CP6 SBP AMEM Assessment

Version 1.0

A report for Network Rail & The ORR
from Asset Management Consulting Limited (AMCL)

The Institute of Asset Management PATRON
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EXECUTIVE SUMMARY

This report documents the findings of an independent assessment of Network Rail's Asset Management capability maturity. The assessment was undertaken between September 2017 and February 2018, with an effective assessment date concurrent with the publication of Network Rail's Control Period 6 (CP6) Strategic Business Plan (SBP) on the 9th February 2018. The assessment evaluated Network Rail's Asset Management capability maturity as of the 9th February 2018 and compares it to regulatory Asset Management capability maturity targets previously agreed between the Office of Rail and Road (ORR) and Network Rail. This report also compares Network Rail's evaluated Asset Management capability maturity with previous assessments undertaken at the end of CP4 in 2014 and at the time of the CP6 Initial Industry Advice (IIA) in 2016.

This Draft B report has been updated from Draft A to include due consideration of the suite of documents published by Network Rail as its CP6 SBP submission.

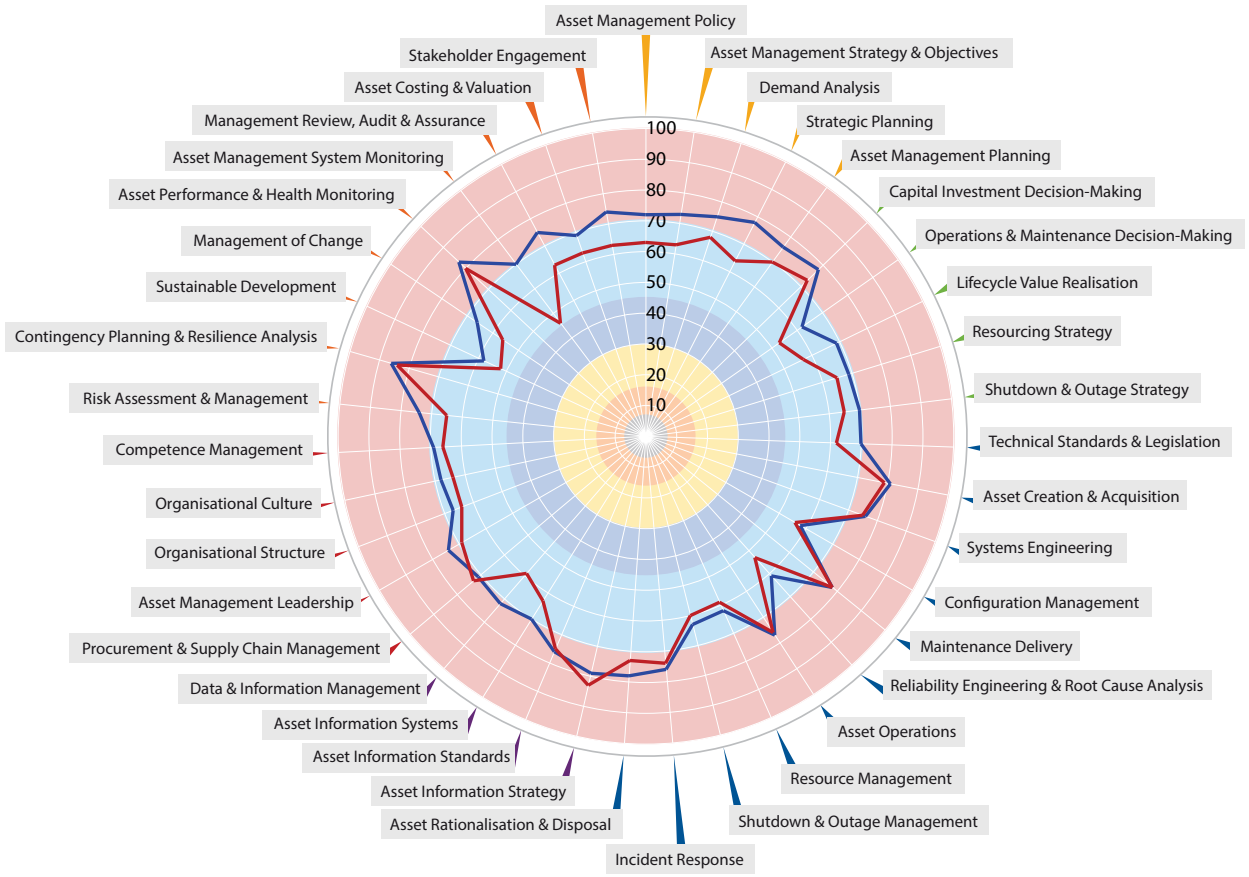
The assessment was undertaken by Asset Management Consulting Limited (AMCL), the Independent Reporter for Asset Management, on behalf of the ORR and Network Rail. The assessment was undertaken using an internationally recognised framework for Asset Management consisting of 39 Subjects across six Groups. It was against the six Groups that the ORR and Network Rail had agreed regulatory Asset Management capability maturity targets of 72% ± 2% at 80% confidence to ensure Network Rail exceeded 70% in each Group.

The overall conclusion is that Network Rail has achieved the 72% regulatory target in three of the six Groups of Asset Management within the specified confidence limits, as shown in the table below (Asset Management Strategy & Planning, Asset Information and Risk & Review). The table also shows that one of the remaining Groups, Lifecycle Delivery, has achieved over 70% within the specified confidence limits. The remaining two Groups (Asset Management Decision

Subject Group	End of CP4	Regulatory Target for January 2018	NR as assessed at 2018 SBP	Achieved Confidence interval at 80% level of confidence
1 AM Strategy & Planning	65.4%	72.0%	74.8%	±1.22%
2 AM Decision Making	62.8%	72.0%	69.7%	±1.70%
3 Lifecycle Delivery	67.5%	72.0%	70.8%	±0.71%
4 Asset Information	70.4%	72.0%	74.0%	±0.72%
5 Organisation & People	66.1%	72.0%	69.5%	±0.93%
6 Risk & Review	63.9%	72.0%	72.7%	±1.43%
Overall	66.0%	72.0%	71.9%	±0.49%

Making and Organisation & People) have achieved just under 70% although the confidence limits suggest that 70% may have been achieved. Network Rail has now achieved a level of Asset Management capability maturity which is at least effective in all areas, excellent in a number of areas and is well placed to deliver continually improving performance throughout CP6.

The most significant progress since the end of CP4 has been made within the Strategy & Planning and Risk & Review Groups. This is primarily because of the improved coordination and integration of Network Rail's Asset Management approach nationally and between the Centre and the Routes. This has been made effective through a much clearer organisational design and consistently applied systems and frameworks such as the Asset Management, Enterprise Risk Management and Assurance Frameworks. The diagram below shows the results from this assessment for each of the 39 Subjects within the six Groups of Asset Management and compares this to the level of maturity demonstrated at the end of CP4.



Network Rail now has in place an organisational structure which fully supports the devolved organisation, and many of the risks identified with devolution in the previous two assessments are now being managed effectively. The Routes are now embracing devolution and are operating more effectively with improved levels of leadership and competence. The effective application of the frameworks developed by the Centre to define and embed good practice has been integral in enabling this capability. The role of the Business Performance Management Framework (BPMF) in defining how the matrix organisation operates has also been important.

The matrix organisational structure appears to have brought clarity to the way Network Rail organises itself and the split of roles and responsibilities across the organisation. The high-level split of the System Operator and the Safety, Technical & Engineering (STE) teams has clarified the national support and direction for capacity planning / timetable development and assurance activities respectively. The role of STE as the Technical Authority has been integral in driving the improvements observed during this assessment through the effective definition and implementation of national frameworks and assurance. The STE organisation has matured with a broader scope, for example combining Asset Management and asset operations and the definition of clearer boundaries between STE and the Routes.

The Asset Management System has now been further defined within the Asset Management System Handbook and effectively implemented throughout the organisation. The review and update of this has also been much more clearly defined within the Chief Engineer's organisation within STE and aligned to the requirements of the Assurance and Enterprise Risk Management Frameworks.

An overview of the findings for each group is presented below.

ASSET MANAGEMENT STRATEGY & PLANNING

The Asset Management Strategy & Planning Group has increased in maturity by 9.4 percentage points from the end of CP4. It has comfortably achieved the regulatory target for this assessment with a score of 74.8%. This significant increase in capability maturity for the Group has been achieved by improvements in all Subjects.

Network Rail's Asset Management System has been enhanced in terms of specification, documentation and underlying processes and is supported by positive revisions to the Asset Management Policy and Asset Management Strategy. Work in this area has also driven better alignment of objectives at national and Route level in the Route Strategic Plans, including formal Scorecards at each level.

The overall strategic planning framework has been re-engineered since the last Control Period and is now better defined, logical, understood, implemented, assured and monitored. This has increased the overall level of confidence in, and justification of, Asset Management Plans for CP6. The Rolling Forecast approach by which this has been achieved over the last 18 to 24 months has been challenging for the organisation at times but has paved the way for its effective evolution into a good practice Continuous Business Planning approach

(see recommendation S&P5). This is an opportunity to embed leading practice but must be supported by systemisation of the current spreadsheet-based planning process (see recommendation S&P6) and by due consideration of the long-term sustainability of investment scenarios as part of the approach. For example, the Minimum Levels of Action scenario, used for CP6 strategic planning across many asset classes due to funding constraints, may not be sustainable over multiple Control Periods. Although not analysed in detail as part of this assessment, the risks should be noted by funders and stakeholders.

ASSET MANAGEMENT DECISION MAKING

The Asset Management Decision Making Group has missed the regulatory target for this assessment. However, there has been significant development and effort by Network Rail resulting in an increase in score from 62.8% at the end of CP4 to 69.7%. This increase is based on improvements across all Subjects within the Group.

The Capital Investment Decision Making and Lifecycle Value Realisation Subjects have improved iteratively since the end of CP4. These iterative improvements are based on a solid and well-established framework for capital decision making and the continued evolution of Network Rail's suite of Whole-Lifecycle Cost models in the Lifecycle Value Realisation Subject. The next significant improvement for these models is likely to be the inclusion of maintenance analysis to augment the current capital analysis focused approach to generate true Whole-Lifecycle Cost models.

The approach to strategic resource and track access planning has largely devolved to the Routes and is the focus of significant review and effort in each Route. However, capability in these areas varies by Route and there is no current approach to looking at strategic resourcing and track access planning nationally. This is considered by AMCL to be an area that would benefit from a nationally defined framework to optimise the approach across Routes (see recommendations AMDM5 and AMDM6).

The final Subject in this Group, Operations & Maintenance Decision Making, remains the lowest scoring at 62%. This has increased significantly since the end of CP4 based on a new and enhanced Maintenance Strategy, the development of Activity Based Planning for maintenance and the emerging Intelligent Infrastructure Programme. However, Network Rail has not yet established a good practice risk-based approach to defining maintenance regimes, which limits the potential score for this Subject.

LIFECYCLE DELIVERY

The score for the Lifecycle Delivery Group has increased from 67.5% to 70.8% since the end of CP4 but has missed the regulatory target of 72%. The new strategic Investment Decision Framework, driven by the Memorandum of Understanding between Network Rail and the Department for Transport, has installed a good practice governance structure for CP6 enhancements. Below this, the new Portfolio Programme & Project Management (P3M) Framework clearly defines Infrastructure Project's (IP's) 'one way' approach to Requirements Management, Assurance and GRIP (Projects & Programmes), which are applied across Network Rail.

In support of this approach there is increasing convergence of Network Rail's existing systems engineering approaches and cross-industry coordination via Digital Railway, which should be consolidated in time for CP6.

Reliability engineering roles and responsibilities are now embedded, but there are opportunities to improve the coordination and integration of reliability growth across disciplines and nationally to ensure the most effective and efficient approach to improving reliability is achieved (see recommendation LCD5).

Clear improvements in the definition and use in CP6 plans of maintenance unit costs is evident in the roll-out of the ABP Tool which now should be used to review and benchmark performance in CP6. However, Network Rail's approach to configuration management is still not clearly enough defined. The organisation should develop a framework to identify its configuration management requirements and under what circumstances these are applied, based on the criticality of the assets in question (see recommendation LCD4).

ASSET INFORMATION

The Asset Information Group continues to be a leading area for Network Rail. The overall score has increased by 3.6 percentage points since the last assessment to a current average of 74.0%.

Asset Information is in a state of transition strategically. The strategy for the management and improvement of Asset Information and supporting technologies is now centred on the revised and expanded Intelligent Infrastructure programme. The developing Intelligent Infrastructure programme presents a coherent vision, especially with regard capturing, analysing and exploiting asset data to make better planning decisions. Consolidation and further development of the emerging and existing strategies in this area will provide a coherent Asset Information Strategy (see recommendation AI1).

Network Rail's definition of the information and data required to support decisions and processes within its Asset Management Framework remains centred on the Asset Information Specifications (AIS). One of the final ORBIS projects, 'Exchange of Asset Information' (EAI), intends to provide technologies to ensure the AIS and Minimum Asset Data Requirements (MADR) are efficiently and effectively followed. It is recommended that the EAI project is prioritised and aligned to the Intelligent Infrastructure Programme (see recommendation AI3).

Asset Information Systems have been a major focus for Network Rail since the last assessment, and the ORBIS programme has delivered multiple new solutions against agreed ORR milestones. These have included a number of Decision Support Tools, the Fault Code Look-up application, replacement of GEOGIS with the Infrastructure Network Model (INM), and the introduction of the well received Geo-RINM geo-spatial solution. Less successful has been the delayed go-live of the Civils Strategic Asset Management Solution (CSAMS) solution and user adoption of some Decision Support Tools. It is recommended these areas remain a focus within the emerging Intelligent Infrastructure programme.

Data and Information Management and data quality has improved significantly through CP5 with the design and implementation of the Asset Data Governance (ADG) framework, and necessary IT Systems improvements. Further embedding of ADG is recommended to ensure consistent adoption across the routes (see recommendation AI5).

ORGANISATION & PEOPLE

The score for the Organisation & People Group has increased from 66.1% to 69.5% since the end of CP4. Although the Group has not achieved the regulatory target of 72% the results of the assessment show an organisation which is effectively resolving the cultural issues around accountabilities and governance that arose from devolution.

Solid progress has been made in most areas and there are grounds to be confident that this will continue, especially in the case of Competence Management.

Procurement and Supply Chain Management has scored slightly lower than the end of CP4 assessment because of concerns over relationships with suppliers and the development of a suitably capable supply chain.

The overall picture is one where Asset Management is emerging strongly as a core profession and set of practices, enabled by strong leadership. Clearer structures, assurance and performance management can be expected to consolidate this, but progress continues to depend largely on culture change.

RISK & REVIEW

The score for the Risk & Review Group has increased from 63.9% to 72.7% since the end of CP4 and has therefore achieved the regulatory target of 72%. The Enterprise Risk Management Framework (ERMF) is now fully embedded and effective at Levels 0 to 2 through Business Assurance Committee reviews and the Corporate Risk Assessment Matrix (CRAM) is being consistently applied (for example for CP6 Route planning and prioritisation). Validating the alignment of risk assessment and management at Level 3 and below to ERMF requirements should now be a priority for Network Rail (see recommendation R&R1).

A revised Assurance Framework is now in place that reflects the '3-Lines of Defence' model that has operated since devolution and enhanced assurance activities have been effectively defined and implemented. For example, within IP's P3M Framework and underpinning the Chief Engineer's assurance and governance structure.

The Asset Management System is now being effectively monitored and reviewed within the Chief Engineer's governance structure which is aligned to the ERMF and Assurance Framework, although some review activities continue to occur outside of this structure.

Management of change through MSP4NR has been effectively embedded at the Centre and within Routes. However, ensuring change management benefits are effectively identified, managed and delivered with no double-counting of benefits is now a priority (see recommendation R&R5).

There has been a systematic improvement of stakeholder engagement at Route level supporting development of the CP6 Route Strategic Plans. Validation of the achievement of stakeholder requirements identified through this process should be a priority for CP6 (see recommendation R&R10).

Overall conclusions and detailed recommendations can be found in Section 5 of this report.

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
1V1W	One Vision, One Way
ABP	Activity Based Planning
ADG	Asset Data Governance
AIS	Asset information Specification
AM	Asset Management
AMCF	Asset Management Competence Framework
AMEM	Asset Management Excellence Model
AMIP	Asset Management Improvement Plan
ASR	Asset Stewardship Review
ATR	Asset Technical Review
BAC	Business Assurance Committee
BCR	Business Critical Rules
BIM	Building Information Management
BPMF	Business Performance Management Framework
CMRP	Continual Modular Route Planning
CP4	Control Period 4
CP5	Control Period 5
CP6	Control Period 6
CARS	Civils Asset Reporting System
CRAM	Corporate Risk Assessment Matrix
CRD	Client Requirements Document
CRI	Composite Reliability Measure
CSI	Composite Sustainability Index
CRO	Cost Risk Optimisation
CSCG	Company Standards & Controls Group
CSAMS	Civils Strategic Asset Management Solution
CSI	Composite Sustainability Measure
CSM	Common Safety Method and also Configuration State Matrix
DfT	Department for Transport
DIMOS	Director of Incident Management & Operational Security
DR	Digital Railway
DRRD	Detailed Route Requirements Document

Acronym	Description
DRSAM	Director of Route Safety & Asset Management
DST	Decision Support Tools
DU	Delivery Unit
EAI	Exchange of Asset Information
EBAK	Enabling Better Asset Knowledge
ECC	Engineering Completion Certificate
EMS	Environmental Management System
ERMF	Enterprise Risk Management Framework
ERR	Enterprise Risk Register
FCL	Fault Code Lookup
FMEA	Failure Modes and Effects Analysis
FMECA	Failure Modes and Effects & Criticality Analysis
FMS	Fault Management System
GEOGIS	Geography and Infrastructure System
Geo-RINM	Geo-Rail Infrastructure Network Model
GFMAM	Global Forum for Maintenance and Asset Management
GRIP	Governance for Railway Investment Projects
HLOS	High-Level Output Specification
iELC	Integrated Engineering Lifecycle
IAM	Institute of Asset Management
IIA	Initial Industry Advice
INM	Infrastructure Network Model
IP	Investment Projects
IT	Information Technology
IMS	Integrated Management System
ISO	International Standards Organisation
KPI	Key Performance Indicator
LADS	Linear Asset Decision Tool
LTPP	Long Term Planning Process
LNW	London North Western (Route)
MADR	Minimum Asset Data Requirements
MSP4NR	Managing Successful Projects for Network Rail

GLOSSARY

Acronym	Description
NAMR	National Asset Management Review
NIRG	National Infrastructure Reliability Group
NOC	National Operations Centre
OM&R	Operations, Maintenance & Renewals
ORBIS	Offering Rail Better Information Services
ORR	Office for Rail and Road
P3M	Portfolio, Programme and Project Management
P3M3	Portfolio, Programme and Project Management Maturity Model
PDSS	Project Delivery Standard Specification
PBR	Periodic Business Review
PRS	Project Requirements Specification
RAM	Route Asset Manager
RBM	Risk Based Maintenance (includes Reliability Centred Maintenance, Cost-Risk Optimisation and predictive analytics)
RCM	Remote Condition Monitoring
RF	Rolling Forecast
RIRG	Route Infrastructure Reliability Group
RMM	Rail Method of Measurement
ROGS	Railways and Other Guided Transport Systems (Regulations) 2006
RRD	Route Requirements Document
RSP	Route Strategic Plan
RSSB	Railway Safety & Standards Board
SAMP	Strategic Asset Management Plan
SBP	Strategic Business Plan
SE	South East
SHEP	Safety, Health, Environment Panel
SICA	Signalling Infrastructure Condition Assessment
SIPOC	Supplier, Input, Process, Output and Customer
STE	Safety, Technical & Engineering
TLG	Technical Leadership Group
TOC	Train Operating Company
V&V	Verification & Validation
WLC	Whole Life Cost
WR&CCA	Weather Resilience & Climate Change Adaptation

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1 INTRODUCTION

1.1 BACKGROUND

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

During CP3 and CP4 AMCL undertook a number of assessments at key points in time that provided a view of Network Rail's Asset Management capability maturity, and the organisation's progression in delivering the Asset Management Improvement Plan (AMIP).

This assessment has been undertaken against the Asset Management activities known as the Global Forum for Maintenance and Asset Management's (GFMAM's) '39 Subjects', which are also clustered into 6 Groups. As part of the regulated agreement for CP5 the measure of Network Rail's Asset Management capability maturity became a regulated measure, with a target capability for each of the 6 Groups in the model set at 72% by the time of the submission of the SBP for CP6.

This assessment provides the assessment of Network Rail's current Asset Management capability maturity against this targeted measure.

1.2 NETWORK RAIL REGULATED MEASURES FOR CP5

ORR set the following Regulated Measures for Network Rail for CP5:

> ***"We have therefore decided to set a score of 72% for each group as a regulated output. If Network Rail achieves a group score of 72%, the probability it exceeded the 70% excellence threshold for that group will be around 90%. We have decided that these outputs will apply at the time of Network Rail's CP6 SBP submission (January 2018). For the remainder of CP5, we expect Network Rail to demonstrate continuous improvement towards best practice, consistent with achieving its aims for CP6."***

This report contains the current assessed position against the Regulatory measures agreed at the end of CP4. The assessment was completed using the version of the AMEM used at the end of CP4 to ensure the consistency of results between control periods

1.3 SCOPE & OBJECTIVES OF THIS AMEM ASSESSMENT

The scope and objectives of this review were defined in the Independent Reporter Mandate 'Network Rail's Asset Management Capability – ahead of January 2018' (Final, June 2017) and the main objectives, which is covered in this report, are to conduct a PR18 AMEM assessment that includes the following:

- AMEM assessment as at January 2018 covering all AMEM activities (the 39 subjects and six groups as shown below);
- Consideration of the interim AMEM 2016 assessment findings, to verify the learning, action undertaken or reasons for non-action by Network Rail;
- An assessment of areas of good or emerging best practice, understanding of opportunities for further improvement. This assessment should be accompanied by a commentary and available benchmark knowledge of known frontier capabilities in Global Asset Management capability; and
- The assessment must be carried out in such a way that it can be accompanied by resultant levels for the network-wide and group scores, accuracy and confidence levels.

The mandate required that this assessment was completed on 'an equivalent and comparable basis to the PR13 assessment' and therefore the scope was aligned as far as possible to the end of CP4 assessment scope.

The scope of the assessment was as follows:

- **Timescale –** The effective assessment date is publication of the CP6 SBP, originally December 2017 but moved to February 2018. Interviews and review of evidence will be based on AMCL's understanding of Network Rail's position at this date;
- **Geographic –** The geographical scope of the assessment is National with Route-level samples as required across all eight Routes;
- **Assets –** The assets within scope are track, signalling, structures, E&P, telecoms and operational property, valid at the National level only;
- **Interviewees –** identified by Network Rail in two tranches – central process owners and Route-level practitioners, largely at RAM-level or above; and
- **Coverage –** current process capability focused on CP5 delivery and monitoring processes and CP6 SBP development.

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, 2011, 2013, 2014 and 2016. This assessment has been completed using the version of the AMEM used at the end of CP4 to ensure consistency.

The AMEM, which is shown in Figure 1, enables clients to assess their Asset Management capability maturity and benchmark it against world best practice.

It is built around the '39 Subjects' which span the range of technical, organisational and human capabilities needed to achieve world-class Asset Management. These subjects are aligned with the second edition of the 'Asset Management Landscape' agreed by the Global Forum for Maintenance & Asset Management (GFMAM). The AMEM tests the existence, completeness, effectiveness and integration of these subjects and is applicable to any asset intensive organisation, including those in highly regulated environments.

Strategy & Planning
01 Asset Management Policy
02 Asset Management Strategy & Objectives
03 Demand Analysis
04 Strategic Planning
05 Asset Management Planning

Asset Information
22 Asset Information Strategy
23 Asset Information Standards
24 Asset Information Systems
25 Data & Information Management

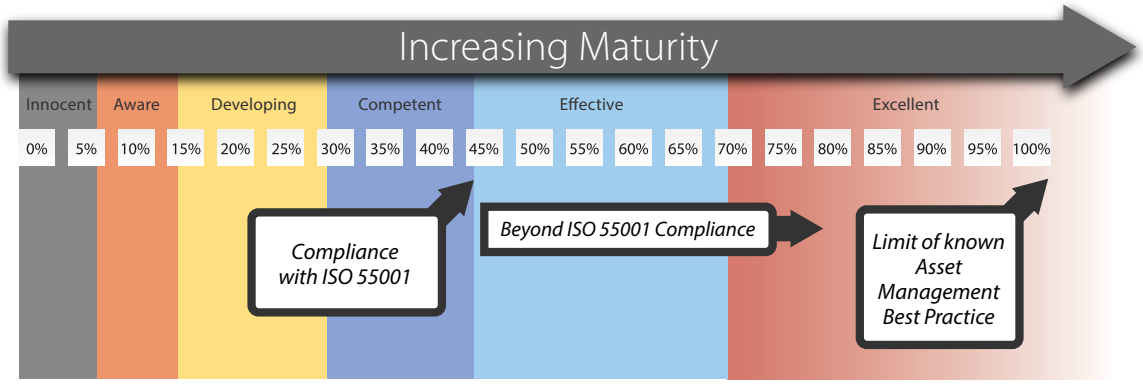
Asset Management Decision-Making
06 Capital Investment Decision-Making
07 Operations & Maintenance Decision-Making
08 Lifecycle Value Realisation
09 Resourcing Strategy
10 Shutdown & Outage Strategy

Organisation & People
26 Procurement & Supply Chain Management
27 Asset Management Leadership
28 Organisational Structure
29 Organisational Culture
30 Competence Management

Lifecycle Delivery
11 Technical Standards & Legislation
12 Asset Creation & Acquisition
13 Systems Engineering
14 Configuration Management
15 Maintenance Delivery
16 Reliability Engineering
17 Asset Operations
18 Resource Management
19 Shutdown & Outage Management
20 Fault & Incident Response
21 Asset Decommissioning & Disposal

Risk & Review
31 Risk Assessment & Management
32 Contingency Planning & Resilience Analysis
33 Sustainable Development
34 Management of Change
35 Asset Performance & Health Monitoring
36 Asset Management System Monitoring
37 Management Review, Audit & Assurance
38 Asset Costing & Valuation
39 Stakeholder Engagement

Figure 1: The AMCL Asset Management Excellence Model (AMEM)



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

Figure 2: The AMEM Asset Management Maturity Scale

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

Organisations progress through these maturity states at different rates depending on the starting point, the importance of the Subject area to the organisation, and the level of commitment and capability within it. Typically, organisations can progress quickly through the lower maturity states, but then find progression through the higher maturity states slower and more of a challenge. This is because key requirements at the higher levels of maturity include that the approach is fully embedded, integrated and subject to continual improvement, all of which require a long-term commitment and effective collaborative working. Organisations may experience dips in maturity when operating at the higher levels of maturity before improving again.

2 OVERVIEW OF ASSESSMENT PROCESS

2.1 ACTIVITY PRIORITISATION

Table 1 shows where the activities have been assessed generically and where they have been assessed by asset discipline. Where activities are to be assessed by asset discipline, this has included all six disciplines of track, signalling, structures (including earthworks), E&P, telecoms and operational property. Table 1 also describes the Asset Management activities that will be assessed at the Centre, those activities that will be assessed at the Routes and those that will be assessed at both.

As mentioned in Section 1.4, this assessment was completed using the version of the AMEM used at the end of CP4 to ensure the consistency of results between control periods.

Group	Ref	Subject Name	Sources Required	Assess by:
Strategy & Planning	1	Asset Management Policy	Centre	Generic
	2	Asset Management Strategy & Objectives	Centre	Generic
	3	Demand Analysis	Centre & Route	Generic
	4	Strategic Planning	Centre & Route	Asset Type
	5	Asset Management Planning	Centre & Route	Asset Type
Asset Management Decision Making	6	Capital Investment Decision-Making	Centre & Route	Asset Type
	7	Operations & Maintenance Decision-Making	Centre & Route	Asset Type
	8	Lifecycle Value Realisation	Centre & Route	Asset Type
	9	Resourcing Strategy	Centre	Generic
	10	Shutdown & Outage Strategy	Centre	Generic
Lifecycle Delivery	11	Technical Standards & Legislation	Centre	Generic
	12	Asset Creation & Acquisition	Centre & IP	Asset Type
	13	Systems Engineering	Centre & IP	Asset Type
	14	Configuration Management	Centre, Route & IP	Asset Type
	15	Maintenance Delivery	Centre & Route	Asset Type
	20	Fault & Incident Response	Centre & Route	Asset Type
	16	Reliability Engineering	Centre & Route	Asset Type
	17	Asset Operations	Centre	Generic
	18	Resource Management	Centre	Generic
	19	Shutdown & Outage Management	Centre	Generic
	21	Asset Decommissioning & Disposal	Centre	Generic
Asset Information	22	Asset Information Strategy	Centre	Generic
	23	Asset Information Standards	Centre	Generic
	24	Asset Information Systems	Centre & Route	Asset Type
	25	Data & Information Management	Centre & Route	Asset Type
Organisation & People	26	Procurement & Supply Chain Management	Centre	Generic
	27	Asset Management Leadership	Centre	Generic
	28	Organisational Structure	Centre	Generic
	29	Organisational Culture	Centre	Generic
	30	Competence Management	Centre & Route	Asset Type
Risk & Review	31	Risk Assessment & Management	Centre & Route	Asset Type
	32	Contingency Planning & Resilience Analysis	Centre	Generic
	33	Sustainable Development	Centre	Generic
	34	Management of Change	Centre	Generic
	35	Asset Performance & Health Monitoring	Centre & Route	Asset Type
	36	Asset Management System Monitoring	Centre	Generic
	37	Management Review, Audit & Assurance	Centre	Generic
	38	Asset Costing & Valuation	Centre	Generic
	39	Stakeholder Engagement	Centre	Generic

Table 1: AMEM Subjects Assessed at Centre or Route, and Generically or by Asset Type

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 four 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.

4) **Recording:** The way in which evidence is indexed, collated, stored, retrieved and referenced to criteria and scores.

The AMEM Assessment Criteria and accompanying Questions are designed to gather evidence on four aspects of Asset Management capability, namely:

- **Existence:** Does something exist – for example is there a policy, strategy or process to cover a specific aspect of Asset Management and is it current?
- **Completeness:** Is the scope of the policy, strategy or process consistent with good or best practice?
- **Effectiveness:** Is the policy, strategy or process effectively utilised and is it having 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 ISO 55001 using the AMEM assessment process.

2.3 ASSESSMENT CONFIDENCE

The scope of the assessment included Network Rail's central organisation with Route-level samples as required across all eight Routes. The number of sources and interviews for each activity were designed to achieve the ORR's mandate requirements for confidence, namely:

- To achieve results at the same level of confidence as the end of CP4 baseline for each of the 6 Subject Groups'; and
- 'To realise consistent levels of accuracy at ±2% at 80% confidence for each of the 6 Subject Groups'.

A planned interview scope across the 39 subjects was generated to achieve the required assessment confidence detailed above. Table 2 below shows the planned and actual confidence levels achieved.

Group	Number of Interviews	Target Confidence interval at 80% level of confidence	Achieved Confidence interval at 80% level of confidence
Strategy and Planning	43	2%	±1.22%
Asset Management Decision-Making	25	2%	±1.70%
Lifecycle Delivery	34	2%	±0.71%
Asset Information	16	2%	±0.72%
Organisation and People	22	2%	±0.93%
Risk and Review	37	2%	±1.43%
Overall	177	2%	±0.49%

Table 2: Target and Actual Confidence Intervals

2.4
TIMESCALES AND SOURCES OF EVIDENCE

Evidence was obtained through a number of methods. The primary method was interviewing Network Rail personnel who had been identified by Network Rail as having the appropriate knowledge of the Activities. The assessment commenced on 13th September 2017 and the final interview was completed on the 19th January 2018.

During this time 177 interviews were conducted with a cross-section of Network Rail staff, and over 750 pieces of documentary evidence were requested. All interviewees are listed in Appendix C to this report. Where this evidence is referred to in the text of this report, a reference to the specific evidence has been added, and these are listed in Appendix D. Some of the evidence may not be referenced in the report but is referenced in the detailed scores held within the AMEM database.

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3 OVERALL FINDINGS

3.1 OVERVIEW OF GROUP AND SUBJECT SCORES

Section 1.2 of this report introduces the agreed Group-level targets for January 2018, which are 72% for each Group, and the rationale for this. Table 3 below shows Network Rail's scores at the End of CP4, the regulatory target for January 2018 and Network Rail's current assessed scores and associated 80% confidence intervals.

Subject Group	End of CP4	Regulatory Target for January 2018	NR as assessed at 2018 SBP	Achieved Confidence interval at 80% level of confidence
1 AM Strategy & Planning	65.4%	72.0%	74.8%	±1.22%
2 AM Decision Making	62.8%	72.0%	69.7%	±1.70%
3 Lifecycle Delivery	67.5%	72.0%	70.8%	±0.71%
4 Asset Information	70.4%	72.0%	74.0%	±0.72%
5 Organisation & People	66.1%	72.0%	69.5%	±0.93%
6 Risk & Review	63.9%	72.0%	72.7%	±1.43%
Overall	66.0%	72.0%	71.9%	±0.49%

Table 3: Network Rail Group-Level Scores at 2018 SBP

Figure 3 below shows the comparison between the end of CP4 and the current scores at the 39 Subject level.

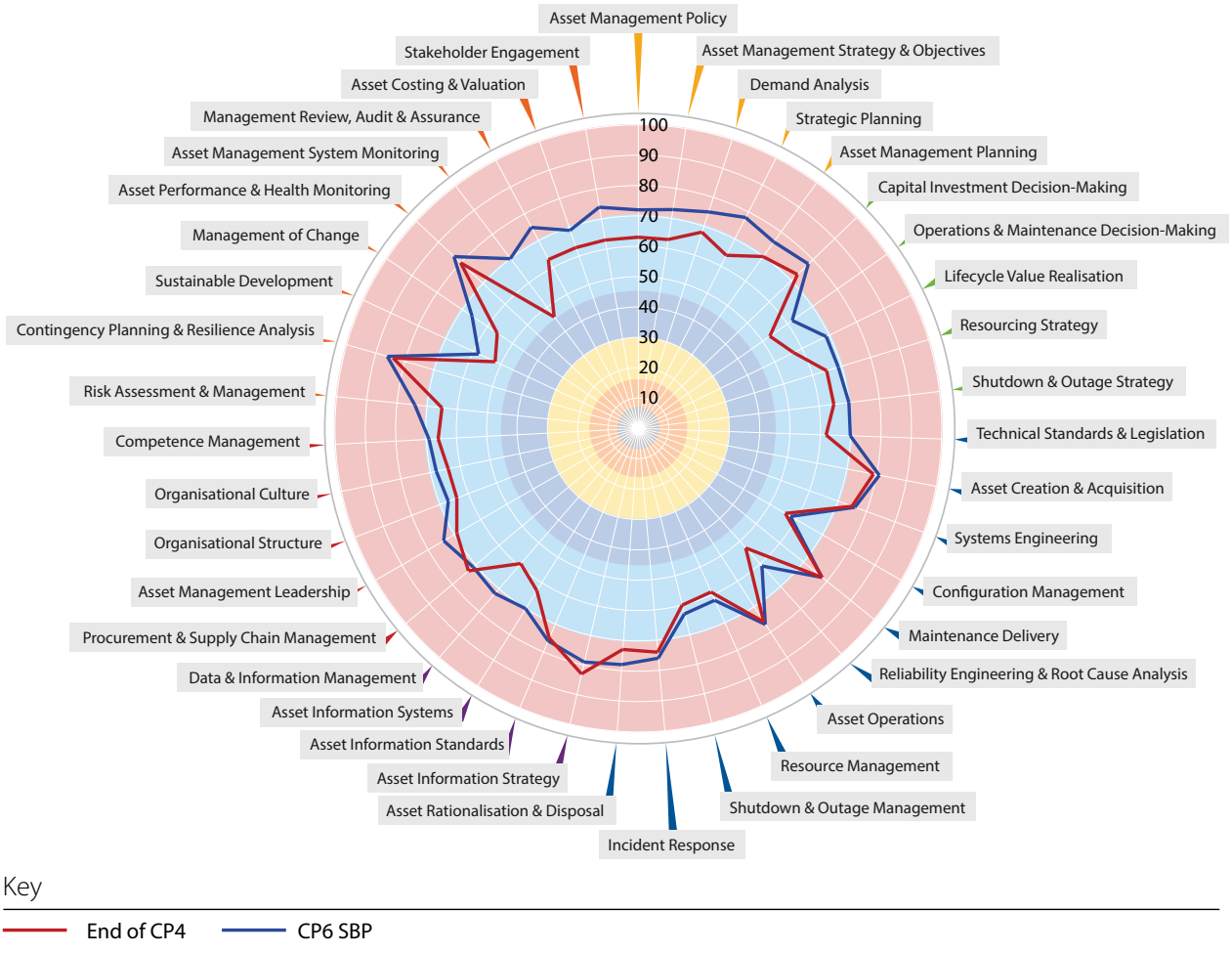

Figure 3: Network Rail end of CP4 versus current as assessed scores for the 39 subjects

An Interim assessment was undertaken in 2016, and a review of the progress made against the recommendations made then, to verify the learning, action undertaken or reasons for non-action by Network Rail is shown in Appendix A for each Subject.

3.2 BENCHMARKING

Figure 4 shows the Network Rail Group-level scores for the 2009, 2014 (End of CP4) and 2018 (CP6 SBP) assessments against a sample of scores from the AMEM assessment database.

The benchmark information presented in this section provides information at the 6 Group level, for all current assessments in the AMEM database for all sectors. The current benchmark information presented in this section is therefore based on sample shown in Table 4.

Figure 5, which is based on the same sample, shows Network Rail's overall assessment scores against sector means and quartiles.

Sector	Sample
Electricity Generation	14
Electricity Dx/Tx	10
Gas Dx/Tx	4
Highways	4
Main Line Rail	7
Metro	6
Multi	2
Water	5
Military	1
Ports	1
FCRM	1
FM	1
Total	56

Table 4: AMEM Assessment Benchmark Sample

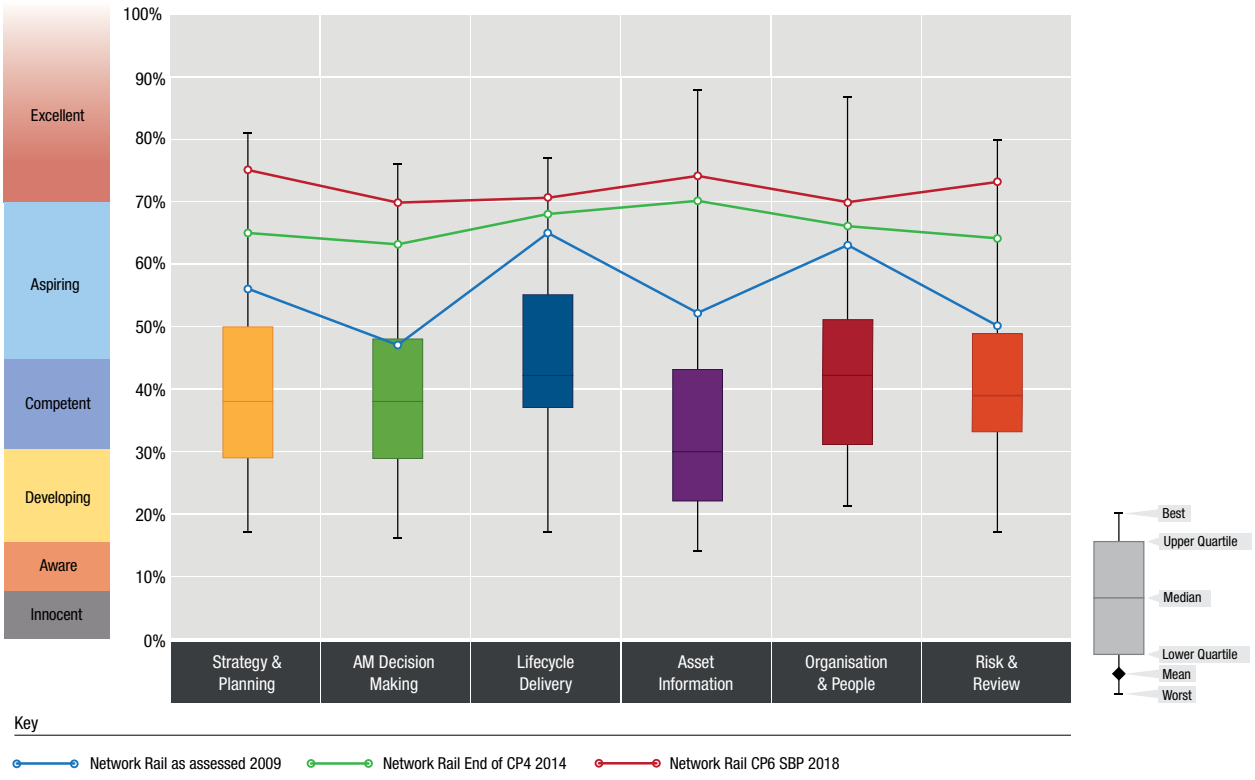

Figure 4 Network Rail Benchmark Group-level Scores

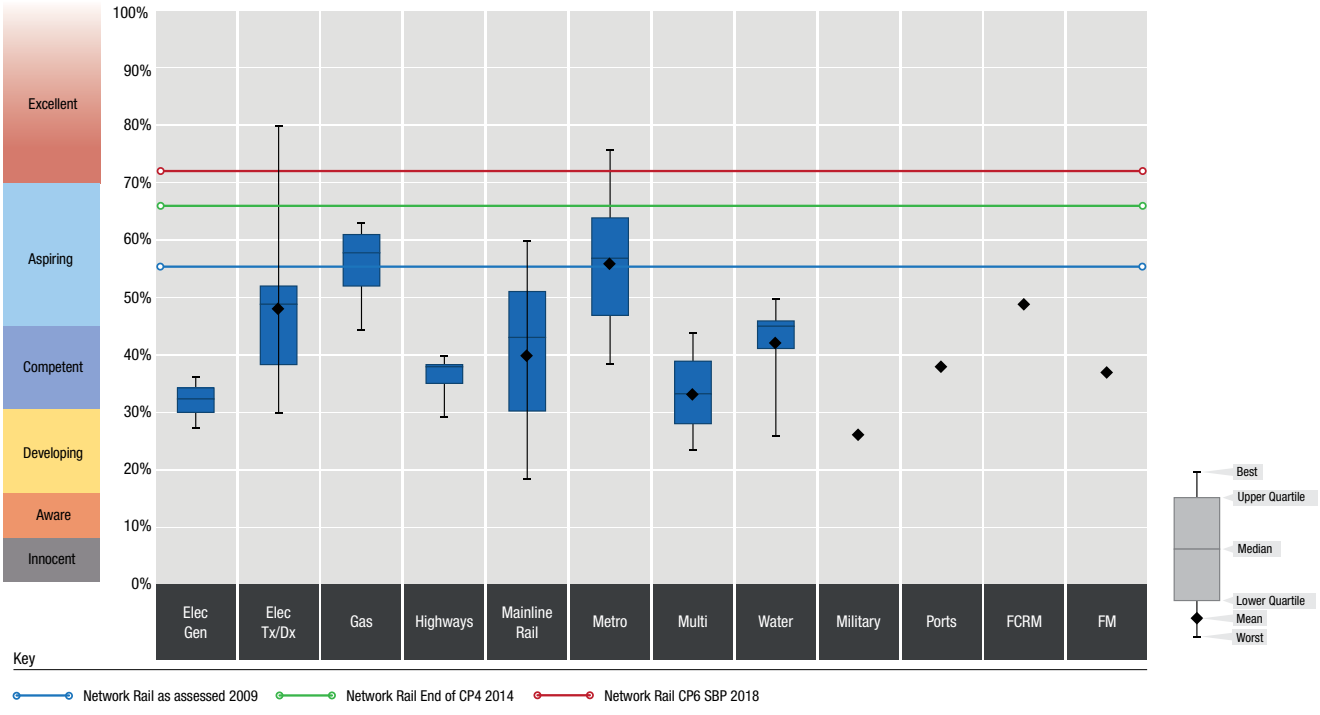

Figure 5 Network Rail Benchmark Group-level Scores

4
GROUP LEVEL FINDINGS

4.1
STRATEGY & PLANNING

The Asset Management 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 effective 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 Group is split into five Subjects which are:

- **Asset Management Policy**
  the principles and requirements derived from and consistent with the organisational strategic plan that the organisation will use to manage its physical assets.
- **Asset Management Strategy & Objectives**
  the strategic approach for the management of the physical assets of the business that will be used to achieve the organisational strategic plan, including the definition of specific Asset Management objectives.
- **Demand Analysis**
  the processes an organisation uses to both assess and influence the demand for, and level of service from, an organisation's assets.
- **Strategic Planning**
  the process an organisation uses to undertake strategic Asset Management planning.
- **Asset Management Planning**
  the processes and plans that specify the activities and resources, responsibilities, timescales and risks for the achievement of the Asset Management objectives.

4.1.1 SCORE SUMMARY

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Asset Management Policy	63%	72%	S&P1	To continue the development of a best practice IMS Network Rail should demonstrate full alignment of the Performance Management/ Assurance Framework, Business Process Model, Asset Information Model and Technology and Data Architectures with the completed Enterprise Process Architecture by 2020.
			S&P2	In order to align with the requirements of ISO 55001, Network Rail Routes should define the scope, boundaries and roles of Route specific Asset Management Systems with respect to Network Rail Centre, the Routes and the relationship with the Integrated Management System by the start of CP6.
Asset Management Strategy & Objectives	63%	73%	S&P3	By the start of CP6, Network Rail should demonstrate how the new Asset Management Strategy has been effectively embedded in the organisation.
Demand Analysis	68%	75%	S&P4	By the start of CP6, Network Rail should specify the programme for the development, rollout and continual improvement of Continual Modular Route Planning.
Strategic Planning	64%	78%	S&P5	Network Rail should refine and embed the Continual Business Planning approach, including management of changes in Enhancement plans, from the start of CP6.
Asset Management Planning	70%	76%	S&P6	By the midpoint of CP6, Network Rail should systemise the Continual Business Planning process and the bottom-up workbanks it is based on.

Table 5: Summary of Maturity Scores for Strategy and Planning Group

4.1.2 SUMMARY OF FINDINGS

The overall score for the Asset Management Strategy & Planning Group has increased by 9.4 percentage points to a current average of 74.8%. Of the five Subjects within the Group all have increased since the end of CP4.

As reflected in the scores, the Strategy & Planning Group has been a key focal point for Network Rail since the end of CP4. Critical to this has been the ongoing development and embedding of the Safety, Technical & Engineering (STE) group at the centre forming a coherent and close working relationship and procedures with the Routes, Business Planning, Finance and other key planning stakeholders. There has been significantly better defined and documented evidence available across all Subjects in this Group than for any previous assessment. This well evidenced coherency of approach has supported the increase in scores across the constituent Subjects.

The first Subject, Asset Management Policy, which includes the definition of the organisation's Asset Management System, has increased its maturity score to 72%. This increase is based largely on significant developments in the definition of the Asset Management System, supported by improved understanding and clarity of the management system roles across the Routes and central organisation. A significantly revised Asset

Management Policy was published as part of the CP6 SBP submission, with clear evidence provided (NR/CP6/SBP/SP02) of its development and refinement for the changing business context, including addressing:

- Lessons learned since 2014, including the definition of guidance on both the minimum whole life cost guidance and minimum levels of activity required to accord with standards, prevent undue lifecycle implications and provide an 'envelope' to support Route planning and delivery;
- Better alignment with the continued devolution of Routes and their changing requirements; and
- Alignment to ISO 55001 and the management of competency profiles and training requirements across the organisation to support this.

Even prior to the publication of the formal Asset Management Policy the organisational maturity had been demonstrated by the well evidenced development of the document, including extensive consultation and input from the Routes (NR/CP6/SBP/SP03). This includes the transfer of accountability for implementing an effective Asset Management System from the central organisation to the Routes.

Network Rail's Asset Management System has been subject to good practice development in the last two years. Developments have included further definition of the system, associated Asset Management Framework (NR/CP6/SBP/SP04), assurance and roles of the Routes and Operations. This has been supported by further consideration of associated capabilities, competences, data, information, systems, tools and communication (NR/CP6/SBP/SP05). However, the most significant development has been the translation of the Asset Management System

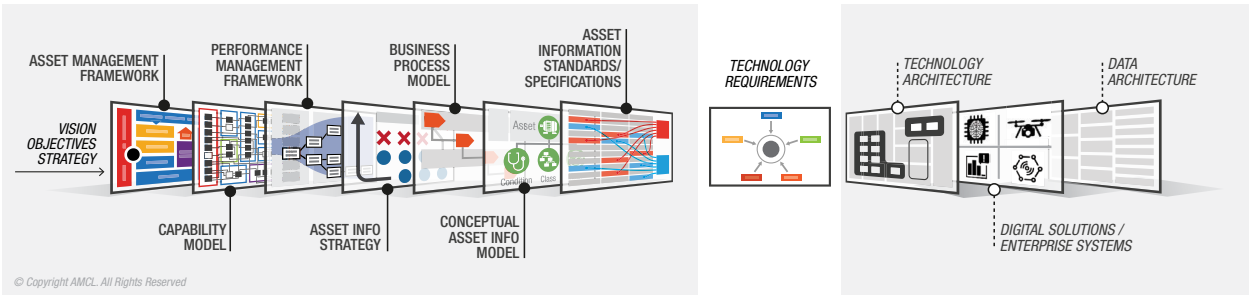

Figure 6 Best Practice Asset Intensive Business Design and Alignment to Information and Technology

into a Business Process Architecture. Network Rail's new Business Process Architecture aligns well with the best practice approach shown in the diagram above and is a clear extension of the Asset Management Framework. The approach below represents best practice for an asset intensive business such as Network Rail and enables the complete alignment of asset information and systems with business processes, performance management and overall strategy and objectives.

As well as establishing the first two layers on the left, Network Rail is developing other layers of the above approach. Most notably, the ongoing generation of SIPOC (supplier, input, process, output and customer) process definitions to initiate a fully defined Business Process Model layer. As an operational business, Network Rail also has established documentation for the other layers of the above approach including a Performance Management Framework, Information Standards and Data Architectures. However, these are not yet as demonstrably aligned with the Asset Management Framework as the Business Process Architecture. Doing so would enable consistency at all levels of the organisation, removal of waste and duplication, alignment of IT systems with business needs and de-risking of IT implementations (as long as the organisation's Asset Information Strategy and approach is aligned with the Business Process Architecture) and more consistent and effective assurance across business activities.

The current status of the overall business design in pockets is acknowledged by the ongoing Integrated Management System (IMS) work (NR/CP6/SBP/SP06). The IMS is seeking to integrate an overall Enterprise Process Architecture based on the work undertaken in Asset Management to date. Progress has been evidenced in bringing together the twenty-six current management systems (including Asset Management as the core) into the Enterprise Process Architecture by the IMS initiative (NR/CP6/SBP/SP07). This remains an ambitious but potentially highly beneficial and leading practice initiative if successful. AMCL considers that maximum benefits from this initiative would be realised if clear alignment was demonstrable from the IMS and Enterprise Process Architecture through all the layers of Business Design shown above to the asset information model and underpinning data and technology architectures.

Although the recent, centrally led, development of the Network Rail's Asset Management System has been positive, there remains a challenge in effectively defining

Asset Management Systems at Route level. The Routes are seeking to align, although not necessarily gain certification of, their Asset Management activities with ISO 55001. This will require clear definition of the Route-specific Asset Management Systems, but the specific boundaries are not yet fully defined.

The maturity score for the Asset Management Strategy & Objectives Subject has increased to 73%. The definition of the organisation's Strategic Asset Management Plan (SAMP), as required by ISO 55001, has effectively evolved with the continued devolution of the Routes and is now clearly defined (NR/CP6/SBP/SP05) as centred around the Route Strategic Plans (RSPs) and supporting documentation. Enhanced templates, structures and guidance have been evidenced for the development of the RSPs alongside systematic review and assurance of their development (NR/CP6/SBP/SP08). The RSPs have developed to include Route-specific Asset Strategies based on the central Asset Policies and extensive use of the Corporate Risk Assessment Methodology (CRAM) to assure alignment (NR/CP6/SBP/SP25).

As part of the CP6 SBP submission Network Rail formally published a revised Asset Management Strategy, which sits above and directs the SAMP documentation (NR/CP6/SBP/SP10). This document effectively brings together a range of strategic themes, plans and initiatives into a coherent overall strategy. This is also now augmented by a contemporary short-form strategy for Asset Management capability (NR/CP6/SBP/SP11) which sets out strategic themes for business alignment, people, intelligence, data and management review of the Asset Management System.

Asset Management Objectives have undergone a step change since CP4 and particularly during the development of the CP6 plans. Clear structures and aligned templates have been established (NR/CP6/SBP/SP12) and National (NR/CP6/SBP/SP13) and Route (NR/CP6/SBP/SP14) scorecards developed, the latter included in the relevant RSP documents.

The Demand Analysis Subject has increased in score to 75%. This has been driven by several key factors. The Long-Term Planning Process (LTPP) has continued to mature and rollout (NR/CP6/SBP/SP15), including the publication of Route Studies and Route Specifications for all Routes (with the exception that London North-Western Route has yet to produce a Route Study). These extensive documents form the key link and alignment between high-level demand forecasting and its translation into physical asset requirements. Network Rail is currently seeking to refine the LTPP by establishing prioritised and geographically focused continual review and improvement process called Continual Modular Route Planning (CMRP). CMRP is relatively early in its development and rollout but will enable the Route Studies and Specifications to be continually updated and maintained for each Route. This will be further enabled by improved interaction and analysis of willingness to pay between Network Rail and the Department for Transport (DfT) with respect to enhancements. This improvement is based on the Memorandum of Understanding between DfT and Network Rail that sets out the joint governance of enhancement decision making between the two parties based on the three-stage (Develop, Design, Deliver) Investment Decision Framework (IDF). It was noted by Routes without any enhancements currently funded in CP6 that any change to

the situation will have a significant impact on the established OM&R plans. This impact could be both risk and opportunity.

Further improvements in the Demand Analysis Subject include continued enhancement of long-term passenger demand and traffic/tonnage growth modelling and better industry wide interaction to support these from a long-term strategic perspective. At the more tactical end of the process, wide-ranging enhancements to Network Rail's Clienting Principles (NR/CP6/SBP/SP16) and Sponsors' Handbook (NR/CP6/SBP/SP17) procedures are driving improved consideration of non-asset solutions and more effective and timely specifications of major programmes.

The Strategic Planning Subject has been a key area of focus for Network Rail in the build up to CP6 and has increased in score to 78%. Network Rail's strategic planning process has changed notably since the last Strategic Business Plan (SBP) submission 5-years ago. Reflective of the continued devolution of the Routes, the approach for CP6 has been much more bottom-up led. Instead of the Routes prioritising spend based on top-down defined costs and volumes, as was the case for CP5, the plans have been Route led with extensive review and assurance (NR/CP6/SBP/SP18) from the centre. The Route plans, based on guidance from the centre (NR/CP6/SBP/SP19), have been subject to systematic and rigorous technical, sustainability, financial and deliverability review from the centre. Led by the Business Planning Review team, the restructured STE organisation has led the technical and sustainability review of the plans against Asset Policies (NR/CP6/SBP/SP20). Although onerous, these reviews were considered by all interviewees to be effective and challenging. The central whole-life cycle costing models, which drove the top-down approach for CP5, have been used during the CP6 planning process to support the initial derivation and subsequent validation of costs and volumes in support of the STE and financial reviews. All interviewees considered the clarity of process and milestones (NR/CP6/SBP/SP21), the guidance on planning requirements (NR/CP6/SBP/SP22) and relevant scenarios (NR/CP6/SBP/SP23) to be clearer and more effective than before. Assurance of the alignment of the plans was managed, as previously, via the Asset Policies (NR/CP6/SBP/SP24) and the enhanced technical and sustainability review but also augmented for CP6 planning by the inclusion of CRAM (NR/CP6/SBP/SP25) analyses across all Routes (see Figure 7) and asset classes (NR/CP6/SBP/SP26). The Asset Policies themselves (NR/CP6/SBP/SP24) have been subject to evolutionary, rather than revolutionary, development since the last assessment. The key changes include a move to a more risk-based approach and the inclusion of minimum levels of activity as well as whole life cost guidance to reflect the funding constrained context of Network Rail as an organisation.

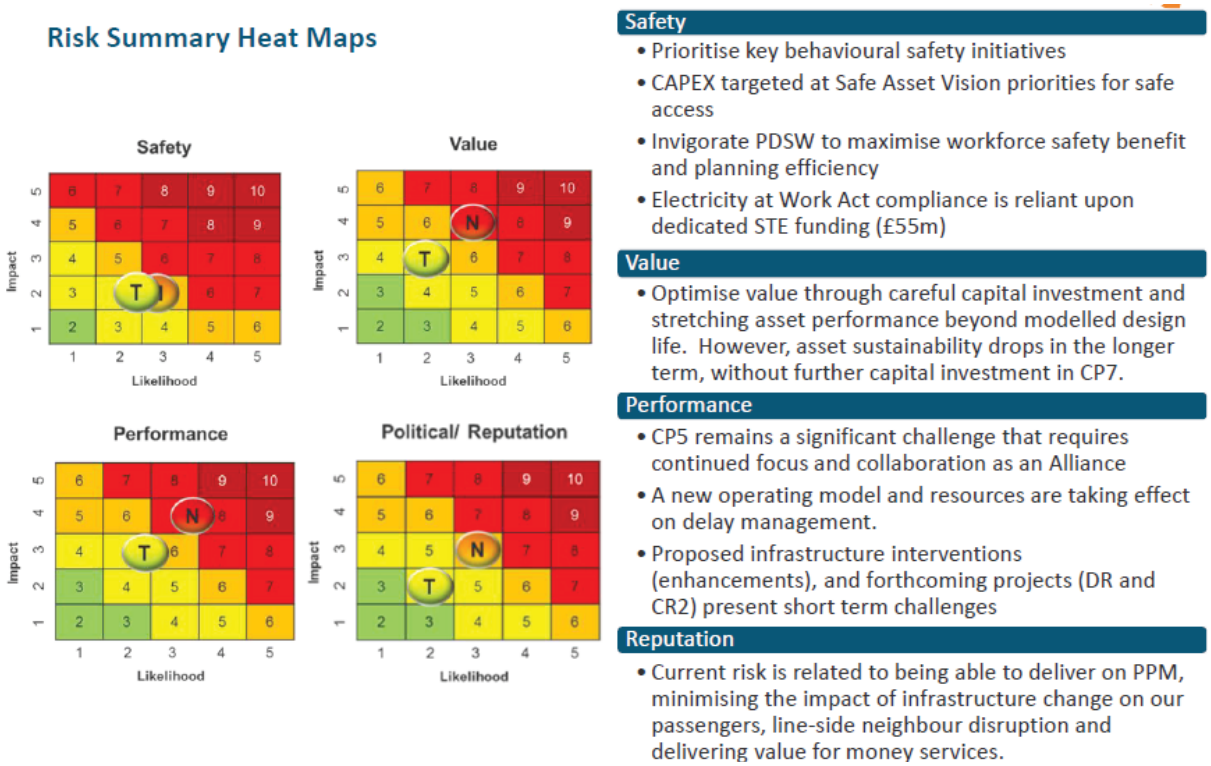

Figure 7 Example CRAM Analysis Outputs

The iterative development of the plans was managed via the Rolling Forecast (RF) process, which remains ongoing for CP5 work and included CP6 plans over the last 18-24 months. The development of CP6 plans was reviewed approximately every 6 periods as part of the RF process, along with more frequent draft submissions in the build up to SBP submission. Overall, the process has been a positive step change for Network Rail with intensive development and iteration of plans over a relatively long period of time. It is critical to the continued development of the strategic planning process and Network Rail's efficiency and effectiveness that this effort is maintained and that the proposed Continual Business Planning approach, which in effect has been happening for the past 18 months, is institutionalised.

One note of caution with respect to Strategic Planning relates to the management of Enhancements now that this process has been divorced from the Operating, Maintenance and Renewal budgets (OM&R). It is understood that the SBP submission will define OM&R budgets for the Routes, via the Route Strategic Plans, as well as overall Network Rail budgetary requirements. The submission will be cognisant of Enhancement budgets and plans where they are well enough defined. However, Enhancement plans that are being developed with DfT and the wider industry could impact on the submitted OM&R plans as they are developed during the next Control Period. Network Rail will need to develop an effective change control process to manage the risks and opportunities associated with any such Enhancements, particularly if they are accelerated. Likely impacts include access arrangements, resource constraints and the deferral or acceleration of capital expenditure and related impacts on maintenance expenditure.

The Asset Management Planning score has increased to 76%. Part of this increase is due to the overlap between Strategic Planning and Asset Management Planning and the improvements outlined above. However, there have also been a range of specific and more tactical improvements. As well as the strategic outlines incorporated in the RSPs, the detailed Asset Management Plans are managed at the workbank level for each asset class in each Route (NR/CP6/SBP/SP27). The workbanks are captured in Microsoft Excel (NR/CP6/SBP/SP28) and the masters held by the relevant Route Asset Manager. The Excel worksheets are well structured and templated to allow roll-up of workbanks at Route level and the provision of remits to delivery agents such as Infrastructure Projects, Works Delivery and contractors, as appropriate. Although apparently effective for the CP6 planning process, there is an inherent risk of control and configuration management associated with multiple Excel spreadsheets. Network Rail is mindful of this and is progressing both the development of a best practice change control process in SE Route and increasing the use of SharpCloud software (NR/CP6/SBP/SP29) to manage the workbanks and their delivery. The software appears to be very useful tool which can bring significant benefits with respect to monitoring and analysis. However, its use varies significantly across Routes currently and, although it is a powerful management tool, it is currently inherently reliant on the underlying workbank data held in Excel.

As with the Strategic Planning Subject, one of the strengths of Network Rail's current planning approach is the review and assurance of the Asset Management Plans via the central teams (NR/CP6/SBP/SP30). This is undertaken both as part of the RF process and via technical forums between RAMs and Professional Heads of asset classes and has been greatly improved since the last assessment. There are also a range of Route internal reviews, checks and balances in place (NR/CP6/SBP/SP31) which now also make use of the CRAM analyses.

Network Rail is more than aware of the delivery issues which have impacted CP5 plans. To better prepare itself for CP6 and enable it to progress asset investment effectively from Day 1 of the next Control Period it has systematically increased its level of review and assurance of Asset Management Plans, as previously discussed. This has been supported by earlier and more comprehensive deliverability reviews (NR/CP6/SBP/SP32), better engagement with train operators and other engineering access stakeholders and earlier maturing of the workbank and engagement with delivery agents (NR/CP6/SBP/SP33) to ensure remits are in place and CP6 work is being planned well in advance. Note though that sufficient advance funding must be in place to enable effective development of investment plans for CP6 through the early GRIP stages. Without such funding assigned, there remains a risk that planning will falter until CP6 monies are released.

As a final related note on the overall Strategy & Planning Group, it is AMCL's understanding that Network Rail's CP6 SBP submission can be summarised as CP5 funding plus approximately 15%. This level of funding has driven the need for a change in Asset Policies to include minimum levels of activity, which the CP6 submission is largely derived from in terms of asset investment. Although a reasonable Asset Management scenario in the short-term, which AMCL considers Network Rail has managed effectively, this level of funding may not be sustainable over multiple Control Periods and the risks should be noted by funders and stakeholders.

4.2 ASSET MANAGEMENT DECISION-MAKING

The Asset Management Decision-Making 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 a set of asset policies which present optimised Asset Management lifecycle decisions for all the organisation's assets, and guidance on how these should be applied or modified. The Group is split into five Subjects which are:

- **Capital Investment Decision-Making** the activities undertaken by an organisation to determine the capital expenditure requirements necessary to deliver the strategic plan.
- **Operations & Maintenance Decision-Making** the processes and activities undertaken to define appropriate maintenance requirements.
- **Lifecycle Value Realisation** the activities undertaken by an organisation to trade-off the costs and benefits of different renewal and maintenance interventions over the life of the assets, systems and asset portfolio with respect to value.
- **Resourcing Strategy** the activities undertaken by an organisation to optimise the use of people, plant, tools and materials to deliver the required Asset Management activities.
- **Shutdowns & Outage Strategy** the activities undertaken by an organisation to develop an optimised strategy for shutdowns or outages.

4.2.1 SCORE SUMMARY

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Capital Investment Decision-Making	73%	78%	AMDM1	By the start of CP6, Network Rail should define the requirements for using whole-lifecycle cost tools for renewal decisions within the Routes and assure they are used where required.
Operations & Maintenance Decision-Making	53%	62%	AMDM2	By the start of CP6, Network Rail should demonstrate how the revised Maintenance Strategy has been effectively embedded in the organisation.
			AMDM3	By the start of CP6, Network Rail should establish a cost-risk optimisation based maintenance definition process and quantify the associated potential efficiencies.
			AMDM4	By the start of CP6, Network Rail should improve the Intelligent Infrastructure Strategy programme scoping to include a stronger focus on FMEA as well as opportunities identified by Routes.
Lifecycle Value Realisation	57%	69%	AMDM5	By the mid-point of CP6, Network Rail should refine the existing suite of Whole-Life Cycle cost models to include full lifecycle impacts of maintenance interventions for priority assets.
Resourcing Strategy	65%	69%	AMDM6	By the start of CP6, Network Rail should establish a strategic approach for the optimal management of resources on a national basis to deliver plans and achieve objectives as efficiently as possible.
Shutdowns & Outage Strategy	65%	70%	AMDM7	By the start of CP6, Network Rail should have completed and embedded across the organisation, including in Continuous Business Planning, the Work and Access Planning process element of the National Engineering Access Framework.

Table 6: Summary of Maturity Scores for Asset Management Decision-Making Group

4.2.2 SUMMARY OF FINDINGS

The overall score for the Asset Management Decision-Making Group has increased by 6.9 percentage points to a current average of 69.7%. Of the five Subjects within the Group all have increased since the end of CP4.

The first Subject in the Group, Capital Investment Decision-Making, has increased to 78% since the last assessment. A clear approach and process is now in place across all asset groups, with well-defined rules for capital investment identification defined in the continually improving Asset Policies (NR/CP6/SBP/DM01) and whole-life cost models (NR/CP6/SBP/DM02). Options analysis is again driven by the Asset Policies with a range of specific standards in place (NR/CP6/SBP/DM03) where applicable. One of the big drivers for improvement recently has been the use of CRAM analyses to support investment decision making and the incorporation of a more risk-based approach in the Asset Policies. The capital investment workbank maturity (NR/CP6/SBP/DM04) is also more advanced for CP6 than it was at the equivalent point for CP5 and more demonstrably aligned with organisational objectives. This is largely based on the CP6 Strategic Planning process and Rolling Forecast management approach discussed previously. Across most routes, the workbanks are being developed with delivery agents, such as Works Delivery and Infrastructure Projects to enable both the management of backlog from CP5 and the initiation of further CP6 works from the start of CP6. This earlier and more effective interfacing with delivery agents than previously has also enabled better deliverability assurance at this stage than five-years ago. As the workbanks mature they are managed through the well-established GRIP process (NR/CP6/SBP/DM05) with specific and good practice requirements captured at each gateway. This is supported by clear review and validation processes (NR/CP6/SBP/DM06) and strong governance and business case requirements.

A further major enhancement since the end of CP4 in Capital Investment Decision-Making relates to the whole-life cycle cost modelling capability. As well as ongoing enhancements to the models themselves and the input data that drives them, there has been the rollout of the Cobalt whole-life cost tool across the company for use at Route level. Critical to this is the development of Asset Lifecycle Profiles (ALPs) (NR/CP6/SBP/DM07) for use by the Routes. These provide a basis for good practice whole-life cycle cost analyses across the capital investment decision making process. However, the tool and the templates have not yet been fully embedded in the Route organisations and are still largely run by the central teams for major projects only.

The Operations & Maintenance Decision-Making Subject has increased to 62%. This improvement is largely driven by three key factors: Maintenance Strategy, Activity Based Planning and the developing Intelligent Infrastructure programme.

There has been a significant improvement in the Network Rail Maintenance Strategy (NR/CP6/SBP/DM08) since the end of CP4. This is

now a more concise and effective document which is aligned with objectives and focuses on efficiencies and deliverables. The seven areas of focus in the Maintenance Strategy are:

- Organisational accountability;
- Enhanced asset condition monitoring and analytics;
- Risk based maintenance;
- Activity-based business plans;
- Planning capability framework and tools;
- Trade-off between maintenance access and train services; and
- People.

In AMCL's opinion it is a good practice document defining appropriate objectives and approaches for Network Rail. However, despite being available since 2016, interviews with Route representatives demonstrated a limited knowledge of the strategy and its contents. This may have been because AMCL was designated to largely speak to Route Asset Managers with respect to this subject, rather than members of the Maintenance organisation itself, but there is clearly an opportunity for improved communications and awareness. The strategy may also require updating to reflect the subsequent development of the Intelligent Infrastructure programme discussed below.

Activity Based Maintenance Planning (ABP) is one of the seven areas of focus in the Network Rail Maintenance Strategy defined above. The programme (NR/CP6/SBP/DM09) has essentially moved the Network Rail Delivery Unit (DU) organisations from funding submissions based on historical costs to activity-based and activity-costed plans for CP6.

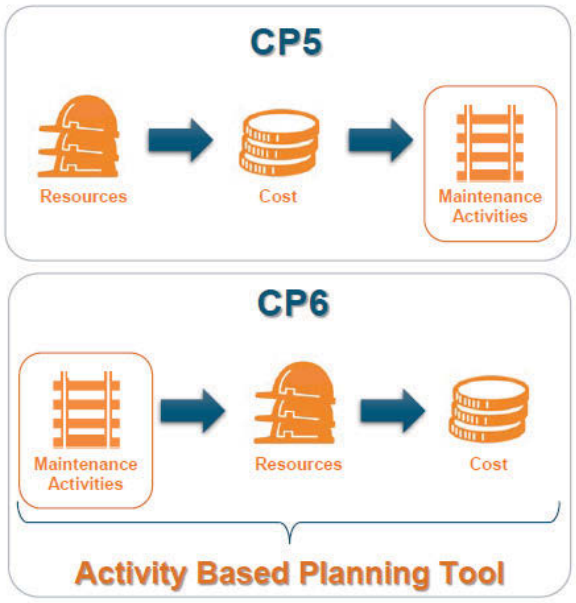

Figure 8 Change in Maintenance Delivery Unit Planning Approach – CP5 to CP6 (Network Rail)

DU delivered maintenance currently accounts for 80% of total maintenance expenditure and includes Track, Signalling and Electrification & Plant This is a significant improvement in an area where Network Rail was criticised at the point of submission of the CP5 SBP. The initiative to develop ABP appears to have been well managed and effective in meeting timescales to support CP6 planning (NR/CP6/SBP/DM10) and RSP submissions.

The Intelligent Infrastructure programme is intended to bring together multiple initiatives and workstreams across Network Rail which are focused on improving the effectiveness and efficiency of maintenance activities (NR/CP6/SBP/DM11). The programme includes a range of technology, IT systems, data and process improvement initiatives. This is considered a valuable approach in terms of clarity across the organisation and mitigating the risk of double counting efficiencies across

the different objectives of the Intelligent Infrastructure programme, which are to:

- Implement a consistent network wide operating model;
- Embed reliability engineering into products and maintenance regimes, including the use of Failure Mode and Effects Analyses (FMEA) as the basis for future reliability engineering and new infrastructure adoption;
- Optimise the use of embedded condition monitoring technology (formerly known as 'Intelligent Infrastructure');
- Evolve train-borne monitoring;
- Maintain existing vehicle monitoring capability;
- Transform analysis and analytical capability;
- Exploit information systems; and
- Industrialise autonomous systems.

In simple terms, all improvement initiatives during CP6 will come under either Digital Railway, Research & Development or Intelligent Infrastructure. However, although the Intelligent Infrastructure programme is based on several existing initiatives, the integration of these activities is at a relatively early stage. Although six core work packages have been defined, along with Tranche 1 projects for late CP5 and early CP6, a range of further projects for CP6 are still at the proposal stage and it is understood that key resources to deliver these projects are still being sought.

One of the initiatives moving into Intelligent Infrastructure is Network Rail's Risk Based Maintenance (RBM) Programme. Risk-based maintenance remains an ongoing opportunity for Network Rail as the existing RBM programme actually focuses on reliability centred maintenance (NR/CP6/SBP/DM12). Although the reliability centred approach (based on Moubray's RCM2 process) has enabled the development of a number of FMEAs, which can be used to better embed reliability engineering as referenced in the Intelligent Infrastructure objectives above, it does not provide a full cost-risk based approach. This is targeted by the Intelligent Infrastructure programme, as shown in Figure 9, but currently remains a gap in the organisation's capability.

Work Package 2: Maintain for Reliability

Embed Processes across Network Rail to utilise reliability-centred maintenance techniques in the creation of maintenance regimes across all disciplines. Evolve the current approach to incorporate performance requirements, transitioning to full risk based maintenance.

Figure 9 Extract from Network Rail Intelligent Infrastructure Strategic Plan (v1.0 – 13/10/2017)

A positive observation relating to the Operations & Maintenance Decision-Making Subject was the clearer and closer ties between Route infrastructure (Asset Management and Maintenance) teams and the Operations organisation as a result of devolution.

The Lifecycle Value Realisation Subject has increased significantly from 57% at the previous assessment to 69% in this latest assessment. This was driven, as already discussed, by incremental improvements in the Asset Policies (NR/CP6/SBP/DM13) and continued enhancement of the whole-life cost models used at the centre on an organisational basis and those available to the Routes. The role of the central whole-life cycle models has also evolved and matured with the enhanced approach to Strategic Planning (NR/CP6/SBP/DM14). Although it varied by asset class, clear and effective use of the whole-life cycle models was evidenced across all the asset classes for various scenarios (NR/CP6/SBP/DM15). Track is arguably the strongest model of the suite and Operational Property potentially the weakest, due to the respective homogeneous and heterogeneous nature of the asset portfolios. An overall summary of the current status of the models developed and operated by the central STE organisation can be seen in Figure 10.

Asset	Model Name	Model Age	Asset Granularity	Asset Lifecycle Relationships	Key Asset Outputs	Model Confidence / Validation
Track	VTISM	>10 years	Circa 50m Plain Line Sections Individual S&C	Usage Condition / Failure Heavy Maintenance	Asset % Used Life Condition Failures Safety Delay Costs	High
Signalling	ICM - Signalling	>10 years	SEU	Nominal Service Life / SICA Ramaining Life	Remaining Life	High
LX	ICM - Signalling	>10 years	LX Components	Nominal Service Life / SICA Ramaining Life	Remaining Life	Medium
Operational Property	Tier 1 - Property	1 year	Block / Feature / Attribute (Critical Assets)	Asset RemainingLife / Assessed Asset Remaining Life	Remaining Life	Low
Telecoms	Telecoms DST	>5 years	Individual Asset	Nominal Service Life	Remaining Life	High
Structures	Tier 1 - Bridges	1 year	Individual Brisge / Major Element	Condition Relationship (State Probability)	Condition of Principal Load Bearing Elements	Medium
Earthworks	SCAnNeR	5 years	5 Chain Lengths (in Cohorts)	Condition Relationship (State Probability)	Condition / Risk	Medium
Electrical Power	Tier 1 - EP	>5 years	Individual Asset / Wire Run for OLE	Nominal Service Life	Remaining Life	Low

Figure 10 Network Rail STE Model Summary

The links between the Asset Policies and the whole-life cost models were also demonstrably improved and the outputs considered more accurate and tangible because of continued improvements in condition and deterioration data.

Remaining areas for development of the models are understood to be focused on:

- Enhancement of the existing model suite from being largely capital analysis based only to include maintenance lifecycle cost analyses and enable truer Whole-Lifecycle Cost analysis; and
- Development of an integrated Whole-Lifecycle Cost model based on the ALPs and providing a single Route level model with localised profiles.

The management of aging assets remains locally based with little material change since the previous assessment, although, the embedding of improved governance and forums between Routes has enabled some improvement in the national management of strategic spares. The approach to rationalisation of assets remains opportunistic rather than systematic.

The fourth Subject in this Group, Resourcing Strategy, has increased its score to 69%. This remains an area of intense focus and effort by the Routes but little has changed fundamentally other than incremental improvements at individual Route level. There is no overarching Network Rail Resourcing Strategy and there remain issues around the management of key resource constraints (Kirow Cranes was one example given) with last minute changes and delays to bookings still reported.

Although the Routes themselves did not generally have a Resourcing Strategy as such either, other than the current and planned contractual frameworks, the increase in score is a result of the determined efforts by the Routes to manage resources more strategically and make the most of engineering access available. An Organisational Capability section is included in the RSPs (NR/CP6/SBP/DM16) to give an overview but the heart of the effort is in the integrated plans (NR/CP6/SBP/DM17) being developed. These are being shared with delivery agents earlier (NR/CP6/SBP/DM18) and are subject to more effective delivery assurance (NR/CP6/SBP/DM19) than previously. However, there is no national approach to sharing or definition of good practice and the potential realisation of resource efficiencies on a national basis.

The fifth and final Subject in the Group, Shutdown & Outage Strategy, has increased in score to 70%. This is a result of intensive effort and focus (NR/CP6/SBP/DM20) by the Routes to optimise engineering access arrangements. Track access, in general, was recognised as a key risk and constraint by all Routes.

A range of factors are relevant to this score increase and have been developed to various degrees across the Routes since Access Planning was devolved to them in early 2017.

All Routes have been able to develop more effective and regular interaction with key stakeholders, such as TOCs, to understand their needs, objectives and constraints (NR/CP6/SBP/DM21) with respect to access arrangements. This has also enabled Network Rail to better clarify the need for the work, the outcomes of the work and how they align with the TOC objectives.

Each Route is also developing some form of integrated plan (NR/CP6/SBP/DM22) with a focus on the optimisation of engineering access. The maturity and technology (NR/CP6/SBP/DM23) utilised for these integrated plans varies by Route, as does the general approach, but what does not vary is the understanding of the criticality of the subject matter and the need for extensive effort and development.

As per the Resourcing Strategy Subject, there is no national approach to sharing or definition of good practice to enable optimisation of track access on a network basis. However, evidence was provided of the draft National Engineering Access Planning Framework published in December 2017 (NR/CP6/SBP/DM24). Whilst this appears to remain focused on the tactical operational planning with the relatively new System Operator organisation (NR/CP6/SBP/DM25), it does provide evidence that the planned development and integration of this with 'Business Planning' (8-years to 1-year) and 'Strategic Railway Planning' (up to 35-years out). Development and implementation timescales for the National Engineering Access Planning Framework were not defined and it is important that these long-term planning integrations are fully developed and built into the Route Strategic Planning processes to assure the optimisation of track access.

4.3 LIFECYCLE DELIVERY

The Lifecycle Delivery Group contains all the Asset Management Activities required to implement the Asset Management Plans created in the Asset Management Strategy & Planning Group (see Section 4.1). The Group is split into eleven Subjects which are:

- **Technical Standards & Legislation** the processes used by the organisation to ensure its Asset Management activities are compliant with the relevant technical standards and legislation.
- **Asset Creation & Acquisition** the organisation's processes for the acquisition, installation and commissioning of assets.
- **Systems Engineering** a robust approach to the design, creation and operation of systems.
- **Configuration Management** a management process for establishing and maintaining consistency of a product's physical and functional attributes with its design and operational information throughout its life.
- **Maintenance Delivery** the management of maintenance activities including both preventive and corrective maintenance management methodologies.
- **Reliability Engineering** the processes for ensuring that an item shall operate to a defined standard for a defined period of time in a defined environment.
- **Asset Operations** the processes used by an organisation to operate its assets to achieve the business goals.
- **Resource Management** the processes used by an organisation to manage its resources in support of its Asset Management plans.
- **Shutdown & Outage Management** the processes used by an organisation to optimally deliver the shutdown and outage strategy.
- **Fault & Incident Response** the processes used by an organisation to predict and respond to failures and incidents.
- **Asset Decommissioning & Disposal** the processes used by an organisation to decommission and dispose of their assets.

4.3.1 SCORE SUMMARY

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Technical Standards & Legislation	62%	70%	LCD1	By the start of CP6 Network Rail should consider introducing a more systematic way of planning where Network Rail wishes to influence external standards and regulations bodies and what engagement is required to achieve this.
			LCD2	By the start of CP6 Network Rail should implement risk-based decision-criteria and overall process to demonstrate to stakeholders that required levels of compliance will be achieved.
Asset Creation & Acquisition	79%	81%	N/A	No recommendations identified.
Systems Engineering	75%	76%	LCD3	By the start of CP6 Network Rail should finalise and embed the 'Requirements, V&V and ECC master model', and fully align with the Digital Railway cross-industry systems integration approach.
Configuration Management	56%	58%	LCD4	By the start of CP6 Network Rail should develop a framework to identify Network Rail's configuration management requirements and under what circumstances these are applied, based on the criticality of the assets in question.
Maintenance Delivery	78%	78%	N/A	No recommendations identified.
Reliability Engineering	53%	61%	LCD5	By the start of CP6 Network Rail should improve the coordination and integration of reliability growth across disciplines and nationally to ensure the most effective and efficient approach to improving reliability is implemented.
			LCD6	By the start of CP6 Network Rail should complete alignment of the common failure mode lookup table for FMS/FCL to the maintenance FMECAs.
Asset Operations	76%	77%	N/A	No recommendations identified.
Resource Management	59%	62%	LCD7	Ensure the ABP Tool is fully utilised by the start of CP6 to monitor and benchmark maintenance activities and costs.
Shutdown & Outage Management	60%	63%	LCD8	By the start of CP6 Network Rail should fully implement and monitor the benefits of NR/L2/OPS/202 and NR/L2/OCS/303 to improve the systematic allocation of resources to possession work.
Fault & Incident Response	74%	76%	N/A	No recommendations identified.
Asset Decommissioning & Disposal	73%	78%	LCD8	Provide more systematic consideration of decommissioning plans within the CP6 RSPs.

Table 7: Summary of Maturity Scores for Lifecycle Delivery Group

4.3.2 SUMMARY OF FINDINGS

The overall score for the Lifecycle Delivery Group has increased by 3.3 percentage points since the end of CP4 to a current average of 70.8%. Of the eleven Subjects within the Group, all but one has increased since the end of CP4.

The first Subject in the Group, Technical Standards & Legislation, has increased by 8 percentage points since the end of CP4 after dropping back at the time of the IIA assessment. Network Rail has demonstrated an improved level of coordination with respect to the identification and control of external standards and regulations which was the concern at the time, particularly the interface between Centre and Routes. The new post of Chief Systems Assurance Engineer, reporting into the Chief Engineer within STE (the Technical Authority) is a key coordinating development. Three main registers are used to maintain a view of compliance - the H&S Legal Register, the Environmental Register and the Legal Panel Horizon Scanner & Legislative Tracker. The level of compliance is monitored full time by one of the Chief Systems Assurance Engineer's staff, who monitors an edited list brought to the Company Standards & Controls Group (CSCG – chaired by the Chief Systems Assurance Engineer – NR/CP6/SBP/LD01 and NR/CP6/SBP/LD02) by the Senior Legal Counsel Impact assessments are completed by members of the CSCG. These consist of individual reports based on analysis and engineering judgement. As far as possible requirements are not interpreted within this process but repeated into Network Rail's systems as far as possible. If standards need to be aligned or developed to the changing external requirements identified and assessed they go through the well-developed and embedded standards development, review and briefing process. However, there is no overall plan for influencing external bodies with respect to changing or developing legislation or regulations – but it was reported that Network Rail staff are strategically placed in the relevant working groups, mainly within the European, CSM and ISO bodies.

The Asset Creation & Acquisition and Systems Engineering Subjects have both also increased by 2 and 1 percentage points respectively since the end of CP4, after also dropping back at the time of the IIA assessment. This was due mainly to the 'One Vision, One Way' programme (1V1W – NR/CP6/SBP/LD03) that was underway at the time of the IIA assessment, but not complete, which had been primarily driven by the P3M3 improvement work which was completed in November 2016. The 1V1W programme consists of five main workstreams:

- **Workstream 1 –** Process: Introduction of a revised set of processes within a new Project, programme and portfolio management (P3M) framework.
- **Workstream 2 –** Refreshed Integrated Management System (IMS): Reconstituting and updating the IMS around Professions (see Workstream 3) rather than capabilities.
- **Workstream 3 –** Professions: Definition and roll out of 19 separate professional communities within IP to provide expert focus and support.
- **Workstream 4 –** Risk: Improved application of strategic risk management through ERR process within IP (as opposed to the well-established project-level management of risk) in accordance with Network Rail's ERMF and the (see Section 4.6, Risk & Review).

- **Workstream 5 –** Business Change & Improvement: A 3-year IP-specific change programme aligned to MSP4NR (see Section 4.6, Risk & Review).

The output of Workstream 1 is summarised in Figure 6 below. There are four elements within the P3M Framework. GRIP for Projects is the oldest, which has now been supplemented with GRIP for Programmes. In addition to these two main elements, the existing Network Rail Requirements management standard has been revised and brought in at Level 2 (NR/CP6/SBP/LD04), with a new Network Rail Requirements Manual (NR/CP6/SBP/LD05) and set of guidance introduced at Levels 3 and 4. The requirements management element better integrates and updates existing good practice within Network Rail within the Clienting Principles, Sponsor's Handbook, and existing standards. It formalises the management of requirements into consistent levels and specification (for example: Client Requirements Document (CRD), Route Requirements Document (RRD), Detailed Route Requirements Document (DRRD) and the Project Delivery Standard Specification (PDSS)). The entire P3M Framework has a compliance date of March 2018, but appears to already be effectively embedded.

Policy	Level 1 Standard - NR/L1/INI/P3M/100 Project, programme and portfolio management (P3M) framework policy				
What	Level 2	NR/L2/INI/P3M/104 Network Rail requirements	NR/L2/INI/P3M/105 Assurance of project, programme, and portfolio (P3M) investment	NR/L2/INI/P3M/101 GRIP for Projects	NR/L2/INI/P3M/102 GRIP for Programmes
How	Level 3	NR/L3/INI/P3M/126 Network Rail requirements manual Module 01 NR/L3/INI/P3M/126/01 Requirements framework Module 02 NR/L3/INI/P3M/126/02 Requirements processes Module 03 NR/L3/INI/P3M/126/03 Project Delivery Standard Specification	NR/L3/INI/P3M/127 Peer Reviews of project, programme and portfolio (P3M) investment NR/L3/INI/P3M/127 Work Instruction – Peer Reviews Regional examples: IP Central – GRIP Level 1 Assurance Process IP Southern – Application of 1st Line GRIP Assurance	NR/L3/INI/P3M/120 Starting a project NR/L3/INI/P3M/121 Initiating a project NR/L3/INI/P3M/122 Leading a project NR/L3/INI/P3M/123 Controlling a project stage NR/L3/INI/P3M/124 Managing a stage boundary NR/L3/INI/P3M/125 Closing a project	No Level 3 standards defined yet.
Guidance	Level 4				

Table 8: P3M Framework

The assurance element of the P3M Framework is perhaps the newest. It aligns with Network Rail's broader '3 Lines of Defence' Assurance Framework (see Section 4.6, Risk & Review) and is described in NR/L2/INI/P3M/105 – Assurance of project, programme and portfolio (P3M) investment (NR/CP6/SBP/LD06). This requires the implementation of a programme of Peer Reviews to provide internally independent assurance of Network Rail's most complex and high impacting infrastructure investment projects and programmes described in further detail in NR/L3/INI/P3M/127 – Peer Reviews of project, programme and portfolio (P3M) investment (NR/CP6/SBP/LD07), which are now being fully undertaken (NR/CP6/SBP/LD08). NR/L2/INI/P3M/105 also requires Level 2 annual assurance reviews which provide an annual health check on Route Business infrastructure investment portfolios by assessing the key infrastructure projects and programmes, which are also being undertaken. In addition, the various IP Regions now have Programme Manager organisations in place to explicitly undertake Regional assurance activities aligned with the P3M Framework.

The delivery of Network Rail's investment portfolio under the P3M Framework is aligned to a revised level of national governance defined in the Investment Decision Framework (IDF) shown in Figure 11 below. This has been developed in response to a Memorandum of Understanding between Network Rail and the DfT (NR/CP6/SBP/LD09) and is overseen by the Portfolio Board (NR/CP6/SBP/LD10), a joint Network Rail / DfT responsibility, which is responsible for delivery of the agreed programme business case. Individual Programme Boards look after the individual programmes (NR/CP6/SBP/LD11), for example Great Western and Brighton Main Line, and all CP6 programmes will be defined, agreed and delivered through this mechanism. Although this approach is recognised good practice for portfolio enhancement management, concerns have been raised within Network Rail of the potential impact on OM&R plans of enhancements being accelerated through this process (see Section 4.1 on Strategy & Planning).

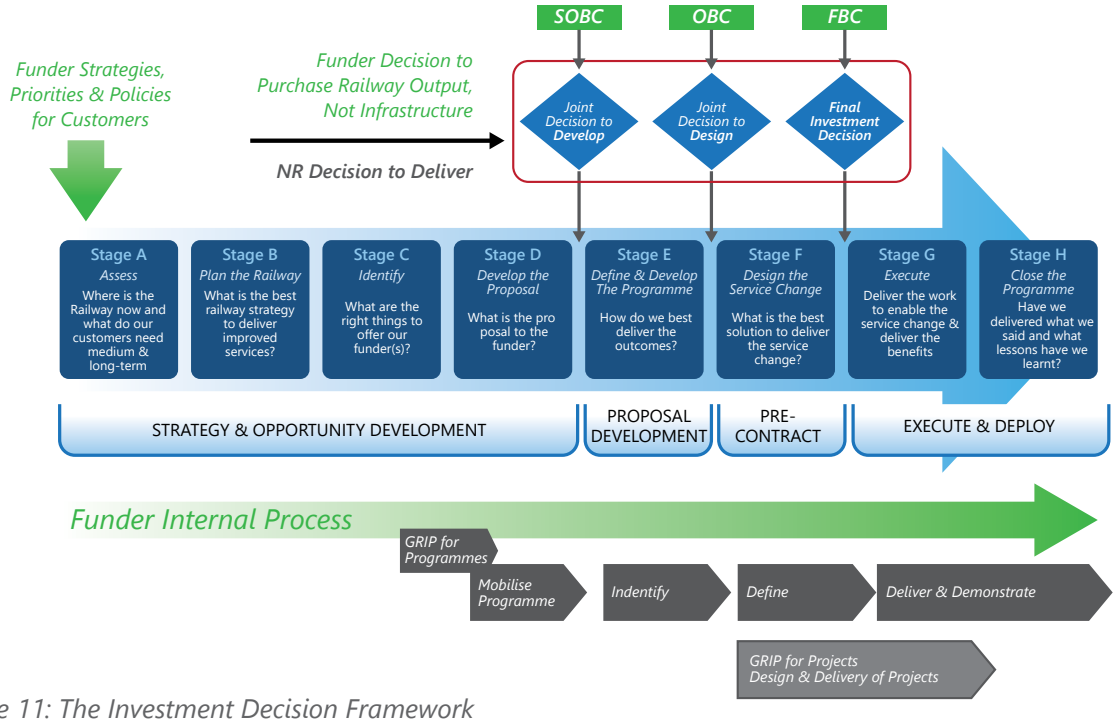

Figure 11: The Investment Decision Framework

Network Rail's Systems Engineering capability has also been further developed and integrated to support the definition and management of requirements through the portfolio, programmes and projects managed through the IDF and P3M Framework. At the GRIP level, the adoption of the Integrated Engineering Lifecycle (iELC) is now reasonably well embedded, and its use was made mandatory in October 2017. IP Engineering has implemented its new Governance & Operating model (NR/CP6/SBP/LD12) which sets out an overall model at four levels, including systems capabilities. Within this the Systems Design Engineer is leading the development of the 'Requirements, V&V and ECC master model' (NR/CP6/SBP/LD13) which, although currently in draft, consolidates a number of well-established and embedding Systems Engineering elements into a single approach under the IDF (including GRIP, iELC, ECC and Requirements Management). In parallel with this, the Chief Systems Engineer within Digital Railway is more clearly defining the role of Digital Railway as the System Authority under ROGS within the broader industry (NR/CP6/SBP/LD14). In this role it is supporting the development and implementation of an industry-wide systems integration approach which will manage assurance, requirements, configuration and issues within an agreed industry level governance forum such as the RSSB's Technical Leadership Group (TLG). The approach has been successfully trialled on the Bi-Mode Operation (25kV OHL/Self Powered) trains which will operate between Paddington and Bristol (NR/CP6/SBP/LD15 & NR/CP6/SBP/LD16).

Configuration Management continues to be a challenge for Network Rail although it has increased by 2 percentage points since the end of CP4. Although there are pockets of good practice in this area, a defined configuration management system or coordinated approach is not in place. The use of high-level Configuration State Matrices (CSMs) to define how the network configuration transitions during programme delivery is typical, but these are high-level and do not then inform the operating lifecycle (NR/CP6/SBP/LD17). The Digital Railway has moved from a programme to an 'end state' focus, and provides Routes with a number of 'migration states' against which they can evaluate costs and benefits before planning to implement (NR/CP6/SBP/LD18). The Western Rail Link to Heathrow programme has adopted the IP Great Western and Crossrail Region's Information Management Strategy and is making use of a full BIM-compliant model in Bentley Microstation. This uses standard BIM templates and libraries as defined by NR/L2/INI/EDT/CP0091 and the intention is to hand this over into the operating cycle (NR/CP6/SBP/LD19). However this is an early trial and is not the rule. Symptoms of reactive configuration management continue to be reported – for example the requirement to undertake correlations and full surveys of signalling layouts prior to design work commencing. The recommendation made at IIA remains, namely that Network Rail should develop a framework to identify Network Rail's configuration management requirements and under what circumstances these are applied, related to the criticality of the assets in question.

The Maintenance Delivery and Resource Management Subjects have not significantly changed since the end of CP4, with only Resource Management increasing by 3 percentage points. The delivery of maintenance activity and the management of the resources continue to be undertaken with broadly the same approaches. Maintenance is generally well controlled, usually via the Ellipse system, and there is a clear focus on monitoring plan delivery and backlog. Although resource planning is generally still

a 'top-down' activity which is not driven by 'bottom-up' workload requirements perhaps as strongly as it could be, the Activity Based Planning Tool (ABP Tool – see also 4.6, Risk & Review and 4.2, Asset Management Decision Making) has been utilised consistently across Network Rail in the preparation of CP6 maintenance plans (NR/CP6/SBP/LD20). This tool includes outputs which enable longer-term resource requirements to be understood to a reasonable degree of detail, and it was reported that the tool will be utilised to monitor plan progression and to benchmark maintenance unit costs during CP6 (NR/CP6/SBP/LD21 & NR/CP6/SBP/LD22).

Fault & Incident Response is another Subject which has not significantly changed since the end of CP4 increasing by 2 percentage points, at least within the Routes where the activity is undertaken. The Fault Code Lookup (FCL) App is now reasonably well embedded, with the challenges reported at the end of CP4 and at the IIA assessment resolved. Further developments to the effectiveness of this are described under Reliability Engineering below.

Reliability Engineering is another Subject which dropped back a little at the IIA assessment, but has now improved by 8 percentage points since the end of CP4. The main reason for this is that the disaggregation of reliability responsibilities within STE had not been fully embedded at the time of the IIA assessment but this has now been rectified. There is no longer a reliability group, and the Professional Asset Heads and their Principal Engineers are responsible for coordinating the overall plan for their asset's reliability. This is achieved through engagement with the Asset Technical Reviews (ATRs) and through the National Infrastructure Reliability Group (NIRG) and associated Route groups (RIRGs). However, not all the asset disciplines have current reliability plans or initiatives in place, but those that do such as the LNW Rail Management initiative are able to demonstrate successful implementation (NR/CP6/SBP/LD23). Network Rail's performance management tool, iPat, is not mandatory and is used as a performance improvement tool rather than a target-setting reliability improvement plan. In general, the coordination of reliability growth is improving but not yet fully optimised, with no overall framework to promote this. The Design for Reliability standard is now reasonably well embedded, and Network Rail's performance in improving reliability over time is consistent. The Chief Engineer also has a Head of Maintenance Reliability whose role is to coordinate reliability improvement through maintenance activity. And finally, the Systems Reliability Improvement Manager provides extensive failure and performance analysis services to the Professional Heads and the NIRG and RIRGs (NR/CP6/SBP/LD24 & NR/CP6/SBP/LD25).

Now the FCL App is effectively embedded in the Routes as described above under Fault & Incident Response, the next stage is currently being progressed, and is a specific objective within the revised Intelligent Infrastructure programme (see Section 4.2 – Asset Management Decision Making). This aims to fully align the common fault tree structure associated with the FCL App and the Fault Management System (FMS) to the Failure Modes, Effects & Criticality Analyses (FMECAs) used to define the RCM and RBM regimes (see Figure 12). Once complete, this will represent a good practice approach within Reliability Engineering which will enable improved feedback and update of the RCM and RBM regimes.

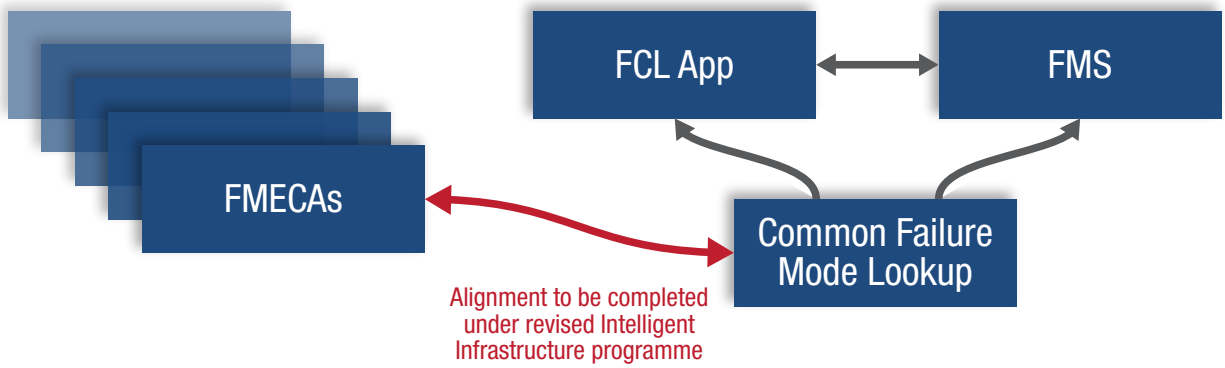

Figure 12: Integration of Failure Mode Information

Asset Operations has shown a very minor improvement since the end of CP4. Network Operations has been disaggregated since the IIA assessment, and a new Head of Operations now reports into the Chief Engineer. This means there are now improved opportunities to integrate Asset Management, Engineering and Operations more effectively. The Network Operations Strategy put in place for CP5 will be superseded in CP6 by Route Operations Strategies which are currently being developed according to the National 'Short Form' Operations Strategy (NR/CP6/SBP/LD26). The Operations Standards Steering Group continue to oversee feedback and continual improvement of operations standards, and now contains a broader range of members since coming under the Chief Engineer. Consolidation of the Operations Manual, National Control Instructions and the Managed Stations Manual into a single document (the National Operations Publication) was delivered successfully in March 2017. This group has also overseen the update and delivery of NR/L2/OPS/202 (Engineering Responsibilities) and NR/L2/OCS/303 (Possessions) which now both include the systematic allocation of resources to possession work which improve the Shutdown and Outage Management scores.

Asset Decommissioning & Disposal continues to be a relative strength for Network Rail, improving by 5 percentage points since the end of CP4. The processes for decommissioning and disposing of assets continue to improve, particularly with respect to the environmental and sustainability aspects (see also Risk & Review, Section 4.6). Many of the RSPs contain plans for this end of the lifecycle, but only where these plans are significant.

4.4 ASSET INFORMATION

The Asset Information 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 Group is split into four Subjects which are:

- **Asset Information Strategy**
  the approach to the definition, collection, management, reporting and overall governance of asset information necessary to support the implementation of the organisation's Asset Management strategy.
- **Asset Information Standards**
  the specification of a consistent structure and format for collecting and storing asset knowledge.
- **Asset Information Systems**
  the asset information systems the organisation has in place to support the Asset Management activities and decision-making processes in accordance with the asset information strategy.
- **Data & Information Management**
  the data and knowledge held within the organisation's asset information system.

4.4.1 SCORE SUMMARY

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Asset Information Strategy	83%	79%	AI1	By December 2018 further enhance the Intelligent Infrastructure Strategic Plan to present an Asset Information Strategy that effectively integrates the associated Data, Technology, IT Systems and Governance strategies. Complete detailed definition of the Intelligent Infrastructure programme plan, including detailed alignment to the associated Business Architecture and Asset Management Framework.
Asset Information Standards	75%	76%	AI2	By the end of CP6 and to support the Intelligent Infrastructure Programme: • refine the Asset Information Specifications (AIS) to define the full scope of attributes related to the asset lifecycle such as cost and performance. • fully embed the AIS Viewer across the Routes.
			AI3	By the end of CP6 ensure that the 'Exchange of Asset Information' tool-set has been implemented, and that related business processes are in place that ensure adherence to MADR.
Asset Information Systems	63%	70%	AI4	By the end of CP6 complete implementation of the Activity Based Planning (ABP), SharpCloud and PowerBI solutions to ensure consistent use across all Routes, managed by Route Services IT on an enduring platform.
Data & Information Management	59%	72%	AI5	By the start of CP6 fully embed the ADG Framework across the Routes, including the provision of necessary workstreams within the Intelligent Infrastructure Programme.

Table 9: Summary of Maturity Scores for Asset Information Group

4.4.2 SUMMARY OF FINDINGS

The Asset Information Group continues to be a leading area for Network Rail. The overall score has increased by 3.6 percentage points since the last assessment to a current average of 74.0%. Of the four Subjects within the Group three have increased and one has decreased.

Asset Information Strategy has reduced by 4 percentage points to 79% since the last assessment. This reflects that Network Rail are in a state of transition. The previous Asset Information Vision centred on the ORBIS programme and demonstrated alignment to Network Rail's corporate themes, with detail on improvement initiatives and expected outcomes. It was comprehensive and graphical and should be replaced with a consolidated and integrated Asset Information Strategy to reflect the new direction and to demonstrate full alignment.

The revised Asset Management Strategy (Section 11 - NR/CP6/SBP/AI01) includes an early stage and short form Asset Information Strategy. This reflects on the ORBIS programme and references the legacy Asset Information Vision. It defines key areas for improvement, and has a focus on the adoption of BIM. It confirms Network Rail is adopting two overarching technology strategies; Intelligent Infrastructure and Digital Railway.

The vision and strategy for the management and improvement of Asset Information and supporting technologies is now centred on the revised and expanded Intelligent Infrastructure programme referenced in the Chief Engineer's Strategic Plan Oct 17 (NR/CP6/SBP/AI02). This large-scale cross-functional initiative has the ultimate goal of improving the availability of the infrastructure by:

- Understanding the probability of individual asset failure;
- Predicting when failure will occur;
- Forecasting the impact on the operational railway; and
- Planning intervention prior to disruption to train services.

The programme will require new and evolved IT systems and technology infrastructure and is expected to involve large volumes of business change. The Network Rail Intelligent Infrastructure Strategic Plan (NR/CP6/SBP/AI03) sets out the high-level programme strategy to the end of CP6 related to all 'operational infrastructure'. Intelligent Infrastructure will encompass capabilities in asset and maintenance regime design, asset condition and fault data capture, asset data analysis and analytics, works planning and management system integration.

The Intelligent Infrastructure Programme Overview (NR/CP6/SBP/AI04) presents a coherent vision, especially with regard capturing, analysing and exploiting asset data to make better planning decisions. It attempts to tackle some of the criticisms of ORBIS with structured stakeholder engagement within the Routes, clear benefits realisation and necessary governance planned through the Intelligent Infrastructure Governance Group. However, the programme is ambitious and currently at an early stage of definition, a high-level programme plan is provided and a scope with workstream leads identified as shown in Figure 13 below. The model presents high-level alignment to the Asset Management Framework.

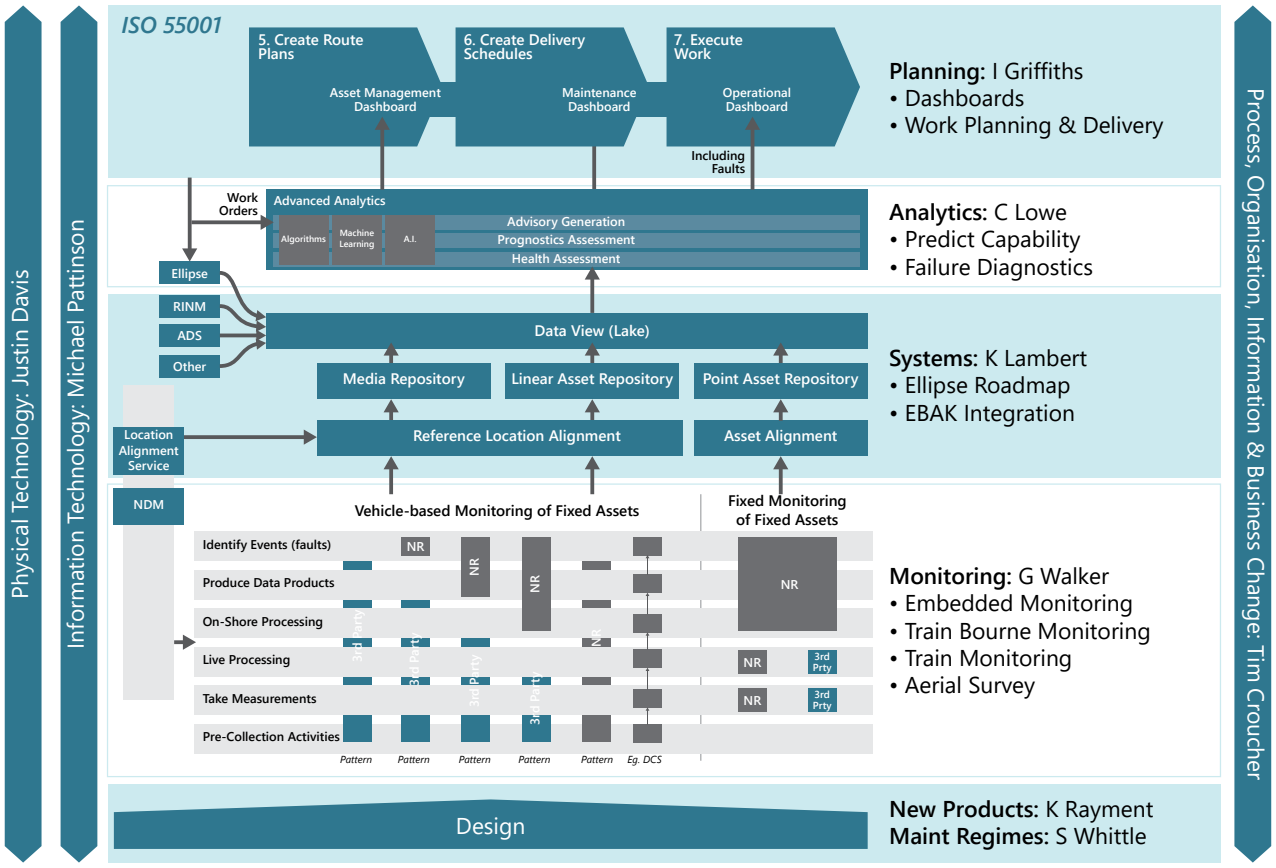

Figure 13 – Intelligent Infrastructure Programme Systems Model

It should be noted that 'Intelligent Infrastructure' was the term used for an existing CP5 programme installing remote condition monitoring and to describe existing business system platforms – it is therefore important that clear branding and communications are used to avoid confusion with stakeholders.

The new Intelligent Infrastructure programme will bring into scope final stage ORBIS projects (through to March 2019), the well-received Enabling Better Asset Knowledge (EBAK) initiative, and the Ellipse Exploitation improvement projects. To date the EBAK and Ellipse Exploitation workstreams have demonstrated good engagement with information users in the Routes to agree high level needs and priorities, leading to the development of improvement roadmaps.

These roadmaps are now merged into the new vision and plan for Intelligent Infrastructure. Many of those interviewed referenced the continued improvement in benefits definition, building on approaches followed during ORBIS, through EBAK, and now into Intelligent Infrastructure. The MSP4NR framework (see Section 4.6, Risk and Review) has been used in the definition of the Intelligent Infrastructure programme, with a structured tool used to agree the benefits case for each workstream (NR/CP6/SBP/AI06). It was referenced that in the definition of the Intelligent Infrastructure programme 100+ people from across the organisation were engaged, defining and categorising 650+ business needs.

Further development and definition of the Intelligent Infrastructure programme strategy and plan is required, including

detailed alignment to associated strategies including Digital Railway. An organisation wide and data focused Information Vision Strategy (NR/CP6/SBP/AI05) exists as well as a suite of comprehensive IT and business aligned Technology Strategies (NR/CP6/SBP/AI08 and NR/CP6/SBP/AI25). The platforms on which the Intelligent Infrastructure programme will develop further capabilities are being delivered by the Route Services IT organisation.

Both the Network Rail Business Process Architecture and the Network Rail Conceptual Information Reference Model (NR/CP6/SBP/AI09) provide positive developments in consolidating Asset Information needs and should be used to support the development of Intelligent Infrastructure. The vehicle for Data and Information Management at Network Rail is the Asset Data Governance (ADG) framework. This was delivered by the Professional Head of Data and has been well embedded in a number of Routes. It was stated that ADG was now business as usual, and a foundation of Intelligent Infrastructure but it is recommended a workstream is included to ensure full adoption.

In summary, there have been valuable lessons learnt since the development of the original ORBIS Asset Information Strategy in terms of shortfalls in business engagement and the scope of asset information challenges. The emerging Intelligent Infrastructure Programme shows promise and aims to exploit new technologies and techniques in monitoring and analytics. However, this plan needs to be further developed and integrated into an expanded Asset Information Strategy and roadmap, based on the content introduced in the revised Asset Management Strategy (Section 11 -NR/CP6/SBP/AI01). To ensure effective replacement of the recently retired ORBIS centred Asset Information vision and roadmap. This would demonstrate how the various strategies and initiatives described align with each other and more importantly align with the overall goals of Network Rail and the corresponding business architecture.

Asset Information Standards have increased marginally by 1 percentage point to 76% since the last assessment. Network Rail's definition of the information and data required to support decisions and processes within its Asset Management Framework remains centred on the Asset Information Specifications (AIS – NR/CP6/SBP/AI10). The specifications define the necessary data attributes required by Network Rail, organised by Asset Type. Attributes are categorised by how the attribute can support decisions, i.e. What is the Asset? Where is the Asset? The AIS attempts to map attributes to the primary IT system where they are mastered, but it was noted that this mapping is often incomplete.

The Asset Information Specification is generally deemed beneficial and comprehensive, although interviewees felt that this attribute model needs to refocus on quality and importance, and to better define attributes related to the asset lifecycle, such as cost and performance. The associated Minimum Asset Data Requirements (MADR – NR/CP6/SBP/AI11) are a sub-set of the AIS and specify the minimum amount of information Network Rail expects back from its suppliers. These requirements focus on the 'What' and 'Where' data attributes of an asset record. One of the final ORBIS projects, 'Exchange of Asset Information' (EAI), intends to provide technologies to ensure the AIS and MADR are efficiently and effectively

followed. This will include the definition of business processes, which would ensure all parties involved in the process of exchanging asset information comply to these Asset Information Standards. It is recommended that the EAI project is prioritised and aligned to the Intelligent Infrastructure Programme. Furthermore, the scope of data defined in the MADR and captured through the business processes should be comprehensive. The EAI project and MADR will support Network Rail's aspirations to follow Building Information Modelling (BIM) principles.

A positive development is the provision of an AIS Viewer (NR/CP6/SBP/AI12), which is intended to provide a line of sight back to the systems that hold the assets and the standards that drive the asset data requirements. The viewer attempts to make the legacy Excel based AIS more accessible to Network Rail staff, allowing them to understand asset data attributes (e.g. field length, type) and the data requirements for each asset class. The viewer highlights which fields are mandatory to support the ORR A2 quality measures and MADR. It also provides hierarchical navigation of asset types and example photos. Further development, education and embedding of this tool within the Intelligent Infrastructure programme is recommended.

One area for focus and improvement in relation to Network Rail's Asset Information Standards is necessary alignment to needs, quality and the data schemas defined in the key IT Systems used. There is a plethora of supporting standards and guidance documents that further specify data attributes and data quality parameters (NR/CP6/SBP/AI13, NR/CP6/SBP/AI14, NR/CP6/SBP/AI15), beyond the core AIS and AIS Viewer. Furthermore, guidance is provided in other documents on how to structure data records in IT Systems such as Ellipse (NR/CP6/SBP/AI16). Continued consolidation and alignment of these standards into a common set of specifications is recommended, along with necessary integration to the Conceptual Information Model (NR/CP6/SBP/AI17).

Asset Information Systems has been a major focus for Network Rail since the last assessment, and this subject has increased by 7 percentage points to 70%. The ORBIS programme has delivered multiple new solutions against agreed ORR milestones, including a number of Decision Support Tools, the Fault Code look-up application, and replacement of GEOGIS with the new Infrastructure Network Model (INM) solution. Ellipse is now confirmed as the strategic solution for all asset registers and work volumes, and further exploitation of Ellipse's functionality and tooling forms a key part of the Intelligent Infrastructure Programme. A comprehensive plan and roadmap (NR/CP6/SBP/AI18) for Ellipse enhancement and increased use has been created through extensive engagement with the business users an unconstrained catalogue of needs. Detailed integration of Ellipse improvement workstreams with the new Intelligent Infrastructure Programme is recommended, alongside enhancements in Fault/Defect management in Ellipse and further integration with new Activity Based Planning capabilities to support planned versus actual cost analysis.

As referenced in Section 4.3 Lifecycle Delivery the Fault Code Lookup application (NR/CP6/SBP/AI19) is effectively embedded within the routes and is improving the categorisation of fault records in FMS. Further alignment of FMS, Ellipse and related FMECAs is recommended to support improvements in Reliability Engineering.

One related project has the been the delivery of the Civils Strategic Asset Management Solution (CSAMS). CSAMS shows great promise and business users have a high expectation of the workflows, user interface and mobility that will be delivered. Unfortunately, CSAMS has had a number of delays and is not yet live; this is understood to be a commercial product issue. The CARRS solution is still being used for Structures and the sub-optimal JBA solution for GeoTechnical. These legacy IT Systems were reviewed within this assessment. In general, interviewees felt Network Rail's ability to deliver IT Systems projects has improved, including requirements and business case management, with some lessons having been learnt through ORBIS. But a recommendation for the Intelligent Infrastructure programme was to ensure the necessary embedding and aftercare of new IT solutions. Those interviewed did state that in general they were clear on who was responsible for different IT systems and how to request support and enhancements.

A positive Asset Information Systems development under ORBIS has been the introduction of Geo-RINM (NR/CP6/SBP/AI20), an on-line solution to view the rail network, showing the locations of Network Rail's assets in a geo-spatial context. It brings together over 140 different data layers, taking information directly from Network Rail's asset data registers (including Ellipse), and other external data stores. Those interviewed were very positive towards the solution, stating it was useful to view assets, the condition of assets, plan works delivery at a worksite, and understand the effect of vegetation and the local environment when assessing assets.

As described, a focus for ORBIS was the delivery of Decision Support Tools (DSTs), and this capability and further analytics improvement continue as a theme within the Intelligent Infrastructure Programme (NR/CP6/SBP/AI21). There has been mixed feedback on the three DST solutions: Linear Asset Decision Support (LADS) for track (NR/CP6/SBP/AI22), Signalling DST and Electrification & Plant DST. Lessons learnt from these projects should be considered in new projects going forward.

One area of Asset Information Systems development is the emerging use of SharpCloud (NR/CP6/SBP/AI23) and PowerBI as tools to visualise the management system, access policies, plans, periodic reports and to get real-time updates of progress against plans, including Renewals (NR/CP6/SBP/AI24). It was noted that these technologies are at different levels of adoption across the Routes, with LNW leading progress. Users gave positive feedback on these developments. However, the management and continued improvement of SharpCloud, the Excel-based Activity Planning Solution, and also niche monitoring solutions in the routes, such as Perpetuum track monitoring, need consideration. It is recommended that the balance of Route-based technology development and centrally deployed IT systems is reviewed to ensure that solutions are sustainably managed. It is also recommended to align improvement projects for Asset Information Systems to IT Strategies (NR/CP6/SBP/AI25), Route Services target application architectures (NR/CP6/SBP/AI27), and the emerging needs of the business architecture (NR/CP6/SBP/AI26).

Data and Information Management has increased significantly by 13 percentage points to 72%. Development through CP5 of Network Rail's Asset Information Management System has focused on the design and implementation of the Asset Data Governance framework

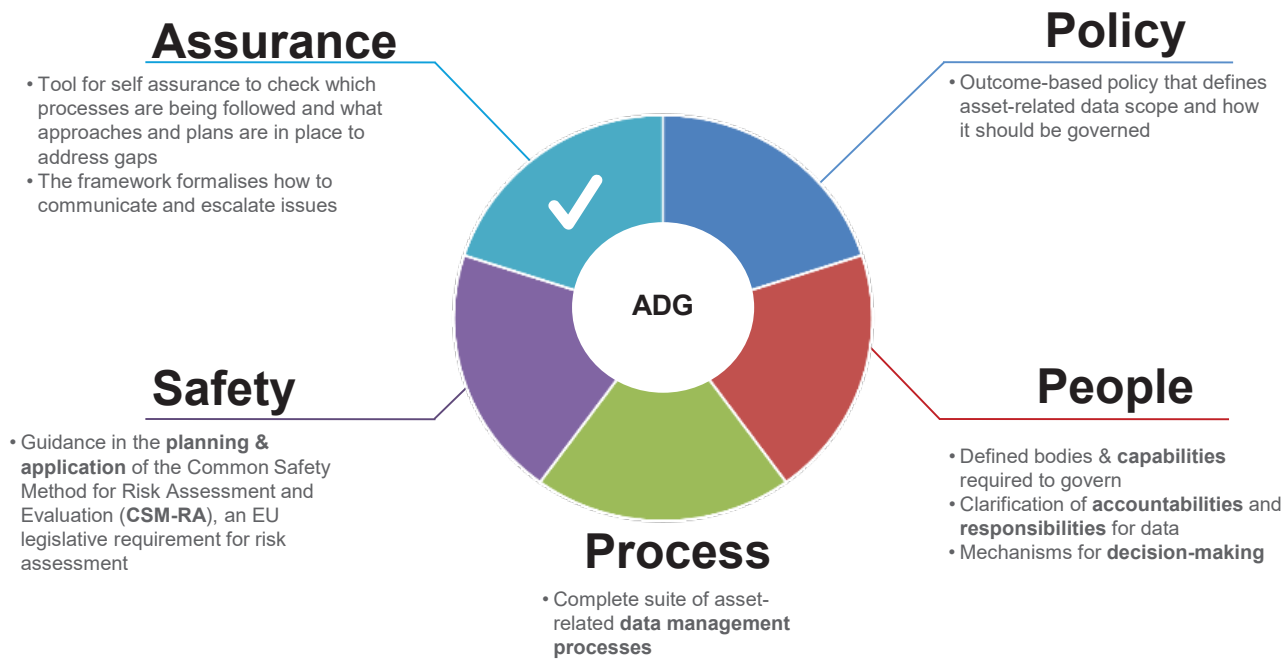

Figure 14 – High level representation of the Network Rail ADG Framework

(ADG – NR/CP6/SBP/AI28). It is an ambitious programme utilising ISO8000 to define necessary data quality management processes and standards. It defines the policy, processes and people needed to manage Network Rail's data assets, with the goal to drive ownership and decision making, supported by assurance, technology and communication.

In general, interviewees reported positive adoption of ADG within the Routes. The effectiveness of embedding ADG processes and policies into the Routes does rely on the provision of the necessary resources and roles, for example, a Route Asset Data & Analysis Manager and support staff (NR/CP6/SBP/AI31). Terms of reference (NR/CP6/SBP/AI29) and structured repeat meetings are generally in place within the Routes (NR/CP6/SBP/AI30). However, although it was referenced that ADG was now 'business as usual' within Network Rail, further embedding is recommended to ensure consistent adoption across the routes.

Furthermore, definition is required of how ADG can support and effectively integrate with the Intelligent Infrastructure Programme.

Data quality has increased across Network Rail as a result of the ORBIS programme and the focus it provided on Asset Information, including improvements in Asset Information Systems, the AIS and the increasing effectiveness of ADG. Other factors related to this data quality improvement include the ORR A2 data quality metrics (NR/CP6/SBP/AI32) and the visibility this provides to problem records, and the structured processes to resolve, with A2 data quality being the subject of a separate regulated output for CP5. Those interviewed reported increased confidence in the Asset Register data quality across the majority of asset classes. Further focus is required on the quality of wider data attributes related to condition, cost and performance, and the accessibility of unstructured documents and technical records.

4.5 ORGANISATION AND PEOPLE

The Organisation and People Enablers Group is focused on assessing the capability of an organisation, its people and its supply chain to effectively implement all aspects of Asset Management. The Group is split into five Subjects which are:

- **Procurement & Supply Chain Management**
  the management and development of supply organisations.
- **Asset Management Leadership**
  the leadership of the organisation in promoting a whole-life Asset Management approach to the stewardship of the organisation's assets.
- **Organisational Structure**
  the structure of the organisation in terms of its ability to deliver effective Asset Management.
- **Organisational Culture**
  the culture of the organisation in terms of its ability to deliver effective Asset Management.
- **Competence Management**
  the processes used by the organisation to systematically develop and maintain an adequate supply of competent and motivated people to fulfil its Asset Management objectives.

4.5.1 SCORE SUMMARY

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Procurement & Supply Chain Management	73%	71%	O&P1	Improve effectiveness of processes to enable dialogue and feedback on Asset Policies and Supplier performance between Routes, Procurement and Suppliers including IP.
				Define the desired future Supply Chain capability and how Network Rail will engage and work with Suppliers to achieve this.
				Review the competence implications of the desired future Supply Chain capability for Procurement staff
Asset Management Leadership	69%	74%	O&P2	Define and prioritise the specific leadership challenges of embedding AM thinking and practices and align management development programmes with these
Organisational Structure	55%	67%	O&P3	Bring the same level of attention being brought to individual competences and role progression to the design of teams and the review of team performance
				Produce long term forecasts for the overall workforce together with a strategy for its development across the Routes
Organisational Culture	67%	68%	O&P4	Define the culture changes needed in different parts of the business to support AM implementation and develop a strategy for achieving these
Competence Management	66%	69%	O&P5	Continue the integration of the AMCF and AM role pathways as currently planned by E&AMCSG
				Review Succession Planning practices and identify how these can be revised to take wider organisational needs into account including how talent information is captured and disseminated.

Table 10: Summary of Maturity Scores for Organisation and People Group

4.5.2 SUMMARY OF FINDINGS

The overall score for the Organisation and People Group has increased by 3.4 percentage points since the last assessment to a current average of 69.5%. Of the five Subjects within the Group four have increased and one, Procurement and Supply Chain Management, has decreased slightly from the end of CP4 assessment.

With regards to Procurement and Supply Chain Management, the score has slipped back slightly to 71% in this assessment. Whereas in the previous assessment it looked as if alignment between Procurement and Supply Chain Management, Asset Management Objectives and Policies was gathering pace, the pace now appears to have slowed.

The alignment of supplier capability with Asset Management Policies appears weak. Respondents pointed to problematic relationships between Procurement and Suppliers which were making it difficult to make the shift from delivering work to delivering value.

Respondents raised questions about the effectiveness of relationships between Routes, Procurement and Suppliers. Route-Supplier relationships appear to be stronger than Route-Procurement relationships where there appears to be no formal process for resolving issues. Route-Route dialogue and feedback on supplier performance is more an opportunity than a reality at present – information sharing on forward demand appears to be piecemeal. Respondents were doubtful that network-wide scale economies are being exploited as fully as they could be.

The Asset Policies do not appear to have the influence Network Rail thinks they should be having in terms of their impact on the supply chain. Suppliers appear to be distant from them, with no specific mechanism for dialogue or feedback on their contents. Although one respondent claimed that Suppliers should be 'feeling' the effects of the Asset Policies, it is difficult to see how supplier capability is being aligned with the Asset Management objectives and Policies or what incentives are being given to Suppliers to do this going forward. This problem is being compounded by late confirmation of works being given to suppliers (NR/CP6/SBP/OP08) that has been picked up in previous assessments and insufficient projections of the future supplier capabilities Network Rail will need. These issues are acknowledged by Network Rail in a recent analysis of the situation which amongst other things identifies the need for "a new pipeline process" and "a transformation approach in supplier relationships" (NR/CP6/SBP/OP07).

It is a mixed picture because the Route-Centre relationship is still in transition and there are some cultural issues to be overcome, including:

- Procurement is still too delivery orientated;
- Maintenance Delivery Units are regarded as too compliance driven.
- Route Commercial and Procurement Managers do not appear familiar enough with Asset Management Objectives and Policies.
- Some Routes are more active than others in driving supplier performance.

Respondents identified a need to engage suppliers better on expected levels of reliability, technology development and focus them on asset availability as part of a broader plan to shift liabilities from NR to the supply chain but it is not clear from the evidence whether this is happening.

Progress on asset performance reporting is bringing more coherent dialogue across Routes, there are plans to start up Route and Regional Supplier working groups and the introduction of activity based planning should help make the way work is planned and resources are committed more precise (NR/CP6/SBP/OP07). There is a recognition that overall Supply Chain strategy needs to tie in the Route AMPs and that the challenge is to get better at forward planning i.e. defining what sort of supply chain is needed in future and how best to engage it. This is work in progress.

There has been a good increase in the score for Asset Management Leadership taking it to 74%. The organisation continues to benefit from a very consistent and unambiguous messaging from senior leadership. Asset Management is beginning to be explicitly referenced in these (NR/CP6/SBP/OP09) and the routine they give to safety and business risk management, asset performance, financial prudence, diversity and continuous improvement is entirely conducive to good Asset Management practice and most are business as usual.

There is a need for more clarity on the specifics of the leadership challenges inherent in putting Asset Management thinking and practices at the centre of the business and this was acknowledged by a number of respondents. The Leadership Programmes (for Senior, Intermediate and Frontline Managers) need to be refreshed in this regard.

The Annual Leadership Conference is the cornerstone of the current approach to developing a coherent senior leadership cohort – in 2017 it was attended by around 250 senior leaders and around 100 other managers currently engaged in the Accelerated Leadership Programme. The evidence points to it having a decisive influence on the behaviours of senior managers (more lessons learned activities than in the past) and the beliefs of other managers and staff. This influence radiates out through a hierarchy of meetings including the National Engineering Conference, Joint Strategy meetings etc.

The use of Asset Management language seems much more pervasive than at the time of the previous assessment. This is particularly the case in maintenance performance reporting (NR/CP6/SBP/OP06), whole life cost audits of big programmes and the Asset Management assurance activities of DRAMs. It also appears to be finding its way into personal objectives, learning and development plans, learning activities and inductions but the evidence suggests it is too soon to claim that these are common practices across all Routes.

There appears to be a healthy awareness amongst senior respondents of the danger that Senior Leadership focuses its attentions on itself as opposed to the operational realities of the wider organisation, stakeholder interests or customer experiences.

The score for Organisational Structure has increased to 67% in this area as the previous tensions between Routes and Centre appear to have subsided. The following observations were made:

- Accountabilities for costs and performance now seem more consistent and comparable across the Routes than in the previous assessment.
- There still appears to be a mix of intended and unintended variations in the ways the Routes interpret and apply national strategies and policies.
- The matrix organisational structure which is drawing maintenance, renewals and operations together around technical authorities offers the prospect of a single management system that can serve many masters.
- The need for organisational stability is recognised in the 2018 Strategic Business Plan and creates a more certain context for embedding the new matrix structure.

Asset Management Teams in the Routes appear to have more deliberate, formal structures although there are concerns in some about the ability to find people with sufficient knowledge of the business to be effective in Asset Management roles.

The score for Organisational Culture has improved slightly since the end of CP4 to 68% and the following observations are made

All respondents had a clear sense of overall purpose and strategic direction and most agreed that this has much to do with the consistency of senior level messages on safety, putting the customer first, supporting the Routes, and the Better Every Day initiative. There are still questions about how effectively messages are cascaded through the management structure to front line staff, suppliers, customers and other stakeholders but these are recognised.

Senior management goals for the organisational culture are clear and as mentioned have been very consistent. Management commitment to these goals seems strong. Management systems and operating procedures are being aligned with them, for example the objective to update all the key engineering and operational standards by March 2018 using a risk-based approach aligned to the principles of Business Critical Rules (BCR). All in all, the evidence suggests that the organisation is becoming more outward looking, innovative and outcome-focused than previously and breaking the cycle of short term thinking.

However, the evidence also suggests that:

- More work needs to be done to align incentives across the organisation and its supply chain (including IP). This need is recognised in the 2018 Strategic Business Plan.
- There appear to be differences in the assumptions about functions being made by Routes and those underlying the emerging Matrix Organisation.
- More could be done to take the needs of, and impact on, customers and other stakeholders into account in Asset Management decision-making.

There has been a noticeable improvement in Competence Management and the score has improved to 69%. An Asset Management Competence Framework (AMCF) is in place (as

part of the E&AM Capability) to complement other CFs being used in recruitment, appraisals, training and development, career and succession planning (NR/CP6/SBP/OP03). AMCF integration is just starting. There is no auditable, assured regime yet. Different Routes and functions are at different stages. However, the evidence (NR/CP6/SBP/OP04, NR/CP6/SBP/OP02) indicates that the necessary leadership and resources are now in place to drive implementation which creates confidence that this can be achieved as planned (NR/CP6/SBP/OP01).

The Competence Management System on Oracle is being used to capture and present a significant amount of the capability (competence and capacity) although not all of it.

Most respondents think that the suite of Asset Management Training options now available (3-day IAM Certificate course, 1-day awareness course, e-learning module) give good value. RAMs appear keen to get their staff engaged and DRSAMs seem supportive.

The AM training being provided is helping embed AM thinking and practices by raising awareness of AM strategic planning and alerting staff (not just those in obvious AM roles) to the challenges of becoming an AM organisation and how their roles contribute to this. Route score cards appear to be helping in this respect.

There are a few issues which are holding back the scores. Corporate succession planning and manpower planning processes are in place, but these are not integrated yet with the competence frameworks and capability information. Some interesting tools have been developed locally to aid this integration, and some Routes have more formal succession management approaches than others, but too much information about talent availability appears to be in peoples' heads. The initial work (NR/CP6/SBP/OP05) done on progression paths by the E&AMCSG is encouraging and suggests that current variability in succession and manpower planning across the Routes is being addressed.

Good progress has been made on laying foundations for developing the competence of people in AM roles. Less attention has been given to AM teams where practices appear to vary from Route to Route.

Maintaining corporate knowledge and knowledge management is still challenging. There are some good local practices but these appear to be inconsistencies across Routes and functions both in terms of maintaining documents (e.g. on the e-business system) and of debriefing and handovers when staff are replaced.

Workforce planning is happening at Route level mainly in areas where infrastructure and equipment lifecycles are short but focused on implications of plans not strategic objectives with little evidence presented of it being aggregated to corporate wide forecasts.

4.6 RISK AND REVIEW

The Risk & Review Group contains all the Asset Management Activities associated with risk assessment, risk management, review and audit of the organisation's Asset Management System, ensuring that the continuous improvement loop is closed. There are nine Subjects in this Group which are:

- **Risk Assessment & Management**
  the policies and processes for identifying, quantifying and mitigating risk and enhancing opportunities.
- **Contingency Planning & Resilience Analysis**
  the processes and systems put in place by the organisation to ensure it is able to continue to operate its assets to deliver the required level of service in the event of an adverse impact such as a major weather incident, act of terrorism or major power failure.
- **Sustainable Development**
  an enduring, balanced approach to economic activity, environmental responsibility and social progress to ensure all Asset Management activities are sustainable in perpetuity.
- **Management of Change**
  the organisations processes for reviewing the impact on its Asset Management system of any major change.
- **Asset Performance & Health Monitoring**
  the processes and measures used by the organisation to assess the performance and health of its assets using performance indicators.
- **Asset Management System Monitoring**
  the processes used by the organisation to review the overall effectiveness of its Asset Management System in delivering its Asset Management Strategy and Objectives.
- **Management Review, Audit & Assurance**
  the organisation's processes for closing the 'plan-do-check-act' cycle and assuring that the organisation is achieving and continually improving its activities.
- **Asset Costing & Evaluation**
  the organisation's processes for defining and capturing maintenance and renewal unit costs and the methods used by the organisation for the valuation and depreciation of its assets.
- **Stakeholder Engagement**
  the methods an organisation uses to engage with stakeholders to articulate different scenarios within its strategic plans.

4.6.1 SCORE SUMMARY

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Risk Assessment & Management	65%	74%	R&R1	By the start of CP6 Network Rail should ensure risk management capability at Level 3 and below is embedded, ensuring full alignment with the requirements of the overall ERMF.
			R&R2	By the start of CP6 Network Rail should define a consistent framework or approach for asset risk which enables appropriately granular risk assessments at asset level, ensuring full alignment with the requirements of the overall ERMF.
Contingency Planning & Resilience Analysis	84%	86%	R&R3	No recommendations identified.
Sustainable Development	52%	58%	R&R4	By the start of CP6 Network Rail should publish the new Sustainable Development Vision and ensure it is fully briefed into the Routes and integrated into the broader Asset Management System.
Management of Change	56%	66%	R&R5	By the start of CP6 Network Rail should have fully embedded its change management capability, focusing on the systematic identification, management and realisation of benefits.
Asset Performance & Health Monitoring	80%	83%	N/A	No recommendations identified.
Asset Management System Monitoring	46%	70%	R&R6	By the start of CP6 Network Rail should update the Asset Management System Handbook to more accurately reflect the management review processes followed within Network Rail.
			R&R7	By the start of CP6 Network Rail should develop and implement a milestone plan for NAMR sessions to reflect annual and other periodic priorities.
Management Review, Audit & Assurance	63%	75%	R&R8	By the start of CP6 Network Rail should ensure all Asset Management review activity is effectively incorporated into the overall Asset Management System review structure.
Asset Costing & Evaluation	63%	69%	R&R9	Ensure the RMM is published externally in March 2018, and develop Volume 3 as soon as possible to fully support the continual improvement of Network Rail's maintenance unit cost approach.
Stakeholder Engagement	63%	74%	R&R10	By the start of CP6 Network Rail should establish a common and consistent methodology for validation of the achievement of stakeholder requirements at Route level.

Table 11: Summary of Maturity Scores for Risk and Review Group

4.6.2 SUMMARY OF FINDINGS

The overall score for the Risk and Review Group has increased by 8.8 percentage points since the last assessment to a current average of 72.7%. All Subjects in the Group have made progress since the end of CP4, and this is the most significant increase of all the Groups. It has been driven by far greater clarity around the definition of the Asset Management system and its review, and the demonstrable embedding of the Enterprise Risk Management and Assurance Frameworks.

The Risk Assessment & Management Subject has increased 9 percentage points since the end of CP4. This reflects the continued embedding, utilisation and updating of Network Rail's Enterprise Risk Management Framework (ERMF), contained in the Network Rail Risk Policy which aligns to ISO 31000 and Orange Book requirements (NR/CP6/SBP/RR01 & NR/CP6/SBP/RR02), under the governance of the Audit & Risk Committee (ARC). This is now fully rolled out and implemented from Levels 0 to 2, where strategic risk management processes are fully defined and well-established (based on bow-tie methodology implemented through Enterprise Risk Records (ERRs) – NR/CP6/SBP/RR03). Level 3 and below is now fully engaged in developing appropriate approaches (such as a common risk register approach) . The ERMF has been fully briefed at Route level (NR/CP6/SBP/RR04) and in some Routes specific process and guidance has been produced (NR/CP6/SBP/RR05).

The risk management culture within Network Rail is evident, and appears fully embedded at all levels, however, Centre support for the delivery levels (Level 3 and below) is not as structured as the Executive level (Levels 0 to 2). The Business Assurance Committee (BAC) has achieved this at the Executive and Directorate levels, as the Periodic Business Review (PBR) has done at the Route level. In general, staff understand the need to consider risks systematically, and plan using risk-based techniques. The most significant example of this is usage of the Corporate Risk Assessment Matrix (CRAM) to systematically help prioritise the CP6 Route Strategic Plans (RSPs) within all Routes sampled (NR/CP6/SBP/RR06, NR/CP6/SBP/RR07 & NR/CP6/SBP/RR08).

Another key observation of the implementation of the ERMF is the commitment to continual improvement. For example, the use of SharpCloud to capture and present the ERRs is now well embedded, and improvements such as the 'Portfolio Risk Story' have been completed. The 'Risk Trajectories' and the 'Control by Business Area' initiatives, to make effectiveness of controls over time and the scope of risk more visible, are ongoing. Below Level 2 Network Rail is free to use any approach as long as it complies with ERMF principles, however it is recognised that this is not yet well enough supported by the Centre. Current approaches include ARM, Primavera, @Risk, various spreadsheets and the ALCRAM level crossing risk model. Three eLearning modules have been designed to support staff in this area (NR/CP6/SBP/RR09), and a support portal containing risk assessment tools and approaches is being developed (NR/CP6/SBP/RR10).

Contingency Planning & Resilience Analysis has increased marginally since the end of CP4. The appointment of the Director of Incident Management & Operational Security (DIMOS) has for the first time brought many aspects of

fault and incident response together including operational security, the National Operations Centre (NOC), contingency planning and incident management preparedness. In this last area the introduction of Senior Incident Officers and Incident Officers in the Routes, coordinated by the DIMOS, is aiming to further professionalise and improve Network Rail's capabilities in responding to major faults and incidents.

Sustainable Development has also increased marginally since the end of CP4 by 6 percentage points. The Sustainable Development Strategy published in 2013 at the time of the CP5 SBP is still current, and its implementation continues as modified by the 'Believable Path' assessed at the time of the IIA assessment. A new Sustainable Development Vision (NR/CP6/SBP/RR11) has been written in draft to support the CP6 SBP which addresses:

- Reclassification of Network Rail as an arm's length public sector organisation;
- Network Rail's recent changes in structure based on the Shaw Report and other government enquiries;
- The changing external setting for sustainable development, particularly amongst rail industry peers (e.g. Crossrail) and supply chain partners; and
- Internal developments within Network Rail.

Reports from the Routes suggested that the current strategy was not as well understood at that level as it perhaps could be, but evidence of sustainable development awareness, initiatives and outcomes at the Route level was evident, for example minimising energy consumption and waste (NR/CP6/SBP/RR12 & NR/CP6/SBP/RR13). Looking forward, however, the requirements of the sustainable development strategy have been confirmed in the CP6 business planning guidance and in the Sustainable Development Short Form Strategy, and assurance of the RSPs tests their inclusion.

The Sustainable Development Vision will form part of a broader Environmental Strategy, which in turn supports the introduction of a new ISO 14001 compliant Environmental Management System (EMS – as part of the broader Integrated Management System) which will be live in March 2018. The Level 1 Environment & Social Performance Policy (NR/CP6/SBP/RR14) includes four main themes: social performance, environment, energy and carbon, and weather resilience and climate change adaptation. The Level 2 standards which support this policy cover the requirements for design, operations and maintenance, many of which are already in existence.

The Weather Resilience & Climate Change Adaptation (WR&CCA) plans put into place in the Routes by the end of CP4 are still being delivered within the Routes with reporting to Defra every five years (next due 2020). A new WR&CCA strategy for 2017 to 2019 will be published in February 2018 (NR/CP6/SBP/RR15) which contains four main elements:

- Analyse risks and costs
- Integrate into business as usual
- Streamlining operational weather management
- Proactive investment

Progress in all these areas is already evident in various current processes and initiatives including the new EMS, weather preparedness (365 Process), and investments identified in the Route Strategic Plans. Governance is in place in the form of the weather Resilience Group (NR/CP6/SBP/RR16).

Management of Change has increased by 10 percentage points since the end of CP4. This is being driven by the increased consistency and application of change management within Network Rail as defined in the MSP4NR framework first introduced at that time. MSP4NR is now well embedded and there is evidence that it is being widely and consistently used across a range of projects and initiatives. There is a new Business Change Director who has three main objectives for CP5:

- Do change in the right way – MSP4NR is now five years old, well embedded and continually improved to reflect good practice. This is described in more detail in the Business Change Policy (NR/CP6/SBP/RR17).
- Change capability - the introduction of a competence framework with three main roles (Senior Responsible Owner, Programme Manager and Business Change Manager – NR/CP6/SBP/RR18) is complete, plus the Business Change Newsletter and knowledge share events (including institute of Change Management).
- Right change programmes – realisation that many change programmes were underway but not necessarily as coordinated as they should be, particularly with respect to benefits. An executive focus on this has led to the appointment of a Transformation Director and the 'Delivering for our Customers' initiative.

The ability of Network Rail to deliver change more effectively has been underpinned by the introduction of formal change capability within the Routes. Change Directors have been in place for two years now. The specific organisational structure supporting the Change Directors varies between Routes but within a Board approved templated structure. The Change Directors have responsibility for the oversight of all change initiatives in the Route (NR/CP6/SBP/RR19). This varies according to Route needs, for example in Western Route it is split broadly into three areas: local projects, national programmes and infrastructure readiness (for example CrossRail). Each programme has a Senior Responsible Owner who is responsible for delivering the benefits identified. There has been some concern that the benefits identified in many change projects and programmes have not been delivered, but that many of these were defined prior to the current change capability being in place. Benefits are now more clearly defined, allocated and monitored across the change portfolio (NR/CP6/SBP/RR20).

Change Governance is in place at two main levels. The Change Portfolio Group oversees coordination of national programmes, owns the MSP4NR framework and provides assurance on the national programme (NR/CP6/SBP/RR21 to NR/CP6/SBP/RR23). There are also Route Portfolio Steering Groups in place which provide Route-level governance (NR/CP6/SBP/RR24 & NR/CP6/SBP/RR25).

Asset Performance & Health Monitoring continues to be an area of strength for Network Rail, increasing marginally by 3 percentage points to 83% since the end of CP4. There is a clearly defined meeting structure in place, mostly defined by the Business Performance Management

Framework (BPMF – NR/CP6/SBP/RR26), of which the Asset Technical Reviews (ATRs) and Asset Stewardship Reviews (ASRs) drive the national monitoring of asset-specific condition and health information (NR/CP6/SBP/RR27 & NR/CP6/SBP/RR28). In general, the National and Route Scorecards provide the overall set of KPIs that are reviewed (NR/CP6/SBP/RR29 & NR/CP6/SBP/RR30) with a range of asset-specific and Route-level indicators in place to support more detailed review of asset performance and health. For example, the Composite Reliability Index (CRI) and the Composite Sustainability Index (CSI) or the Track Stewardship report (NR/CP6/SBP/RR31 & NR/CP6/SBP/RR32) provide the national, reportable view of overall infrastructure reliability and condition. Local daily, weekly and monthly reliability information is available, plus Route Dashboards and other asset-specific information such as detailed structures or track condition information (NR/CP6/SBP/RR33 to NR/CP6/SBP/RR35).

Management Review, Audit & Assurance has also improved significantly since the end of CP4 to 75%. The update to the Network Rail Assurance Framework in December 2017 to incorporate the '3 Lines of Defence' model that the organisation has been following since devolution means that this document now much better reflects the actual assurance activities being undertaken in the organisation (NR/CP6/SBP/RR36). It is also notable that the approach is widely understood within Network Rail and consistently adopted – for example the IP Assurance approach described in more detail in Section 4.3 on Lifecycle Delivery (NR/CP6/SBP/RR37). The Chief Engineer also reflects the 3 Lines of Defence model as shown in Figure 15 below, and his Strategic Plan puts in place a set of objectives and actions which will further integrate Network Rail's Asset Management approach and focuses on a risk-based approach to assurance (NR/CP6/SBP/RR38).

Level 3: Independent Challenge & Assurance Independent & Regulator Audit	• Independent External audits e.g. ORR • Internal Audit (Group Finance) • GALP • ORR Inspection Plan
Level 2: Corporate Oversight Strategic Management, Policy & Procedure Setting, Functional Oversight, Assurance Panels	• Engineering Verification • 'Deep Dive' Reviews • Functional Audits (Topic & Management System) • Principal Contractor Licensing • Plant Operations Scheme Audits
Level 1: Management Control Established Risk & Control Environment	• Route/Region/Project Compliance Monitoring • Inspections & Safety Conversations • Management Reviews & Advisory Visits • Plant Operations Scheme Site Monitoring • Self-Assurance

Figure 15: The Chief Engineer's 3 Lines of Defence

Asset Management System Monitoring has increased significantly since the end of CP4 to 70%. As discussed in Section 4.1 on Strategy & Planning, the Asset Management System has been more clearly defined within the revised Asset Management System Handbook (NR/CP6/SBP/RR39). This aligns the 'Review & Learning' phase with Network Rail's overall Assurance Framework (3 Lines of Defence model) discussed above. The National Asset Management Review (NAMR), which was noted as being defined in the BPMF but discontinued at the time of the IIA assessment, has been reinstated with at least four quarterly reviews completed between December 2016 and November 2017 (NR/CP6/SBP/RR40). There does not appear to be a fixed agenda for the NAMR, but it does cover updates on the implementation of key initiatives such as Digital Railway, Asset Management capability as well as updates on assurance activities and the opportunity to discuss good practice approaches, for example for Asset Technical Reviews (NR/CP6/SBP/RR41). The overall Chief Engineer's meeting governance structure is shown in Figure 16 below.

The NAMR is defined as the key review mechanism for the Asset Management System in the Asset Management Handbook, but there is no milestone plan for the NAMR session with agendas created according to immediate need. Other Asset Management assurance activities are undertaken but for different audiences, for example the Asset Management Summary Assurance Report for RF2 which was completed for Excom (NR/CP6/SBP/RR42). There are therefore still improvement Network Rail can make to improve the integration of these review activities.

Asset Costing & Evaluation has also improved to 69% since the end of CP4. The Rail Method of Measurement, which has now been the default cost-planning approach for

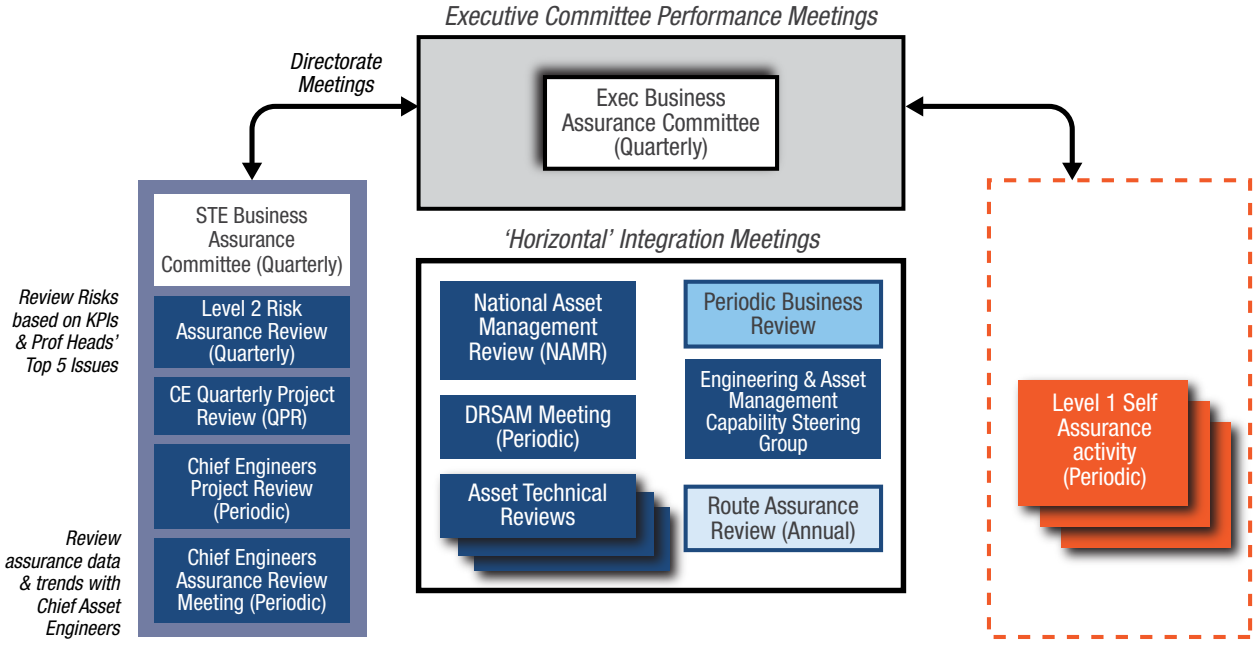

Figure 16: Chief Engineer's Governance Meeting Structure

the last four years will be formally issued in March 2018 for external use. The content of the three volumes, which were due to be published in December 2016, has now been revised. Volumes 1 and 2, which external to Network Rail usually define the architecture and measurement system respectively, have been combined into a single Volume 1. Volume 2 will now be a cost model compendium, containing the 236 cost models (known as RACMs) designed to support the CP6 RSPs. The new Volumes 1 and 2 are planned to be published externally in March 2018. Volume 3 will support the maintenance cost models that have underpinned the Activity Based Planning (ABP) Tool.

The ABP Tool emerged from the ABP initiative described at the time of the IIA assessment, which has rationalised and standardised maintenance standard jobs into a prioritised list of 568 jobs out of approximately 5,000 standard jobs that accounted for 98% of Network Rail's volumes. The ABP Tool has been consistently utilised within the Routes to plan for CP6. It takes standard jobs from Ellipse, RAM volumes, DU finance figures and provides costs, headcount, overtime, plant and other costs as outputs. The core specification is the Ellipse standard job – but the value of the job is derived locally. It therefore will allow analysis and benchmarking of maintenance unit costs across Network Rail, but has not yet been used in the way (NR/CP6/SBP/RR43 to NR/CP6/SBP/RR45).

Stakeholder Engagement has improved by 11 percentage points to 74% since the end of CP4. This is due to a very clear and effective approach to engaging Network Rail's key stakeholders at both the national and Route levels. This operates at three levels: Government (DfT) and other funders, operators and Routes, and the ORR. At all levels the approach used is mature and has been further developed under the devolved framework now being pursued to enable Route-based regulation (NR/CP6/SBP/RR46 & NR/CP6/SBP/RR47).

There is no one system for engaging stakeholders, but there are tried and tested systematic approaches at each of the three levels which continually improve on each iteration. For example, new guidance for systematically engaging stakeholders at Route level underpins the development of all Route Strategic Plans (NR/CP6/SBP/RR48). Scotland Route utilised this guidance by analysing the HLOS and have specified plans to meet all requirements. These have been qualitatively reconciled with the top 10 passenger priorities and assessed during two all-day workshops with stakeholders and published in Section 2 and App J of the Scotland RSP (NR/CP6/SBP/RR49).

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The overall conclusions to this assessment are:

1) Network Rail has achieved the 72% regulatory target in three of the six Groups within the specified confidence limits (Strategy & Planning, Asset Information and Risk & Review).

2) Network Rail has achieved 70% in one of the Groups within the specified confidence limits (Lifecycle Delivery).

3) Network Rail has missed the 72% regulatory target in two of the six Groups (Asset Management Decision Making and Organisation & People) although the confidence limits suggest that 70% may have been achieved.

4) Network Rail has now achieved a level of Asset Management capability maturity which is at least effective in all areas, excellent in a number of areas and is well placed to deliver continually improving performance throughout CP6.

5) The most significant progress has been made within the Strategy & Planning and Risk & Review Groups. This is primarily a result of the improved coordination and integration of Network Rail's Asset Management approach nationally and between the Centre and the Routes. This has been made effective through a much clearer organisational design and consistently applied systems and frameworks such as the Asset Management, Enterprise Risk Management and Assurance Frameworks.

6) Network Rail now has in place an organisational structure which fully supports the devolved organisation, and many of the risks identified with devolution in the previous two assessments are now being managed effectively.

7) The high-level split of System Operator and Safety, Technical & Engineering (STE) has clarified the national support and direction for capacity / timetable development and assurance activities respectively, and the

role of STE as the Technical Authority has been integral in driving the improvements observed during this assessment through the effective definition and implementation of national frameworks and assurance.

8) The Asset Management System has now been further defined within the Asset Management System Handbook and effectively implemented throughout the organisation. The review and update of this has also been much more clearly defined within the Chief Engineer's organisation within STE and aligned to the requirements of the Assurance and Enterprise Risk Management Frameworks.

9) The most obvious sign of the successful implementation of the Asset Management System is the preparation of CP6 plans. This is now Route-based with improved alignment to national objectives and local stakeholders. Both of these aspects have been driven by national guidance which appears to have been consistently and effectively applied.

5.2 RECOMMENDATIONS

The recommendations made in this report are reproduced in the following tables.

5.2.1 STRATEGY & PLANNING

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Asset Management Policy	63%	72%	S&P1	To continue the development of a best practice IMS Network Rail should demonstrate full alignment of the Performance Management/ Assurance Framework, Business Process Model, Asset Information Model and Technology and Data Architectures with the completed Enterprise Process Architecture by 2020.
			S&P2	In order to align with the requirements of ISO 55001, Network Rail Routes should define the scope, boundaries and roles of Route specific Asset Management Systems with respect to Network Rail Centre, the Routes and the relationship with the Integrated Management System by the start of CP6.
Asset Management Strategy & Objectives	63%	73%	S&P3	By the start of CP6, Network Rail should demonstrate how the new Asset Management Strategy has been effectively embedded in the organisation.
Demand Analysis	68%	75%	S&P4	By the start of CP6, Network Rail should specify the programme for the development, rollout and continual improvement of Continual Modular Route Planning.
Strategic Planning	64%	78%	S&P5	Network Rail should refine and embed the Continual Business Planning approach, including management of changes in Enhancement plans, from the start of CP6.
Asset Management Planning	70%	76%	S&P6	By the midpoint of CP6, Network Rail should systemise the Continual Business Planning process and the bottom-up workbanks it is based on.

5.2.2 ASSET MANAGEMENT DECISION-MAKING

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Capital Investment Decision-Making	73%	78%	AMDM1	By the start of CP6, Network Rail should define the requirements for using whole-lifecycle cost tools for renewal decisions within the Routes and assure they are used where required.
Operations & Maintenance Decision-Making	53%	62%	AMDM2	By the start of CP6, Network Rail should demonstrate how the revised Maintenance Strategy has been effectively embedded in the organisation.
			AMDM3	By the start of CP6, Network Rail should establish a cost-risk optimisation based maintenance definition process and quantify the associated potential efficiencies.
			AMDM4	By the start of CP6, Network Rail should improve the Intelligent Infrastructure Strategy programme scoping to include a stronger focus on FMEA as well as opportunities identified by Routes.
Lifecycle Value Realisation	57%	69%	AMDM5	By the mid-point of CP6, Network Rail should refine the existing suite of Whole-Life Cycle cost models to include full lifecycle impacts of maintenance interventions for priority assets.
Resourcing Strategy	65%	69%	AMDM6	By the start of CP6, Network Rail should establish a strategic approach for the optimal management of resources on a national basis to deliver plans and achieve objectives as efficiently as possible.
Shutdowns & Outage Strategy	65%	70%	AMDM7	By the start of CP6, Network Rail should have completed and embedded across the organisation, including in Continuous Business Planning, the Work and Access Planning process element of the National Engineering Access Framework.

5.2.3 LIFECYCLE DELIVERY

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Technical Standards & Legislation	62%	70%	LCD1	By the start of CP6 Network Rail should consider introducing a more systematic way of planning where Network Rail wishes to influence external standards and regulations bodies and what engagement is required to achieve this.
			LCD2	By the start of CP6 Network Rail should implement risk-based decision-criteria and overall process to demonstrate to stakeholders that required levels of compliance will be achieved.
Asset Creation & Acquisition	79%	81%	N/A	No recommendations identified.
Systems Engineering	75%	76%	LCD3	By the start of CP6 Network Rail should finalise and embed the 'Requirements, V&V and ECC master model', and fully align with the Digital Railway cross-industry systems integration approach.
Configuration Management	56%	58%	LCD4	By the start of CP6 Network Rail should develop a framework to identify Network Rail's configuration management requirements and under what circumstances these are applied, based o the criticality of the assets in question.
Maintenance Delivery	78%	78%	N/A	No recommendations identified.
Reliability Engineering	53%	61%	LCD5	By the start of CP6 Network Rail should improve the coordination and integration of reliability growth across disciplines and nationally to ensure the most effective and efficient approach to improving reliability is implemented.
			LCD6	By the start of CP6 Network Rail should complete alignment of the common failure mode lookup table for FMS/FCL to the maintenance FMECAs.
Asset Operations	76%	77%	N/A	No recommendations identified.
Resource Management	59%	62%	LCD7	Ensure the ABP Tool is fully utilised by the start of CP6 to monitor and benchmark maintenance activities and costs.
Shutdown & Outage Management	60%	63%	LCD8	By the start of CP6 Network Rail should fully implement and monitor the benefits of NR/L2/OPS/202 and NR/L2/OCS/303 to improve the systematic allocation of resources to possession work.
Fault & Incident Response	74%	76%	N/A	No recommendations identified.
Asset Decommissioning & Disposal	73%	78%	LCD8	Provide more systematic consideration of decommissioning plans within the CP6 RSPs.

5.2.4 ASSET INFORMATION

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Asset Information Strategy	83%	79%	AI1	By December 2018 further enhance the Intelligent Infrastructure Strategic Plan to present an Asset Information Strategy that effectively integrates the associated Data, Technology, IT Systems and Governance strategies. Complete detailed definition of the Intelligent Infrastructure programme plan, including detailed alignment to the associated Business Architecture and Asset Management Framework.
Asset Information Standards	75%	76%	AI2	By the end of CP6 and to support the Intelligent Infrastructure Programme: • refine the Asset Information Specifications (AIS) to define the full scope of attributes related to the asset lifecycle such as cost and performance • fully embed the AIS Viewer across the Routes
			AI3	By the end of CP6 ensure that the 'Exchange of Asset Information' tool-set has been implemented, and that related business processes are in place that adhere to MADR.
Asset Information Systems	63%	70%	AI4	By the end of CP6 complete implementation of the Activity Based Planning (ABP), SharpCloud and PowerBI solutions to ensure consistent use across all Routes, managed by Route Services IT on an enduring platform.
Data & Information Management	59%	72%	AI5	By the start of CP6 fully embed the ADG Framework across the Routes, including the provision of necessary workstreams within the Intelligent Infrastructure Programme.

5.2.5 ORGANISATION & PEOPLE

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Procurement & Supply Chain Management	73%	71%	O&P1	Improve effectiveness of processes to enable dialogue and feedback on Asset Policies and Supplier performance between Routes, Procurement and Suppliers including IP.
				Define the desired future Supply Chain capability and how Network Rail will engage and work with Suppliers to achieve this.
				Review the competence implications of the desired future Supply Chain capability for Procurement staff
Asset Management Leadership	69%	74%	O&P2	Define and prioritise the specific leadership challenges of embedding AM thinking and practices and align management development programmes with these
Organisational Structure	55%	67%	O&P3	Bring the same level of attention being brought to individual competences and role progression to the design of teams and the review of team performance
				Produce long term forecasts for the overall workforce together with a strategy for its development across the Routes
Organisational Culture	67%	68%	O&P4	Define the culture changes needed in different parts of the business to support AM implementation and develop a strategy for achieving these
Competence Management	66%	69%	O&P5	Continue the integration of the AMCF and AM role pathways as currently planned by E&AMCSG
				Review Succession Planning practices and identify how these can be revised to take wider organisational needs into account including how talent information is captured and disseminated.

5.2.6 RISK AND REVIEW

Subject	End of CP4	CP6 SBP	Ref	Recommendations
Risk Assessment & Management	65%	74%	R&R1	By the start of CP6 Network Rail should ensure risk management capability at Level 3 and below is embedded, ensuring full alignment with the requirements of the overall ERMF.
			R&R2	By the start of CP6 Network Rail should define a consistent framework or approach for asset risk which enables appropriately granular risk assessments at asset level, ensuring full alignment with the requirements of the overall ERMF.
Contingency Planning & Resilience Analysis	84%	86%	R&R3	No recommendations identified.
Sustainable Development	52%	58%	R&R4	By the start of CP6 Network Rail should publish the new Sustainable Development Vision and ensure it is fully briefed into the Routes and integrated into the broader Asset Management System.
Management of Change	56%	66%	R&R5	By the start of CP6 Network Rail should have fully embedded its change management capability, focusing on the systematic identification, management and realisation of benefits.
Asset Performance & Health Monitoring	80%	83%	N/A	No recommendations identified.
Asset Management System Monitoring	46%	70%	R&R6	By the start of CP6 Network Rail should update the Asset Management System Handbook to more accurately reflect the management review processes followed within Network Rail.
			R&R7	By the start of CP6 Network Rail should develop and implement a milestone plan for NAMR sessions to reflect annual and other periodic priorities.
Management Review, Audit & Assurance	63%	75%	R&R8	By the start of CP6 Network Rail should ensure all Asset Management review activity is effectively incorporated into the overall Asset Management System review structure.
Asset Costing & Evaluation	63%	69%	R&R9	Ensure the RMM is published externally in March 2018, and develop Volume 3 as soon as possible to fully support the continual improvement of Network Rail's maintenance unit cost approach.
Stakeholder Engagement	63%	74%	R&R10	By the start of CP6 Network Rail should establish a common and consistent methodology for validation of the achievement of stakeholder requirements at Route level.

APPENDIX A
REVIEW OF IIA SUBJECT LEVEL FINDINGS

At the publication of the IIA assessment, Subject-level findings were summarised according to the following format:

- **Completeness of Process, Artefact or Capability?**
  is the process underpinning this Subject capability fit for purpose, aligned and integrated across the business? Does it reflect current good practice in this Subject?
- **Communicated & Understood?**
  is the process fully communicated and understood by those who need to know? Do they demonstrate a clear understanding of how the process integrates with Network Rail's broader Asset Management System and are they clear on how it will be used to deliver Asset Management objectives?
- **Effectively Applied?**
  is the process effectively applied where it needs to be? Is there evidence that the process is effectively applied where it needs to be applied, and is there evidence that it has been effectively embedded and continually improved over time?
- **Results in Required Outcome?**
  is there evidence that the process has produced the required outcome? If not, is there evidence that this is understood and continual improvement or process refinements are in place?

The following tables provide an update to the IIA findings in a similar format.

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STRATEGY & PLANNING

No.	Subject	SBP Maturity Score	Completeness of Process, Artefact or Capability?	
1	Asset Management Policy	72%	Asset Management System well defined and documented. Asset Management Policy updated and due for publication with SBP.	
2	Asset Management Strategy & Objectives	73%	Asset Management Objectives well defined, disaggregated and built into RSPs. Revised Asset Management Strategy recently published as part of SBP.	
3	Demand Analysis	75%	Good practice process across HLOS, LTPP, Market Studies, Route Studies and into RSPs.	
4	Strategic Planning	78%	Revised process better defined, with clear milestones and iterations.	
5	Asset Management Planning	76%	Asset class workbanks established across all Routes and supported by ABP for DUs.	

	Communicated & Understood?	Effectively Applied?	Results in Required Outcome?
	Asset Management System communicated with senior teams in Routes. Revised Asset Management Policy developed with DRSAMS and RMDs but not yet published or widely communicated.	Overall approach built in through Asset Policies, Strategic Planning Process and guidelines, Whole-Life-cycle models, etc. Asset Management System governance now systematic.	Revised Asset Management Policy still to be published but current version well embedded. Clarity of boundaries in Asset Management System required to enable Routes to 'align' with ISO55001.
	Asset Management Objectives built into RSP templates and guidance. Revised Asset Management Strategy recently published as part of SBP but not yet fully embedded.	Asset Management Objectives have driven Route strategic planning approach. Revised Asset Management Strategy, recently published as part of SBP, summarises and integrates a range of individual existing strategies.	Better alignment of objectives and plans and clearer drivers for RSPs. Asset Management Strategy provides better clarity of interfaces between various strategies and initiatives.
	Well understood by those with direct involvement and better planning and guidance on stakeholder management.	Route Studies developed for nearly all Routes, supported by specifications and other documentation.	Route Studies in place to support Route planning and will be enhanced via Continual Modular Route Planning.
	Routes all supported clear communication and guidance for plans and scenarios.	Progress ahead of previous iterations and supported by clearer overall framework and RSP templates.	Clear approach and process to development and refinement of scenarios – from initial unconstrained to CP5+15%.
	Rolling Forecast and ABP planning requirements well defined, communicated and guided.	Developed and published in line with milestones and process and subject to extensive and systematic STE, Finance and BRT review as part of Rolling Forecast assurance process.	Ongoing delivery issues identified during CP5 mitigated by earlier development and maturing of workbanks supported by better delivery assurance and earlier planning, but still to be proved.

ASSET MANAGEMENT DECISION-MAKING

No.	Subject	SBP Maturity Score	Completeness of Process, Artefact or Capability?	
6	Capital Investment Decision-Making	78%	Clear framework from condition assessment to GRIP, supported by Asset Policies and WLC models.	
7	Operations & Maintenance Decision-Making	62%	Revised Maintenance Strategy and new Intelligent Infrastructure Strategy established and ABP established for CP6 planning. RCM2 process under RBM programme well established but no supporting CRO process developed.	
8	Lifecycle Value Realisation	69%	WLC models continue to be enhanced with improving condition and deterioration data and development of ALPs. Aging assets and asset rationalisation processes well established at individual Route level.	
9	Resourcing Strategy	69%	No clear strategy established nationally. Deliverability reviews and strategic resource planning were in place at Route level but vary by Route.	
10	Shutdown & Outage Strategy	70%	No overall access strategy identified. Managed at Route level but approach varies by Route. National Engineering Access Planning Framework in early development stage.	

	Communicated and Understood?	Effectively Applied?	Results in Required Outcome?
	Overall framework well understood and communicated via Asset Policies, GRIP processes, SICA, etc.	Overall framework well applied. Lack of direct Route adoption of WLC models at time of assessment.	Investment plans well verified and managed, linked to wider system by Asset Policies and WLC models.
	Revised Maintenance Strategy not fully embedded in Route teams interviewed. New Intelligent Infrastructure Strategy and approach still developing. RCM2 and ABP well understood by DUs.	RCM2 coverage extended but actual application across asset base still limited. No formal cost-risk optimisation application. ABP applied in CP6 planning.	Positive developments with respect to new Maintenance and Intelligent Infrastructure Strategies and ABP but benefits still to be demonstrated. Full RBM not yet established.
	Lifecycle approach by asset class well captured in Asset Policies and Whole-Lifecycle Cost tools. Regularly communicated via updates and technical reviews and forums.	WLC models systematically applied at centre and in support of Routes.	Confidence in modelled capital costs and volumes better than ever, supported by learning from improved data sets for asset condition and deterioration but limited maintenance cost & volume analysis
	Central plant and access booking processes well understood but national strategy and guidance on or framework for use of human resources not communicated.	Route based approach is effective but may not be optimal across the organisation.	No clear strategy to measure against and delays in delivery noted during CP5 with specific issues such as Signalling skills identified. Earlier and more rigorous planning in place for CP6.
	Current approach well understood at various levels of involvement. New National Engineering Access Framework will require strong change management.	Improved cross-industry stakeholder involvement at Route specific level and Route based approach is effective but may not be optimal across the organisation.	Access identified as a key challenge for all Routes. No clear national framework yet established but each Route working more effectively with TOC/FOCs and other stakeholders. Shorter-term tactical process is subject to significant review and assurance.

LIFECYLE DELIVERY

No.	Subject	SBP Maturity Score	Completeness of Process, Artefact or Capability?	
11	Technical Standards & Legislation	70%	Three main registers are used to maintain a view of compliance - the H&S Legal Register, the Environmental Register and the Legal Panel Horizon Scanner & Legislative Tracker. The level of compliance is monitored full time by one of the Chief Systems Assurance Engineer's staff	
12	Asset Creation & Acquisition	81%	Good practice P3M Framework established which clearly sets out Requirements Management, Assurance and GRIP Programmes / Projects	
13	Systems Engineering	76%	Good practice and well established systems engineering approach embedded in GRIP methodology, and the Systems Analysis Group	
14	Configuration Management	58%	There are a range of configuration management approaches within NR, which are not necessarily consistent or appropriate, and there is no overall framework for when such an approach would be appropriate	
15	Maintenance Delivery	78%	Processes for maintaining the assets are well established and embedded	

	Communicated and Understood?	Effectively Applied?	Results in Required Outcome?
	Company Standards & Control Group now has role of ensuring clear management and communication of standards development and changes throughout the business	Network Rail is developing a systematic approach to understanding its compliance status with external regulations and standards focused on the CS&CG	Lack of clarity with respect to identifying and funding rectification of non-compliances for CP5 (e.g. Electricity at Work Act) led to issues rectifying these non-compliances during CP5.
	Good understanding of P3M Framework elements within the IP and supplier community as required	Some variation in the quality of GRIP application, but improved Assurance through the P3M Framework	Historical evidence of specific project and programme failures, and general concern over meeting planned milestones and costs, however performance is now improving.
	Good understanding of GRIP requirements within the IP and supplier community as required. Good understanding of Systems Analysis Group's products where needed	Some variation in the quality of GRIP application, which is being rectified through the P3M3 programme – specifically the iELC initiative. Some System's Analysis Group processes not mandatory.	Two examples – Level of Control (LOC) procedure has not been consistently applied and Route Requirements Documents (RRDs) are rarely effectively filled in, however both these issues appear to be being effectively addressed on completion of P3M actions.
	No clear understanding of what configuration management is amongst Network Rail staff, with some exceptions	No process to apply – individual asset change management processes to support various systems (e.g. Ellipse, Relay Database, OHL Protection)	Reliance on reactive verification of configuration – e.g. validation of Project Requirements Specification (PRS) documentation if sourced from Ellipse
	Processes for maintaining the assets are well established and embedded	Processes for maintaining the assets are well established and embedded	Processes for maintaining the assets are well established and embedded

LIFECYLE DELIVERY (CONTINUED)

No.	Subject	SBP Maturity Score	Completeness of Process, Artefact or Capability?	
16	Reliability Engineering	61%	Network Rail has built up an effective level of capability in this area over the years, focusing on the development of the NIRG and the RIRGs. However, reliability initiatives are not coordinated as part of an overall Reliability Growth Plan aligned to the AM objectives.	
17	Asset Operations	77%	Processes for operating the assets are well established and embedded	
18	Resource Management	62%	Resources are managed at the Route, and specifically at the DU level. Alignment with the AM plan is not improved for CP6 through the ABP Tool	
19	Shutdown & Outage Management	63%	Processes for managing possessions are well established, but not within an overall Possession Strategy	
20	Fault & Incident Response	76%	Processes for responding and rectifying faults and failures on the assets are well established and embedded	
21	Asset Decommis-sioning & Disposal	78%	Processes for decommissioning and disposing of assets are well established and embedded	

	Communicated and Understood?	Effectively Applied?	Results in Required Outcome?
	The NIRG / RIRG approach is well communicated and understood, and some of the specific Systems Analysis Group products are now being better communicated and understood	Central reliability group has been disaggregated across the new engineering organisation, and individual roles have now been filled and clarified	NR's headline reliability performance has continued to improve over recent years, although the NIRG / RIRG focus has shifted from managing underlying reliability through to Service Affecting Failures (SAFs)
	Processes for operating the assets are well established and embedded	Processes for operating the assets are well established and embedded	Processes for operating the assets are well established and embedded
	Resources are managed at the Route, and specifically at the DU level. Alignment with the AM plan is not improved for CP6 through the ABP Tool	Resource planning for CP6 driven by the ABP Tool, so traditional 'top-down' now being replaced	Use of the ABP Tool should improve the deliverability of NR's plans, which often rely on overtime and third parties to meet requirements
	Processes for managing possessions are well established but not always executed effectively	Lack of formal process for establishing lessons learned and continually improving approach	Lack of formal process for establishing lessons learned and continually improving approach
	Processes for responding and rectifying faults and failures on the assets are well established and embedded	Processes for responding and rectifying faults and failures on the assets are well established and embedded	Issues with the implementation of the Fault Code Lookup (FCL) iPhone App are fully resolved
	Processes for decommissioning and disposing of assets are well established and embedded	Processes for decommissioning and disposing of assets are well established and embedded	Processes for decommissioning and disposing of assets are well established and embedded

ASSET INFORMATION

No.	Subject	SBP Maturity Score	Completeness of Process, Artefact or Capability?	
22	Asset Information Strategy	79%	Original Asset Information Strategy was completed, embedded and continually improved. Significant update to strategy underway as the Intelligent Infrastructure programme is further defined.	
23	Asset Information Standards	76%	Suite of Asset Information Standards in place, centred on the Asset Information Specification. These provide detail of necessary data model to meet the majority of Asset Information needs. Further development required.	
24	Asset Information Systems	70%	Extensive suite of IT systems in place to serve the Asset Management process and decision needs of Network Rail staff. Improvement in the use of Ellipse as a core solution and the introduction of GeoRINM. Further improvement in Decision support tooling and go-live of CSAMS required.	
25	Data & Information Management	72%	The Asset Data Governance framework is embedded, with roles and responsibilities and management system in place.	

	Communicated and Understood?	Effectively Applied?	Results in Required Outcome?
	Routes are generally aware of the scope and goals of Intelligent Infrastructure. Routes have been consulted on needs and priorities as the programme has developed. Communication and embedding of a consolidated and integrated Asset Information Strategy version is recommended.	The emerging Intelligent Infrastructure Strategic Plan and supporting presentations have been extensively used for stakeholder engagement and to support further refinement of the high-level programme. Relevant CP6 SBP Asset Information Strategy content has only just been released in the revised Asset Management Strategy.	Intelligent Infrastructure Strategic Plan in its current form provides guidance on scope, objectives, responsibilities and a high-level programme. It requires further definition of scope and an update to present alignment to other programmes, strategies and the Asset Management System.
	Routes and Central programmes aware of standards and their use. The development of the Asset Information Specification Viewer allows users to better understand information requirements.	Specific standards related Minimum Asset Data Requirements including the ORR A2 data quality measures are effectively applied. Wider attributes (i.e. Risk, Cost) not fully applied.	Good base line model to define the data attributes that Network Rail require is in place. Effectively used in data quality processes. Scope of Asset Information Standards needs further refinement with alignment to Conceptual Information Reference Model.
	Network Rail staff understand in general which IT systems provide which elements of the Network Rail information model, and who is responsible for that system. Some improvement in communicating the end to end system process is required.	IT systems are generally well implemented to support process and decisions. Some improvements required in seamlessly switching between systems to support a requirement.	The majority of users are satisfied with key systems, but further integration, and increased scope of decision support tools is required.
	In general the routes understand current data management processes, including MADR and ORR A2 data quality measures. The ADG framework does require further embedding in certain routes and asset classes.	Current data quality measures are well applied. Including some data validation at point of entry. Scope of data quality audits and reports could be increased.	Data quality is improving, based on tactical initiatives and IT systems enhancement. Some asset classes and 'information layers' require better data quality management.

ORGANISATION AND PEOPLE

No.	Subject	SBP Maturity Score	Completeness of Process, Artefact or Capability?	
26	Procurement & Supply Chain Management	71%	Gateway and BRAVO processes well defined and consistent with good practice	
27	Asset Management Leadership	74%	Current leadership ethos and development processes compare to best in class	
28	Organisational Structure	67%	Network Rail has defined quite clearly how interfaces, roles and relationships should work in a matrix organisation but this is still being embedded.	
29	Organisational Culture	68%	Evidence of a much more focused approach to shaping the culture of the business than in previous assessments when the approach was less well-defined	
30	Competence Management	69%	An AMCF is now in place to give structure and measurement to the definition of AM roles and progression paths between them	

	Communicated and Understood?	Effectively Applied?	Results in Required Outcome?
	Routes are positive about new opportunities to exploit local supplier relationships	Processes for dialogue and feedback between Routes, Procurement and Suppliers not fully effective	National supply category management effective, but opportunities for further national scale economies persist, delivery is still more important than value in many minds, and future desired supply chain capabilities are not defined
	DRAMs have taken ownership of AM and ISO 55001 conformity – team development and AM practices vary across Routes	Centre provides training, tools and support that the Routes are routinely using to develop people in, and prepare people for, AM roles	Leadership development not geared specifically to the challenge of embedding AM
	Clarity should enable the kind of cross functional information sharing, collective learning and evidence based decision-making that characterise effective AM	Good early signs that Routes are speaking the same language about performance and improvement priorities	A long-term plan for the development of the Workforce would provide a better basis for measuring impact of plans and programmes in this area.
	Evidence of staff engagement and alignment with messages cascading from Annual Leadership Conference	Greater clarity around organisational purpose and direction, reinforced by Route performance indicators, appears to be having the desired effect on staff attitudes and beliefs	Realising the desired workplace performance and behaviour is dependent on how well management systems are aligned and how operational management responds
	AM is more central to the framing of personal objectives, learning and development plans for people in AM roles and teams	AMCF integration (with other CFs and in competence management processes and activities) is underway with supporting plans, resources and leadership	No long-term plan for the workforce to provide context or give direction to a systematic approach to developing and managing AM competences

RISK AND REVIEW

No.	Subject	SBP Maturity Score	Completeness of Process, Artefact or Capability?	
31	Risk Assessment & Management	74%	Fully defined and Risk Management Framework, which is described in the Risk Management Policy and aligns to ISO 31000 and Orange Book requirements	
32	Contingency Planning & Resilience Analysis	86%	Very mature processes for managing operational and business contin-gencies aligned to good practice	
33	Sustainable Development	58%	Sustainable Development Strategy was published at the end of CP4 and aligned to good practice and is in the process of being reviewed	
34	Management of Change	66%	MSP4NR process, implemented about 18 months prior to the assessment, is based on good practice change management processes	
35	Asset Performance & Health Monitoring	83%	CRI / CSI / SHEP / Engineering Assurance Reports examples of measurement of asset stewardship, and Asset Reporting Manual governs how Network Rail reports to ORR	

	Communicated and Understood?	Effectively Applied?	Results in Required Outcome?
	Risk Management Framework implemented at Levels 1 and 2, with Level 3 in progress (Level 1 = ExCom, Level 2 = Directorates, Level 3 = Business Areas).	Where communicated and understood the application of the Risk Management framework is effective. Work now underway to provide better support for alignment at Level 3 and below.	Where communicated and understood the application of the Risk Management Framework enables a clear and flexible focus on managing risks
	All personnel who are required to implement contingency plans are trained and drilled	Contingency plans are rehearsed and continually improved, and occasionally implemented. Appointment of Director of Incident Management & Operational Security (DIMOS)	Evidence that the application of contingency plans do not always result in desired outcomes, however lessons are learnt and changes made
	Reported that Sustainable Development Strategy is not yet fully understood in the Routes	New Sustainable Development Vision (strategy) to be implemented as part of SBP	Consistent implementation of the Sustainable Development Strategy is not yet evident, or feeding back effectively into the AM System
	New change governance arrangement with local Route Change Management Director, resources and Boards introduced	Several examples of implementation evidenced throughout the assessment	Concern that change benefits are not being realised as planned but recognised that this was for change initiated prior to MSP4NR
	Good evidence at Centre and Route levels of a clear under-standing of all relevant KPIs and reporting requirements	Core monitoring and reporting completed by the Risk Analysis and Assurance group.	In general, regulatory reporting achieves desired outcomes, however opportunities exist to develop more sophisticated measures which take more account of asset lifecycles

RISK AND REVIEW (CONTINUED)

No.	Subject	SBP Maturity Score	Completeness of Process, Artefact or Capability?	
36	Asset Management System Monitoring	70%	Review activities at all levels in Network Rail, driven by the new CEO and the implementation of the BPMF, with NAMR and CE focus on the Asset Management System	
37	Management Review, Audit & Assurance	75%	Network Rail continues to implement its '3-lines of defence' assurance model, based on good practice approaches, now formally updated into the Assurance Framework standard (036)	
38	Asset Costing & Valuation	69%	Good practice approaches in place (such as RMM) with Network Rail and IP in process of aligning and ABP Tool now fully implemented for CP6 planning	
39	Stakeholder Engagement	74%	Operates at three levels: Government (DfT) and other funders, operators and Routes, and the ORR. At all levels the approach used is mature and has been further developed under the devolved framework now being pursued to enable Route-based regulation	

	Communicated and Understood?	Effectively Applied?	Results in Required Outcome?
	BPMF well understood by all those who are governed by its requirements. Chief Engineer has effective review and governance structure in place	The National Asset Management Review (NAMR), which was noted as being defined in the BPMF but discontinued at the time of the IIA assessment, has been reinstated with at least four quarterly reviews completed between December 2016 and November 2017	Development and continual improvement of the Asset Management System at Centre and Route is now clearly defined by the Chief Engineer but and fully reflected in the Asset Management System Handbook
	The '3-lines of defence' assurance model is well understood by all of those who are charged with its implementation – evidence in Chief Engineer and IP Assurance element in P3M Framework	The '3-lines of defence' assurance model is well understood by all of those who are charged with its implementation – evidence in Chief Engineer and IP Assurance element in P3M Framework	The '3-lines of defence' assurance model is well understood by all of those who are charged with its implementation – evidence in Chief Engineer and IP Assurance element in P3M Framework
	Range of approaches reasonably well understood, including recent imple-mentation of ABP Tool for CP6 planning	RMM implementation now fully embedded (5 years) and ABP Tool for MUCs	Unit costs are becoming more reliable across Network Rail to ensure reliable cost estimating and management of costs against budgets
	There is no one system for engaging stakeholders, but there are tried and tested systematic approaches at each of the three levels which continually improve on each iteration	In general, stakeholders are effectively engaged, but effectiveness of this is often difficult to gauge and understand	Improved stakeholder engagement in preparing CP6 RSPs based on Centre guidance systematically applied within the Routes

APPENDIX B
UPDATE ON 2016 IIA RECOMMENDATIONS

STRATEGY & PLANNING

Subject	Ref.	Recommendations	Update on Recommendation
Asset Management Policy	01	Issue and embed the new Asset Management Policy.	Work in Progress. Policy due to be published with SBP. Will require subsequent embedding across the organisation.
	02	Ensure greater clarity of the scope, boundaries and roles within the Asset Management System with respect to Network Rail Centre, the Routes and the relationship with the Integrated Management System.	Complete. Extensive definition in Asset Management System Handbook and Process Architecture. Supported by further development of IMS.
Asset Management Strategy & Objectives	03	Issue and embed the new Asset Management Strategy.	Revised Asset Management Strategy recently published as part of SBP. Will require embedding across the organisation.
	04	Refine Asset Management objectives to ensure they are SMART, aligned with the organisational Balanced Scorecard and can be more easily disaggregated and aligned with at Route level.	Complete. National and Route scorecards established and driving Route Strategic Plans.
Demand Analysis	N/A	No recommendations identified.	N/A

Subject	Ref.	Recommendations	Update on Recommendation
Strategic Planning	05	Identify root cause for initial top down / bottom up misalignment of work volumes and costs and improve process to rectify.	Complete. Strategic planning process re-engineered with clear bottom-up and top-down alignment, review and assurance processes.
Asset Management Planning	06	Review the Asset Management planning process and the use of Asset Management Plans at the DU level to assure that realistic plans are developed that can be appropriately resourced and delivered to achieve outcomes and objectives.	Complete. Delivery Unit planning process re-engineered based around Activity Based Planning.

ASSET MANAGEMENT DECISION-MAKING

Subject	Ref.	Recommendations	Update on Recommendation
Capital Investment Decision-Making	07	Implement further training and accelerate embedding of whole-life cost tools within the Routes themselves	Work in Progress. Tool and Asset Life Lifecycle Profiles complete but not yet systematically utilised at Route level.
Operations & Maintenance Decision-Making	08	Issue and embed the new Maintenance Strategy	Work in Progress. Revised, good practice, Maintenance Strategy published but not yet well recognised by Route teams interviewed.
	09	Establish a formal cost-risk optimisation (CRO) process to enhance the reliability centred maintenance regimes to risk based regimes.	Work in Progress.
Lifecycle Value Realisation	10	Align WLC models with emerging maintenance regimes developed using the new Maintenance Strategy	Work in Progress.
	11	Consider implementation of portfolio optimisation across the network	Work in Progress.
Resourcing Strategy	12	Establish a strategic approach and strategy/plan hierarchy for the identification, sourcing and management of resources necessary to deliver plans and achieve objectives	Work in Progress. Established at Route level, although approach varies by Route, but not yet developed as a national framework.
	13	Complete this at both national and Route levels	As above.
Shutdowns & Outage Strategy	14	Establish a common good practice approach to Route level possession planning and optimisation defined in a national Possession Strategy	Work in Progress. National Engineering Access Planning Framework in early draft stages.

LIFECYCLE DELIVERY

Subject	Ref.	Recommendations	Update on Recommendation
Technical Standards & Legislation	15	Rectify scope of current compliance register to include external standards, regulations and legislation that affect Network Rail's Asset Management System	Work in Progress. Understood that this has not been specifically clarified, however the Chief Systems Assurance Engineer has a dedicated member of staff to monitor all key compliance requirements from the three main registers for the Company Standards & Controls Group, which is also chaired by the Chief Systems Assurance Engineer.
	16	Clarify accountabilities and responsibilities for maintaining the accuracy of the compliance register	Complete. Three main registers are used to maintain a view of compliance - the H&S Legal Register, the Environmental Register and the Legal Panel Horizon Scanner & Legislative Tracker. The level of compliance is monitored full time by one of the Chief Systems Assurance Engineer's staff.
	17	Complete risk-based decision-criteria and overall process to demonstrate to stakeholders that required levels of compliance will be achieved	Work in Progress. A risk-based approach has been applied to clear the standards update started by Business Critical Rules. 180 standards were prioritised in 2017, a further 180 for 2018, and the remainder by the end of CP5. This is reactive, however, and not embedded in the Company Standards & Controls Group approach.
Asset Creation & Acquisition	18	Complete introduction of the 20 P3M3 improvement projects, including fully embedding any changes within the IP community	Completed in November 2016 and now superseded by the 'One Vision, One Way' initiative which is ongoing and continuing to produce effective outcomes.

LIFECYCLE DELIVERY (CONTINUED)

Subject	Ref.	Recommendations	Update on Recommendation
Systems Engineering	19	Complete introduction of the 20 P3M3 improvement projects, including fully embedding any changes within the IP community	Completed in November 2016 and now superseded by the 'One Vision, One Way' initiative which is ongoing and continuing to produce effective outcomes.
	20	Improve knowledge of the capabilities of the Systems Analysis Group within Network Rail, and consider making an increased volume of good practice guidance in this are mandatory	Complete. A brochure has been produced and made available on Connect, although not evidenced.
Configuration Management	21	Develop a framework to identify Network Rail's configuration management requirements and under what circumstances these are applied, related to the criticality of the assets in question	Not started.
Maintenance Delivery	N/A	No recommendations identified	N/A
Reliability Engineering	22	Clarify roles and responsibilities for reliability planning and growth and coordinate these across the Centre organisation	Complete.
	23	Focus the NIRG and RIRG structure more on to managing and growing underlying reliability and ensure they coordinate effectively between disciplines and across the country	Work in Progress.
	24	Develop integrated reliability growth plans across disciplines and across the country to ensure the most effective and efficient approach to improving reliability is implemented	Work in Progress. Reliability growth plans still appear to be asset- or Route-specific, although brought together to a degree within the NIRG / RIRG structure using iPat (where this is utilised).

Subject	Ref.	Recommendations	Update on Recommendation
Asset Operations	N/A	No recommendations identified	N/A
Resource Management	25	Align resource management activities with updated national and Route Resourcing Strategies	Not complete.
Shutdown & Outage Management	26	Align possession management activities with the updated Possession Strategy	Not complete.
Fault & Incident Response	N/A	No recommendations identified	N/A
Asset Decom-missioning & Disposal	N/A	No recommendations identified	N/A

ASSET INFORMATION

Subject	Ref.	Recommendations	Update on Recommendation
Asset Information Strategy	27	Update the Asset Information Strategy to reflect current status of information to meet business needs across Network Rail, IT systems enhancement programmes, and Data Management. Include a consolidated SMART roadmap of improvement initiatives, to achieve the benefits case. Re-integrate ORBIS project progress in to the Asset Information Strategy, and detail of the implementation of the new Asset Data Governance (ADG) Framework.	Work in progress. Emerging Intelligent Infrastructure Programme and Asset Management Strategy provides vehicle for revised Asset Information Strategy.
	28	Align revised Asset Information Strategy with wider Network Rail technology strategy, and clarify relationship to 'Better Asset Knowledge' working group / initiative.	Work in progress. Emerging Intelligent Infrastructure Programme and Asset Management Strategy provides vehicle for revised Asset Information Strategy.
Asset Information Standards	29	Implement greater clarity and communication of the suite of documents, specifications, dictionaries and models which comprise the Network Rail definition of their information model, and how these support the ADG framework.	Work in progress. But significant improvement with introduction of the AIS Viewer on-line tool.
	30	Continue to focus on the Asset Information Specifications, ensuring they cover all asset classes beyond track, and define in detail attributes for all 'information layers', e.g. Financial. Provision of a full set of data quality parameters is also required.	Work in progress.

Subject	Ref.	Recommendations	Update on Recommendation
	31	Focus on embedding the new IT systems just delivered through the ORBIS programme (such as Ellipse upgrade) and necessary change management, to ensure benefits are realised.	Complete. Further post go-live embedment recommended.
Asset Information Systems	32	Continue to implement 'Improved Planning Tools' and 'Visualisation' themes within the 'Better Asset Knowledge' initiative to break down silos in work banks, and to provide better integration between systems. Ensure easier access to information to tackle issues with multiple system entry points.	Work in progress.
Data & Information Management	33	Clearly communicate and roll-out the new ADG information management framework to the Routes, with necessary responsibilities and resources confirmed. Establish strong linkage from the ADG framework to relevant Asset Information Standards, specifically the Asset Information Specifications with necessary quality parameters.	Complete. Final communicating and embedment of ADG is required.

ORGANISATION & PEOPLE

Subject	Ref.	Recommendations	Update on Recommendation
Procurement & Supply Chain Management	34	Improve effectiveness of processes to enable dialogue on supplier performance and contract management between Routes and IP.	Work in Progress.
	35	Improve effectiveness of processes to enable feedback from Routes to the owners of Asset Policies and Asset Management Strategy in the Centre.	Work in Progress.
Asset Management Leadership	36	Alignment of business strategy, control frameworks, decision-making processes and delivery mechanisms should be made a more explicit topic for leadership development at all levels.	Work in Progress.
	37	Provide all DRAMs and RAMs with an executive briefing on the principles, concepts and applications of asset management and ensure this features in the induction of all new DRAMs and RAMs.	Complete
Organisational Structure	38	Produce long-term forecasts for the overall workforce along with a strategy for its development across the Routes and business units.	Work in Progress.
	39	Review the impact of the evolving matrix organisation on asset management capabilities of the business and take appropriate actions to enhance this if required.	Work in Progress.

Subject	Ref.	Recommendations	Update on Recommendation
Organisational Culture	40	Evaluate the relationship between the Asset Management Strategy and current culture shaping activities and use the findings to develop a plan to make it more explicit in future.	Work in Progress.
Competence Management	41	Add Asset Management to the list of Capability 'Families' being addressed by the Capability Project and define and enact a plan for the integration of Asset Management competence requirements.	Complete
	42	Ensure personal objectives are more closely aligned to the achievement of Asset Management objectives.	Work in Progress.
	43	Continue to implement the approach to providing training, tools, and support to people in Asset Management roles.	Complete

RISK & REVIEW

Subject	Ref.	Recommendations	Update on Recommendation
Risk Assessment & Management	44	Complete implementation of the Risk Management Framework at Level 3, ensuring clear integration into Asset Management decision making	Work in Progress to improve support at Level 3: Three eLearning modules have been designed to support staff in this area, and a support portal containing risk assessment tools and approaches is being developed.
	45	Complete the 'Weather Resilience & Climate Change Strategy' and ensure Routes are fully engaged in its implementation and review	Complete in draft ready for issue February 2018.
Contingency Planning & Resilience Analysis	N/A	No recommendations identified	N/A
Sustainable Development	46	Develop a stronger linkage from the new Sustainable Development Strategy to Network Rail's Asset Management System	Complete. The requirements of the sustainable development strategy have been confirmed in the CP6 business planning guidance and in Sustainable Development Short Form Strategy, and assurance of the RSPs tests their inclusion.
Management of Change	47	Complete implementation of the MSP4NR process, ensuring full alignment with Asset Management System requirements	Complete. MSP4NR is now well embedded and there is evidence that it is being widely and consistently used across a range of projects and initiatives.
Asset Performance & Health Monitoring	N/A	No recommendations identified	N/A
Asset Management System Monitoring	48	Develop and incorporate into the BPMF an Asset Management System review approach which is demonstrably implemented at both Centre and Route levels	Complete. The National Asset Management Review (NAMR), which was noted as being defined in the BPMF but discontinued at the time of the IIA assessment, has been reinstated with at least four quarterly reviews completed between December 2016 and November 2017.

Subject	Ref.	Recommendations	Update on Recommendation
Management Review, Audit & Assurance	49	More clearly identify and align audit and assurance activity that is directly related to the implementation and review of the defined Asset Management System at both Centre and Routes	Complete. The Chief Engineer now has a defined set of governance and assurance meetings which include the NAMR and fulfil this recommendation.
Asset Costing & Evaluation	50	Complete introduction of the Rail Method of Measurement and ensure alignment between Network Rail and IP approaches	Work in Progress. Due for publication March 2018 after deciding to re-configure the three volumes.
	51	Complete Activity Based Planning initiative and develop increased alignment between core Network Rail and IP (RMM) approaches	Work in Progress. ABP initiative complete and ABP Tool effectively implemented for CP6 planning in the Routes. Volume 3 of the RMM will be based on this work to describe maintenance unit costs.
Stakeholder Engagement	52	Complete systemisation of the stakeholder engagement approach at Centre	Complete.
	53	Ensure clear focus on communication to support the Asset Management System is enabled both at Centre and at Routes	Work in Progress. New guidance for systematically engaging stakeholders at Route level underpins the development of all CP6 RSPs. This is based on workshops and improved communication to understand stakeholder requirements, but requires validation.

APPENDIX C ASSESSMENT INTERVIEWEES

Interviewee	Job Title
Adam Checkley	SRAM Signalling Power & Buildings LNW
Adrian Bocking	Systems Integration Manager Network Development
Adrian Murray	Route Asset System Integration Manager Scotland
Alastair MacFarlane	RAM Geotechnical Drainage & Off Track Scotland
Amanda Hall	Engineering Expert (Systems)
Andrew Coleman	Head of Telecoms Asset & Performance Management
Andrew Simmons	Chief Systems Engineer
Andrew Thomas	RMD Wales
Andy Cross	RAM Civils Wales
Andy Doherty	Chief Rail Technology Officer
Andy Kirwan	Head of Whole Lifecycle Costing
Andy Smith	Head of Programme Management
Anthony Dewar	Head of Buildings & Architecture
Baney Young	Programme Manager IP
Ben Edwards	DRSAM Scotland
Brian Mayo	Director NSC Technical Services
Brian Tomlinson	Chief Systems Assurance Engineer
Carole Bayliss	SRAM LNW
Charles Robarts	Director, Planning & Regulation
Chris Sills	IP Regional Contact
Claire Beranek	Route Asset Manager Signalling LNW
Clive Berrington	Director of Business Planning & Strategy
Colum Cavanagh	RAM Track Wessex
Dan Kent	Head of Corporate Quality
Dan Mandoc	Professional Head - Telecoms

Interviewee	Job Title
Danny Pollard	Group Framework & Reporting Manager
Dave Webb	RAM Track LNW
David Castlo	RAM Buildings & Civils Wessex
David Godley	Head of Engineering & AM Capability
David Harding	Economics Analysis Manager
David Johnson	Senior Asset Manager
David Tunley	Route Asset System & Integration Manager Western
Davin Crowley Sweet	Head of Asset Data
Dean Chauke	RAM E&P LNW
Dudley Chaplin	Contracts & Procurement Manager
Gareth Evans	Principal Engineer Track & Lineside
Garry Bosworth	Principal Engineer Buildings & Civils
Giles Tottem	Programme Manager ORBIS
Graham Hopkins	Group STE Director
Helen Hunter Jones	Head of Group Risk
Helen Samuels	IP Engineering Director
Huw James	Programme Management Director
James Dean	DRSAM LNW
James Nattrass	Director of Incident Management and Operational Security
James Wood	Financial Controller Process & Reporting
Jason Saxon	Head of Supply Chain, Asset Information Services
Jeff Davies	DRSAM Wales
Jeremy Axe	Principal Enterprise Architect
Jeremy Morling	Head of Signalling
John Edgley	Head of Track
Jon Shaw	Group STE Director
Julian Staden	Principal Engineer
Julie Neuhoff	Programmer Director (Route Change)
Kevin Gedge	System Design Engr IP
Lee Jones	Programme Manager LNW
Lisa Constable	Head of Environment and Sustainable Development
Maegan Bell	Project Director (IP Track: Programme Management & Track Development)
Mark Bradbury	Principal Engineer – Track & Lineside
Martin Jones	Chief Control, Command & Signalling Engineer
Martin Jurkowski	Principal Sponsor - Route Investment LNW
Matt Allen	Head of Timetable Production – Capacity Planning
Matthew Tattersall	Head of Programme Development

Interviewee	Job Title
Mike Gallop	DRSAM Western
Mike Howard	Enterprise Architect - Technical
Mike Wright	IP Central Programmes
Milind Joshi	Project Engineering Manager
Nick Tedstone	Head of Structures
Nico Lategan	Senior Enterprise Risk Specialist
Nigel Edwards	Professional Head of Power Distribution HV/LV
Nigel Salmon	Systems Reliability Improvement Manager, Infrastructure Reliability Team
Nigel Wheeler	RAM E&P Wessex
Paul Ashton	Head of Operations Principles & Standards
Paul Barnes	Senior Programme Manager Western
Paul Harwood	Director Route Sponsorship
Paul Johnson	Head of Business Change
Phil Doughty	Professional Head of Contact Systems AC/DC
Piers Treacher	Strategic Planning Manager
Richard Anderson	IP Regional Contact
Rob Hopper	Business Analyst
Robert Ampomah	Reliability Improvement Manager Track & Lineside
Robert Freeman	Head of Timetable Production
Ronnie Bignell	Route Asset Manager (Signalling) Wessex
Rupert Walker	Strategy & Planning Director
Samuel Chew	Principal Analyst, Whole Lifecycle Costing
Simon Abbott	Head of Geotechnical
Simon Gyde	RAM Buildings Western
Simon Maple	Director Route Sponsorship
Simon Thick	RIM Anglia
Stephen Blakey	Commercial Projects Director IP
Steve Armstrong	Programme Director Route Services
Stuart Kistruck	DRSAM Wessex
Terry Shorten	RAM Buildings South East
Tim Flower	Head of Maintenance
Tim Kersley	Head of Asset Management Strategy
Tom Stanley	Route Asset System & Integration Manager, Wales
Wendy Morgan	Route Asset System & Integration Manager, South East

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APPENDIX D
SELECTED EVIDENCE

Strategy and Planning Reference	Evidence
NR/CP6/SBP/SP01	Network Rail Asset Management Policy March 2014
NR/CP6/SBP/SP02	Asset Management Policy paper (Ver2) Aug 17 PBR
NR/CP6/SBP/SP03	Asset Management Policy 2017 rev 2.0 Aug PBR submission watermark
NR/CP6/SBP/SP04	AMS Document Hierarchy
NR/CP6/SBP/SP05	Asset Management System Handbook 20171221
NR/CP6/SBP/SP06	3B - Process Architecture Board Paper 0.1
NR/CP6/SBP/SP07	2A - IMS engagement session slide deck_FINAL
NR/CP6/SBP/SP08	RSP Guidance Notes v2.05 final
NR/CP6/SBP/SP09	Network Rail Asset Management Strategy October 2014
NR/CP6/SBP/SP10	Asset Management Strategy
NR/CP6/SBP/SP11	Short Form Strategy - asset management V1
NR/CP6/SBP/SP12	Long Term Scorecard Guidance Phase 2 1.1
NR/CP6/SBP/SP13	Guide_to_the_2017_National_Scorecard_v19
NR/CP6/SBP/SP14	AngliaP5scorecard
NR/CP6/SBP/SP15	Long Term Planning Process programme
NR/CP6/SBP/SP16	clienting-principles
NR/CP6/SBP/SP17	Sponsors' Handbook
NR/CP6/SBP/SP18	Planned CP6 Assurance
NR/CP6/SBP/SP19	CP6 Strategy and Guidance
NR/CP6/SBP/SP20	SBP_CP6RF2_STESummaryAssuranceReport_EarthworksMining_V1.2
NR/CP6/SBP/SP21	Strategic_Planning_Process_v0.5
NR/CP6/SBP/SP22	RF6 GUIDANCE DOCUMENT v1.1
NR/CP6/SBP/SP23	Guidance on CP6 IIA scenarios
NR/CP6/SBP/SP24	CP6 Structures Asset Policy_v2.0
NR/CP6/SBP/SP25	CRAM v1.2
NR/CP6/SBP/SP26	Wessex Route Strategic Plan Dec 17 3.44
NR/CP6/SBP/SP27	Interim Guidance on Development of Route Workbanks for CP6
NR/CP6/SBP/SP28	RAM(S)_Wessex IXL Workbank CP6
NR/CP6/SBP/SP29	SharpCloud user guide

Strategy and Planning Reference	Evidence
NR/CP6/SBP/SP30	Summary assurance findings RF2
NR/CP6/SBP/SP31	Period 8 - Track ASR v1
NR/CP6/SBP/SP32	RF6 CP6 Deliverability Assurance Report / RF6 Deliverability Presentation
NR/CP6/SBP/SP33	Grove Park Footbridge RRD Yr1 CP6

Asset Management Decision-Making Reference	Evidence
NR/CP6/SBP/DM01	CP6 Structures Asset Policy_v2.0
NR/CP6/SBP/DM02	Modelling Slides (ORR slides Jan 2017)
NR/CP6/SBP/DM03	NR/L2/TRK/2102
NR/CP6/SBP/DM04	20-21 issued for planning v1.3
NR/CP6/SBP/DM05	NR-L2-INI-P3M-101 - GRIP - Projects [published]
NR/CP6/SBP/DM06	P07_201718 ATR Pack V1.0
NR/CP6/SBP/DM07	Asset Lifecycle Profile – Intro.
NR/CP6/SBP/DM08	Network Rail Maintenance Strategy Final Nov 2016
NR/CP6/SBP/DM09	ABP Steering Group 27th July 2017
NR/CP6/SBP/DM10	Business Planning Template Overview (DU Maintenance)_Dec16
NR/CP6/SBP/DM11	Network Rail Intelligent Infrastructure Strategic Plan for signature
NR/CP6/SBP/DM12	NR_L2_ELP_21087
NR/CP6/SBP/DM13	1_Track Asset Policy
NR/CP6/SBP/DM14	structures AM model
NR/CP6/SBP/DM15	Guidance on CP6 IIA scenarios
NR/CP6/SBP/DM16	20171017 Western Route Strategic Plan
NR/CP6/SBP/DM17	CP6 One Plan Flow Chart v2
NR/CP6/SBP/DM18	LNW CP6 CAPEX Renewals Delivery Strategy Draft v1 dated 12-5-17
NR/CP6/SBP/DM19	SE Route Capex Delivery Dashboard - Total SE P08 for DRSAM PBR
NR/CP6/SBP/DM20	HALO establishment 4-11-15
NR/CP6/SBP/DM21	20171121 Using stakeholder engagement to improve Network Rail Western's route strategic plan
NR/CP6/SBP/DM22	One Plan workshop 1 - Expectations
NR/CP6/SBP/DM23	LNW SharpCloud Screenshots
NR/CP6/SBP/DM24	Access Planning Framework Nov 2017 V0.3
NR/CP6/SBP/DM25	Visio-Ops Planning Timeline v3

Lifecycle Delivery Reference	Evidence
NR/CP6/SBP/LD01	Company Standards & Control Group Terms of Reference
NR/CP6/SBP/LD02	Company Standards & Control Group Minutes
NR/CP6/SBP/LD03	'One Vision, One Way' Transition Plan, Version 1.0
NR/CP6/SBP/LD04	Network Rail requirements – NR/L2/INI/P3M/104
NR/CP6/SBP/LD05	Network Rail requirements manual – NR/L3/INI/P3M/126
NR/CP6/SBP/LD06	Assurance of project, programme and portfolio (P3M) investment
NR/CP6/SBP/LD07	Peer Reviews of project, programme and portfolio (P3M) investment – NR/L3/INI/P3M/127
NR/CP6/SBP/LD08	2017 Peer Review Schedule
NR/CP6/SBP/LD09	Memorandum of Understanding between Department for Transport and Network Rail on rail enhancements – March 2016
NR/CP6/SBP/LD10	Network Portfolio Board Terms of Reference (BPMF)
NR/CP6/SBP/LD11	Route Programme Board Terms of Reference (BPMF)
NR/CP6/SBP/LD12	IP Engineering – Governance & Operating Model – IP8029
NR/CP6/SBP/LD13	Requirements, V&V and ECC master model - V5.0, 02/12/2016
NR/CP6/SBP/LD14	System Authority TLG slides 08/01/17 with RTS slide
NR/CP6/SBP/LD15	Bi-Mode Safety Plan 001 – November 2017 – Version 4
NR/CP6/SBP/LD16	Bi-Mode Generic System Requirements Specification V0.1
NR/CP6/SBP/LD17	North of England Programmes – Systems Integration: Configuration State Definition Matrix
NR/CP6/SBP/LD18	Digital Railway Migration States v5
NR/CP6/SBP/LD19	Western Rail Link to Heathrow – Demonstration Video
NR/CP6/SBP/LD20	Business Planning Template Overview (DU Maintenance) – Dec16
NR/CP6/SBP/LD21	Scotland RF06 CP6 DU Comparison Norm Hours 28/09/17 v1
NR/CP6/SBP/LD22	Off Track Volume Review – CP6 Deliverability Plan
NR/CP6/SBP/LD23	West Coast Rail break summary
NR/CP6/SBP/LD24	Daily Reliability Report - South East
NR/CP6/SBP/LD25	National Reliability Reports and Data
NR/CP6/SBP/LD26	Short Form Strategy - Operations v0.4

Asset Information Reference	Evidence
NR/CP6/SBP/AI01	Asset Management Strategy
NR/CP6/SBP/AI02	Chief Engineer's Strategic Plan Oct 17
NR/CP6/SBP/AI03	Network Rail Intelligent Infrastructure Strategic Plan
NR/CP6/SBP/AI04	II overview 1
NR/CP6/SBP/AI05	Information Vision Strategy

Asset Information Reference	Evidence
NR/CP6/SBP/AI06	Intelligent Infra CP6 Programme Dossier v1.9
NR/CP6/SBP/AI07	NR IT Strategy - IT Architecture Roadmap
NR/CP6/SBP/AI08	NR IT Strategy - NR Direction of Travel
NR/CP6/SBP/AI09	NR Conceptual Information Reference Model - Proposed Finance View_0_1
NR/CP6/SBP/AI10	Track AIS v2 32
NR/CP6/SBP/AI11	Minimum Asset Data Requirements v1.0
NR/CP6/SBP/AI12	AIS_Viewer_User_Guides_v0_3
NR/CP6/SBP/AI13	EP Core Spec V6.2_15 Dec 2016
NR/CP6/SBP/AI14	Signalling Guidance Document
NR/CP6/SBP/AI15	Track Guidance Document
NR/CP6/SBP/AI16	Ellipse Design Document - AC Distribution v2.0.2(1)
NR/CP6/SBP/AI17	A-I-01 NR Information Architecture - Conceptual Information Model
NR/CP6/SBP/AI18	Meeting with ORR V1 (Ellipse Roadmap)
NR/CP6/SBP/AI19	FCL - User Guide
NR/CP6/SBP/AI20	GRV Programme Overview - 06.02.18
NR/CP6/SBP/AI21	171115 ICE Conference - Keith Farquharson slides - V1
NR/CP6/SBP/AI22	Track DST - Overview_Nov 2017
NR/CP6/SBP/AI23	LNW SharpCloud Screenshots
NR/CP6/SBP/AI24	LNW PowerBI Screenshots
NR/CP6/SBP/AI25	NR IT Strategy - Target Architecture Report
NR/CP6/SBP/AI26	Route Services - IT - ISS Business Architecture
NR/CP6/SBP/AI27	MO-A-01 - NR Application Landscape - Assets
NR/CP6/SBP/AI28	Asset Data Governance
NR/CP6/SBP/AI29	ToR - Asset Data Governance - Central Planning Group
NR/CP6/SBP/AI30	ADG CoP Minutes
NR/CP6/SBP/AI31	Route Asset Data and Analysis team
NR/CP6/SBP/AI32	A2 regulated output overview presentation

Organisation and People Reference	Evidence
NR/CP6/SBP/OP01	Asset Management – Capability in Network Rail, David Godley, Head of Engineering and Asset Management Capability, Slidepack dated
NR/CP6/SBP/OP02	Terms of Reference, Competence Development Groups (CDGs), dated 22-09-27
NR/CP6/SBP/OP03	Asset Management Competences Framework 20-10-17

Organisation and People Reference	Evidence
NR/CP6/SBP/OP04	Engineering & AM Capability Steering Group, Terms of Reference 30-12-16
NR/CP6/SBP/OP05	AM Competency Framework Role Profiles, July 2017
NR/CP6/SBP/OP06	Wheeled Plant Programme Board. Slidepack 27-09-17
NR/CP6/SBP/OP07	CP6 Strategic Business Plan and Procurement Strategy, Jo Dunn, Head of Procurement, Slidepack 01-02-2018
NR/CP6/SBP/OP08	Summary Meeting Note of RIA SME Group Meeting Held at RIA on 13 October 2017
NR/CP6/SBP/OP09	Network Rail Strategic Business Plan 9 February 2018

Risk and Review Reference	Evidence
NR/CP6/SBP/RR01	Network Rail Risk Policy – NR/L1/RSK/001
NR/CP6/SBP/RR02	Enterprise Risk Management Business Process – NR/L2/RSK/001
NR/CP6/SBP/RR03	Asset Management Level 1 ERR
NR/CP6/SBP/RR04	Enterprise Risk Management Strategy – Wessex Presentation
NR/CP6/SBP/RR05	Western Route Risk Management Manual
NR/CP6/SBP/RR06	Wessex DRSAM Final Tactical Risk Register 1.1
NR/CP6/SBP/RR07	Wessex CP6 TRACK Renewal Scenarios v4.2
NR/CP6/SBP/RR08	Route Strategic Plans
NR/CP6/SBP/RR09	ERM e-learning Modules 1 Pager
NR/CP6/SBP/RR10	Western Route BAC – 20/09/17 Management of Operational (level 3-5) Risks & Risk Trajectories
NR/CP6/SBP/RR11	Sustainable Development Version v0.83
NR/CP6/SBP/RR12	Western Route Businesses Energy Consumption Study 2017-18
NR/CP6/SBP/RR13	Waste Management Report Western Route V2
NR/CP6/SBP/RR14	Level 1 Environment & Social Performance Policy – NR/L1/ENV/100
NR/CP6/SBP/RR15	Weather Resilience & Climate Change Adaptation Strategy 2017-2019
NR/CP6/SBP/RR16	Weather Resilience Group terms of Reference (BPMF)
NR/CP6/SBP/RR17	Business Change Policy – Rev 2 March 2017
NR/CP6/SBP/RR18	Competency Framework for a Project Manager - Change
NR/CP6/SBP/RR19	Western Change Team PBR November 2017
NR/CP6/SBP/RR20	Western Portfolio Benefit Tracker
NR/CP6/SBP/RR21	Change Portfolio Group Terms of Reference (BPMF)
NR/CP6/SBP/RR22	Change Portfolio Group Action Tracker June 2017
NR/CP6/SBP/RR23	Business Change Assurance Overview Presentation
NR/CP6/SBP/RR24	Western Change Portfolio Steering Group Terms of Reference (BPMF)

Risk and Review Reference	Evidence
NR/CP6/SBP/RR25	Western Change Portfolio Steering Group Decisions & Actions 09/10/17
NR/CP6/SBP/RR26	Business Performance Management Framework
NR/CP6/SBP/RR27	Asset Technical Reviews – Telecoms Terms of Reference (BPMF)
NR/CP6/SBP/RR28	Structures & Buildings – ASR/RIRG Pack P5 November 2017
NR/CP6/SBP/RR29	National Scorecard
NR/CP6/SBP/RR30	LNW Scorecard P5
NR/CP6/SBP/RR31	Composite Reliability Indicator (CRI)
NR/CP6/SBP/RR32	Composite Sustainability Indicator (CSI)
NR/CP6/SBP/RR33	Daily Reliability Report - LNW North & South east
NR/CP6/SBP/RR34	LNW South Dashboard Period 07
NR/CP6/SBP/RR35	Track Stewardship Report Q1
NR/CP6/SBP/RR36	Network Rail Assurance Framework – NR/L2/ASR/036
NR/CP6/SBP/RR37	Assurance of project, programme and portfolio (P3M) investment – NR/L2/INI/P3M/105
NR/CP6/SBP/RR38	Chief Engineer's Strategic Plan 2017 – Draft 4
NR/CP6/SBP/RR39	Asset Management System Handbook – May 2017 – V1.1
NR/CP6/SBP/RR40	NAMR Agendas for 02/12/16, 24/02/17, 19/05/17 & 03/11/17
NR/CP6/SBP/RR41	NAMR Presentation Pack for 24/02/17
NR/CP6/SBP/RR42	Asset Management Summary Assurance Findings RF2
NR/CP6/SBP/RR43	ABP Tool Business Planning Template Overview (DU Maintenance) – December 2016
NR/CP6/SBP/RR44	Scotland RF06 CP6 DU Comparison Norm Hours 28/09/17 v1
NR/CP6/SBP/RR45	Scotland Off Track Volume Review - CP6 Deliverability Plan
NR/CP6/SBP/RR46	Overall framework for regulating Network Rail – ORR PR18 consultation – July 2017
NR/CP6/SBP/RR47	Network Rail's response to ORR's consultation on the overall framework for regulating Network Rail (PR18) – 21 September 2017
NR/CP6/SBP/RR48	RSP Guidance Notes – December 2016 – V2.02
NR/CP6/SBP/RR49	Scotland Route Strategic Plan – December 2017