could be made between that area and the day-to-day management of the network

with respect to reliability. For example, the Systems Engineering group have developed the Rail Reliability Data Handbook (RRDH) which is modelled on the OREDA approach in the oil and gas sector, but this is not commonly available outside the group (NRSBP-LCD68).

> ⦿ *CP4 Roadmap Clarification 015*
>
> *By the end of CP4 Network Rail should have a fully supported plan in place to align the RRDH to the outcomes of the FIIP and revise the scope and function of the RRDH to ensure all relevant aspects of Network Rail can access and contribute to its development.*

6.7.2 Contingency Planning

Contingency planning has not been specifically addressed within the previous AMEM assessments of Network Rail, as it has been reported and evidenced on previous visits to control centres that contingency plans are in place. However, it appears from this assessment that there are two areas where Network Rail may need to address its capabilities in the definition, deployment and rehearsal of contingency plans:

1) Definition and rehearsal – It was reported that contingency plans are not consistently created across Network Rail. For example, within the WICC contingency plans had recently been re-written as the Wessex Alliance had reviewed them and deemed them not to reflect Alliance working strongly enough. The existing contingency plans from the LNE and LNW Routes were used as templates, and the new Wessex Alliance plans are now being rehearsed. Although this is a positive example of continual improvement, it indicates that national coordination in this area is not as effective as it could be.

2) Awareness – Route interviewees demonstrated that the initial response to incidents was consistently sound but that incident response was almost always worked up from the point of a suitable individual or team attending site and then formulating a plan. There was little evidence of prepared contingency plans for types of events with the Delivery Unit just making sure that 'experienced and competent people are on site to work up the plan'. The only contingency plans that were alluded to during the assessment were those at stations such as evacuation plans and for one off high profile events such as the Olympics.

> ◉ *CP4 Roadmap Clarification 016*
>
> *By the end of CP4 Network Rail should have a plan in place (for completion in the first year of CP5) to revise its approach to the generation, rehearsal and review of contingency plans. This should ensure the right degree of national consistency and best practice is matched with local freedom and awareness of plans.*

6.7.3 General Comments and Observations

The following general comments and observations were made during the Route assessment:

- The installation of II Flight Engineers in control centres is evident, and confidence in the data emerging from the II initiative is improving. In some cases up to 80% of critical assets are currently being monitored. In addition the alarm limits/parameters can now be adapted by local teams and do not require the equipment supplier to make the updates.

- Within the WICC it was reported that the Alliance is a positive trigger for performance improvement. The WICC has re-organised and a short-fall in MOM and shift signalling supervisors remedied. It was reported that there has been a positive cultural change in the attitudes of the Route Control Managers, who are Network Rail employees, but now feel more empowered to make operational decisions that they know will be supported by the broader Alliance structure.

- The Wessex Alliance also reported the introduction of an Emergency Response Unit, which is a combined Alliance BTP initiative to ensure serious incidents can be responded to as quickly as possible.

- The Wessex Alliance also reported taking over responsibility for the planning and delivery of seasonal preparedness plans from NDS and their contract DB Schenker to South West Trains. This was perceived as a positive move which will allow a previous national resource, to be focused on local Route requirements.

- In general there appeared to be very good engagement with Train Operating Companies and it was felt that the flow of incident and post incident information, including post incident operating restrictions was effectively managed. Post incident, TOCs would able to see assurance documentation pertaining to the resolution of the incident.

- Systems such as FMS and TYRELL are used by incident response teams and controllers in a well-established process. In some cases incident controllers have taken responsibility for the update of FMS reporting in an effort to improve information gathered, rather than relying on maintenance teams or signallers, who may not have the time or expertise to update the data appropriately.

- Training on new/novel equipment can sometimes be inadequate. This is something that is being improved by the Route reorganisation as local Route maintenance engineers now have far greater powers to ensure that the introduction of new equipment is better managed.

- There was a concern expressed that although good resource and contractor information is available, the effective response to incidents often seems to rely on relationships and goodwill for both contractors and staff.

6.8
Asset Rationalisation & Disposal

At the time of the IIP assessment it was noted that Network Rail did not have a systematic process for the identification of asset rationalisation opportunities at the national, strategic level. A number of one-off, independent studies were provided as evidence, and AMCL Roadmap Capability 3.11 was defined to promote the systematic and periodic consideration of asset rationalisation opportunities throughout the network. The SBP success criterion was to have asset rationalisation proposals detailed in each of the Route Plans. This does not appear to have been achieved, although a few Route Plans do identify rationalisation opportunities at a high level (NRSBP-SBP7 and NRSBP-SBP10).

The IIP assessment report also noted that Network Rail was starting to evaluate the potential for rationalising the number of point ends across the network. This work has now matured, is called the Network Optimisation initiative, and is sponsored by the RDG (NRSBP-LCD69). The objectives of the Network Optimisation initiative are to:

- 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.

The initiative is being rolled out in three stages. Firstly, national point operating information on point usage and tonnage has been analysed and 10% of points have been identified as potential

rationalisation candidates. Secondly, a pilot trial on the Wessex Alliance has been 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 (NRSBP-LCD70). The team included representatives from Network Rail and the TOCs and FOCs. This has been completed, and the local business case to rationalise the points pre-renewal has been granted. Thirdly, the methodology will be refined based on lessons learnt, and rolled out across the rest of the network.

This initiative is important for two reasons. Firstly, it provides a generic model for the systematic rationalisation of assets which could be rolled out to other areas if it proves successful, and demonstrates that the Network Change Procedure is fit for purpose assuming stakeholder engagement is secured early on in the process. Secondly, the 1,000 point ends which Network Rail is targeting to achieve will be funded independently of the ORR's CP5 determination, and in addition to the 399 point ends identified in the SBP, so tracking the benefits of the rationalisation will be of great importance. This is a new approach for Network Rail and if successful will allow the organisation to demonstrate its capabilities in this area.

Network Rail has also continued to develop its capabilities in the disposal and re-use of assets, and manages the disposal of its asset in an increasingly careful manner. Manual Handling Depots (MHDs) at Crewe, Westbury and Whitemoor (which is Network Rail owned) take in and dismantle, assess and recycle as appropriate rail, sleepers and ballast (NRSBP-LCD71 to NRSBP-LCD73). However, it has been noted that in a recent RailKonsult report (Innovation Efficiency Study, Summary Report, Reference BBRT-2573-RP-0001, Version: Issue 2) it was estimated that there were significant opportunities for the further cascade and refurbishment of materials amounting to a conservative estimate of £27.5m.

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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 Targets

Table 17 below shows the scores from the 2011 (IIP Update) assessment, the target score from the AMCL Roadmap for the SBP, the actual score from the SBP assessment, the alignment of Network Rail's AMIP with the AMCL Roadmap as of August 2012,and comments on any variance from target.

Activity	IIP Update Score	SBP Roadmap Target	SBP Score	Summer 2012 Alignment Report	SBP Target Achieved	Comments
Asset Information Strategy & Standards	69%	74%	74%	G	YES	**Roadmap** – 2/3 achieved, 1/3 partially achieved **Target achieved** due to following: • ORBIS defines the programme for delivering the Asset Information strategy • MDM provides the basis for the knowledge standards but no information specification was available
Asset Information Systems	51%	60%	56%	A	NO	**Roadmap** – 1/1 partially achieved **Target not achieved** due to delays in initiation of ORBIS programme
Asset Knowledge & Data	45%	56%	52%	A	NO	**Roadmap** – 3/3 partially achieved **Target not achieved** due to the following: • Delayed initiation of ORBIS • Arup data confidence assessment not available • Route stakeholders were unclear on their role on assuring data quality

Table 17   Asset Knowledge Group Targets

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 18 below shows a summary of the SBP 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	SBP Success Criteria	Summary of SBP 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 Asset Management System requirements and the SBP Asset Information Plan has been updated, where appropriate, by May 2012.	This capability has been achieved. A workshop was held in December to review AIS delivery (ORBIS) against the requirements of the Asset Management System. Further reviews are planned in 2013 to maintain alignment. The ORBIS delivery plan has been updated and aligned with Asset Management benefits realisation for CP5. Key Asset Management stakeholders are represented on the ORBIS Programme Board (Head of Asset Management Strategy) and ORBIS Programme Review Meeting (Group Asset Management Director). Asset Information is represented on key steering groups (RBM) to ensure alignment of ORBIS and AI with Asset Management policy delivery.
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 SBP is developed by April 2012. 2. The Asset Information Specification for SBP has been produced by April 2012.	This capability has been partially achieved. A suite of documents has been developed as part of the MDM ORBIS project that form part of the Asset Knowledge Standards and describe the processes, quality controls and governance by which data is specified. The Track dataset has been produced using this process. There is currently no RACI matrix that covers the whole end-to-end process in the devolved structure.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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.	1. The Data Dictionary for SBP is updated by December 2012 by reflect the SBP Information Specification 2. The CP5 Data Dictionary for Track assets has been implemented and it can be demonstrated that it aligns with the CP5 Asset Information Specification for Track assets by December 2012.	This capability has been achieved. CP4 data requirements are captured by ADIP in the 'As-Is' Data Dictionary. CP5 detail design and asset data hierarchy for Track asset complete and being built. Definitions for Condition, Failure and Utilisation are being developed by joint working groups. MDM roadmap developed providing visibility of expansion of MDM to cover Network Rail and GB rail infrastructure.
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 Asset Information Plan for SBP is complete by May 2012. 2. The data collection process for SBP is completed by December 2012.	This capability has been partially achieved. The AI Plan for CP4 and SBP development has been developed and is being implemented by the Asset Data Improvement Programme. Changes to the Asset Information Plan resulting from devolution are not apparent.
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.	1. The data confidence assessment approach and application plan have been developed by June 2012. 2. The outputs of the SBP assessment are consistent with the requirements of the Data Dictionary, or corrective actions established, and have been shared with relevant stakeholders by January 2013.	This capability has been partially achieved. A high level methodology has been designed. This has been reviewed by Arup but the results of this review were not available at the time of the AMEM interviews. Stakeholders within Routes were found not to be aware of the data confidence assessment process and the devolved requirements yet. Trajectories for confidence levels are understood to be being developed and should be available at the end of March.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP Assessment Findings
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 programme of identified ADM priorities for SBP has been completed by January 2013.	This capability has been partially achieved. The Devolution Handbook mandates the use of current standards, including ADM, on Routes. However, no detail regarding 'on the ground' monitoring is currently in place or developed for monitoring of new standards. Quality reports are issued periodically for GEOGIS and Ellipse by the AI Data Management team. A confidence assessment methodology is in place and programme and escalation pathways are being developed for key CP5 milestones. An assessment of data confidence levels is being provided by Arup, but was not available at the time of the AMEM assessment.
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.	Tactical system improvements identified in ORBIS have been implemented by January 2013.	This capability has been partially achieved. The overall programme was initiated later than identified in the AMCL Roadmap and only high-level architecture models have been produced to date. The ORBIS Design Authority is being strengthened to cover commercial, business, enterprise, service and programme architectures to provide the required levels of overview and integration. The Gartner TIME review of Asset Management systems currently remains the identified approach to individual systems. A 90 day programme to model the process, organisation, technology and information architectures covered by the scope of ORBIS in ProVision will shortly commence.

Table 18   Summary of assessment findings for the Asset Knowledge Group

7.3
Asset Information Strategy & Standards

7.3.1 Asset Information Strategy

At the time of the 2011 IIP Assessment, Network Rail's AIS was under development. This meant that Network Rail was behind in terms of meeting the target dates specified in the roadmap for the initiation of its AIS. Most critically, Network Rail was behind target for the upfront definition of the key Asset Information Specification and Asset Knowledge Standards when compared to that required to meet the roadmap criteria. However, progress was noted in the tactical delivery of the ADIP towards supporting the asset information requirements of the SBP.

The full version of the AIS ('Asset Information Strategy: Vision and Roadmap (v1.0)') (NRSBP-AKN3) was released in September 2011 and reviewed as part of the 2011 IIP Update, which noted that this appeared to address many of the issues raised in terms of the existence of an overarching strategy and the AMEM score was revised accordingly. This Vision & Roadmap document set out a long-term strategy for Asset Information and is now being implemented and delivered through the ORBIS transformation programme. However, the delays to the publication of the AIS had knock-on effects on its subsequent initiation, so the scores for Asset Information Specification and Asset Knowledge Standards were not materially improved in the 2011 IIP update.

The recommendation from the 2011 IIP Assessment (and subsequent update) was for a detailed review of the newly-published AIS to *'provide assurance of Network Rail's management of asset information in support of CP5 submissions'*.

This review was carried out by AMCL in 2012 and the results published in 'Review of Asset Information Strategy Phase 2: ORBIS'[1]. The report further validated the results of the 2011 IIP Update Assessment in that the Vision & Roadmap represented:

> *'a major step forward in terms of Network Rail's approach to Asset Information. It is considered to contain all of the elements required for a good practice AIS and provides a solid foundation on which to develop the Asset Information capability within Network Rail and the wider industry.'*

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1   *Review of Asset Information Strategy Phase 2: ORBIS, AMCL, Version 1.0, 28th September 2012*

However, the report also highlighted that *'while Asset Information and ORBIS have made a lot of progress since September 2010, the initial delay in mobilising the Asset Information Directorate and developing the AIS prior to that point have left a challenging trajectory to recover to the agreed Roadmap targets by the publication of the Strategic Business Plan (SBP) in January 2013 and the end of the current Control Period (CP4)'.*

The report also gave guidance in terms of specific recommendations for the deliverables required to support the SBP submission in terms of the overarching AIS and supporting Asset Information Specifications.

This position has been reinforced by this assessment. The overall picture is of an organisation that has put in place a clear vision and strategy for Asset Information that has an alignment to that of the wider organisation and is moving into the delivery phase. However, the delays to starting the programme have meant that there are several milestones in 2013 that need to be met for the overall position to have reached that targeted for the end of CP4. The change in scores from the IIP Update assessment to the SBP assessment can be seen in Diagram 49 below.
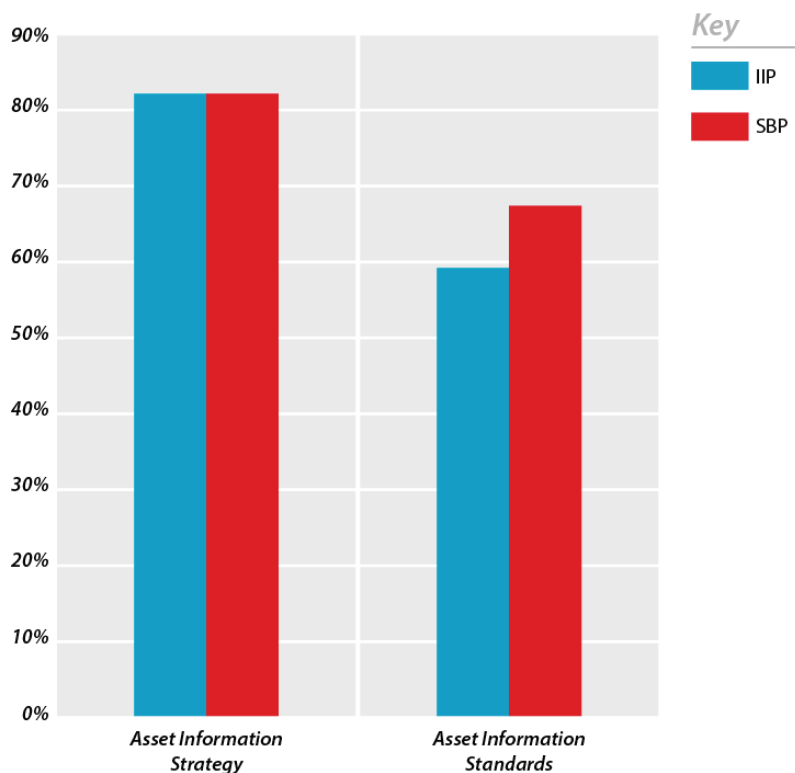
Diagram 49   Comparison of Asset Information Strategy and Asset Information Standards scores between IIP Update and SBP assessment

Issues still remain regarding the clarity of the link from the Asset Information Vision to the more detailed planning and coordination of Asset Information and Information Systems delivery. Documents such as the Strategic Planning Framework mapping to capabilities, services and projects (NRSBP-AKN14) help in this regard, but need to be developed further and the dependencies mapped in terms of delivery timelines to the delivery roadmap. This mapping should include all projects impacting asset knowledge this would have additional value as a frame of reference for engaging those in the wider and route based asset information community.

◉ CP4 Roadmap Clarification 017

By the end of CP4 Network Rail should establish a mapping from the Asset Information Vision and Strategy to individual projects (including 'non-ORBIS' projects), showing interdependencies and ensuring delivery pathways are developed and maintained.

The focus on delivery of vision and strategy at the centre does now require a subsequent communication programme into the devolved Routes. There were some common themes identified by the key stakeholders interviewed during this assessment regarding asset information at Route level, which focused around two perceptions:

1) That an ORBIS 'centric' initiative was being driven with limited involvement from the Routes.

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 could be attributed to a lack of engagement, a lack of communication about engagement activity, or a mixture of the two. There is a risk that the new systems are seen by the wider asset data community as being either 'imposed' or something that they are not connected with. The business as usual model, following completion of ORBIS, will require quality, innovation and improvement to be largely driven from and funded by the asset data communities in the Routes and so this mechanism will become of increasing importance. One suggestion from an interviewee was that Asset Information 'champions' were needed in the routes to help communicate and inform regarding all asset information matters, both ORBIS and business as usual.

◉ CP4 Roadmap Clarification 018

By the end of CP4 Network Rail should establish mechanisms within the Routes to define clear responsibilities and interfaces with the central organisation, and to act as communication channels for the improvement and integration of project information.

In contrast to the previous observation, there is a marked improvement in the perception of asset information provision from Route staff who are not involved in data as their core role but are users of data. The 'Breakthrough Projects' are known and supported widely.

A process and supporting documentation for developing Asset Information Specifications has now been produced (NRSBP-AKN8) and an Asset Information Specification for Track has recently been produced using this process.

7.3.2 Asset Information Specification and Asset Knowledge Standards

As mentioned above, alongside publication of the AIS, the priority for Network Rail 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. Tactical improvements had been made through ADIP but an aligned, holistic approach across the asset base and aligned with Network Rail's overall Asset Management System had yet to be developed. Network Rail's MDM programme is intended to address this.

Recommendation 42 of the 2011 IIP Assessment was to review Network Rail's update of the ADIP to support CP5 SBP on its publication, to *'provide necessary assurance of Network Rail's management of asset information in support of CP5 submissions'*. This can be summarised as follows:

- **Asset Information Specification Process –** A robust and pragmatic process for developing Asset Information Specifications has been produced (NRSBP-AKN8). This includes a requirement to define the needs for data in the context of overall business drivers such as the SBP, Asset Policy, Mandates and Organisational changes, thus providing 'line of sight' to organisational goals. It also specifies a re-checking of the final Asset Information Specification against these needs before sign-off.

- **Asset Information Specifications –** The first Asset Information Specification (for Track) is reported as being complete. A representative selection of data description lines from the specification was provided (NRSBP-AKN2). Evidence of stakeholder (i.e.RACI) analysis for the end-to-end asset information arrangements, as required in the Asset Information Specification process, and including the extent of the devolved organisation was not evidenced or observed.

- **Master Data Management (Data Dictionary) –** Work on the MDM system building is currently underway with a planned 'go live' date of May 2013. This is for the scope of Track assets only.

- **Asset Information Plan –** 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, rollout and go live has not been produced. This would aid greatly

the tracking of timelines for ultimate delivery of the Asset Information Strategy elements (an example of the need for this can be found in section 7.4.6 and this is linked to CP4 Roadmap Clarification 017).

In summary, Network Rail and the ORBIS programme have initiated the arduous but imperative process of defining the asset information required and establishing the asset knowledge standards required as appropriate to that information with regard to the role it plays in supporting decision making in the overall business. Development to date has been undertaken by the ADIP programme in three key phases:

- Development of key asset data and information to support the IIP process, within relevant time constraints;

- Development of key asset data and information to support the SBP process, within relevant time constraints; and

- On-going development of the ADIP process to support business-as-usual workstreams through CP5 and beyond.

However, wider development of the asset information requirements specification and quality standards across the business is understood to be largely undertaken through the MDM element of the ORBIS programme. Whilst there is clear evidence of a wide-ranging and robust programme of work being developed, the outputs to date have been limited to the Track asset discipline, which does reflect appropriate prioritisation of work. The MDM process is also now moving on to other asset disciplines but development trajectories to achieve Roadmap targets for the end of CP4 remain steep due to the late initiation of the ORBIS programme.

7.4
Asset Information Systems

7.4.1 General

Asset Information System progress remains behind target timescales, due principally to the knock-on effects of delays in initiating the development of the Asset Information Strategy and the resulting ORBIS programme. As a result only high-level architecture models have been produced to date.

The ORBIS Design Authority is being strengthened to cover commercial, business, enterprise, service and programme architectures to provide required levels of overview and integration and help increase the rate of progress in this area but activities to produce more detailed mapping of business and systems architecture, developed from the vision and strategy, have not yet been undertaken. A 90 day programme to model the process, organisation, technology and information architectures covered by the scope of ORBIS in the 'ProVision' software system will commence shortly. The AIS Vision & Approach has identified a rationalised view of standard and existing systems moving forward (e.g. Ellipse), alongside some exceptions, such as the continued use of the OPAS system specifically for buildings. AMCL's previous AIS review[2] proposed that a Systems Plan should be produced to capture these transitions and the final target state. This had not been completed at the time of this assessment but is anticipated to follow completion of the 'ProVision' model.

No specific recommendation is made here as the matter is believed to be already captured within the recommendations emanating from the previous review (see footnote 6).

7.4.2 Business As Usual (BAU)

The AIS 'Vision & Approach' indicates that the Asset Information function will increase its lead role in the development of asset information systems going forward, working in conjunction with the IM team. It can already be recognised that activity in the BAU area is increasing and becoming focused as organisational structures and processes are defined. The pragmatic strategy of developing this using BAU type projects from an early stage is resulting in a capability that is likely to be mature well before the ORBIS programme is concluded.

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2   *Review of Asset Information Strategy Phase 2: ORBIS, AMCL, Version 1.0, 28th September 2012*

A 'one front door' approach is being adopted to building new relationships between those in the Routes and the Asset Information function. This involves individuals being appointed as points of contact from the Asset Information team. This will become a key linkage in the process of defining and delivering improvements to Asset Information in the post-ORBIS environment. It is not clear what the requirements for interface will be from the Routes' point of view, how this will be set and by whom (see CP4 Roadmap Clarification 018).

7.4.3 System Requirements Definition

In the area of system specification and procurement it is the stated strategy to move 'up the V' (reference to the widely recognised 'V-diagram' of systems engineering) in terms of a change from the historic practice of defining detailed system requirements to one of specifying high level outcomes. This is aligned to a move away from engaging many system integrators to one with a smaller number of strategic implementation partners. Given the ambitious nature of the ORBIS programme and its multiple areas of system integration activity in the near future this format is considered by AMCL to allow for greater flexibility. This is however dependent on having systems architecture modelling of sufficient detail and clarity to allow concurrent activity to progress with an acceptable level of risk.

7.4.4 System Implementation

At the time of the previous assessment it was found that Network Rail did not have a standard methodology for asset information system implementation. Although there are now standard approaches to elements of system implementation there is no overarching system implementation process.

In adopting the V-model it will be equally necessary to define the high-level stages of implementation in order to assess project risk and track ownership of elements with the partner integrator, and across multiple projects.

7.4.5 Business Continuity Planning

At the last assessment it was stated that there are no tried and tested Business Continuity Plans in existence, representing a potentially significant lack of assurance in abnormal situations. End users generally had limited or no awareness of an agreed approach if either a major system or major

facility were suddenly unavailable for extended time periods. This was considered by AMCL to be an area for immediate action. At this assessment Route based staff were found to remain unaware of any tried and tested Business Continuity Plans.

⦿ CP4 Roadmap Clarification 019

By the end of CP4 Network Rail should develop a risk-based prirotisation for all systems and applications to focus continuity planning requirements, including communication routes with key stakeholders and end users.

7.4.6 Asset Condition

The development of asset condition data specifications now also considers the programme to define a framework for risk based maintenance (see Section 5.3) as well as to fill gaps in current asset condition data and knowledge. Timescales for the completion of this activity are not shown on the ORBIS programme delivery roadmap although the project to implement the resulting data specification (ORBIS project reference AI_22.5) is currently shown as running in the first six months of 2015 (NRSBP-AKN16). These activities need to be considered together as part of a critical path to deliver a single source of condition data by the end of 2015 and progress monitored accordingly (see CP4 Roadmap Clarification 017). It is currently not clear to the assessment team if the scope of the work to define a set of condition codes will apply to the whole scope of assets or a subset.

7.4.7 Fault Management – FMS

The 2011 IIP Assessment referenced several potential issues with Network Rail's FMS (Fault Management System) as the main source of information on faults for certain asset groups within Network Rail. A number of these issues were also documented in Network Rail's own Asset Policies at the time where issues with FMS data had hindered the policy development. FMS was then the subject of two reviews by AMCL, being covered by the 'Review of Asset Information Strategy Phase 2: ORBIS'[3] and 'Review of Asset Failure Management'[4] as the main system supporting this process. The findings of these reports are not repeated here.

Both reviews highlighted that FMS had been listed as a 'Tolerate' system within the ORBIS programme, pending Network Rail's review of failure management.

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3   *Review of Asset Information Strategy Phase 2: ORBIS, AMCL, Version 1.0, 28th September 2012*
4   *Review of Asset Failure Management, AMCL, version 1.0, 6th September 2012*

The ORBIS programme includes a project to integrate and align defect, fault and condition data (ORBIS project reference AI_22.5) that is currently shown as running in the first six months of 2015 (NRSBP-AKN16). Work to define data requirements, including standard codes will therefore have to be completed in advance of this, via the new Asset Information Specification Development Cycle. The current timescales indicate that a single source of aligned data will not be available for population until late 2015.

However, it is acknowledged that there FIIP project will provide a tactical solution to the capture of root cause of failure data within FMS. This project is discussed in section 6.7 on Incident Management.

◉ CP4 Roadmap Clarification 020

By the end of CP4 Network Rail should demonstrate clear alignment between ORBIS, FIIP and the outputs of the Asset Information Specification and Asset Knowledge Standards development processes

7.4.8 Track

The track data migration project (ORBIS project reference AI_22.2) is programmed to commence in 2013 and delivers a migration from the existing GEOGIS system to the RINM as one of its stated outcomes. RINM goes live in 2015, with parallel running of GEOGIS and RINM occurring throughout 2016.

Asset Management decision making within the Track asset discipline should also be greatly supported by the LADS system, which has recently completed initial trials as part of the SBP development process and is considered by AMCL to reflect good practice in the management of linear rail assets.

7.4.9 Telecoms

Ellipse is the master source of asset information for the centrally managed NRT (see Section 5.4.8) Telecoms asset discipline and business impact assessments are currently being carried out to assess the continuity planning requirements of systems for telecoms asset information. This is independent of the OSS project and is proceeding ahead of this. A high level contingency plan has been produced in draft and is awaiting approval.

There are understood to be plans for the Telecoms asset discipline to implement the ISO 27001 standard for information security but the link between this strategy and the Asset Information Strategy is unclear.

7.4.10 E&P

Ellipse is the master source of asset information and work management for Electrical Power.

No major issues were identified in its use for these purposes by the stakeholders interviewed, although the further development of condition and degradation data across the EP asset discipline continues to be recognised as a key area for further development following the IIP and SBP development processes.

7.4.11 Ops Property (Buildings)

OPAS, supplied by Atrium Software, is the key system to manage buildings. It is an 'off the shelf' system specifically for property management but has had a number of customisations to meet specific Network Rail needs.

The OPAS system is currently undergoing a further series of upgrades and customisations (external to, and pre-dating the ORBIS programme). These will enable a series of activities and processes to be migrated into the core OPAS system, these include:

- Linking asset records to fault, remedy and defect information

- Scheduling of planned preventative maintenance

- Programme management

- Recording of risk data (including risk factors)

The plans for using risk factor values in the creation of automatically derived alarms and escalation criteria appear to offer industry leading potential. The results should be monitored as potential examples of transferrable practice.

Formation of a governance board for the OPAS system is planned for summer 2013, to follow the delivery of the enhancement programme.

7.4.12 Signalling

Ellipse is the master Asset Register for Signalling Assets. It also contains the standardised job 'norms' for works management purposes.

Ellipse has recently undergone an improvement programme (pre-dating ORBIS) and is programmed for involvement in two further projects as part of the ORBIS programme: AI_031.0 (AM platforms including Ellipse and ESRI Integration) and AI_031.1 (Ellipse and ESRI upgrades). Ellipse 6.3.3 goes out of support during the ORBIS timeline and the brief project outline provided for project AI_031.1 (Ellipse and ESRI upgrades) indicates that this project will address the upgrade requirement.

Interviews at route level indicated that there has been an improvement in data quality as a result of the previous improvement programme and also as a result of internal benchmarking and best practice sharing in Maintenance delivery units.

7.4.13 Structures

The main Asset Register for Structures is CARRS, with structures condition information stored in SCMI and tunnels through TCMI. These are currently supported by tactical tools with some local use of spread sheets. A replacement for CARRS is understood to be in development but specific details of the timing for the replacement were not apparent in evidence or as part of the interviews undertaken.

Interviews at a Route level indicated that users were aware that CARRS is due to be replaced as part of the ORBIS programme but there was no knowledge of the plans and timescales for this.

The BCAM programme has an interface with Asset Data and Systems for Structures and the ORBIS programme as part of its wider remit. BCAM has a higher focus on the process change required in the central team and Routes to support the changes in policy and delivery, rather than ORBIS which is more focused on delivery of improved information services. ORBIS provides the overall strategy and logic for Asset Information and BCAM has some specific requirements within this. Elements of ORBIS have had direct interfaces with BCAM, such as improvements in data quality for Earthworks, Structures and Buildings through ADIP.

The BCAM elements were originally left out of ORBIS as they were considered to be part of separate scope. Buildings & Civils were focusing on the initial process change and restructuring. This has now been revisited to include Asset Information functionality gaps in ORBIS.

7.5   Asset Data & Knowledge

The ADIP has delivered benefits in the area of existing datasets. Overall there has been an improvement in governance procedures for asset data and knowledge, and various new groups and meetings have been instigated at the start of 2013. Monitoring of effectiveness and continual improvement should follow but it is too early for formal results.

7.5.1 Data Confidence Assessment

A high level methodology for data confidence assessment has been designed By Network Rail using an alphanumeric coding, similar to that developed in the UK Water Industry. Arup (Part A – Independent Reporter) conducted a data quality review of Network Rail utilising that methodology in the lead up to this assessment which have been assessed with respect to PAS 55 compliance (see Section 10)

7.5.2 Data Audit

With the change in data ownership to the Routes there is now a local requirement for the routes to conduct data audits and manage the corrective action process. There is then an acknowledged requirement for the central Asset Information team to give assurance on this process. The range of actions available for non-compliance is not clear. It is also unclear whether the Asset Information Team will specify audit details (process and sample size) or if this will be locally defined.

Interviewee responses indicated that a system of opportunistic local checking where staff are already present on site for another role or another type of audit will also carry out some data auditing. This is a pragmatic and efficient approach but may require a central framework and guidance to ensure consistency.

◉ *CP4 Roadmap Clarification 021*

By the end of CP4 Network Rail's strategy for audit and assurance against the Asset Information Specification should include provision for both national and local datasets, local audit and central assurance.

7.5.3 Track

A strategy is in place to replace condition reports via paper with mobile applications and thus bring about an improvement in core data by codifying fields that were previously free text. Care must be taken that the software and delivery timescales of this do not delay the improvement in process and practice.

The LADS system is due to be rolled out nationally following the delivery of the ADS in September 2013. The LADS system is intended to create a 'pull' from the wider business for subsequent technology. Indications are that this will be well received, based on the limited exposure so far.

7.5.4 Telecoms

Ellipse is the master source of asset information for Telecoms. There is currently no asset data audit or assurance process in place for Telecoms asset data. Recruitment is underway for Telecoms compliance and audit staff and these new roles are intended to include this scope. There is also a plan for telecoms asset data to be compliant with the ISO 27001 (security) standard within the next 18 months. As per Section 7.4.9, the link to the overall Asset Information Strategy is unclear with regard to both of these initiatives.

7.5.5 E&P

Ellipse is the master source of asset information for Electrical Power. New asset hierarchies for OLE, SPS and Distribution have been built using facilitated workshops. This activity has been evidenced as interfacing with the overall ORBIS project and the results have been fed into MDM.

A number of other specific initiatives have also been demonstrated by Network Rail, including how real-time data has been successfully used in the area of insulation condition trending where the deployment of Bender units with associated trending, alarm thresholds and maintenance responses has proved effective.

However, at an overall level, Network Rail has noted that the successful implementation of the Asset Policy and further confidence in the delivery of the required CP5 outputs is dependent on several enabling activities, including the following relating to asset information:

- *Enhanced asset information data quality– through the Asset Data Improvement Programme /ORBIS programme to improve intervention decision making activities;*

- *Improved business as usual asset condition data collection – to improve knowledge of asset degradation mechanisms; and*

- *Improved system utilisation knowledge through increased energy measurement and SCADA facilities.*

A significant amount of work on asset information for Electrical Power and Fixed Plant assets was noted by AMCL during the IIP and SBP development phases, particularly with respect to ADIP. This is particularly the case for key asset types, where condition information was held or collated to support the 'top-down' modelling process. However, the completeness and quality of the asset information, particularly asset condition information, remains variable across the asset base. Particular issues related to Signalling Power Supplies, which was only transferred to the asset discipline at the start of CP4.

7.5.6 Ops Property (Buildings)

Interviewees indicated that there was currently no formal governance in place for the OPAS system and Buildings data (see section 4.4.11), although there is evidently a high level of cooperation across the user community.

There is no overall data standard for OPAS. Local requirements are being written on a case-by-case basis. Changes are being made to the dataset but these are lagging business strategy and being driven by immediate modelling need.

It was reported that there are effectively two current hierarchies for building and civils assets and as a result, calculating unit costing is impossible without manual manipulation of data on spread sheets.

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 Targets

Table 19 below shows the scores from the 2011 (IIP Update) assessment, the target score from the AMCL Roadmap for the SBP, the actual score from the SBP assessment, the alignment of Network Rail's AMIP with the AMCL Roadmap as of August 2012,and comments on any variance from target.

Activity	IIP Update Score	SBP Roadmap Target	SBP Score	Summer 2012 Alignment Report	SBP Target Achieved	Comments
Contract & Supply Management	71%	72%	72%	G	YES	**Roadmap** – 1/1 achieved **Target achieved** since periodic reporting against contract performance standards is now in place.
Organisational Structure & Culture	60%	68%	63%	A	NO	**Roadmap** – 1/3 achieved, 2/3 partially achieved **Target not achieved** due to following: • Approach from 2011 revised • Redesigned vision and strategy but not validated across the organisation • Limited progress aligning team and organisational competences
Individual Competence & Behaviour	61%	73%	67%	A	NO	**Roadmap** – 2/2 partially achieved **Target not achieved** due to following: • Progress has been made on defining individual competence requirements but some technical challenges remain • Tailoring of training approaches not complete

Table 19   Organisation & People Targets

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 20 below shows a summary of the SBP 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	SBP Success Criteria	Summary of SBP 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. The IAM competence framework has been configured to produce Network Rail's Asset Management competence framework by April 2012 2. All key asset manager roles are defined and the criteria for selecting these explicitly defined by April 2012 3. Role profiles are defined for all key asset manager roles that include the performance standards required against the Asset Management competence framework by May 2012 4. Initial assessments have been carried out for all key asset manager roles against the role profiles and any gaps identified by July 2012	This capability has been partially achieved. 1. 12 role descriptions based on analysis of Network Rail "RACI items" are the core of the competence framework. Each item identifies "activities" which describe a mix of knowledge, understanding, personal characteristics and tasks used to define levels of performance. Role descriptions include selected IAM competence elements regarded as relevant. A set of Network Rail qualifications contextualise each element. 2. Job titles within scope are assigned one or more of the 12 role descriptions. A matrix provides an overview of these relationships and shows how they are distributed across the routes and centre. 3. 78 job titles now have role profiles, from asset engineer to technology manager[ii]. These profiles are combinations of the 12 role descriptions as they relate to each specific job title. 4. Self-assessments have been carried out by all 125 members of staff defined as holding key asset management roles.
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. Staff in key Asset Management roles have training and development plans in place to address their Asset Management training and any refresher training needs by January 2013 2. Training courses for key Asset Management staff have been reviewed for their relevance to the Asset Management competence framework and the balance of skills covered by January 2013	This capability has been partially achieved. 1. Only some of the staff defined as holding key asset management roles have training plans that address asset management training needs identified through their self-assessments. 2. Some training courses with some relevance to asset management are in place and others are under development.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP Assessment Findings
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. Identify key Asset Management teams and the criteria for selecting these are explicitly defined by April 2012 2. Key Asset Management teams have Asset Management goals and group competence requirements built into their terms of reference by January 2013	This capability has been partially achieved. 1. The key asset management teams have been identified, taking into account the devolved structure and the role of the central asset management team. 2. The objectives and responsibilities of the key asset management teams have been defined. Group competence requirements for the teams are still outstanding.
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 key Asset Management roles have the full range of their current competence captured in the database by January 2013 2. The database is accessible by all those with a legitimate reason for doing so by January 2013 3. The database is in a form that can readily be interrogated and can provide information necessary for such activities as team creation, training planning and manpower planning by January 2013	This capability has been achieved. 1. Self-assessment results and details of relevant qualifications have been captured together with summary outcomes of discussions between assesses and their line managers[iii]. 2. & 3. The database can be interrogated and used for producing management information but is not yet used widely and has not been integrated into the standard IT systems.
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. Agreement is reached both at senior manager level and amongst key asset managers on the desired Asset Management culture by January 2013 2. Gap analysis has been carried out and areas where cultural change is necessary have been identified by January 2013	This capability has been partially achieved. 1. Senior management has determined how it intends to define the desired asset management culture and started to engage on this with people in key asset management roles. 2. A high level gap analysis has been carried out involving senior managers which identifies current and desired positions on culture dimensions. A high level assessment of culture maturity in different parts of the organisation has also been conducted along with an analysis of the extent to which existing initiatives support the transition from current to desired culture. This analysis has not yet been validated across the organisation.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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.	n/a	No objectives set.
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.	1. Performance standards have been defined and are included in tender information by January 2013 2. Standards are achieved for at least 80% of contracts awarded by January 2013	This capability has been achieved. 1. & 2. Periodic reporting is now available on contractor and supplier performance.

Table 20   Summary of assessment findings for Organisation & People Group

8.3
Contract & Supplier Management

There is evidence of continuing improvement in this area. For instance, improved alliancing (NRSBP-OP16) with TOCs, suppliers and contractors; and, the infrastructure investment criteria (NRSBP-OP17) that are being used at route level in order to reduce dependency on centralised decision making.
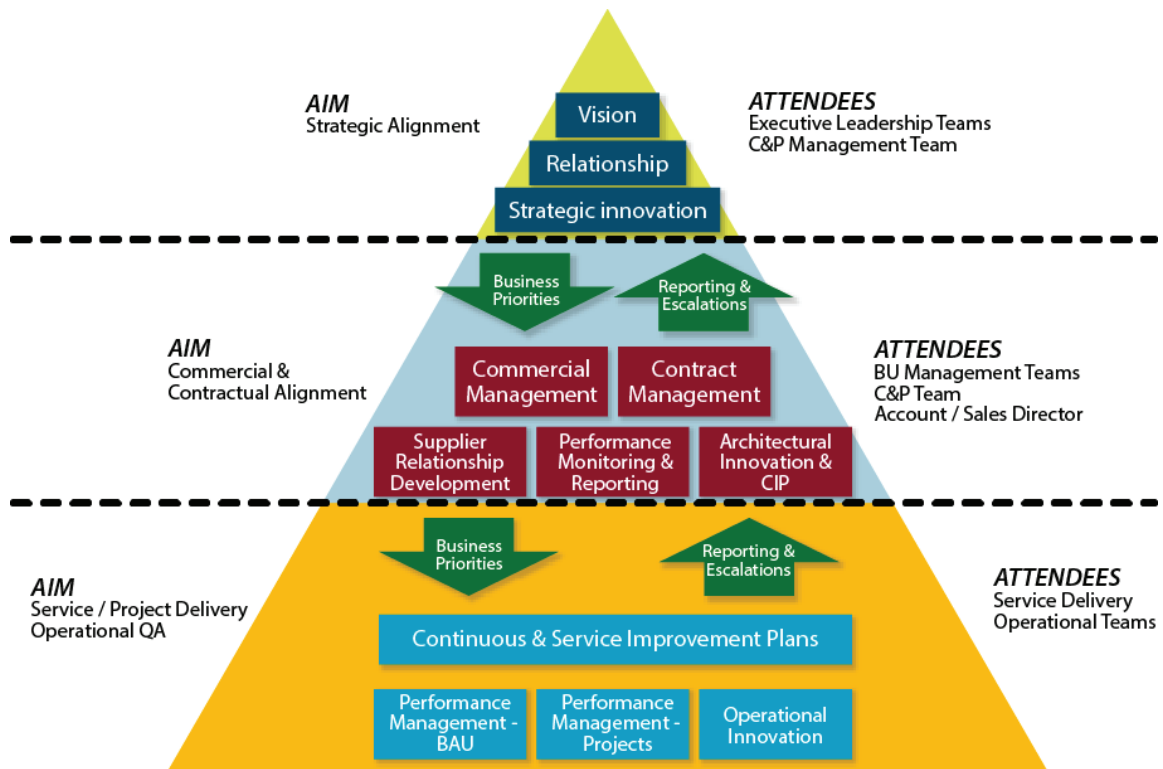
The organisation is seeking to become more flexible and adaptive in its contracting strategies. This is reflected in the Supplier Relationship Management models (NRSBP-OP18) (Figure 1 gives an example of these), Category Management Strategy (NRSBP-OP19) and the associated tactics that are being put in place. These tactics include the Product Strategies (NRSBP-OP20) which are being used to define multi-disciplinary requirements and now are being piloted. Communicating better with contractors about forthcoming project work and start dates (NRSBP-SBP1) is being given particular attention. Respondents reported that some improvements have been made in this area but recognise that more needs to be done. A number of approaches are being considered for addressing this issue including longer contracts (NRSBP-OP21).

◉ CP4 Roadmap Clarification 022

Uncertainty about major project start dates persists. By the end of CP4 Network Rail should design and put in place a process for setting and announcing start dates and monitoring its effectiveness which uses some of the statistical data which is already collected.

A review process has been introduced along with an enhanced range of performance indicators (NRSBP-OP14) including quality indicators, the value of which will be reviewed towards the end of CP4. The approaches that have been adopted in Major Works and Renewals appear to be more sophisticated than those adopted in Maintenance (NRSBP-OP22).

A wide range of strategies for managing contractor and supplier relationship are being explored. The routes, which are taking over a good portion of the letting and management of contracts, appear to recognise the learning curve they are on with regard to becoming an intelligent client. For instance, they are beginning to think about options such as acquiring smaller suppliers in order to secure their position in a single supplier market. Also, they are looking for ways of improving the handover process from major projects (NRSBP-OP23).

⊙ CP4 Roadmap Clarification 023

The handover process between major projects and the Routes has been identified as an area needing attention. By the end of CP4 Network Rail should define and implement explicit handover requirements and monitor their effectiveness.

⊙ CP4 Roadmap Clarification 024

Initial project trials are addressing the interfaces between Infrastructure Projects, National Delivery Service and the Routes in relation to the contracting of larger projects. A stable relationship between the Routes and the centre depends on there being clarity on the explicit criteria and rules about how Routes can bid for renewals and large projects. This applies both to tendering and the management of supplier relationships. Network Rail should capture and translate the lessons from these trials into explicit criteria and rules in the next iteration of the Devolution Handbook.

8.4
Organisational Structure & Culture

A clear and coherent set of culture goals and aspirations are defined in 'A Better Railway for a Better Britain' (NRSBP-OP24) and good structure is evident in the emerging analysis of culture maturity. The detail of how these goals and aspirations will be achieved is being worked on in a number of ways including definitions of where the organisation stands on various culture dimensions (NRSBP-OP11) and how mature the culture is (NRSBP-OP12). Outside of senior management there does not yet appear to be much awareness of this work, although in certain areas, most notably customer

orientation and collaboration, there is clear evidence (NRSBP-OP15) from contract and supplier management and relationship-building with TOCs that some of the current thinking about culture is already embedded in practice. Respondents pointed to the approach being taken in Alliancing (NRSBP-OP25) as an example of the positive effect that engaging stakeholders directly in asset management decision making has on organisational culture.

◻ *CP4 Roadmap Reiteration 012*

A conducive organisational culture is essential to embedding asset management successfully. By the end of CP4 Network Rail should define the measures that can be used to monitor culture change and cultural maturity. These measures should be validated throughout the business to check that senior management perceptions give an accurate assessment of what is happening throughout the organisation.

In most other areas, the outputs of the work on culture are still at an early stage of development (NRSBP-OP10). For instance, the Executive Rules initiative has the potential to impact very positively on culture and competence within the organisation but it is too early to judge this.

The structural and cultural challenges of devolution have been identified and have started to be addressed. For instance, the Devolution Handbook sets out the new structure, its key interfaces and how these are to be managed. However, respondents reported that, in practice, there is some tension between the centre and the routes over such matters as where responsibility will lie for small, medium and large sized projects and who will manage the relationships with the contractors involved. This tension relates to the ways in which the asset managers in the routes are testing the boundaries of where their responsibility begins and ends. Allocation of responsibility is being assessed in a number of trials (NRSBP-OP26).

The intention is to carry out a survey relating to organisational culture by 2014 (NRSBP-OP27). At this stage, it is unclear what the focus of this survey will be and what the findings will be compared against. It was reported that organisational culture maturity will feature in the next Asset Management Policy (NRSBP-OP10).

◉   CP4 Roadmap Clarification 025

Network Rail should ensure that the planned organisational culture survey focuses on assessing current cultural fit and maturity with regards to effective asset management. It should use a suitable range of measures of culture and cultural maturity to ensure its findings are reliable and valid. Analysis of survey results should identify definitive actions to improve cultural fit and maturity.

The approach to shaping the composition and competences of teams and aligning them to corporate strategy has, historically, been a pragmatic one. Respondents explained that the intention is to adopt a more proactive, predictive approach that is better aligned with overall strategy. However, there is no evidence of a methodology for this as yet and respondents indicated that they were unclear as to how progress will be made.

8.5
Individual Competence & Behaviour

A structured approach to managing and developing asset management competences is still under development. The approach has been trialled and the response to this indicates that, while it has been reasonably well-received, there are some technical issues relating to its design which will need to be addressed if they are not to hamper implementation over the longer term. The SBP success criteria relating to asset management training have not been met fully.

Twelve role descriptions, also referred to as 'competence descriptions', have been defined. These are mapped to RACI items developed by the company and also to selected contextualised elements from the IAM Competences Framework (NRSBP-OP1). One or more of the 12 role descriptions has been assigned to every job title within scope. A matrix has been developed which provides an overview of these relationships (NRSBP-OP2). Role profiles have been produced for 78 job titles ranging from asset engineer to technology manager. These profiles are combinations of the 12 role descriptions as they relate to each specific job title. The results have been briefed out to 125 managers who have been identified as holding key asset management roles. They have undertaken self-assessments against the applicable role descriptions to identify personal, professional development needs. How rigorously this is done is subject to the varying perceptions and commitment of the individuals involved. For instance, respondents who are strongly committed to asset management tended to view the self-assessment as an opportunity whereas other respondents remained unconvinced.

For the same reasons, some respondents were unable to describe how the role descriptions relate to their work, whereas others viewed these developments as core to their work and progression. The feedback from respondents suggests that more needs to be done to convey the relationship between the new role descriptions and the jobs people do, within the context of the company's asset management plans.

There is a technical issue with the design of the 12 role descriptions that can potentially cause longer term problems in managing and improving Network Rail asset management competence. A fundamental aspect of the design of a fit for purpose competence framework is that it provides a description of what it means to be a competent organisation. The core issue is whether the RACI is a good place to start the development of such an asset management competence framework.

The RACI items were taken from the current Network Rail Asset Management System (AMS). As a result of using the RACI items as a starting point, the 12 role descriptions are necessarily historical, looking back to what has been included in the AMS up to now. This means that the Competence Framework may quickly become out of date as and when the organisation needs to adapt to new circumstances, ways of working, technologies and so on. This is likely to make it difficult to detect if there are areas of asset management competence relevant to Network Rail that are not being covered or not being covered in sufficient depth. The cross-referencing of the role descriptions to the IAM Competence Framework was undertaken in the background and will have to be revisited to reflect further changes.

Best practice in the design of competence frameworks is to provide a hierarchical description of what is needed to be organisationally competent. Working down the hierarchy allows you to identify how the competences of teams and individuals need to contribute to the overall competence that the organisation requires. In this way, the risk that individual competences are misaligned with organisational requirements can be managed. The IAM Competence Framework provides one example of the top level of such a hierarchy and can provide the starting point for developing an organisation specific competence framework.

The terminology being used continues to hamper the approach being taken. A prime example of this is the assumption that the terms 'activity' and 'competence' can be used interchangeably (NRSBP-OP1). The confusion this causes is clear in the activity descriptions and the approach is at odds with common practice.

✳ CP5 Roadmap Recommendation 008

Progress can be made with the immediate roll out of the Asset Management competence framework. A CP5 Development Action should be to review the competence framework development methodology and address the identified technical issue.

Work is underway (NRSBP-OP28) on defining a training matrix, training courses and course materials but the change management implications of rolling this out have not yet been addressed. An example of this, and as already introduced in Section 6.4 on Systems Engineering, is the work Network Rail has done in developing its Total Value training courses (NRSBP-OP4) which focus on the contribution that systems engineering should make to overall Asset Management. The intention is to promote the integration of detailed technical competences with the asset management requirements that overarch them. These courses have been developed in response to problems arising from the different perceptions of asset management that are held within the business. It is too soon to judge the effectiveness of the training and it is still early in the process of mapping (NRSBP-OP29) current and future training to the competence role descriptions.

The integration of competence frameworks is made more difficult by the fact that generic management and leadership frameworks are owned by Human Resources, technical competence frameworks are owned by the professional heads and the asset management competence framework is being developed in a separate project.

◉   CP4 Roadmap Clarification 026

By the end of CP4 Network Rail should define a methodology and guidelines for the alignment of competence requirements, selection criteria, training needs analysis and specification and evaluation of training and professional development..

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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 Targets

Table 21 below shows the scores from the 2011 (IIP Update) assessment, the target score from the AMCL Roadmap for the SBP, the actual score from the SBP assessment, the alignment of Network Rail's AMIP with the AMCL Roadmap as of August 2012,and comments on any variance from target.

Activity	IIP Update Score	SBP Roadmap Target	SBP Score	Summer 2012 Alignment Report	SBP Target Achieved	Comments
Risk Assessment & Management	75%	76%	75%	G	NO	**Roadmap** – 1/1 partially achieved **Target not achieved** due to the following: • IRM is embedded at a tactical level and being used in Asset Management System • SBP suggests Network Rail is starting again in terms of corporate risk and ERM approach • Hence disconnect between approach presented externally and that used internally is still present
Sustainable Development	50%	45%	52%	G	YES	**Roadmap** – 1/1 achieved **Target exceeded** due to sustainability strategy in place and demonstrable good progress
Weather & Climate Change	51%	43%	52%	G	YES	**Roadmap** – 1/1 achieved **Target exceeded** due to modelling and integration and demonstrable good progress
Review & Audit	62%	68%	64%	A	NO	**Roadmap** – 2/5 achieved, 3/5 partially achieved **Target not achieved** due to following: • New Assurance Framework not fully embedded - uncertainty around accountability, audit structure and governance in devolved organisation • Multiple audit plans within above framework, not clear how these are integrated

Table 21   Risk & Review Group Targets

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 22 below shows a summary of the SBP 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	SBP Success Criteria	Summary of SBP 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 processes (1 to 3) are defined and implemented by January 2013.	This capability has been partially achieved. 1. A clear link between Asset Management objectives and IRM has been established at a tactical level, although the strategic Risk approach is currently under review. 2. Risks within asset groups are understood and managed consistently, however comparisons between risk types and asset groups are less well understood. 3. The current framework for handling Asset Management Delivery Risks is the IRM (as referenced in the IIP). These will be migrated to the ERM approach
Sustainable Development	6.2	Sustainability Strategy	A Sustainability Strategy in place and is integrated into the Asset Management system	1. Network Rail develops a Sustainability Strategy that is designed to deliver: 2. the content of the Sustainability Policy 3. the various projects and initiatives on-going or planned within Network Rail (including all of those reported in the CRR) 4. the defined plan for CP5. One senior person within Network Rail is then given accountability for the delivery of this strategy.	A single Sustainability Strategy has been developed by January 2013 to deliver all Network Rail's initiatives in this area.	This capability has been achieved. Central S&SD Sustainable Development Strategy has been delivered. This has yet to be signed off by the Board and fully implemented across the functions and the Routes . High-level initiatives and statements are captured in the strategy and these will be developed and reflected in the Delivery Plan Indicative initiatives and plans are available from Functions and Routes, although the level of maturity of these approaches varies. Overall accountability has been given to the S&SD Director, although there are areas of the organisation who are still aligning to this Strategy.

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP Assessment Findings
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 (now known as TRaCCA) 3. the on-going CP5 delivery plans	Each asset group has drafted changes to their Asset Policies which reflect Network Rail's climate change adaptation requirements by December 2012.	This capability has been achieved. Weather & Climate Change forms part of the Sustainabile Development Strategy. The TRaCCA programme is underway and evidence of some Climate Change and weather resilience work in the Asset Policies. There is an improved understanding of weather-related risks and impacts of Climate Change, although this has yet to manifest itself in clear implementation plans for the Routes.
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.	The Asset Management System review cycle is defined by December 2012.	This capability has been achieved. The AMS documentation and Devolution Handbook set out these procedures and these now need to be embedded
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 strategy for an overall audit and assurance regime relevant to Asset Management is complete by September 2012.	This capability has been partially achieved. The Overall assurance regime for Asset Management is managed by Strategic Services and integrated into the corporate assurance framework. It is still split into several assurance schemes (including NCAP) although these are understood to be aligned. Audit plans are in place for main Asset Management activities, Internal audit plan and Maintenance audit plans are said to be risk-based, although it is not clear how these risks are assessed given the corporate framework is under review. Some audits are deemed as cross-functional although it is not clear how fully integrated these activities are.
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 new Engineering Verification standard has been effectively implemented within the devolved organisation by March 2012.	This capability has been partially achieved. The Engineering Verification standard and process is in place and has been implemented, although the number of inspections undertaken is currently well behind target

AMEM Activity	2012 Capability Ref	2012 Capability Name	2012 Capability Statement	2012 Improvement Specification	SBP Success Criteria	Summary of SBP 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 defined and baselined by January 2013.	This capability has been partially achieved. Several performance measures are already established and regularly monitored. Others are being developed for CP5 and therefore in some areas the baseline is not yet understood. 1. Lagging measures are In place and regularly reported. 2. Leading stewardship measures on remaining life appear to be in place and forecasts are given in the SBP documentation 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.	An evidenced set of reasoning based on benchmarking data is used to support the SBP submission by January 2013.	This capability has been achieved. There is evidence of benchmarking having being undertaken for the Asset Management system as a whole and for asset-specific activities, which has been summarised in the SBP and appears to be driving improvement initiatives.

Table 22 Summary of assessment findings for the Risk & Review Group

9.3
Risk Assessment & Management

At the time of the IIP review (and update), the main barrier to Network Rail's demonstration of a fully integrated Risk Management system was the gap between 'bottom-up' tactical risk management and 'top down' corporate strategic risks. The Integrated Risk Management (IRM) standard had been introduced and was seen to be well established within Network Rail across all disciplines. In addition, the high-level corporate risk matrix had been used by some asset groups to drive both the development of asset policies and the tactical management of day-to-day risks.

The revised IRM standard was introduced to address this gap by putting risk management into context, with guidance on implementation provided through the IRM handbook. The aim was to improve the handling of risk from being a compliance-led, process-driven approach to a cultural awareness of risk in terms of achievement of objectives. The corporate level risks were also to be refreshed and aligned to the risk register in place through IRM.

It is understood that there have been changes of personnel within Network Rail since the last assessment, and therefore the deployment and integration of the updated IRM (NRSBP-RR1 & NRSBP-RR2) has been limited. In addition, there has been a change in approach with the arrival of the new CEO and re-shaping of the corporate vision with a focus on Safety & Sustainable Development (pg.13 of NRSBP-SBP1). Therefore the risk around the corporate objectives has had to be reviewed. Network Rail has embarked on a three-year programme to review and recast its corporate objectives and corresponding risks and implement an ERM approach that starts from the corporate objectives and works down (NRSBP-RR3). It is also felt that there is a need to simplify the existing risk registers (ARM holds 220,000 risks) and align this work to the improvements to standards as part of the Executive Rules programme. It was also seen as important to change the culture of Management Review from seeing risk as something that had to be done (as an agenda item) to being the focus of the session and hence how the business is managed. This links in to the overall improvements to the Governance, Risk and Assurance review Network Rail is currently undertaking (see also Section 9.6).

Both the existing IRM and improved ERM approaches are based on good practice applied in other industries and are consistent with ISO 31100: 2011. However, having paused to re-boot the process of implementing IRM and integrating this with the top-down strategic risks, Network Rail has effectively stood still between assessments in terms of its positioning on the AMEM scale, as the disconnect between top-down and bottom-up approaches to risk remains. In the meantime, the organisation has continued to maintain the existing approach and Network Rail has a good understanding of its key Safety and Performance risks, which have been reflected in the asset policies. However, the long-term ambitions remain the same and progress will need to be accelerated to meet the targets for the end of SBP.

◉   *CP4 Roadmap Clarification 027*

Network Rail should review the impacts of its ERM programme on the Asset Management System and the management of risk within this, and assess the impacts on delivering the Roadmap capabilities by the end of CP4.

At a more tactical level within Asset Management, the asset policies demonstrate an understanding of risks within asset types, although these are broadly the same as those in place in the policies reviewed in the 2011 IIP Assessment. However, while the safety and performance risks appear to be well understood, assessed, prioritised and consistently managed within each Asset Group, comparisons between other risk types (against the 10 Corporate themes) and asset groups are less well understood. It is understood that the ERM and Executive Rules work may help enable this.

> ⦿ *CP4 Roadmap Clarification 028*
>
> *Network Rail's Asset Policies should be reviewed at an appropriate point in the ERM Programme to incorporate the likely impact of asset risks on the overall corporate risks to demonstrate that these are aligned and managed accordingly.*

9.4
Sustainable Development

The IIP Assessment recognised that Network Rail had defined Sustainability Principles and a Sustainability Policy and evidence was coming through of the implementation of these in the business. The draft CP5 policies supporting the IIP contained examples of initiatives that were driven by a Sustainable Development agenda, such as the recycling of track materials. In addition, activities in this area were being reported in the Corporate Responsibility Report. However, it was noted that these initiatives were not part of a coherent Sustainability Strategy.

The IIP Report therefore recommended that Network Rail should *'develop an internal Sustainability Strategy aligned to its Sustainability Policy which has a single person, or body, accountable for its delivery'*. It was also noted that the incoming CEO had identified sustainability as a priority and had plans to strengthen Network Rail's capabilities in this area.

Since the IIP Assessment, the S&SD directorate has 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.

The initial activities of this group have been to consolidate existing support activities in these areas into one central function and to review and recast Network Rail's position on sustainability. The key output of this initial phase is the Sustainable Development Strategy, issued as a supporting document to the SBP submission, which sets out to capitalise on the *'considerable momentum in Network Rail and across the rail industry around sustainable development'* (NRSBP-SBP45). Therefore the above elements of the recommendations from the last review have been broadly met by Network Rail, although it is understood that the SD Strategy still needs to be officially signed off by the Board. A public statement on the company's commitment to sustainable development is presented in the core SBP documents, including the published plans.

In the absence of an official corporate Sustainability Strategy, certain functions have created their own systems and processes to fill the perceived capability gap, such as the Thameslink Programme's Sustainable Development Policy (NRSBP-RR5). It is understood that these are to be aligned to the corporate strategy to address this disconnect.

⦿ CP4 Roadmap Clarification 029

By the end of CP4 the Network Rail Board should endorse the Sustainability Strategy to enable full roll-out and implementation, ensuring existing business unit strategies are aligned to the corporate strategy to avoid duplication and clarify responsibilities for Sustainable Development in the devolved organisation.

The remaining elements of the IIP recommendations were to collate and align existing initiatives in this area into the strategy. The current document focuses on:

'a sustainable development vision and strategic objectives, (outcomes, outputs and activities). It also reviews the fundamental principles of a sustainable business and looks at where we will focus our efforts – key priorities. It also sets out key outcomes we are seeking up to 2024'.

Network Rail's focus should now be on turning the vision and strategic objectives into a set of initiatives and embed these into its CP5 Delivery Plans. There is a need to consolidate and align existing initiatives that are being carried out in Functions (such as NDS), Programmes (such as Thameslink) and the Routes into a suite of plans that can be delivered by these business units over CP5 as part of Network Rail's overall strategy.

⦿ CP4 Roadmap Clarification 030

Network Rail should demonstrate in its CP5 Delivery Plan (or other appropriate document) that it is implementing the initiatives in the Sustainable Development Strategy at both corporate and functional level.

There are also 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. Once again, Network Rail's approach in these areas has been piecemeal to date. Good examples are available from major programmes where there is sufficient resource in the programme and the funder (such as DfT, Scotland or local government) has specified actions in this area as part of the programme. For example, certain areas of the business have already established an EMS and the Thameslink project has achieved certification to ISO 14001:2004 (NRSBP-RR5). NDS is also seeking accreditation for its EMS and the latest audit has identified areas to be addressed. There is also evidence of Sustainable Development activity in the new Asset Policies and Route

Strategic Business Plans. However, feedback from the Routes suggested that there was little in the way of processes or incentives to increase the profile and priority for sustainable development at maintenance depots.

In its day-to-day business Network Rail continues to manage its obligations to UK and EU legislation through the existing systems and has suitable controls and reporting structures to manage and monitor compliance.

However, in the absence of the overall strategy these initiatives have yet to be co-ordinated into an overall position for Network Rail in terms of a statement on its existing Sustainable Development capability and external validation. In addition, Network Rail has not sought a Business in the Community ranking this year. This has been deliberate, as the company has wanted to focus on redefining its vision and strategy before committing externally to certification and benchmarking as it sees it as important to establish and embed the right systems first.

⦿ CP4 Roadmap Clarification 031

Network Rail should set a timescale for the implementation and external validation of its business systems within the Sustainable Development plans for CP5.

Finally, it was noted by NDS that a change in asbestos legislation had led to identification of an environmental risk that translated into a financial risk as ballast was unable to be recycled. By better understanding and quantifying its Sustainable Development objectives, Network Rail will be able to better understand the risk and opportunities around these objectives and use them to drive its Sustainable Development agenda. For example, NDS already runs a Risk Register for Environmental risks which need to be integrated into the overall ARM framework (NRSBP-RR6).

⦿ CP4 Roadmap Clarification 032

By the end of CP4 Network Rail should identify the risks and opportunities associated with achieving its Sustainable Development objectives over CP5 and reflect these in its Risk Framework.

9.5
Weather & Climate Change

9.5.1 Climate Change

The IIP Assessment noted a substantial improvement in this area of Network Rail's capability from the 2009 Assessment. This was based largely on the successful delivery of the 'Network Rail Climate Change Adaptation Report' to Defra in April 2011, and Network Rail's participation in the first stage of the 'Climate Change Adaptation Study' funded by RSSB (now known as TRaCCA). It was noted that Network Rail was making positive moves in this area and was contributing to appropriate industry groups.

The IIP Assessment report therefore recommended that the findings from these reports would need to be integrated into its Asset Policies, so that it could 'clearly demonstrate the link between its understanding of climate change adaptation requirements and its discipline-specific Asset Policies'.

At the time Network Rail set out its ambitions to *'detail the likely spend on climate change resilience and adaptation over the CP5 and CP10 periods'*. The IIP Assessment noted that at the time of the assessment, this work plan was still in draft but was clearly developing well.

Work in supporting Climate Change has continued following the IIP and Network Rail continues to support the industry-wide TRaCCA initiative to understand the impacts of Climate Change on Rail Assets through RSSB. Findings from Phase 1 to 3 of this analysis have been fed into Network Rail's Asset Policies and further work will feed into Network Rail's developing CP5 Delivery Plans.

Climate Change now forms part of the Network Rail's approach to Sustainable Development and as such is 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 does not exist and specific objectives to Weather and Climate Change are set out in the Sustainable Development Strategy. Supporting evidence focused on Weather and Climate Change was provided for the purposes of the assessment, including the SBP document 'Climate and Weather Resilience for Network Rail Assets' (NRSBP-SBP46).

> ⊙ *CP4 Roadmap Clarification 033*
>
> *Climate change objectives should be set out in the endorsed version of the Sustainable Development strategy, and specific initiatives to achieve these detailed in the CP5 Delivery Plans (or other appropriate document) at Corporate, Function and Route levels. These should reflect the findings of the TRaCCA programme as these become available.*

9.5.2 Weather Resilience

The IIP Assessment also noted that with respect to short-term weather resilience, Network Rail had a range of tried and tested approaches for specific asset-related weather risks, and that a weather resilience study for CP5 was being developed to cover such things as *'earthworks management, a new drainage manual, and the mapping of potential water accumulation'*.

Since the IIP, Network Rail has faced several challenges in this area with a combination of severe weather conditions that the CEO has said provided *'wake-up call to us all'* (NRSBP-RR7). This has given momentum to improve Network Rail's understanding of the impacts of weather on its asset base and the programme to review these risks has accelerated as a result. This has included asset-specific assessments of weather-related risk and also the modelling of possible increases in risk were the potential for severe weather conditions to increase. This work is has produced preliminary outputs to support the SBP submission, but there is still much work to be done in this area.

Network Rail needs to improve the quality of information available to support these types of analysis. While high-level data on climate change is available externally, its understanding of the historic consequences of weather conditions is driven by the quality of its fault management data and corresponding weather data. As observed in Section 6.7.1 on root cause analysis, Network Rail is still in the process of reviewing and improving its underlying fault data as captured in FMS and until this is complete it is unlikely that data will be sufficiently robust to link failure modes to weather types and hence identify where to prioritise infrastructure resilience. Network Rail has also identified that the operational envelope for required performance achieved by its assets can fall short from that set out in the original asset specification (NRSBP-RR8), which suggests that Network Rail should be learning from its weather experiences and feeding this learning back into its design and product acceptance processes.

> ✳   *CP5 Roadmap Recommendation 009*

Network Rail's current initiatives to improve understanding of weather impacts and develop these into asset-specific strategies should be developed and implemented through the CP5 Delivery Plans. The Asset Information required to support this should be identified so that this can be collected during CP5.

9.6
Review & Audit

9.6.1 Management Review

The IIP Assessment of Review & Audit noted that it *'continues to be an area of relative maturity for Network Rail, with scores for the 2011 assessment being maintained'*. The overall process for Management Review (the ERM, QBR and MBR) are well embedded and several examples of the packs used for these sessions were seen as evidence (NRSBP-RR9).

In this area it was recommended that *'Network Rail should ensure its document hierarchy is fully populated, and set up a clear management review cycle with its newly defined Asset Management System as the focus.'* This was of particular importance and was a PAS 55 Minor Non-conformance at the time.

The key change in this area has been the role of Strategic Services within Asset Management Services. Strategic Services is the custodian of the Asset Management System (see Section 4.3 on Policy & Strategy) and has a key role in the Management Review process to provide reporting and assurance services to Network Rail Group for Asset Management activities. This has meant that many of the documents have now been more clearly defined, with both documentation of the Asset Management System (NRSBP-SBP28) and guidance for Asset Management activities in the Devolution Handbook (NRSBP-SBP48). In addition, the Asset Management Services team has worked closely with the Technical Services (Asset Management Services) and Strategic Planning (Group Strategy) teams to review the policies and plans for consistency.

Internal Benchmarking is still carried out for Maintenance Delivery Units and at a high-level Routes can see their Asset Stewardship KPIs to understand their relative positions at an overall Route level, which enables simple benchmarking for other Asset Management activities (NRSBP-RR9, NRSBP-RR10).

Network Rail has continued its programme of external benchmarking, although the extent and breadth of coverage varies by Asset Type (NRSBP-SBP47). However, additional opportunities will be presented by benchmarking Asset Management performance of individual Routes and identifying the drivers of any differences.

The IIP Assessment Report observed that while the Asset Health Index and its associated KPIs provided an indication of the overall health of Network Rail's asset portfolio, there was no clear set of 'asset stewardship indicators'.

During this assessment it was reported that during CP3, and with slight modifications in CP4, Network Rail used a composite measure to monitor the condition and reliability of the infrastructure at a national level. The composite measure is known as the ASI. It comprises 25 separate measures covering the six major asset disciplines: track, structures, operational property, signalling, electrification & plant, and telecoms.

In most respects the regular monitoring of the ASI and its underlying components has provided effective feedback on the short term performance and longer term sustainability of the infrastructure and has helped focus maintenance and renewal interventions in areas of most importance to Network Rail's customers and funders.

However, the ASI does not have all the characteristics of an effective performance indicator. It was reported that he measure is not intuitive, requiring a significant investment in time to understand the period to period movements and longer term trends. The apparent complexity of the measure has become more evident as the ASI has been disaggregated to set targets and monitor progress at operating route level, with a larger group of people involved in interpreting and reacting to its performance.

Since the IIP assessment Network Rail has gone some way towards defining a more appropriate set of KPI measures for CP5, but these are still to be fully embedded in development. Forecasts of Asset Remaining Life have been provided as supporting evidence in the SBP as part of a sustainability test (NRSBP-SBP21).

◼ *CP4 Roadmap Reiteration 013*

By the end of CP4 Network Rail should implement the asset stewardship KPIs and back-fill these with historic data where possible to improve its baseline and to demonstrate the expected impacts of Asset Management initiatives.

9.6.2 Findings for Audit

The previous assessment noted that Network Rail was in the process of reviewing its overall Assurance Framework, along with its Governance and Risk Frameworks, to provide an overall GRA Framework that aligns existing audit, assurance and governance activities to the management of corporate risks. This process is on-going, but clear steps have been made in terms of progress.

An audit of Network Rail's Assurance Framework was carried out by KPMG (NRSBP-RR11). This determined an approach and recommendations for how the new Assurance Framework should be structured in terms of three levels of assurance:
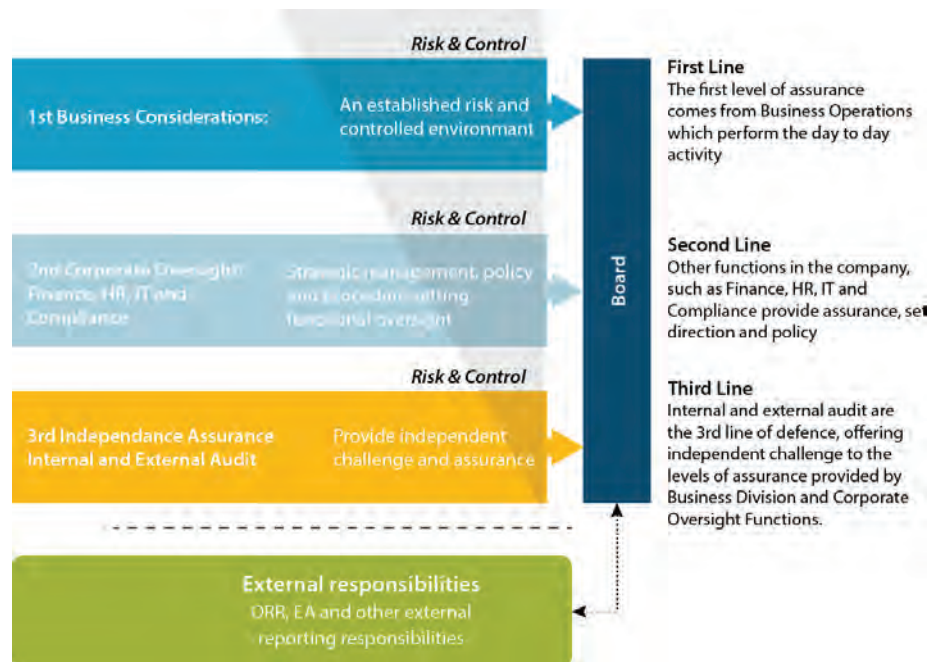
Diagram 50   Network Rail's Assurance Framework (source NRSBP-RR11)

The existing assurance and audit programmes have then been mapped to these levels, with accountabilities defined for these within each of the functions and at Executive Level. This is particularly important as in the devolved organisation, different parties have responsibility for different elements of assurance and it is important that these are aligned and that full coverage of the Asset Management System (and wider corporate framework) is in place.

Within this framework, audit of the Asset Management System is assured by the Strategic Services team within Asset Management Services. This is a newly created team that is developing and establishing its services and therefore these have yet to be fully implemented. Elements of this are covered by the guidance in the Asset Management System Framework and Devolution Handbook but it is not clear how this is brought together in the overall assurance framework. It is noted that NCAP is not the vehicle for carrying out all of these audits as it is focused on Safety Management Systems and compliance in the Routes in Maintenance, hence further activities will have to be defined.

◘ CP4 Roadmap Reiteration 014

By the end of CP4 Network Rail should define how all elements of the Asset Management System are covered by an integrated audit programme.

The overall company internal audit plan was shared (NRSBP-RR12) and this covers the broader scope of Asset Management activities at a high level, through audits of Network Operations, Asset Management Services and Investment Projects in particular. This appears to be a good practice approach to auditing the management systems within each function that then internally manage provide the lower levels of assurance.

Specific programmes within the assurance framework continue to be used in the devolved organisation. NCAP is a tried and tested audit process which has been described in previous assessments, but which has its origins as a fairly narrow audit of Network Rail's Safety Management System (NRSBP-RR13). It is based on some good practice audit principles, and is risk-based in its approach. Over the years it has broadened its scope and now covers a wider range of activities, including the requirements for functions to audit each other.

The Engineering Verification standard and process appears to be well embedded in the business, although the number of Engineering audits undertaken is running significantly behind target (NRSBP-RR14). It is understood that this shortfall is to be addressed.

◘ CP4 Roadmap Reiteration 015

By the end of CP4 Network Rail should establish the reasons for the current shortfall in Engineering Verification audits and define and implement a more effective and efficient way of implementing the standard.

Safety validation for projects introducing new infrastructure onto the network is also managed through the GRIP process, and Network Rail has set up its own, independent certified body (the Network Certification Body) which it is using to provide audit and governance services for product acceptance on to the network (NRSBP-RR15).

10 PAS 55 Assessment and Certification

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.

As an output of the IIP (2011) assessment, AMCL was pleased to confirm that Network Rail had achieved the standard required for Conditional Certification to PAS 55: 2008 Part 1. AMCL is now pleased to confirm that full Certification has been awarded. The full findings for this are presented in Section 10.4

10.1
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 Gap Analyses and Certification Audits. Compliance with PAS 55 is broadly consistent with a level of maturity consistent with 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 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. 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 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 clause.

10.2
Certification Criteria and Terms

Certification depends on the number of Major Non-conformances discovered and the organisation's proposed actions to rectify them. Recertification would be required after three years. Certification to PAS 55 is awarded, monitored and withdrawn after a Certification or Re-certification Audit, as follows:

1. **Full Certification** – no Major Non-Conformances against the requirements of PAS 55 found. Certification lasts for a maximum period of three years. Surveillance visits will be scheduled annually to ensure the progress of Minor Non-Conformances are being satisfactorily managed.

2. **Conditional Certification** – one or more Major Non-Conformances against the requirements of PAS 55 found, but with substantiated evidence that rectification plans are in place. Certification is awarded subject to a surveillance visit within an agreed period where these plans are checked for completeness. At this stage certification could be withdrawn or confirmed for a period of 18 Months.

3. **No Certification** – one or more Major Non-Conformances found with no rectification plans in place.

10.3
Findings

The conclusion of the IIP assessment was that, in general, Network Rail met the requirements of PAS 55, with the required documentation in place and being used, with sufficient control of its day-to-day delivery activities demonstrated. Two major non-conformances and a number of minor non-conformances were identified during the IIP assessment. Conditional certification was awarded, subject to two major non-conformances being resolved at the time that the CP5 Strategic Business Plan was issued, at which point formal close-out of the major non-conformances would be confirmed. AMCL is pleased to confirm that full Certification has now been awarded.

Network Rail's SBP AMEM assessment scores, displayed according to the 24 PAS 55 clauses, are shown in Diagram 51 below.
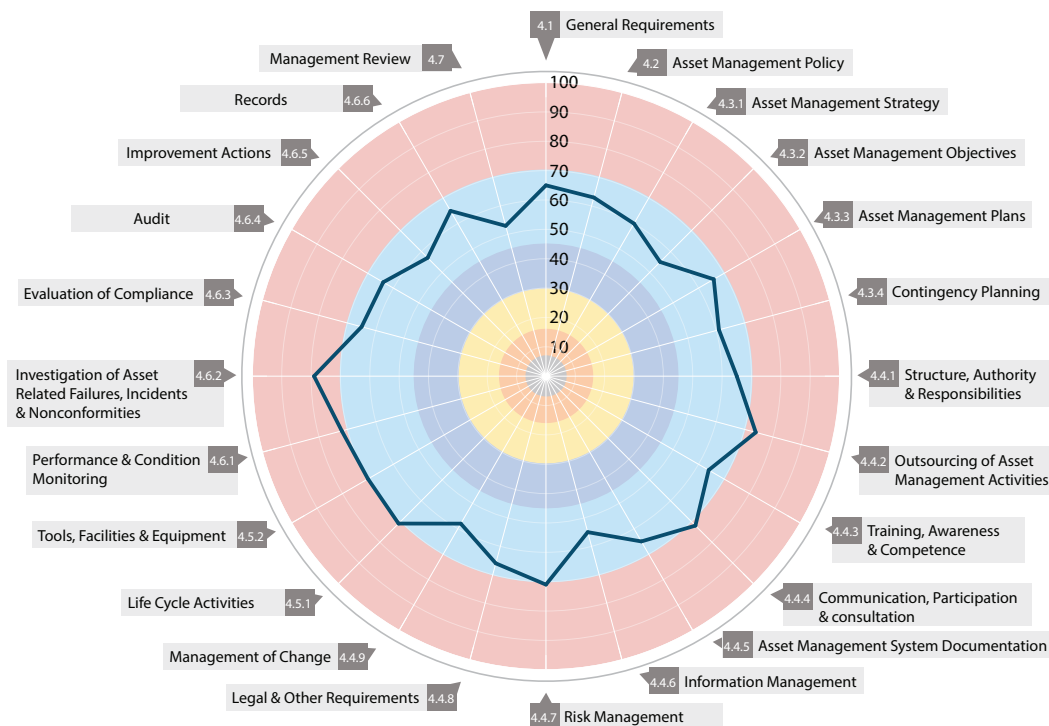
Diagram 51   Network Rail SBP AMEM Assessment Scores by PAS 55 Clauses

10.4
Major Non-conformances

The status of the two major non-conformances identified at IIP are described in the following two sections. The overall result is that AMCL is able to remove the conditions attached to the original 2011 certification and award Network Rail full certification to BSI PAS55:2008.

10.4.1   Network Rail's 'Line of Sight' – Findings

At the time of the IIP Network Rail had not demonstrated a clear 'line of sight' from its Asset Management Policy, Strategy and Route AMPS through to work delivery on the ground. This has been rectified by Network Rail's achievements in aligning its Route Plans with its high-level and corporate objectives, as described in Sections 4 and 5 of this assessment report. No remaining non-conformances remain in this area.

10.4.2   Asset Information – Findings

At the time of the IIP Network Rail had not yet demonstrated that its asset information was fit for the purpose of supporting its Asset Management System decision-making requirements. This major non-conformance was downgraded to a minor non-conformance in the IIP Update report based on the evidence provided at IIP update. The evidence provided was the 'Data Quality Assessment Report' which was the output of an initial asset information confidence grading study which acknowledged a range of issues, and also provided a plan for their rectification.

As part of this assessment, asset data has been reassessed to evaluate whether Network Rail is compliant with clause 4.4.6 of PAS 55 at the time of the SBP submission. The ORR appointed Arup (Part A Independent Reporter) to complete an audit of Network Rail's asset data quality[1]. This report utilised Network Rail's Asset Data Confidence Grading Assessment Methodology (ADCGAM), with agreed variations, to complete the assessment. This report, along with the other evidence reviewed by AMCL as part of this assessment, has resulted in the replacement of the major non-conformance with seven minor non-conformances. These are listed below, with the rationale and full explanation for which are provided after.

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1   Part 'A' Reporter Mandate AO/028 – Audit of Asset Data Quality – Draft Final Report, 25 April 2013

1. **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.

2. **Minor Non-conformance** (Clause 4.4.6 Para 1) – The governance of data within the Anglia and Wales Routes does not meet the minimum requirements for PAS 55 compliance as described in this report and evaluated through an ADCGAM compliant assessment methodology.

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

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

5. **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.

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

7. **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.

10.4.3   Asset Information – Rationale

The Arup 'Audit of Asset Data Quality' report graded the asset information along two dimensions similar to those used in the UK water industry, as shown in Diagram 52 and Diagram 53 below. The first dimension is Data Governance Confidence:

Confidence Gradings			
A	B	C	D
Documented processes in line with good practice supported by evidence	Partially documented processes and/or limited evidence in line with good practice	Evidence of processes, some of which are aligned with good practice	No evidence of coherent processes

Diagram 52   Data Governance Confidence Grading

It is AMCL's view that a Data Governance Confidence Grading of A would be PAS 55 compliant for high criticality information, with a B being PAS 55 compliant for lower criticality information. A Data Governance Confidence Grading at C would indicate a probable minor non-conformance, and a D a potential major non-conformance. The second dimension is Data Quality Confidence:

Data Evaluation	1	2	3	4	5	6
Accuracy	>-99%	>-95%	>-90%	>-75%	>-50%	<50%
Completeness	>=99%	>=95%	>=90%	>=75%	>=50%	<50%
Precision	<-1%	<-4%	<-10%	<-20%	<-40%	>40%

Diagram 53   Data Quality Confidence Grading

It is AMCL's view that a Data Quality Confidence Grading of 1 would be PAS 55 compliant for high criticality information, with a 2 or 3 being PAS 55 compliant for lower criticality information.   A Data Quality Confidence Grading at 4 or 5 would indicate a probable minor non-conformance, and a 6 a potential major non-conformance.

The evaluation was applied to Network Rail's general data governance arrangements to produce the Data Governance Confidence Grading, and to more detailed datasets within 'consistency' and 'sampling' reviews which provided a general and specific assessment of the Data Quality Confidence Gradings. Alpha-numeric evaluations were then produced for each asset discipline, at national and Route levels, to cover the 'Strategic Business Planning' and 'Operational' data uses shown in Diagram 54.

Supporting Evidence Required		
Data Management		Details of databases holding asset data considered in this assessment, then evidence for each of standards, procedures and checks covering: • Data definition • Data collection • Data entry • Validation of information held in databases
Data Use	Strategic Business Planning	• Documented processes for managing data for business planning • Data cleansing processes • Linking, grouping and matching data • Validation of extracted data • Data relied on in developing workbanks • Validation of information used in developing workbanks
	Operational Licence Condition I.20)	• Access to reports • Manipulation and derivation of data used in reports • Timeliness, distribution and availability of reports • Validation of information provided in reports

Diagram 54   Summary of Governance Evaluation Framework

AMCL understands that there is some disagreement between Network Rail and the ORR with respect to the detailed application of the ADCGAM approach by Arup and the sample sizes utilised. However, it is AMCL's view that this approach, coupled with the additional evidence reviewed during the SBP AMEM assessment, has produced sufficient evidence to conclude Network Rail's level of compliance to PAS 55 Clause 4.6.

The clause in PAS 55 concerning Information Management contains a number of requirements that are underpinned by two main Asset Management concepts. The first is that the organisation identifies and understands the information required to make its Asset Management decisions. The second is that once this is understood, the organisation then deploys asset information systems (which do not have to be IT based) to support the collection and use of this information, ensuring a level of quality 'appropriate to the asset management decisions and activities it supports'. PAS 55 does not require an absolute level of data quality.

The outcome of the Arup work is presented at two different levels (nationally and at Route level), and presents findings across all the major asset disciplines.   These findings also distinguish between data use for SBP planning and for operational use (Licence Condition 20). The following general observations are made:

1. No formal assessment of asset information criticality was evidenced within Network Rail during the SBP AMEM Assessment, and so the finer evaluation of compliance set out above between data governance grades of A and B, or between data quality grades of 1, 2 and 3 is not possible. A consistent view of asset information criticality should be complete once Network Rail's asset information specification process is complete (see Section 7.3.2 of this assessment report).

2. At the national level all asset disciplines achieved at least an A or a B for data governance, and all achieved a 1, 2 or 3 for data quality with the exception of Structures, Conductor Rail Equipment, S&C and Transformers which scored 4 and 5 across the 'sampling' and 'consistency' reviews. Based on AMCL's view of these measures with respect to PAS 55 compliance this would indicate that Network Rail is compliant with PAS 55 for data governance, but has potential minor non-conformances for data quality for these assets.

3. At the Route level two Routes achieve a C for data governance (Wales for Structures, and Anglia for Buildings and EP). Based on AMCL's view of these measures with respect to PAS 55 compliance this would indicate that Network Rail has potential minor non-conformances for data governance for these asset disciplines within these specific Routes.

When the findings are split between SBP planning and operational uses it is apparent that data quality confidence is worst within the operational category - with S&C, underline and overline bridges, and transformers scored at 4 or 5.

The following analysis breaks down Clause 4.6 into its constituent parts and indicates the level of compliance suggested by the evidence presented in this assessment report and in the Arup 'Audit of Asset Data Quality' report.

Clause Wording	Compliance
The organisation shall identify the asset management information it requires to meet the requirements of Clause 4 of this specification considering all phases of the asset lifecycle. This information shall be of a quality appropriate to the asset management decisions and activities it supports.	**2 x minor non-conformance** Network Rail has demonstrated in general that it understands the asset management information it requires, as evidenced in this report and through the application of its Asset Information Strategy and ORBIS initiative. It has also done this specifically through agreement with the ORR and Arup on the 'Data Use' parameters underpinning Arup's report. However, the lack of defined asset information criticality means the absolute level of data confidence required is based on engineering judgment. In addition the Anglia and Wales Routes score a 'C' for data governance specifically.
The organization shall design, implement and maintain a system(s) for managing asset management information. Employees and other stakeholders, including contracted service providers, shall have access to the information relevant to their asset management activities or responsibilities. Where separate asset management information systems exist, the organization shall ensure that the information provided by these systems is consistent.	**Compliant** Network Rail has many legacy systems, many of which are functional and providing asset management information as required. It also has plans for enhancing its asset management information systems through ORBIS. Systems are shared with contracted service providers as required.
The organization shall establish, implement and maintain procedure(s) for controlling all information required by Clause 4 of this specification. These procedures shall ensure: a) the adequacy of the information is approved by authorized personnel prior to use;	**Compliant** In general data governance appears to be effective, both through the evidence presented in this and other AMEM assessment reports and through the Arup Data Governance Confidence Gradings of A or B across all asset disciplines, with the exception of Anglia and Wales Routes.

Clause Wording	Compliance
b) information is maintained and adequacy assured through periodic review and revision, including version control where appropriate ;	**4 x minor non-conformances** Network Rail scored Data Quality Confidence Gradings of 4 and 5 within the 'sampling' study for Structures and Conductor Rail Equipment at the national level, and for Structures, S&C and transformers in the 'consistency' study at the Route level. This is an acknowledgment that, according to Network Rail's own assessment methodology, data quality in these areas is not fully adequate for use.
c) allocation of appropriate roles, responsibilities and authorities regarding the origination, generation, capture, maintenance, assurance, transmission, rights of access, retention, archiving and disposal of items of information;	**1 x minor non-conformance** As reported in Section 7.3 of this assessment report Network Rail has put a RACI in place for the ORBIS project, but has not yet defined or rolled these out to the Routes to support 'business as usual' processes.
d) obsolete information is promptly removed from all points of issue and points of use, or otherwise assured against unintended use;	**Compliant** In general data governance appears to be effective, both through the evidence presented in this and other AMEM assessment reports and through the Arup Data Governance Confidence Gradings of A or B across all asset disciplines, with the exception of Anglia and Wales Routes.
e) archival information retained for legal or knowledge preservation purposes is identified;	**Compliant** In general data governance appears to be effective, both through the evidence presented in this and other AMEM assessment reports and through the Arup Data Governance Confidence Gradings of A or B across all asset disciplines, with the exception of Anglia and Wales Routes.
f) information is secure and, if in electronic form, is backed up and can be recovered.	**Compliant** In general data governance appears to be effective, both through the evidence presented in this and other AMEM assessment reports and through the Arup Data Governance Confidence Gradings of A or B across all asset disciplines, with the exception of Anglia and Wales Routes.

Table 23   Update on PAS 55 Minor Non-conformance Status

10.5
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. Progress against these is summarised in Table 24.

PAS 55 Clause	Number of Minor Non-conformances identified in 2011	Status	Action Required
4.1 - General Requirements	1	Closed	None
4.2 - Asset Management Policy	1	Open	CP4 Roadmap Reiteration 001
4.3.1 - Asset Management Strategy	1	Open	CP4 Roadmap Reiteration 002
4.3.2 - Asset Management Objectives	1	Open	CP4 Roadmap Reiteration 002
4.3.3 - Asset Management Plans	0		
4.3.4 - Contingency Planning	1	Open	CP4 Roadmap Clarification 016
4.4.1 - Structure, Authority and Responsibilities	0		
4.4.2 - Outsourcing of Asset Management Activities	0		
4.4.3 - Training, Awareness and Competence	1	Open	CP4 Roadmap Clarification 026
4.4.4 - Communication, Participation and Consultation	0		
4.4.5 - Asset Management System Documentation	2	Closed	None
4.4.6 - Information Management	0		
4.4.7 - Risk Management	0		
4.4.8 - Legal & Other Requirements	0		
4.4.9 - Management of Change	0		
4.5.1 - Life Cycle Activities	2	Closed	None
4.5.2 - Tools, Facilities and Equipment	0		
4.6.1 - Performance and Condition Monitoring	1	Closed	None
4.6.2 - Investigation of Asset Related Failures, Incidents and Nonconformities	1	Open	CP4 Roadmap Clarification 015
4.6.3 - Evaluation of Compliance	0		
4.6.4 – Audit	1	Open	CP4 Roadmap Reiteration 014
4.6.5 - Improvement Actions	1	Open	CP4 Roadmap Reiteration 015
4.6.6 – Records	1	Closed	None
4.7 - Management Review	1	Closed	None

Table 24   Update on PAS 55 Minor Non-conformance Status

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11 Impact of Devolution

Since the IIP assessment Network Rail has devolved its organisation into ten Routes, which means much of the Asset Management activity which used to be undertaken in the Centre is now the responsibility of the Routes. This assessment has been undertaken on Network Rail in its devolved state. At IIP the assessment considered the risks and opportunities that devolution presented in terms of Network Rail further developing its Asset Management capabilities, and this section provides an update to that.

11.1
Review of the Opportunities identified at IIP (2011)

Devolution presented Network Rail with a number of opportunities to further develop its Asset Management capabilities to support on-going efficiencies and delivery of outputs in CP5 and beyond. The following were identified at IIP and are updated here:

1) The application of the Asset Policies within the Routes should ensure a better alignment between policy interventions and local circumstances on the Route, including the requirements of the TOCs and FOCs. If the Asset Policies are developed in a sufficiently flexible manner, an appropriate mix of national policies and local decision-making can be achieved. However, in our opinion, the Asset Policies are not yet sufficiently developed to achieve this.

   This has been demonstrated through the application of Network Rail's Strategic Planning Framework.

2) Devolution should help address the issue raised in this assessment that the linkage between 'bottom-up' planning and 'top-down' planning is weak in some of the asset disciplines, and that the Route AMPs are perceived to be of more value to the Centre in developing long-term plans than for the Routes in planning the actual Asset Management activities to be undertaken. The responsibility for developing the Route AMPs to an agreed template will transfer from the Centre to the Routes under devolution which will improve the ownership of the Route AMPs and the alignment with the Delivery Plans. This should improve the 'line of sight' of the 'top-down' and 'bottom-up' planning processes whilst still maintaining the Centre's ability to develop the long term strategic plans by rolling up all the Route AMPs to a National level.

   Line of sight has been improved and demonstrated, however it is clear that some disciplines have found this easier to implement than others.

3) Deployment of Decision Support Tools (DSTs) should help the Routes to make intervention decisions that can be justified on a whole-life cost-risk basis rather than the tools just being used to develop policy options in the Centre. This should improve the consistency of decision-making in the Routes and improve the alignment of the 'bottom-up' plans with the 'top-down' strategic plans.

The Renewals Expenditure Summary demonstrated a reasonable alignment of the modelled 'top-down' and the 'bottom-up' plans, which it was reported throughout the assessment had been facilitated by an open dialogues between the Centre and the Routes on the application of the DSTs.

11.2
Review of the Risks identified at IIP (2011)

Devolution also presented Network Rail with a number of risks to delivering the Asset Management capabilities in the Roadmap. The following were identified at IIP and are updated here:

1) Confusion about the split in responsibilities between the Centre and the Route, in particular relating to the application of Asset Policies. The current Asset Management Strategy does not acknowledge devolution and there is no description of where the boundaries are between the Centre and the Routes when it comes to Asset Management decision-making. Defining this interface is critical to ensuring that there is a common set of Asset Policies across the network and that Routes can develop AMPs that are focused on their specific needs. This will require further development of the Asset Management Policy, the Asset Management Strategy, the Asset Policies and the Route AMP process as a minimum to reflect this split of responsibilities.

The Devolution Handbook and the Asset Management System document have gone some way to mitigating this risk, although there are a number of examples within this assessment report where clarity around roles and responsibilities needs to be made.

2) Inadequate Asset Management capabilities and experience in the Routes necessary to undertake effective decision-making in the Routes. This was raised in the 2009 Best Practice Review as a concern in the 'pre devolution' state of Network Rail and becomes an even greater concern post devolution as some of the key decision-making currently being undertaken in the centre will be devolved to personnel in the Routes who may have not previously had Asset Management decision-making responsibilities.

This is still a significant risk in our opinion. The appointment of DRAMs and RAMs has mitigated this somewhat, but there are many areas where the successful

implementation of initiatives (such as II and RBM) are almost wholly dependent on competent Asset Management professionals in the Routes.

3) Divergence in the Routes from Network Rail's overall Asset Information Strategy leading to a fragmented approach to the collection, management and analysis of Asset Information. Notwithstanding the delays in Network Rail developing its Asset Information capabilities, the emerging strategy for Asset Information would appear to address the long-term Asset Information needs of Network Rail. Under devolution, it is not clear to what extent the Routes are obliged to follow this strategy, asset knowledge standards and systems that are planned for national adoption.

It appears that ORBIS is being implemented in a consistent manner across all Routes.

4) The existing Audit and Engineering Verification processes may not be adequate for the organisation post-devolution. Some concerns were raised during this assessment as to whether the Engineering Verification process is fit for purpose for the current organisation, in particular for Signalling, Telecoms and EP. Concerns have also been raised over the 'line of sight' of the audit process. Once devolution has occurred, it could be argued that audit and verification is even more critical to ensure that both standards and policies are being adhered to and that the assets are delivering the performance and condition that would be expected.

This risk still exists. The introduction of the new Assurance Framework will mitigate it to some extent, but it is still uncertain whether or not sufficient resources are available to manage this risk in the future.

5) Short-term incentives for delivery of train performance could adversely affect long-term Asset Management decision-making. It is inevitable that the Routes will be focused on short-term train performance as that is the immediate output from the infrastructure. It will therefore be imperative to ensure that the long-term Asset Management implications of decisions are also considered alongside these important short-term needs. Appropriate incentives and statements of responsibilities need to be defined for the key Asset Management roles in the Routes that reflect both the short-term performance issues and the longer-term asset stewardship objectives.

Longer-term asset stewardship measures are being introduced. It is also a concern that the Route Specification do not provide a sufficient enough focus on reliability and availability of the infrastructure. The recommendations in this report which cover the clear specification, disaggregation and monitoring of RAMS requirements over the long-term will help.

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12 Recommendations

To ensure alignment with the current Roadmap, minimise duplication and support future revisions of the Roadmap, the recommendations from this AMEM assessment have been assigned to one of the following three categories:

◪ **CP4 Roadmap Reiterations** (of SBP Success Criteria) – recommendations to address identified shortfalls against a current Roadmap SBP Success Criterion and/or associated Improvement Specifications;

◉ **CP4 Roadmap Clarifications** (to End of CP4 Success Criteria) – recommendations which clarify and add further detail to the current Roadmap End of CP4 Success Criteria and associated Improvement Specifications which have resulted from:

   a. Improved understanding of Network Rail's approach following this assessment;

   b. Network Rail's progress against its chosen delivery mechanism(s) to achieve the current Roadmap Success Criteria and associated Improvement Specifications; or

   c. Developments since the establishment of the current Roadmap, such as the devolution of Network Rail.

✱ **CP5 Roadmap Recommendations** (CP5 Development Opportunities) – recommendations which relate to further opportunities during CP5 and which would be considered and encapsulated in any updated Roadmap for CP5.

None of the identified recommendations materially affect the trajectories or targets defined in the current Roadmap but are intended to provide greater clarity and detail where appropriate and opportunities for further development.

◻ CP4 Roadmap Reiterations

AMCL Reference	CP4 Roadmap Reiteration	2012 Roadmap Capability Statement
001	Network Rail should ensure that all relevant AMCL Roadmap Improvement Specification requirements are included in the draft Asset Management Policy prior to Executive Board authorisation and publication.	1.2
002	Network Rail should ensure all relevant AMCL Roadmap Improvement Specification requirements are included in the draft Asset Management Strategy prior to Executive Board authorisation and publication.	1.3
003	Network Rail should develop an overall maintenance strategy, for incorporation within the CP5 Delivery Plan, which clarifies how the various maintenance initiatives will be optimised and integrated across the asset base.	2.2
004	Network Rail should develop a formalised and quantified safety and reliability analysis process to justify that the risk associated with revised maintenance regimes is demonstrably as low as reasonably practicable prior to the start of Stage 3 of the 'Optimising Maintenance Regimes' programme.	2.3
005	By the end of CP4 Network Rail should develop a clearer definition on what level of authority a RAM has with respect to tailoring maintenance regimes and how the risks of such tailoring are controlled.	2.2
006	Network Rail should review its approach to risk-based maintenance, particularly with respect to quantified cost-risk optimisation, and subsequently undertake an accelerated programme to implement the revised approach for the three most critical asset types by the mid-point of CP5 to test and validate the process.	2.3, 2.5
007	Network Rail should complete the rollout and integration of Tier 2 WLCC models to the devolved Routes to support better Asset Management decisions at the 'local' level by the end of CP4.	2.10
008	By the end of CP4 Network Rail should confirm why the Level of Control procedure is not being applied consistently and objectively, and implement further controls to improve the identification of the correct Level of Control.	3.1

AMCL Reference	CP4 Roadmap Reiteration	2012 Roadmap Capability Statement
009	By the end of CP4 Network Rail should implement a programme management methodology which considers the relevant recommendations made by Halcrow with respect to programme management requirements.	3.1
010	By the end of CP4 Network Rail should revise the approach in Optimising Maintenance Regimes to include a quantitative definition of maintenance frequency tolerances.	3.7
011	By the end of CP4 Network Rail should ensure all the process requirements for the planning of possessions and resources on a national basis captured in NR/L3/NDS/302 have been unambiguously split between NDS and the Route based Access Planning Teams.	3.9
012	A conducive organisational culture is essential to embedding asset management successfully. By the end of CP4 Network Rail should define the measures that can be used to monitor culture change and cultural maturity. These measures should be validated throughout the business to check that senior management perceptions give an accurate assessment of what is happening throughout the organisation.	5.5
013	By the end of CP4 Network Rail should implement the asset stewardship KPIs and back-fill these with historic data where possible to improve its baseline and to demonstrate the expected impacts of Asset Management initiatives.	6.7
014	By the end of CP4 Network Rail should define how all elements of the Asset Management System are covered by an integrated audit programme.	6.5
015	By the end of CP4 Network Rail should establish the reasons for the current shortfall in Engineering Verification audits and define and implement a more effective and efficient way of implementing the standard.	6.6

◉ CP4 Roadmap Clarifications

AMCL Reference	CP4 Roadmap Clarification	2012 Roadmap Capability Statement
001	By the end of CP4 Network Rail should complete a review of the effectiveness of the Asset Management Framework implementation across all disciplines and refine the processes accordingly. These processes should be clearly documented to ensure consistency of application and controlled continual improvement in the future.	1.1
002	By the end of CP4 Network Rail should further develop SBPT232 (the Asset Output Measures Summary) to include to the correct level of detail for all the information specified in AMCL Roadmap Capability 1.4 and provide appropriate monitoring and review.	1.4
003	By the end of CP4 Network Rail should clarify the roles and responsibilities of the Route and Centre level clients.	1.3
004	Within the timescale for implementing the revised LTPP, Network Rail should ensure that the revised LTPP and the disaggregation of RUS documentation into market, geographic and cross-boundary studies is fully aligned with and supports delivery of the strategic planning framework.	1.6
005	Network Rail should review and revise the CP5 deliverability assessment and uncertainty analysis to assure that all risks have effective mitigation plans in place prior to the production of the CP5 Delivery Plan.	1.11
006	By the end of CP4 Network Rail should develop a clear change management plan which assures the risks associated with identified CP5 benefits and efficiencies are robustly managed.	1.11
007	Network Rail should develop and implement a consistent and comparable approach to determining asset criticality across the asset base, to facilitate optimised capex identification, validation and prioritisation, prior to the next SBP.	2.9
008	By the end of CP4 Network Rail should align the three existing taxonomies for Renewals Unit Costs (planning, delivery and control / review) to show the link between planned and reported costs mapped to an appropriate level within of the organisation for the purposes required.	2.16
009	By the end of CP4 Network Rail should demonstrate where the resource-based approach and activity-based costing approaches agree and where they differ to identify any opportunities to rationalise or improve these.	2.8
010	By the end of CP4 Network Rail should define its plan for supply chain access to CCMS2 through CP5.	3.2

AMCL Reference	CP4 Roadmap Clarification	2012 Roadmap Capability Statement
011	By the end of CP4 Network Rail should establish clear guidance linked to the identified level of control on the scale of systems assurance activities required for projects throughout their lifecycle (including RAMS requirements management), ensuring this is also effectively linked into the whole-life management of the assets involved.	3.4
012	By the end of CP4 Network Rail should review the AMIP plan for Systems Engineering Capability Development to ensure that all activities within the scope of Systems Engineering across the organisation are incorporated. This should explicitly address the current interface between the IP and the rest of Network Rail to ensure clarity around roles and responsibilities is achieved.	3.4
013	By the end of CP4 Network Rail should ensure that the II Phase 4 implementation plan effectively integrates the II and RBM initiatives for the long term, in accordance with CP4 Roadmap Reiteration 003, through the adoption of common processes to identify the optimal mix of risk mitigation for each asset type considered..	2.2
014	By the end of CP4 Network Rail should review the success of the Kent Service Group Strategies and consider these for national adoption.	3.9
015	By the end of CP4 Network Rail should have a fully supported plan in place to align the RRDH to the outcomes of the FIIP and revise the scope and function of the RRDH to ensure all relevant aspects of Network Rail can access and contribute to its development.	3.10
016	By the end of CP4 Network Rail should have a plan in place (for completion in the first year of CP5) to revise its approach to the generation, rehearsal and review of contingency plans. This should ensure the right degree of national consistency and best practice is matched with local freedom and awareness of plans.	NEW
017	By the end of CP4 Network Rail should establish a mapping from the Asset Information Vision and Strategy to individual projects (including 'non-ORBIS' projects), showing interdependencies and ensuring delivery pathways are developed and maintained.	4.1
018	By the end of CP4 Network Rail should establish mechanisms within the Routes to define clear responsibilities and interfaces with the central organisation, and to act as communication channels for the improvement and integration of project information.	4.2

AMCL Reference	CP4 Roadmap Clarification	2012 Roadmap Capability Statement
019	By the end of CP4 Network Rail should develop a risk-based prirotisation for all systems and applications to focus continuity planning requirements, including communication routes with key stakeholders and end users.	4.7
020	By the end of CP4 Network Rail should demonstrate clear alignment between ORBIS, FIIP and the outputs of the Asset Information Specification and Asset Knowledge Standards development processes.	4.2, 4.3
021	By the end of CP4 Network Rail's strategy for audit and assurance against the Asset Information Specification should include provision for both national and local datasets, local audit and central assurance.	4.5, 4.6
022	Uncertainty about major project start dates persists. By the end of CP4 Network Rail should design and put in place a process for setting and announcing start dates and monitoring its effectiveness which uses some of the statistical data which is already collected.	5.7
023	The handover process between major projects and the Routes has been identified as an area needing attention. By the end of CP4 Network Rail should define and implement explicit handover requirements and monitor their effectiveness.	NEW
024	Initial project trials are addressing the interfaces between Infrastructure Projects, National Delivery Service and the Routes in relation to the contracting of larger projects. A stable relationship between the Routes and the centre depends on there being clarity on the explicit criteria and rules about how Routes can bid for renewals and large projects. This applies both to tendering and the management of supplier relationships. Network Rail should capture and translate the lessons from these trials into explicit criteria and rules in the next iteration of the Devolution Handbook.	NEW
025	Network Rail should ensure that the planned organisational culture survey focuses on assessing current cultural fit and maturity with regards to effective asset management. It should use a suitable range of measures of culture and cultural maturity to ensure its findings are reliable and valid. Analysis of survey results should identify definitive actions to improve cultural fit and maturity.	5.5
026	By the end of CP4 Network Rail should define a methodology and guidelines for the alignment of competence requirements, selection criteria, training needs analysis and specification and evaluation of training and professional development.	5.1, 5.2, 5.3

AMCL Reference	CP4 Roadmap Clarification	2012 Roadmap Capability Statement
027	Network Rail should review the impacts of its ERM programme on the Asset Management System and the management of risk within this, and assess the impacts on delivering the Roadmap capabilities by the end of CP4.	6.1
028	Network Rail's Asset Policies should be reviewed at an appropriate point in the ERM Programme to incorporate the likely impact of asset risks on the overall corporate risks to demonstrate that these are aligned and managed accordingly.	6.1
029	By the end of CP4 the Network Rail Board should endorse the Sustainability Strategy to enable full roll-out and implementation, ensuring existing business unit strategies are aligned to the corporate strategy to avoid duplication and clarify responsibilities for Sustainable Development in the devolved organisation.	6.2
030	Network Rail should demonstrate in its CP5 Delivery Plan (or other appropriate document) that it is implementing the initiatives in the Sustainable Development Strategy at both corporate and functional level.	6.2
031	Network Rail should set a timescale for the implementation and external validation of its business systems within the Sustainable Development plans for CP5.	6.2
032	By the end of CP4 Network Rail should identify the risks and opportunities associated with achieving its Sustainable Development objectives over CP5 and reflect these in its Risk Framework.	6.1, 6.2
033	Climate change objectives should be set out in the endorsed version of the Sustainable Development strategy, and specific initiatives to achieve these detailed in the CP5 Delivery Plans (or other appropriate document) at Corporate, Function and Route levels. These should reflect the findings of the TRaCCA programme as these become available.	6.2, 6.3

✳ CP5 Roadmap Recommendations

AMCL Reference	CP5 Roadmap Recommendation	2012 Roadmap Capability Statement
001	During CP5 Network Rail should include sufficient information in the Route Specifications to enable a RAMS requirements specification for the Route to be defined.	1.7
002	During CP5, Network Rail should develop a formal mechanism to assess appropriate overall funding scenarios at a National and Route level which model potential alternative HLOS compliant options.	1.8, 2.11
003	Network Rail should develop a comparable format for Route Plans in terms of the degree of justification for any deviation from Asset Policy and modelled work volumes and costs prior to the publication of the next IIP.	1.12
004	During CP5 Network Rail should establish long-term Asset Management planning processes, which enable production of strategic business plans as snapshots of a continuously managed long-term plan (i.e. business as usual). This should include a standardised and consistent format for data and information to enable comparability between control periods.	1.8
005	Network Rail should develop Route level business cases and delivery plans for maintenance efficiencies for implementation and monitoring during CP5.	2.2
006	During CP5 Network Rail should develop a Route-by-Route asset information specification, suite of knowledge standards and data collation plan to support the use of the three Tiers of modelling and Asset Management decision making at Route level.	4.3
007	During CP5 Network Rail should establish a formal programme for the development of the national strategic whole-system rail model, ensuring the model effectively integrates Network Rail's Strategic Planning Framework.	3.5
008	Progress can be made with the immediate roll out of the Asset Management competence framework. A CP5 Development Action should be to review the competence framework development methodology and address the identified technical issue.	5.1
009	Network Rail's current initiatives to improve understanding of weather impacts and develop these into asset-specific strategies should be developed and implemented through the CP5 Delivery Plans. The Asset Information required to support this should be identified so that this can be collected during CP5.	6.3

Appendix A
39 Subjects View -GFMAM

The AMEM is also aligned with the Institute of Asset Management's (IAM's) Asset Management Landscape Project. The IAM is leading this project on behalf of the Global Forum for Maintenance and Asset Management (GFMAM) which provides an international Asset Management framework against which organisations can be consistently 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 52 below. It is anticipated that any assessments undertaken throughout CP5 will be against this standard.
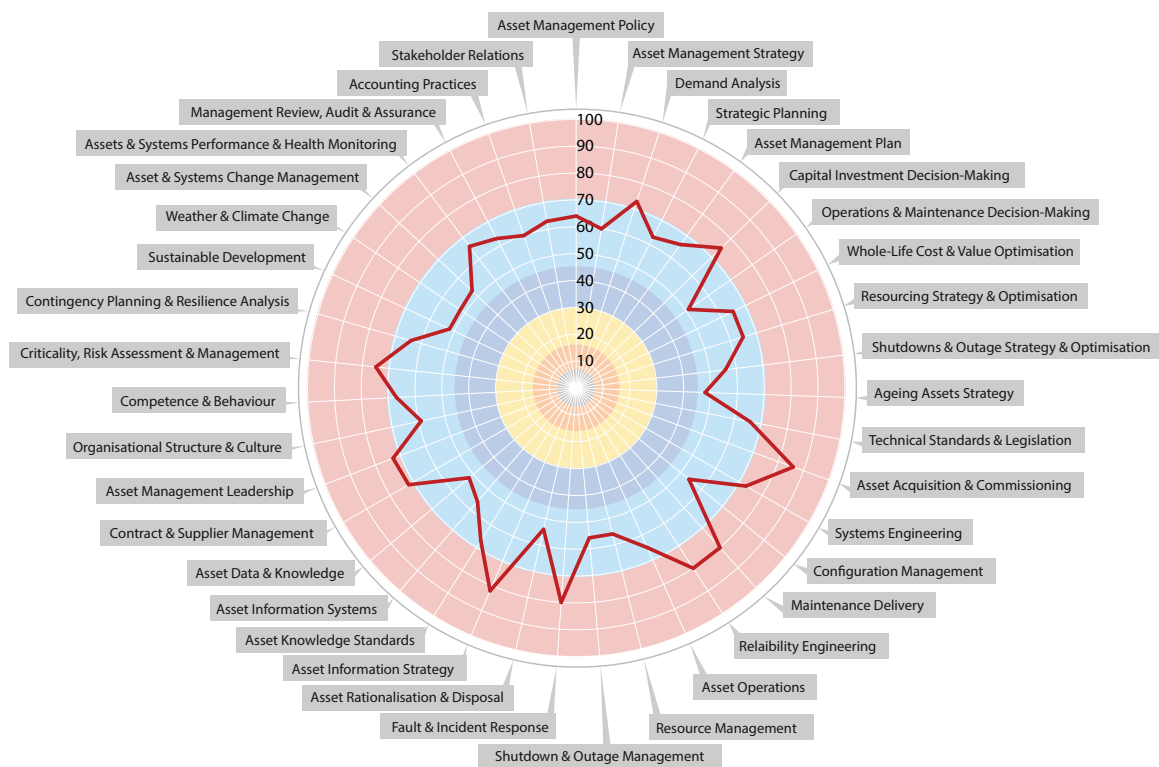
Diagram 52   Network Rail SBP AMEM Assessment Scores by 39 Subjects

Appendix B
Assessment Interviewees

B1.1
Network Rail Interviewees

Interviewee Ref No	Name	Job Title
1	David Higgins	Chief Executive
2	Paul Plummer	Group Strategy Director Planning
3	Jerry England	Group Asset Management Director
4	Tim Kersley	Head of Asset Management Support
5	Charles Robarts	Director of Planning & Regulation
6	Richard O'Brien	Route Managing Director, Network Operations
7	Paul Plummer	Group Strategy Director Plannng
8	Julie Rickard	Principal Strategic Planner (National)
10	Richard Eccles	Director, Network Strategy and Planning
11	Richard Eccles	Director, Network Strategy and Planning
12	Dan Boyde	Strategic Planning Manager
13	Tim Kersley	Head of Asset Management Support
14	Sue Coverdale	Head of Asset Management [Track]
15	Richard Frost	Head of Civils Asset Management [Structures]
16	Stephen Sutcliffe	Head of Civils Asset Management [Buildings]
17	Richard Lawes	Technology Manager [Telecommunications]
18	Phil Collins	Head of Asset Management E&P
19	Mac Andrade	Director, Infrastructure Maintenance
20	Rob Thomas	Head of Strategic Projects
21	Mark Enright	Head of Delivery (Maintenance Services)
22	Farida Jarvis	Programme Manager
23	Andrew Simmons	Professional Head [Signals & Telecoms
24	Deanne Haseltine	Project Manager, IM
25	Farida Jarvis	Programme Manager
26	Andy Jones	Professional Head [Track]
27	Richard Frost	Head of Civils Asset Management [Structures]
28	Colin Sims	Senior Technology Engineer [Tunnels]
29	Stephen Sutcliffe	Head of Civils Asset Management [Buildings]
30	Andy Hudson	Director; Telecoms Asset Management
31	Richard Stainton	Professional Head Electrical Power
32	Matt Skinner	Development Manager AMS
33	Andy Kirwan	National Route Support Engineer
34	Dan Boyde	Strategic Planning Manager

Interviewee Ref No	Name	Job Title
35	Sam Chew	Asset Management Specialist, AMS
36	Andrew Simmons	Director, Future Train and Operations Control Systems, IP
37	Andy Jones	Professional Head [Track]
38	Julian Williams	Development Manager, Corporate Development
39	Richard Frost	Head of Civils Asset Management [Structures]
40	Philip Chalk	Asset Management Specialist, Buildings & Civils - Asset Management
41	Tony Wilcock	Head of Civils Asset Mangement
42	Stephen Sutcliffe	Head of Civils Asset Management [Buildings]
43	Richard Lawes	Technology Manager [Telecommunications]
44	Richard Stainton	Professional Head Electrical Power
45	Matt Skinner	Development Manager AMS
46	Eliane Algaard	Head of Strategic Planning
47	John Schofield	Group Financial Controller
48	Michael Gurtenne	Financial Controller
49	Stephen Blakey	Head of Cost Planning & Bid Management, IP
50	Simon Kirby	Managing Director, Infrastructure Projects
51	Huw James	Head of Programme Management
52	Nigel Best	Systems Analysis Manager, IM
53	Brian Hamilton	Head of Systems Engineering
54	Mark Enright	Head of Delivery (Maintenance Services)
55	Mac Andrade	Director, Infrastructure Maintenance
56	Richard Smith	Asset Transformation Programme Director
57	Paul Plummer	Group Strategy Director Plannng
58	Barny Daley	Head of Infrastructure Maintenance Reliability
59	Jim Morgan	Infrastructure Director, Network Operations
60	Mac Andrade	Director, Infrastructure Maintenance
61	Richard Smith	Asset Transformation Programme Director
62	Katrina Law	Head of Materials NDS
63	Patrick Bossert	Director, Asset Information
64	Richard White	Head of Asset Information
65	Davin Crowley-Sweet	Head of Data Management, AI
66	Edward MCGloin	Route Asset Manager (Buildings)
67	Jeremy Axe	Enterprise Architect - Technical
68	Giles Tottem	Information Management Project Manager
69	Steve Hobden	Programme Manager, AI
70	Ian Tankard	Head of Governance & Assurance, AI

Interviewee Ref No	Name	Job Title
71	Steve Armstrong	Head of Category Management, C&P
72	Ian Sexton	Director; Contracts & Procurement
73	Euan Clifford	Head of Utilities
74	Patrick Butcher	Group Finance Director
75	Richard Doyle	Director, Human Resources
76	Tim Kersley	Head of Asset Management Support
77	Paul Taylor	Director, Safety Culture & Leadership Change
78	Richard Doyle	Director, Human Resources
79	Neil Edwards	Professional Development Manager, HR
80	Keith Brown	Competency Technical Lead,
81	Andrea Parker	Head of Programme Systems Engineering, IP
82	Edward Rollings	Professional Head [Signals & Telecoms]
83	Andy Jones	Professional Head [Track]
84	Richard Frost	Head of Civils Asset Management [Structures]
85	Tony Wilcock	Head of Civils Asset Mangement
86	Nigel Ricketts	Professional Head (Buildings & Civils)
87	Andy Hudson	Director; Telecoms Asset Management
88	Richard Stainton	Professional Head Electrical Power
89	Gareth Llewellyn	Safety and Sustainable Development Director
90	Pete Stanton	Infrastructure Safety Specialist
91	Andy Kirwan	National Route Support Engineer
92	Katrina Keeling	Head of Sustainable Business Strategy
93	Brian Hamilton	Head of Systems Engineering
94	Dexter Davis	Sustainable Infrastructure Strategy Manager
95	Ben Edwards	Strategic Services Director
96	James Collinson	Director, National Certification Body
97	Kevin Robertshaw	Director, Route Asset Management
98	Alan Ross	Director, Route Asset Management
99	Paul Meads	Strategic Planning Engineer, Track
100	Richard Schofield	Director, Route Asset Management
101	Terry Shorten	Route Asset Manager (Buildings)
102	Craig Ellis	Head of Telecoms, Asset Design & Delivery Mgnt
103	Simon Blanchflower	Director, Route Asset Management
104	Stuart Kistruck	Director, Route Asset Management
105	Alan Ross	Director, Route Asset Management
106	Jane Simpson	Director, Route Asset Management
107	Nick Tedstone	Route Asset Manager (Civils)

Interviewee Ref No	Name	Job Title
108	Derek Butcher	Route Asset Manager (Civils)
109	Terry Shorten	Route Asset Manager (Buildings)
110	Fraser Allan	National Telecoms Asset Performance Manager (NE)
111	Daniel Aisthorpe	Route Asset Manager [E&P]
112	John Gerrard	Route Finance Director - Sussex
113	Adrian Moss	Route Asset Manager (Signalling)
114	Andy Franklin	Route Asset Manager [Track]
115	Michael Smith	Route Structures Engineer
116	Terry Shorten	Route Asset Manager (Buildings)
117	Fraser Allan	National Telecoms Asset Performance Manager (NE)
118	Daniel Aisthorpe	Route Asset Manager [E&P]
119	Simon Blanchflower	Director, Route Asset Management
120	Trevor Harris	Project Manager, Infrastructure Investment
121	Jenny Webb	Programme Engineering Manager, Track - Asset Management
122	Daniel Recchia	Project Manager
123	Karl Budge	Route Delivery Director, IP
124	David Rogers	Project Manager, Infrastructure Projects
125	Andy Letts	Programme Engineering Manager, Investment Projects
126	Lindsay Vamplew	Programme Director , IP
127	Jane Simpson	Director, Route Asset Management
128	Hayley Child	Infrastructure Maintenance Engineer
129	Ged Cullinane	Infrastructure Maintenance Delivery Manager
130	David Stevenson	Section Planner / Administrator Infrastructure Maintenance
131	Billy Anderson	Section Planner, Infrastructure Maintenance
132	Mark Davies	Special Projects Manager Electrification
133	Wayne Cockerill	Programme Manager, IM, York,
134	Dave Deeley	Special Projects Manager
135	Philip Bergum	Performance & Assurance Engineer, Infrastructure MTCE
136	John Sharkey	Infrastructure Maintenance Delivery Manager
137	David Stevenson	Section Planner / Administrator Infrastructure Maintenance
138	Billy Anderson	Section Planner [Track], IM (Dundee)
139	Chris Gillot	Assistant Electrification & Plant Maintenance Engineer
140	Wayne Cockerill	Programme Manager, IM, York.
141	Dave Rosser	Infrastructure Maintenance Services Manager
142	Jane Collier	Assistant Track Maintenance Engineer

Interviewee Ref No	Name	Job Title
143	Johanna Grant	Technical Clerk, Buildings & Civils - Asset Management, EA Hse.
144	Adam Checkley	Route Buildings Engineer, Buildings & Civils - Asset Management
145	Marianne Watt	Route Buildings Engineer
146	Darren Hepburn	Buildings & Civils - Asset Management
147	Adrian Murray	Route Asset Manager [E&P]
148	Simon Blanchflower	Director, Route Asset Management
149	Richard Schofield	Director, Route Asset Management
150	Stuart Kistruck	Director, Route Asset Management
151	Richard Schofield	Director, Route Asset Management
152	Mike Gallop	Director, Route Asset Management
153	Alan Ross	Director, Route Asset Management
154	David Webb	Route Asset Manager (Track)
155	Nick Tedstone	Route Asset Manager (Civils)
156	Derek Butcher	Route Asset Manager (Civils)
157	Gordon Harper	Head of National Programmes
158	Andrew Stiles	Business Change Manager, Telecoms
159	Adrian Murray	Route Asset Manager (EP)
160	Simon Blanchflower	Director, Route Asset Management
161	Kevin Robertshaw	Director, Route Asset Management
162	Paul Faulkner	Logistics Coordinator, Infrastructure Maintenance
163	Derek Butcher	Route Asset Manager (Civils)
164	Julian Harms	Route Asset Manager (Geotechnics)
165	Kate Godfrey	Environment Manager , National Delivery Service
166	Ana Maria Castillo Serna	Assistant Contracts & Procurement Manager (Route)
167	Kirsty Young	Head of Consents & Environment, Thameslink Programme
168	Mike Gallop	Director, Route Asset Management
169	Alan Ross	Director, Route Asset Management
170	Alan Brookes	Head of Infrastructure Maintenance Safety & Compliance
171	Kevin Robertshaw	Director, Route Asset Management
172	Jane Simpson	Director, Route Asset Management
173	Stuart Kistruck	Director, Route Asset Management
174	Richard Schofield	Director, Route Asset Management
175	Simon Blanchflower	Director, Route Asset Management
176	Richard Lawes	Technology Manager [Telecommunications]
177	Alan Ross	Director, Route Asset Management
178	Steve Featherstone	Programme Director Track

Interviewee Ref No	Name	Job Title
179	Simon Gates	Director, Route Asset Management
180	Andrew Graham	Incident Management Specialist
181	Martin Arter	Director Infrastructure Programme Management, Infrastructure Investment
182	Tony Ramanathan	System Design Engineer
183	Brian Tomlinson	Director S&SD Risk & Director, S&SD Risk & Assurance, Safety & Sustainable Development
184	Mick Micheal	Interim Group Risk Manager, Finance
185	Rajiv Patel	Head of Internal Audit
186	Paul Gilbert	Head of Planning, NDS
187	Chris Rowley	Head of Operations Development

B1.2
ORR Interviewees

Ref	Name	Job Title
1	Mark Whitham	Engineer, Track
2	Colin Greenslade	Head of Strategy, Planning and System Safety
3	Ian Maxwell	Senior engineer, command, control and signalling
4	Philip Sharpe	RVNET Acting Principal
5	Mervyn Carter	Senior engineer, civil engineering
6	Andrew Wallace	Head of Planning & Operations

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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.

C1.1
General References

Ref	Document Title
NRSBP-SBP1	SBPT101 Network Rail Strategic Business Plan -England and Wales
NRSBP-SBP2	SBPT102 Network Rail Strategic Business Plan - Scotland
NRSBP-SBP3	SBPT205 Asset Management Capability
NRSBP-SBP4	SBPT206 Capacity and performance planning framework
NRSBP-SBP5	SBPT207 Project Development and Delivery
NRSBP-SBP6	SBPT208 Technical Strategy
NRSBP-SBP7	SBPT210 Anglia Route Plan
NRSBP-SBP8	SBPT212 Kent Route Plan
NRSBP-SBP9	SBPT213 LNE Route Plan
NRSBP-SBP10	SBPT215 Scotland Route Plan
NRSBP-SBP11	SBPT218 Wessex Route Plan
NRSBP-SBP12	SBPT220 Efficiency Summary
NRSBP-SBP13	SBPT222 Maintenance Expenditure Summary
NRSBP-SBP14	SBPT223 Renewals Expenditure Summary
NRSBP-SBP15	SBPT224 Investment Expenditure
NRSBP-SBP16	SBPT225 Enhancements
NRSBP-SBP17	SBPT226 Corporate Services Plan
NRSBP-SBP18	SBPT227 Asset Management Services Plan
NRSBP-SBP19	SBPT228 Trade offs summary
NRSBP-SBP20	SBPT232 Asset Output Measures Summary
NRSBP-SBP21	SBPT233 Access strategy and network availability summary
NRSBP-SBP22	SBPT236 Deliverability Assessment
NRSBP-SBP23	SBPT242 Risk Management
NRSBP-SBP24	SBPT243 Assumptions and risk
NRSBP-SBP25	SBPT3001 Asset Management Policy
NRSBP-SBP26	SBPT3002 Asset Management Strategy
NRSBP-SBP27	SBPT3003 Asset Management System
NRSBP-SBP28	SBPT3004 Optimising Maintenance Regimes
NRSBP-SBP29	SBPT3011 Signalling Asset Policy
NRSBP-SBP30	SBPT3012 Electric Power and Fixed Plant Asset Policy Annex 1
NRSBP-SBP31	SBPT3012 Electric Power and Fixed Plant Asset Policy Appendices
NRSBP-SBP32	SBPT3012 Electric Power and Fixed Plant Asset Policy
NRSBP-SBP33	SBPT3013 Structures Asset Policy
NRSBP-SBP34	SBPT3014 Telecoms Asset Policy

NRSBP-SBP35	SBPT3016 Buildings Fabric Asset Policy
NRSBP-SBP36	SBPT3016 Buildings M_E Asset Policy
NRSBP-SBP37	SBPT3090 Master Efficiency Handbook
NRSBP-SBP38	SBPT3091 Scope for efficiency savings in CP5 - evidence from other regulated industries
NRSBP-SBP39	SBPT3169 Infrastructure Maintenance Strategy
NRSBP-SBP40	SBPT3283 Uncertainty Analysis Stage 1
NRSBP-SBP41	SBPT3296 Uncertainty Analysis Stages 2 and 3
NRSBP-SBP42	SBPT3297 Uncertainty Analysis Overall Summary
NRSBP-SBP43	SBPT3302 CP5 Deliverability Review
NRSBP-SBP45	SBPT204 Sustainable Development Strategy
NRSBP-SBP46	SBPT3304 Weather and Climate Change
NRSBP-SBP47	Benchmarking evidence - SBPT3138 to SBPT3168
NRSBP-SBP48	Devolution Handbook Version 4

Strategy & Planning References

Ref	Document Title
NRSBP-SP1	Draft Asset Management Policy
NRSBP-SP2	Draft Asset Management Strategy
NRSBP-SP3	Letter to ORR seeking RUS programme change approval
NRSBP-SP4	Network RUS - Scenarios and Long Distance Forecasts June 2009
NRSBP-SP5	Network Electrification RUS
NRSBP-SP6	Client Remit - Great Western Main Line Electrification
NRSBP-SP7	LTPP Letter Requesting Endorsement of the LTPP (Network Rail to ORR)
NRSBP-SP8	LTPP Endorsement Letter (ORR to Network Rail)
NRSBP-SP9	Asset Manageent Framework Process dated 13/01/2012
NRSBP-SP10	FMS outline process presented to ORR dated 21/11/2011
NRSBP-SP11	WLC Maintenance: End-to-end process map

Whole-life Cost Justification References

Ref	Document Title
NRSBP-WLC1	RBM Presentation - 15th March 2013
NRSBP-WLC2	Barnstaple Modules 1 - 18
NRSBP-WLC3	Barnstaple Snap Chart
NRSBP-WLC4	Track Barnstaple PL Audit Report
NRSBP-WLC5	Track TNC Attachment 2
NRSBP-WLC6	AO/030: PR13 Maintenance & Renewals Review - Draft A, March 2013
NRSBP-WLC7	Part A Reporter: Application of CP4 Asset Policies Draft B 20 December 2012

Lifecycle Delivery References

Ref	Document Title
NRSBP-LCD1	Management Level of Control - NR/L3/INI/PG115/PS/001 Issue 2
NRSBP-LCD2	Independent Reporter Report 'Network Rail Project and Programme Management Capability' (Halcrow - March 2012)
NRSBP-LCD3	Level of Control - Assessment Tool
NRSBP-LCD4	Level of Control - Technical Briefing Pack
NRSBP-LCD5	Level of Control - Control Matrix
NRSBP-LCD6	Level of Control - Process
NRSBP-LCD7	Programme Management Capability Document
NRSBP-LCD8	CP5 Resource Deliverability Review - Summary slides (September 2012)
NRSBP-LCD9	Programme Management Discipline Review Group (DRG) Actions (October 2012)
NRSBP-LCD10	Programme Management Discipline Review Group (DRG) Terms of Reference
NRSBP-LCD11	IP – New Entrants Programmes presentation
NRSBP-LCD12	AMIP: Systems Engineering Capability Development
NRSBP-LCD13	Harrogate SB SSI Circuit Routing Interlocking 1
NRSBP-LCD14	TDG Harrogate Area Resignalling - Circuit requirement spreadsheet Version 1.12
NRSBP-LCD15	TDG Harrogate Area Resignalling - Scope of Works example (Harrowgate SB)
NRSBP-LCD16	TDG Harrogate Area Resignalling - Scope of Works example (Gatwick Redevelopment)
NRSBP-LCD17	TDG Harrogate Area Resignalling - Scheme Outline Design (SOD) Examples
NRSBP-LCD18	TDG Harrogate Area Resignalling - Scheme Outline Design Draft Taking Over Certificate (TOC)
NRSBP-LCD19	Harrogate Area Resignalling Certificate of Completion
NRSBP-LCD20	Harrogate Area Resignalling Certificate of Compliance
NRSBP-LCD21	Thameslink Programme - Key Output 2 Performance & Reliability Data Report (August 2012)
NRSBP-LCD22	Northern Hub Phase 1 - Failure Modes, Effects & Criticality Analysis Report (July 2012)
NRSBP-LCD23	Cardiff Area Signalling Renewal - Scheme Performance Assessment (December 2010)
NRSBP-LCD24	Farnham Frieght Journey Time Assessment (November 2012)
NRSBP-LCD25	Thameslink Core and Inner Area EMGTPA Report (July 2012)
NRSBP-LCD26	Liverpool & Manchester Routes - Potential opportunity sites for non-tilting trains to run at EPS speed (September 2012)

NRSBP-LCD27	2008/09 Thameslink Programme (TLP) Performance Benchmark Report (March 2010)
NRSBP-LCD28	Thameslink Programme KO2 Reliability & Maintainability Requirement Specification and Apportionment – Part 2 (November 2010)
NRSBP-LCD29	Modelling, Simulation and Analysis presentation
NRSBP-LCD30	Risk Based Maintenance Scope Rev 7
NRSBP-LCD31	Risk-Based Maintenance - Champions Roles
NRSBP-LCD32	RBM Implementation Plan Remit Version 01A
NRSBP-LCD33	Barnstaple RCM Track Pilot Documentation
NRSBP-LCD34	II MI Report Full Period 9 2012 - 2013
NRSBP-LCD35	Certificate of Design and Check for Morley Rd
NRSBP-LCD36	NDS Work Instruction - Planning Of Heavy Resource And Network Services - NDS/PLN/LP/070 Issue 1
NRSBP-LCD37	Demand Ratification SBP 20121212
NRSBP-LCD38	Machine Calculation SBP 20121212
NRSBP-LCD39	WHP0006 NDS Locomotive Strategy
NRSBP-LCD40	Fleet Size Modelling SBP 20121212
NRSBP-LCD41	Long term resource demands
NRSBP-LCD42	Letter to John Larkinson re: RDG 140213
NRSBP-LCD43	FMS Improvement programme - Accuracy Remit
NRSBP-LCD44	FMS Codes derived from FMEA - Draft Remit
NRSBP-LCD45	FMS Pipe Line - Fault Code Phase 2 Mobile App v1
NRSBP-LCD46	FMS Improvement Programme - Reporting Remit
NRSBP-LCD47	ORR/Independent Reports presentation on FMS Improvements
NRSBP-LCD48	NIRG Future Agenda
NRSBP-LCD49	NIRG Slides P10 2012
NRSBP-LCD50	iPAT Reliability Plan - Sussex Period 10
NRSBP-LCD51	National Reliability Team Update P8 presentation
NRSBP-LCD52	NIRG Slides P10 2012
NRSBP-LCD53	NIRG Future Agenda
NRSBP-LCD54	New 2013-14 Campaign Programme
NRSBP-LCD55	Reliability Improvement Alert No. 713581 - STS BR 935A Magnetically Latched Relays (Code 008, 009 And 011) Failure To Unlatch
NRSBP-LCD56	Reliability Improvement Alert No. 751604 - Low Voltage DC Track Circuits Cegasa Cells – Planned Maintenance Intervals
NRSBP-LCD57	Reliability Improvement Group – Guidance Note No. 759929 - Cyclon Cells - Issues & Actions
NRSBP-LCD58	Campaign Programme 2012-13
NRSBP-LCD59	Campaign 5 Task List for Maintenance Service
NRSBP-LCD60	Campaign 5 DU Leads List

NRSBP-LCD61	Campaign 5 Points Set Up Phase 1 Remit V2
NRSBP-LCD62	Campaign 9 Performance Bulletin
NRSBP-LCD63	Campaign 9 DU Leads List
NRSBP-LCD64	Campaign 9 Assets in Scope
NRSBP-LCD65	Campaign 9 Work Orders for 5% Asset Selections
NRSBP-LCD66	Campaign 9 Points set up phase 2 Remit
NRSBP-LCD67	Campaign 10 - Installation of new Access Point Signs
NRSBP-LCD68	Railway Reliability Data Handbook (RRDH) extract
NRSBP-LCD69	Network Optimisation Presentation to RDG APSCM working group - 1st March 2013
NRSBP-LCD70	Network Optimisation - Wessex Pilot Study: Summary Findings
NRSBP-LCD71	NDS/SR/INT/WI/001 - NDS Work Instruction for the release of serviceable rails of up to 18M (60') for internal use
NRSBP-LCD72	NDS/UR/WI/001 - NDS Work Instruction for the inspection and re-supply of unused rail in 18.288m (60') lengths into Network Rail Infrastructure.
NRSBP-LCD73	NR/L2/TRK/4100 - Serviceable concrete sleepers for use in running lines and sidings

Asset Knowledge References

Ref	Document Title
NRSBP-AKN1	AIS specifications framework
NRSBP-AKN2	ORBIS Master data management - Track asset hierarchy
NRSBP-AKN3	Asset Information Strategy
NRSBP-AKN4	Asset Information Strategy (Appdx)
NRSBP-AKN5	Knowledge Standard Document Map
NRSBP-AKN6	Strategic planning framework map
NRSBP-AKN7	Programme Architecture 2.0
NRSBP-AKN8	AIS Development Cycle
NRSBP-AKN9	Devolution Handbook (ppt)
NRSBP-AKN10	Asset Information Business Continuity
NRSBP-AKN11	TOR - Asset Information Route Interface Mtg
NRSBP-AKN12	TOR - Data Governance Change Board
NRSBP-AKN13	TOR - Data Change Impact Ass Group
NRSBP-AKN14	Aligning AM and AI Strategy Presentation
NRSBP-AKN15	Integrated Risk Management Doc
NRSBP-AKN16	ORBIS Programme Delivery Roadmap V1.1
NRSBP-AKN17	MDM Roadmap

Organisation & People References

Ref	Document Title
NRSBP-OP1	Asset Management Competency Framework
NRSBP-OP2	Asset management Competence Role Profile matrix
NRSBP-OP3	Example of AM Competence Development Tool, self-assessed: Edward Rollings – Interview 82
NRSBP-OP4	Total value training courses complete and under development x 4, Andrea Parker – Interview 81, and AMIP Approach to Learning & Development document
NRSBP-OP5	Devolution Handbook, Asset Management Competency Framework and roll-out of AM competence self-assessment
NRSBP-OP6	Devolution Handbook
NRSBP-OP7	Presentation of sample outputs from Capability Database
NRSBP-OP8	Hard copy evidence from Tim Kersley – extract from the Asset Management Strategy Update 2013
NRSBP-OP9	Hard copy evidence from Tim Kersley – extract from the Asset Management Strategy Update 2013 (Indicators of cultural commitment across organisational levels)
NRSBP-OP10	Hard copy evidence from Tim Kersley – extract from the Asset Management Strategy Update 2013 (Improvement programme impact on cultural dimensions)
NRSBP-OP11	Hard copy evidence from Tim Kersley – extract from the Asset Management Strategy Update 2013 (Asset Management Cultural Maturity)
NRSBP-OP12	Hard copy evidence from Tim Kersley – extract from the Asset Management Strategy Update 2013 (Culture Dimensions and Initiatives Map)
NRSBP-OP13	Tender Assessment Matrix Energy Services spreadsheet – Euan Clifford, interview 73
NRSBP-OP14	Respondent discussion on Alliance decision making and Western Alliance board member make up
NRSBP-OP15	Presentation: AMS Assurance Services
NRSBP-OP16	Presentation Supplier Relationships at Network Rail – Steve Armstrong, interview 71
NRSBP-OP17	Presentation as example of Emerging Category Strategies – Steve Armstrong, interview 71
NRSBP-OP18	Presentation: Product Strategies - Proposed Approach, 30 Jan 2013 – Steve Armstrong, interview 71
NRSBP-OP19	Strategic Business Plan 2013
NRSBP-OP20	Respondent comment: Two interviews involved discussions on this.
NRSBP-OP21	Respondent comment in interview and SRM detail: see references 16-18
NRSBP-OP22	BIM in Rail: Supply Chain BIM Forum
NRSBP-OP23	'A Better Railway for a Better Britain' hard copy of printed publication
NRSBP-OP24	Paul Plummer letter to John Larkinson dated 14th February 2013

NRSBP-OP25	Lower risk projects trialled being run by the Routes: Bridge Repairs and Bridge Painting
NRSBP-OP26	Tim Kersley Presentation on 'Asset Management People Competency'
NRSBP-OP27	AMIP – Learning and Development Programme: Approach Paper
NRSBP-OP28	Respondent comment: on the development of a formal training and development programme over the next three years.

Risk & Review References

Ref	Document Title
NRSBP-RR1	IRM Handbook
NRSBP-RR2	IRM Standard (NR/L2/RSK/0001)
NRSBP-RR3	ERM Roadmap
NRSBP-RR4	Thameslink SD Policy (N000-NRT-POL-EN-0000009)
NRSBP-RR5	EMS ISO Certificate (EMS590553)
NRSBP-RR6	NDS Env Impacts Risk Register
NRSBP-RR7	NR News Release 20 Feb 2013
NRSBP-RR8	WACC AMSG Presentation
NRSBP-RR9	Anglia QBR
NRSBP-RR10	AMS ERM
NRSBP-RR11	KPMG Report
NRSBP-RR12	2013-14 Audit Plan
NRSBP-RR13	Safety Management System Standard
NRSBP-RR14	Engineering Verification Report
NRSBP-RR15	NCB ERM Pack

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