Office of Rail Regulation and
Network Rail

**Part A Reporter Mandate AO/026:
Application of CP4 Asset Policies**

Report

226767-03

Issue 3 | 25 April 2013

This report takes into account the particular
instructions and requirements of our client.

It is not intended for and should not be relied
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is undertaken to any third party.

Job number   223767-03

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Glossary

AMCL	Asset Management Consulting Limited
AMEM	AMCL Asset Management Excellence Model - TM
ARS	Asset Risk Score
CP4	Control Period 4 (1 April 2009 to 31 March 2014)
CP5	Control Period 5 (1 April 2014 to 31 March 2019)
DfT	Department for Transport
DOO	Driver Only Operated
DST	Decision Support Tool
E2E	End to End – track equivalent of GRIP
GRIP	Guide to Railway Investment Projects
HAM	Head of Asset Management
HLOS	High Level Output Specification
IIP	Initial Industry Plan 2011
ISP	Integrated Station Planning
LCA	Life Cycle Assessment
LMD	Light Maintenance Depot
MDU	Maintenance Delivery Unit
NDS	National Delivery Service
NPV	Net Present Value
NR	Network Rail
OPAS	Operational Property Asset System
ORR	Office of Rail Regulation
PARL	Percentage Asset Remaining Life
RAMP	Route Asset Management Plan
RSSB	Railway Safety and Standards Board
RME	Route Maintenance Engineer
RUS	Route Utilisation Strategies
RWI	Repeatable Work Item
SBP	Strategic Business Plan
SICA	Signalling Infrastructure Condition Assessment
SISS	Station Information and Surveillance Systems
SME	Senior Maintenance Engineer
SSM	Station Stewardship Measure
TOC	Train Operating Company
TSR	Temporary Speed Restriction
VAWP	Visible and Agile Workbank Planning
WLC	Whole Life Costing
WLCC	Whole Life Cycle Cost

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1   Executive Summary

1.1   General

1.1.1   Arup has been appointed by the Office of Rail Regulation (ORR) and Network Rail (NR) as Part A Independent Reporter to provide assurance as to the quality, accuracy and reliability of NR's data that is used to report performance to ORR, the Department for Transport (DfT) and the wider industry.

1.1.2   The purpose of Mandate AO/026 is to review the application of Network Rail's CP4 asset policies in its asset planning and implementation. Specifically, the review is to assess the degree to which there is a clear auditable trail (line of sight) from the asset policy to workbank to work completed on the ground and general compliance with the requirements of the Asset Policy for each functional asset group (discipline).

1.1.3   The work has been carried out in two Phases. This report has been produced at the end of the second phase and sets out the methodology for the overall process and the findings of the detailed reviews carried out at Route Level. We present our findings and recommendations.

1.1.4   In carrying out Mandate AO/026 we have been instructed not to duplicate work carried out under other Mandates. We identified potential overlaps with the following Mandates:

- AO/007 – Review of Civils Asset Management
- AO/017 – Review of Initial Industry Plan
- AO/019 – Review of BCAM Transformation Programme
- AO/024 – Data Assurance (Station and Depot Stewardship)
- AO/028 – Review of Asset Data Quality
- AO/030 – SBP Review
- Work carried out by AMCL related to the AMEM model.

1.1.5   The Mandate requires us to review the following disciplines:

- Track
- Signalling
- Civils
- Operational Property
- Telecoms
- Electrification & Plant

1.1.6   Each of the Policies takes a different approach:

- the Track Policy is extremely detailed, and is related to four route categories, with different sets of policies applied to each category;
- the Signalling, E&P and Telecoms Policies are generally prescriptive and based on defined asset lives, at which replacement takes place;
- the Buildings Policy is based on three main policies (A, B ,C) the Buildings Policy is based around three main asset management principles which may be summarised as condition restoration, maintenance of condition, and managed degradation;

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- the Civils Policy has five key asset management policies (A-E), which in general practice reduce to three (A, B and C) and cover condition restoration, maintenance of condition (applied to primary routes) and managed deterioration (for secondary and freight routes).

1.1.7　　In the Phase 1 (scoping phase), we met key Network Rail HQ Asset Management staff to gain an understanding of the overall process for policy application, in particular the investment planning process. We established that in general terms, the primary decisions in relation to policy application take place at Route level during the development of workbanks for each discipline, with an assurance role carried out by the central Head of Asset Management (HAM) for each asset discipline.

1.1.8　　Arup issued a Phase 1 interim report, including the methodology for Phase 2, which has been incorporated into this report. In the detailed review (Phase 2), we reviewed a representative sample of the 2012/2013 workbanks for each discipline and visited numerous sites to verify whether the appropriate policies were being applied correctly.

1.1.9　　In our review we have considered the current CP4 2012/13 workbank. This includes projects initially selected by NR in or about 2009. In our work under this Mandate, we are reviewing the extent to which the projects which NR is physically delivering now comply with the CP4 asset policies for each of the functional asset groups (disciplines).

1.1.10　　Devolution of the day-to-day running of Britain's railway infrastructure to 10 strategic routes and initiatives such as the development of Route Asset Management Plans (RAMPs) are introducing significant change into the way in which NR operates and plans its business. However, due the lead time from scheme identification to implementation of the projects which are being carried out in the current workbanks, neither of these changes has any significant impact on the areas of focus of our review, as generally they were authorised pre-devolution and therefore these changes have not formed a key part of our consideration during our work.

1.2　　Overall Findings

General

1.2.1　　There is some evidence of compliance with the CP4 Asset Policies for each discipline in the planned and completed maintenance and renewals that were reviewed. However, no evidence was found of a clear audit trail to demonstrate compliance, or variance where this can be justified.

1.2.2　　The overall process may be considered to be cyclical having five key stages: Inspection – Problem Statement – Authority Request – Implementation – Close Out Documentation and Handback, as illustrated in Figure 1-1.

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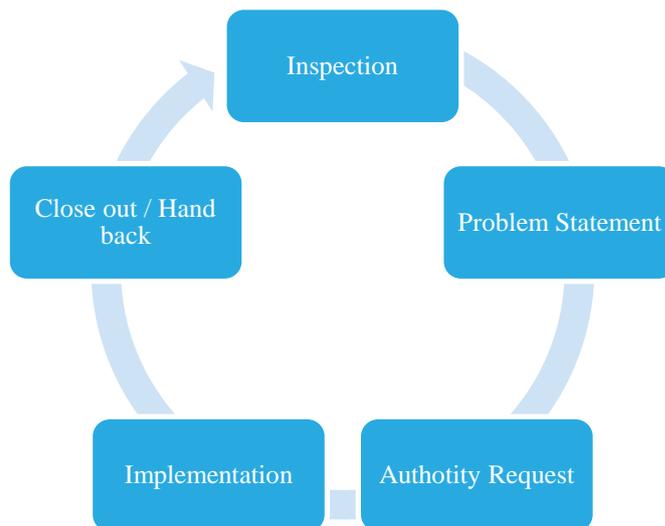
Figure 1-1: The Overall Process

1.2.3 The comments and recommendations in this section apply to each discipline, and therefore have not generally been repeated in the discipline sections. Note that for clarity, the wording of RG2 has been expanded for some disciplines.

1.2.4 The Inspection process, in the context of policy application, highlights asset condition, performance and associated risks and was found to be effective across all disciplines.

1.2.5 Problem Statements are the initial documents prepared by Asset Engineers to describe an anomaly which they consider merits an intervention. The Problem Statement process which identifies key issues and their associated risks was found to be effective across all disciplines. They could be seen to identify a clear line of sight between the asset inspection findings and the problems and risks that the asset condition could present. They also contained details regarding the proposed intervention that may be required. We have found little evidence of the Route teams actively considering policy during this stage. However when we have reviewed the proposed interventions it has generally been possible to identify retrospectively compliance with the policy, although this is not clearly being noted within the Problem Statements we reviewed. We recommend that compliance with Policy shall be explicitly demonstrated at the Problem Statement stage. *(Recommendation RG1)*

1.2.6 The Authority Request process was found to have a number of weaknesses in respect of policy implementation within Network Rail planning, and this needs to be strengthened as NR moves into CP5:

- We have found that although individual projects can be demonstrated to comply with the required policies, this is not recorded in the Authority Papers. It is recommended that NR should amend the Authority Request form to include robust and specific evidence of compliance with (or deviation from) the discipline asset policies, thus clearly evidencing a line of sight from Policy to implementation. *(Recommendation RG2)*

- At the present time, Routes do not have a suitable set of standardised tools available to allow them to accurately calculate the whole life cost of a project and thereby examine a range of intervention options. These tools should be the equivalent of the Tier 2 and Tier 3 models which have been discussed as

part of Mandate AO/030. We recommend that NR Routes are provided with a suitable tool kit which complements the policies and that is ready for use for at the start of CP5. *(Recommendation RG3)*

1.2.7 The Implementation stage, particularly for refurbishment interventions, is critically dependent on being able to carry out the work before the condition of the components deteriorates to the point where renewal becomes essential (thus causing further delay and increased risk). This does not appear to be happening across all disciplines. We recommend that NR should develop methods by which the intervention time between identifying and rectifying a deficiency is reduced significantly to avoid the possibility that an asset may deteriorate to the extent where more intrusive refurbishment or renewal is required resulting in significantly increased whole life costs. *(Recommendation RG4)*

1.2.8 The signalling maintenance engineers' apparent lack of awareness of the Policy is a cause for concern. It is recommended that all RAMs are required to ensure that all of their team members involved with workbank development and implementation are fully briefed on Asset Policy and its wider context. *(Recommendation RG5)*

1.2.9 The Close-Out and Handback stage was investigated and reviewed as part of the Independent Reporter Mandate AO/028. The impact of policy on close out is minimal and so under this Mandate we have not investigated this area.

Observations for CP5

1.2.10 Further to each of the recommendations above, we consider it is essential that the recommended changes are introduced across all disciplines prior to the start of CP5. In CP5, the Asset Policies will be more detailed, and Route Devolution will have become embedded. In a devolved organisation, it will be essential have an explicit audit trial from Asset Policy to Route workbanks to demonstrate both compliance with Policy or agreed variations from it, and also to demonstrate robust and sustainable asset stewardship. In addition, as efficient intervention planning, and greater awareness of policy and its implications throughout asset management teams will be required.

Track

1.2.11 Our reviews confirmed close liaison between the HAM and RAMs during workbank development and policy application.

1.2.12 Three of the site visits found that asset condition had worsened since the original scope had been drawn up, requiring a change in scope and in one case, renewal. The renewal has resulted in the scope and cost increasing, thereby potentially requiring other work to be put back a year so as not to exceed the workbank budget for the year in question.

1.2.13 We also question why risk to the budget takes priority over risk to the workbank where there is a conflict between the two, given all of the prior planning that has taken place to be able to execute the workbank. It is normal practice in any programme budget to hold a reasonable contingency to allow for issues such as this arising. This is a topic for further discussion between NR and the ORR.

1.2.14 Asset condition and the timing of delivery of a specific policy statement is critical. These are factors that need to be understood and learned through experience by Track Maintenance Engineers and others involved in track asset management. We suggest that the experience level of staff should be carefully

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thought about for the implementation of CP5 track policies to ensure that the
Routes have sufficiently qualified and experienced staff available to inspect
assets, and that there is a succession plan in place that will demonstrate that key
positions will be occupied by competent staff who can effectively manage and
implement the Track policy.

1.2.15   Work bank identification was not perceived to be a problem in other asset
disciplines and was only observed within the track discipline.

Signalling

1.2.16   There is a large variance in the quality of justification documentation supplied as
part of the Authority Request process, with some being very obviously of an
uncontrolled nature. We recommend that a review of documentation should be
undertaken and industry best practice be identified to allow the creation of new
documentation templates which should then be adopted across all Routes.
(Recommendation SI1)

1.2.17   It was not possible to establish how the relevant Signalling Policies had been
considered in processing the various schemes due to a lack of mandatory
inclusion in the Authority Requests. A reverse check of the selected schemes
demonstrated that the appropriate policies were being adhered to, but there was
no evidence to prove whether this was fortuitous or intended. An explicit audit
trail needs to be established. *(Recommendation RG2)*

Civils

1.2.18   In our review for this Mandate, we looked only at bridges. The two key policy
statements are as follows:

- Policy B - maintain the asset condition and capability by carrying out
  interventions that achieve the lowest whole life cost, without incurring
  condition led operational restrictions to the railway;

- Policy C - allow assets to deteriorate until interventions are essential to
  maintain safety standards or raise performance levels to an acceptable level
  for continued railway operations. When work is required it should restore an
  acceptable level of performance and minimises the remaining whole life cost
  of the asset.

1.2.19   We have found general compliance with the Policy and policy statements, except
as noted below. Our principal finding is that the wording of the Policies B and C
is such that in practice it is difficult to differentiate between them. This is
illustrated by the example of the number of interventions based on performance
requirements on Routes where Policy B should be applied. Our view is that the
Policy does not drive renewal and maintenance activity. We found little evidence
of proactive direct use of the policy in developing workbanks.

1.2.20   Policy B should be applied to secondary routes, but in practice the great majority
of schemes on secondary routes are being carried out using Policy C. 80% of the
performance related schemes are on the route categories where Policy B should
be applied, and interventions should take place before performance is affected.
This implies that there is a significant backlog of performance related
interventions on the higher category routes and also that the Policy in respect of
route categorisation is not realistic.

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1.2.21   The review was unable to find explicit evidence or an audit trail of compliance with the policies. (***Recommendation RG2)***

1.2.22   The Policy requires a whole life cost assessment to compare replacement and on-going maintenance of the structure. With the exception of one scheme for a Major Structure, we have not seen evidence of any assessments of whole life costs and optional strategies. For two of the schemes we visited on site, we consider that a WLCC analysis at structure level might indicate that refurbishment of the decks is more cost effective than the proposed replacement.

1.2.23   NR is currently working to implement the wide-ranging recommendations made under Mandate AO/007 (Civils Asset Management) and therefore we have not made further recommendations related to Civils asset management in this Report.

Operational Property

1.2.24   The relevance of the Policy to the day-to-day management of the portfolio would appear to be limited. The contents of the policy are being adhered to in the management of the buildings because the way in which the management is being done is already in compliance with the policy. Had the policy not existed, we were advised that the RAM team would in all probability have taken the same course of action. It was however conceded that the policy provided a good check on what is required.

1.2.25   At a strategic level there is evidence that the policy is largely being complied with. This is more associated with the fact that the CP4 Policy reflects the RAM team's current method of working and thus it is easy to 'backfit' the activities to the policy.

1.2.26   We recommend that NR amends the Authority Request form to include a section requiring specific evidence of compliance with the discipline asset policies, thus clearly evidencing a line of sight from Policy to implantation. (***Recommendation RG2)***

Electrification and Plant

1.2.27   Although specific policies or the selection criteria were not always quoted, it appeared that consideration has been taken of the appropriate policies during the project lifecycle. However, this could be more effectively recorded in the project documentation to provide a more auditable record. (***Recommendation RG1***)

1.2.28   We recommend that the context of the two General E&P Asset Management Policies (E&P-1 and E&P-2) in relation to each E&P Asset Type should be documented and should be referenced in Project Managers Remits. (***Recommendation E5***)

1.2.29   With respect to the Train Performance Delay Target initially, at the start of CP4, failures causing delays over 500 minutes were monitored. This was subsequently amended during CP4 to monitoring delays over 300 minutes, and more recently, this has now been amended to delays over 10 minutes. The monitoring criterion has therefore been significantly tightened during CP4.

1.2.30   The Age and Condition of equipment to be replaced should be more explicitly stated, and considered in the context of appropriate Asset Policies, which should also be directly quoted in the Project Managers Remit, where applicable. (***Recommendation E1***)

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1.2.31 The review of the thirteen projects revealed that only six of the E&P Asset Policies had been quoted directly in the submitted information. There were a further 19 Policies which could be relevant, but they were not directly referenced. We recommend that direct referencing of applicable Asset Policies should be included within the Authority Request documentation. (*Recommendation RG2)*

1.2.32 There are inconsistencies between service life stated in some Network Rail Standards, and the maximum service life quoted in some Asset Policies. We recommend that a review is undertaken and either the policies or the NR standards are amended to ensure that the requirements align. (*Recommendation E3)*

1.2.33 With reference to the Continuous Transformer Monitoring Product Trial, we recommend that trials of monitoring equipment should have clearly defined purposes, and details of the cost benefits that are intended to be gained, should be clearly identified. The suitability of existing equipment to be monitored during trials, should be identified (including age and condition). (*Recommendation E4)*

Telecoms

1.2.34 Whilst the Independent Reporter team were satisfied that the SEA route applies telecoms policy (where applicable) to its telecoms work bank, it should however be noted that the majority of telecoms renewals are driven by the need to replace life expired equipment which is difficult or costly to maintain due to shortage of spares and limited manufacturer support.

1.2.35 The majority of policy statements appear to hold more relevance at a strategic level rather than to specific route level projects. The exceptions are policy statements which influence the design of a system or define when renewals of maintenance intervention should occur.

1.2.36 Although individual projects can be demonstrated to be in accordance with the required policies, this is not recorded in the Authority Papers. We recommend that NR amends the form to include specific evidence of compliance with the discipline asset policies, thus clearly evidencing a line of sight from Policy to implementation. (*Recommendation RG2)*

1.3 Acknowledgement

1.3.1 The Independent Reporter Team would like to thank both NR and ORR staff for their assistance with this study, for providing documents as requested and explaining the current procedures and future plans.

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2 Introduction

2.1 General

2.1.1 Network Rail issued revised asset policies for some disciplines in March 2010, in support of its Control Period 4 (CP4) Delivery Plan update 2010. At that time ORR reviewed these asset policies, concluding that all asset policies passed a robustness test and all but Civil Structures passed a test of sustainability. ORR's view is that two years after being issued, these revised CP4 asset policies will be part of business-as-usual the Network Rail's planning of maintenance and renewals.

2.1.2 The purpose of Mandate AO/026 is to review the application of Network Rail's CP4 asset policies in its asset planning and implementation. Specifically the review is to assess the degree to which there is a clear auditable trail from the policy to workbank to work completed on the ground.

2.1.3 The review is part of ORR's programme to monitor if Network Rail is taking a sustainable approach to delivering its plans in CP4. The findings of this review will also be used to inform ORR's annual assessment of Network Rail's efficiency.

2.1.4 The review was undertaken in two stages, namely a scoping phase (Phase 1) followed by a detailed review phase (Phase 2).

2.1.5 The following asset groups were considered:

- Track
- Signalling
- Civils
- Operational Property
- Telecoms
- Electrification & Plant

2.1.6 These functional asset groups are referred to as 'disciplines' in this report.

2.1.7 This report has been produced at the end of the detailed review phase (Phase 2), and sets out our methodology for the overall process plus our findings from the detailed review.

2.1.8 Section 3 of our report sets out our understanding as to NR's overall process for linking asset policy to planned work.

2.1.9 Section 4 sets out the general approach and findings of the review.

2.1.10 Sections 5-10 set out the asset specific approach and findings for each discipline.

2.1.11 A listing of the documents we have been provided with for our review and the meetings held with NR and ORR is included as Appendix B.

2.1.12 Appendix C includes key figures referenced in the text.

2.1.13 Appendix D presents key extracts from the individual asset policies.

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2.1.14 Appendix E relates the individual asset policy statements to the sixteen policy tests[1] proposed by ORR in connection with wider CP5 policy review.

2.1.15 Appendix F presents the discipline specific "Scheme Review" templates which show how the sample schemes relate to the prioritised policy statements.

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[1] ORR-#430597-v1-20111028_ORR_PR13_Policy_review_note dated October 2011

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3 Context and Scope of Review

3.1 Documentation

3.1.1 As part of this overall review we have been provided with the following key documents relating to aspects of the CP4 Policy Application.

3.1.2 The key documents in terms of context and overall process comprises:

C1	Network Rail, Transformation Programme – Visible and Agile Workbank Planning (VAWP) Strategy and Targets, Version 3.1, Aug 2009
C2	Network Rail, Delivery Plan Update 2010
C3	Network Rail, Asset Management Policy, Feb 2011
C4	Network Rail, Asset Management Strategy, Feb 2011
C5	Network Rail, Network Rail Delivery Plan 2011, Dec 2011
C6	Network Rail, CP4 Delivery Plan 2011 Enhancements Programme: statement of scope, outputs and milestones, Dec 2011
C7	ORR Policy Review Note - Assessment of Network Rail's Asset Stewardship, Doc No. 430597.01
C8	Network Rail, Strategic Business Plan 2007, Supporting documentation, Asset management, Oct 2007

Table 3-1 Key Documents

3.1.3 At the start of each of the asset specific sections we have also presented a summary of the key documentation on which we have based our review.

3.1.4 A full list of documents received and meetings / workshops attended is contained in Appendix B1.

3.2 Asset Management Framework

3.2.1 In February 2011, NR published an overall high-level Asset Management Framework (NR 2011, Ref. C3 Asset Management Policy). The framework defines the cycle of NR's asset management decisions and activities in a Plan-Do-Review sequence. NR (2011 Ref. C4 Asset Management Strategy) states:

3.2.2 *"The purpose of the framework is to provide a simple representation of the major building blocks of asset management and the key interfaces between them. It is the starting point for more detailed process mapping and the assignment of responsibilities and accountabilities. It is also useful in relating the activities*

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specified above in the roadmap to the parts of the business that will lead on and participate in their implementation."

Figure 3-1 NR Asset Management Framework (Ref. C3)

3.2.3   NR (Ref C3) notes that the framework is divided into three major areas:

Primary decisions and activities: These are the decisions and activities that start with the high level objectives for the infrastructure and end in the delivery of work on the ground. The framework facilitates the establishment of a 'line of sight' between them.

Enabling mechanisms: The effectiveness of the primary decisions and activities is dependent on many support mechanisms such as asset information, analysis tools, competencies and business processes. The importance of these mechanisms is emphasised by their position at the core of the framework.

Reviewing mechanisms: Reviewing mechanisms provide the feedback loop between the interventions undertaken on the infrastructure and the asset condition and performance that they give rise to. They provide inputs to tactical and strategic responses to measured performance against targets and also to the continuous improvement of the asset management system."

3.3   Asset Management Policy and Strategy

3.3.1   In February 2011, NR published their Asset Management Policy (Ref. C3) and their Asset Management Strategy (Ref. C4). Figure 3.2 shows the relationship between the NR asset management documents.

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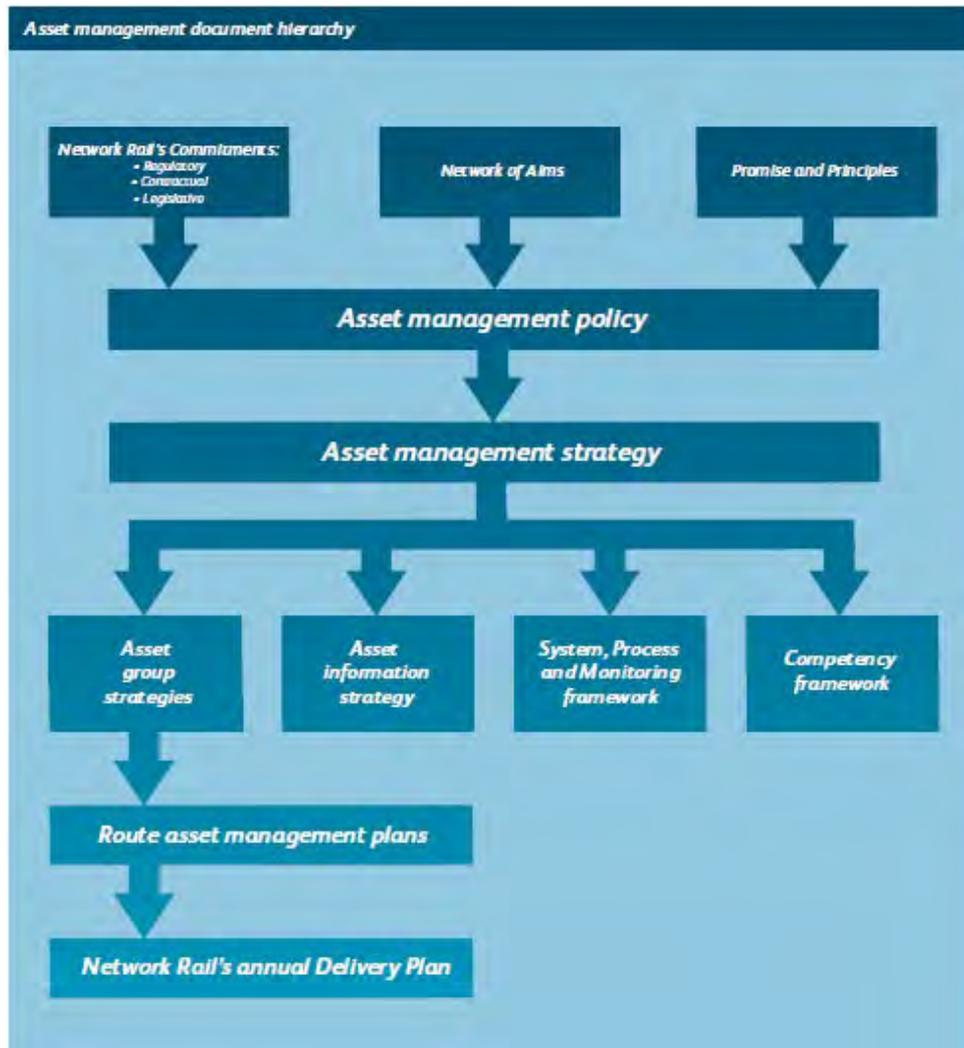
Figure 3-2 NR Asset management document hierarchy (Ref C3)

3.4 Asset Policies / Asset Group Strategies

3.4.1 NR 'Asset Policies' appear to be synonymous with the 'Asset Group Strategies' defined in the NR Asset Management Strategy (Ref. C4). Hereinafter we have used the term 'Asset Policies'.

3.4.2 For clarity, we use 'policy' to refer to statements within the Policy which provide detailed guidance on the management of the assets.

3.4.3 NR Asset Management Strategy (Para 4.2.1) defines the function of these 'Asset Policies' as being:

3.4.4 *"Asset policies. The policies document the asset interventions (maintenance, renewal and enhancements) necessary to deliver the route specifications at the minimum whole life, whole system cost. The policies provide the pivotal link between customer requirements and asset plans. They are the main driver of work volumes and the basis for output and expenditure forecasts. Our existing policies are based, to a significant extent, on traditional practices and engineering. The next generation will be based on formal whole-life costing methods and tools."*

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3.5 Route Asset Management Plans (RAMPs)

3.5.1 The NR Asset Management Strategy (Ref. C4) states:

3.5.2 *"The Route AMPs result from the application of the appropriate asset policies to generate volumes of work to be undertaken on a given route, and they show the cost of delivering these volumes and a forecast of the outputs that the work volumes give rise to. The plans provide a specification for the delivery functions. They also provide assurance to external stakeholders, such as regulators and governments, that the costs are justified and that the infrastructure outputs will be delivered in a sustainable way."*

3.5.3 These plans will be produced for each of the 305 Strategic Route Sections (SRSs) and in their totality will represent the 'local business plan' for asset management activities in the Routes.

3.5.4 Our understanding is that NR are currently developing the template and process for the fourth generation Route Asset Management Plans and specifically that RAMPs are not yet part of the CP4 'business as usual' process. We make further comments on RAMPs in paragraph 3.6.7 below, and also in the discipline specific comments. In the context of this CP4 Review, we understand that 'Top-Down' Policy requirements have been 'reconciled' with 'Bottom-Up' needs in Workbank Development and Business Planning processes. One of our key activities for this Mandate is to gain a better understanding of how this reconciliation has taken place for each discipline when developing the Workbank.

3.6 Workbank Development Process

General

3.6.1 In our discussions with the HAMs, (Heads of Asset Management) – NR's Asset Management discipline heads, a consistent process across the disciplines was outlined. Our understanding of that workbank development process is described in generic terms in the following paragraphs, and subsequently we have provided discipline specific comments.

3.6.2 In our following narrative we are focusing on the Policy perspective, to illustrate the process and the points at which Policy considerations are most likely to influence or direct decision making.

3.6.3 Our Understanding is that the Route Asset Managers (RAMs) and Route Maintenance Engineers (RMEs) are the primary point for the application of Policy. RMEs are responsible for identifying and scoping workbank items; this is a continual process, driven by the steady flow of information which arises from asset examinations. Each Route Maintenance team maintains a list which is (effectively) an unconstrained workbank of all proposed workbank items. The RME reports to the Route Asset Manager, who is accountable for the process.

3.6.4 Similarly, at Central level, the Discipline Business Plan, which holds the authorised projects, is managed as a live document which is also continually updated. The slowly changing nature of these lists is an important characteristic, and the fact that these workbanks transcend Control Periods is an important factor when considering the application of Policy.

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Route Level

3.6.5   Examination and condition reports are evaluated and assessed by the RME's engineering team; where is it considered that intervention is necessary, items of work are described and added to the list of proposed workbank items. The initial action by the RME / RAM is to prepare a Problem Statement which summarises the issues with the asset which needs to be addressed. Figure 3-3 below illustrates the process used by the Buildings team and is typical across all disciplines.

3.6.6   This decision process should be guided primarily by the asset policies, supported by the asset condition and degradation features, and taking into account risk, criticality and performance requirements, and prioritisation. The final decision on inclusion to the list is the responsibility of the RME, which will be critically reviewed by the RAM.

3.6.7   We understand that Route Asset Management Plans (RAMPs) are being developed. The template for these has been produced centrally, but the RAMPs are populated at Route level. We are unclear about the relationship between asset policies and the RAMPs, but from our discussions with the HAMs our impression is that RAMPs are not yet part of the Business as Usual process for asset policy application.

3.6.8   In relation to our work under this Mandate, we are primarily looking at the application of policy as it took place two or three years ago (ie pre-devolution), when RAMPs would certainly not have been part of the process.

3.6.9   Although project authorisation takes place at Central level, as described below, the management of the project continues at Route level. This follows the NR Guide to Railway Investment Process (GRIP) process through design to construction and handback. Changes in scope and cost are referred up to the Investment Panel for authority. Scope changes clearly have the potential to affect the application of Policy.

3.6.10   Part of the change process is deferral – the range of deferral can be from the complete project to particular elements of it. Deferral can occur at any stage of a project, including the implementation stage. NR maintains a deferral register for each discipline. Deferral of work can have policy implications. We did not review this aspect of policy application.

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Figure 3-3 Typical Workbank Development Process Map (Ref. CI 6, Sept 2010). A larger version is presented in Appendix C.

Central Business Planning

3.6.11 Figure 3-4 below shows the Buildings process which is followed at Central level, which is typical for all functions.

3.6.12 The RME prepares investment papers, using a common template, to support the application by the Route for Central approval of the project as described in NR's Business Planning & Investment Authority Process & Guidelines documents. These are Discipline specific documents which are generically consistent. The guidelines contents include:

- Elements of the business plan
- Timelines
- Reviews of Plan
- Estimating for Plan
- Prioritisation
- OPEX / CAPEX
- Deferred work and rollover
- Financial targets
- Change Control

3.6.13 The Authority Request covers a specific GRIP stage (or stages), after which a further authorisation is requested. The request template does not explicitly refer

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to application of policy. The current Business Plans include a cross-reference to asset policies for some disciplines (e.g. Civils), whereas others (e.g. Track) do not.

Figure 3-4 Development of National Plan (Buildings) (Ref. CI 6, Sep 2010). A larger version is presented in Appendix C1.

3.6.14   There is generally a considerable lead time between a project being included in the Business Plan and its implementation. For example, as part of their efficiency programme, the Civils AM team aim to 'lock down' 75% of the 2014-15 workbank in 2008-09, as shown in Figure 3-5 below. This is significant when considering policy application (see Recommendation RG4).

Figure 3-5 B&C Civils Workbank Development Schedule (Ref. C1). A larger version is presented in Appendix C1.

3.6.15   NR carries out its own assurance on the development of the workbanks. This can take various forms, including visits by the HAM and other senior technical staff to the Route to review the workbank and inspect particular assets, or by a group

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meeting consisting of each RAM and the HAM and Professional Head for the
discipline holding a workshop in which workbanks are reviewed collectively.

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4 Phase 2 General Approach

4.1 General Approach

4.1.1 In Phase 2, we visited several Routes with the primary objective of understanding the application of policy in the context of maintenance and renewals for each of the disciplines.

4.1.2 In particular, we reviewed:

- the development of the workbank for 2012-13
- the processes used to develop unconstrained and prioritised workbanks
- the change control process as applied throughout the GRIP project development
- project handback – updating asset registers

4.1.3 We selected a range of projects and maintenance activities which we checked for compliance with the appropriate policies. We analysed the Policy statements and established that nearly all the policy statements are definitive and can therefore be tested for policy application.

4.1.4 In carrying out the Phase 2 work, we looked for significant changes in cost as marker for change in scope / policy implications.

4.1.5 To identify and evaluate the number of tests to be applied, we ranked the policy statements and identified those which are likely to have most influence on strategy, performance or expenditure. This process resulted in the following number of important policy statements per discipline:

Discipline	No. of Tests
Track	35
Signalling	22
Civils	10
Operational Property	2
E&P	23
Telecoms	11

Table 4-1: Number of influencing Policy Statements Per Discipline

4.1.6 This reduces the number of policy statements to about one third of the total. The reason why signalling, telecoms and E&P have a large number of statements reflects the prescriptive nature of the policies for these disciplines; Track has a large number of tests because of the large number of policy statements.

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4.1.7   The ranked policies for each discipline are included as Appendix E.

4.1.8   We have also assessed how each policy relates to the sixteen policy tests proposed by ORR (Ref. C7) in connection with CP5 (These are tabulated in Appendix E). This illustrates which policy statements are prescriptive and which are multi-dimensional; for example several of the track statements cover several facets of the asset life cycle.

4.1.9   To ensure that all routes were covered as part of the review, we randomly selected 2 routes to investigate for each discipline as follows:

	Anglia	East Midlands	Kent	LNE	LNW	Scotland	Sussex	Wales	Wessex	Western
Track									X	X
Civils					X	X				
Signalling	X			X						
Operational Property						X		X		
E&P		X	X							
Telecoms				X	X	X	X		X	

Table 4-2: Route Selection

4.1.10 One primary route was selected for each discipline to which site visits and meetings with the RAM/SME were arranged. These routes are highlighted in the table above.

4.1.11 Following receipt of the 2012/13 discipline workbanks we reviewed the information and selected a representative sample of schemes to investigate in further detail. The number of schemes that were selected per route are detailed in the table below.

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		Anglia	Central/ National	East Mids	Kent	LNE	LNW	Scotland	Sussex	Wales	Wessex	Western
Track	Requested										N/A	N/A
	Received											
Civils	Requested						38		15			
	Received						38		12			
Signalling	Requested	15				35						
	Received	14				35						
Operational Property	Requested							25		25		
	Received							20		23		
E&P	Requested			3	10							
	Received			3	10							
Telecoms	Requested		1			2	5	2	7		3	
	Received		1			2	5	2	7		3	

Table 4-3: Number of Schemes Selected

4.1.12 We requested the business case information and supporting documentation relating to selected schemes from Network Rail. The number of schemes that information was received for is noted in the table above.

4.1.13 The appropriate Arup discipline specialist then reviewed the business case information and supporting documentation for all received schemes and selected 5 from the primary route that they wished to review in more detail.

4.1.14 A visit to the primary route was then arranged to allow the Arup discipline specialist to raise queries with the appropriate RAM and also to review all of the associated documentation for the 5 selected schemes accompanied by a route SME.

4.1.15 Following this initial desktop review meeting, the 5 scheme sites were then visited to allow for further verification of asset condition.

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4.2   General Findings

4.2.1   As the review progressed it became apparent that that there were a number of common findings across all disciplines.

4.2.2   The Authority Request templates utilised by the Routes to detail the proposed works and also to outline the justification do not contain a section requiring the inclusion of information regarding which exact policy or policies apply.

4.2.3   The Routes do not appear to have a suitable set of standardised tools available to allow them to accurately calculate the whole life cost of a project. Costs are currently being estimated on a project by project basis and so inconsistencies may be occurring between the costs attributed to similar schemes on different routes.

4.2.4   Although the majority of the schemes reviewed appeared to comply with the policies that had been set out, it was not always clear whether the projects were included in the workbank because they complied explicitly with a policy, or whether they were included anyway and an applicable policy was then retrospectively found. There appeared to be no specific audit trail available showing a record of which policies applied to the live schemes.

4.2   General Findings

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5 Asset Specific Findings – Track

5.1 Phase 1 Findings

5.1.1 In developing our proposed methodology for Track we have considered the following key references.

T1	Network Rail, Level 2 Renewals Workbank Management, Ref NR/L2/TRK/6001, Issue 2, Aug 2008
T2	Network Rail, Track Asset Policy, Mar 2010
T3	Network Rail, CP4 Delivery Plan Network Availability- Implementation Plan (v2), Mar 2010
T4	Network Rail, Updated Track Asset Policy, Nov 2010
T5	Network Rail, CP4 Route Asset Management Plan – Strategic Route Section C.08, Version 1.0, Dec 2010
T6	Network Rail , Route Asset Management (Track) Report, 2011-2012
T7	Network Rail, Current EM Ramp, Mar 2012
T8	Change in Policy and Building Up Plans.doc
T9	Network Rail, Presentation to Track Asset Management Team

Table 5-1 Key References

5.1.2 We met with the Track HAM on 19th April and the following paragraphs are based on those discussions.

- Track does not use GRIP, but instead uses a process known as *'End to End'* (E2E); Track has a derogation against GRIP.

- The 2010 Track Policy was a major revision brought about by the CP4 Determination, with NR having to revise its approach to Track Renewals and Maintenance (R&M) based on the reduced funding available.

- The overall aim in developing the track asset policy was to achieve the performance improvement targets for track by linking to route criticality, track type and traffic duty. The principal changes were the introduction of refurbishment on the lower criticality routes, and specifying use of cascaded serviceable materials onto these routes. NR's intention was that the Policy would help engineers to determine the right balance of maintenance, refurbishment and renewal on each route to meet the output targets.

- Because of the lead times involved with large annual track renewal programmes, in the 2011/12 workbank there were only minor adjustments made to take account of policy changes (quasi-hybrid policy); and 2012/13

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was the first full year of application of the revised 2010 track asset policy, even though many Problem Statements (the initial step in the process to establish a workbank) had been produced based on the previous policy.

- For Track, Plain Line (PL) is fully compliant, whereas for Switch & Crossings (S&C) there is not the same significant shift towards higher criticality track for complete renewal, mainly due to commitment in some large enhancement schemes. The over-riding approach to Track Renewal and Maintenance is to try and achieve and exceed the aims and output requirements of the 2010 Policy. Figure 5-1, provided by NR, shows the change in proportions spent in different criticality quadrants during CP4. This demonstrates a shift of plain line renewals towards Categories 1a and 1b, which is an expected outcome of the Policy at population level. We have not verified these figures.
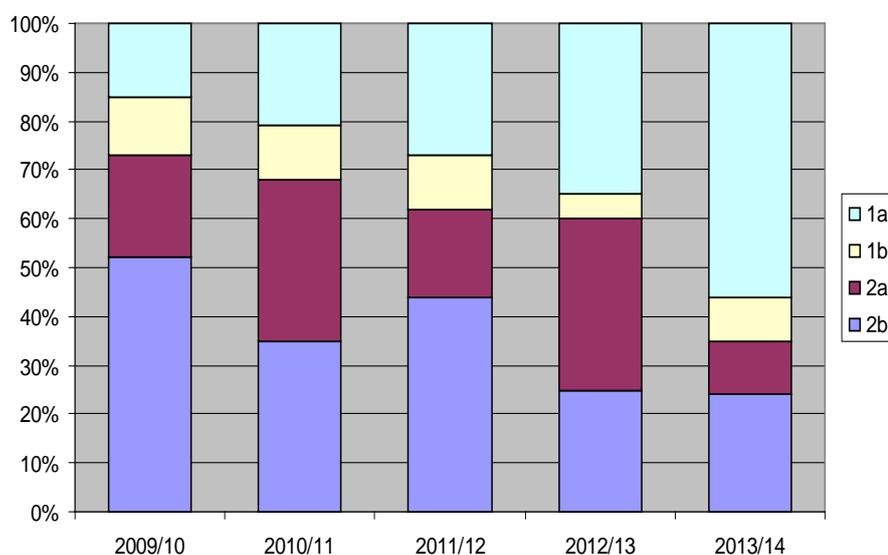
Figure 5-1 Proportion of CP4 Plain Line Renewals by Criticality Quadrant

5.1.3   The Policy consists of 105 statements, grouped as follows:

- **Track System** (20 No.), consisting of General (7 No.), Inspection (1 No.), Maintenance (1 No.), Refurbishment (1 No.), Renewal (7 No.), Interfaces (3 No.)
- **Plain Line System** (2 No.) – Inspection and Maintenance
- **Plain Line Rail**, (13 No.), consisting of Inspections (1), Maintenance (8), and Renewal (4)
- **Plain Line Sleepers** (7 No.), consisting of Maintenance (3), Renewal (2), and Interfaces (2)
- **Plain Line Ballast and Track Geometry** (5), consisting of Inspection (1) and Maintenance (2), Renewal (2)
- **S&C** (24) – generally in addition to the PL requirement – Inspection (1), Maintenance (10), Renewal (13)
- **Lineside Assets** (28), consisting of Drainage (3), Boundary Measures (5), Vegetation (11), Level crossing (3), End Stop (2), Lineside Signs (2), Access points (2)

5.1.4   The Policies are further sub-divided into four criticality quadrants as follows:

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- Quadrant 1a: High cost of incidents and High frequency (18% of network)

- Quadrant 1b: High cost of incidents, Low frequency (7% of network)

- Quadrant 2a Low cost of incidents, high frequency (20% of network)

- Quadrant 2b: Low cost of incidents, low frequency (55% of network)

- A separate statement is provided for each of the quadrants.

- Strategic Route Sections (the network is divided into 306 SRS) are allocated to the four quadrants in the Policy document

5.1.5   The new Policy was briefed out to the Routes between November 2009 and January 2010. At that time, the existing workbank was reviewed against the new policy and, where it was necessary and feasible, work which did not accord with the Policy was removed and replaced with maintenance activities. Workbanks are normally defined 3 years ahead.

5.1.6   More recently, a more detailed engineering design appraisal specification has been developed which has led to a change in contract arrangements to focus more on delivery.

5.1.7   Annual Plain Line workbanks are developed in an iterative process commencing with Problem Statements, in which a particular length of track and its need for renewal is described by Track Maintenance Engineers, usually 3 or 4 years before that length of track might be renewed or refurbished.

5.1.8   Problem Statements are then reviewed by the Route Asset Manager Track's Renewal Engineer and a Plain Line Particular Specification document is prepared following a site inspection. This document specifies the work to be done (type of renewal) and the year in which it should be done based on its condition and a review of relevant track asset condition documents (e.g. track geometry and rail flaw data) and the observed condition.

5.1.9   Problem Statements and Plain Line Particular Specifications are held in NR's CCMS2 document management system.

5.1.10   Plain Line workbanks are derived from Specification documents and managed using Track Renewal System (TRS), which after authorisation will be passed to the Design Team as project remits. P3e is used to manage delivery and change control. S&C follows a similar process. Routes maintain detailed spreadsheets which form the basis of the workbanks, which were reviewed during Phase 2.

5.1.11   Track has published RAMPs for CP4, but maintenance and renewals are monitored using more detailed spreadsheets held within the Routes. RAMPs are seen as the plan for the assets at a point in time.

5.1.12   Within track, application of Policy is monitored through an annual peer review of the workbank, where the HAM and Professional Head spend two days with the RAM team for each Route, and which the ORR visits. Sites are validated using supporting documentation, with site visits to questionable sites. Once a year, the Engineering saloon car is used to inspect sections of each route.

5.1.13   Further monitoring exists through the monthly summary report prepared by the Routes; it monitors delivery against Business Plan and change control. Routes now have change control authority – the HAM gets visibility after approval by Route; the Track HAM has a veto related to policy, lowest WLCC or

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sustainability. A further level of internal assurance is provided by the Quarterly Report which is more detailed than the monthly report and can be used to review assurance topics. Checks on how the delivery of schemes is recorded were carried out during visits to Routes.

5.1.14   In April 2010, as part of its review of the revised CP4 Track Asset Policy, ORR carried out a small number of site inspections at various track renewal locations to review its application. The report[2] concluded that staff were confident that they could deliver the policy requirements. It highlighted that '*Category 2b contains 55% of Network Rail's track assets, and it is in this category that the new policy generally perpetuates legacy CWR and jointed track where the annual tonnage is less than 5 million per annum. These SRSs place a particular responsibility on TMEs and the maintenance team to ensure timely and competent management of the track asset*'.

5.1.15   Following its overall review of the revised CP4 Track Asset Policy in the Spring of 2010, ORR, in a letter to Network Rail on 1st June 2010 concluded that its requirements for asset robustness and sustainability would be met by the track policy.

5.2   Review Approach Alterations

5.2.1   Due to the way in which information relating to track renewal and replacement schemes is held, it is not possible to follow the review procedure for this discipline as was outlined for other disciplines.

5.2.2   Following discussions with both the Arup track discipline specialist and the Network Rail HAM, the basic strategy for our review was amended.

5.2.3   In order to establish the extent to which the new track policy had been applied on the Routes, meetings and site visits were arranged to the Wessex and Western Route offices

5.2.4   In advance each office had supplied spreadsheets listing the track renewal programme for the year 2012-13. From these spreadsheets individual jobs could be identified by generic type (plain line or switches and crossing), location and the type of renewal work to be undertaken i.e. total renewal or refurbishment.

5.2.5   Ten sites were chosen from the workbanks to be discussed in more detail at respective meetings with each Route Asset Manager Track.

5.2.6   Table 5-2 provides a summary of the schemes which were reviewed in detail and visited on site.

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[2] Ref 48 - Richard Spoors Associates Ltd - Report of track site inspections undertaken as part of the ORR review, April 2010

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Location	Scheme Type	Quadrant	Location	Scheme Type	Quadrant
Wessex			**Western**		
Strawberry Hill	S & C	2A	Exeter St Thomas	PL	2b
Farnborough North	PL	2B	Starcross Station	PL	2b
Haslemere Platform 3	PL	1A	Dawlish Warren	S & C	2b
Epsom	S & C	1B	Newton Abbot West Jnc	S & C	2b
Tolworth	S & C	2A			

Table 5-2 Summary of Sample Track Projects

5.2.7   For each workbank item relevant documentation was reviewed and links drawn to relevant track policy statements to evidence that the particular specification was compliant.

5.2.8   The ten sites were then visited to allow for further verification of asset condition and policy compliance.

5.2.9   Table 5-3 provides a summary of the key policy statements investigated:

Track Policy Statement	Comments
2	Route Asset Management Plans shall specify a mix of routine maintenance, refurbishment and renewal designed to deliver the best overall means of meeting the output targets for the track on each SRS, sustainably and within the available funding.
10	Refurbishment may be considered at any point during the life cycle of the track, where it offers an effective whole life cost solution to one or more of the following: • achieve the desired service life of the track system, or • extend the track service life of the system, or • reduce the volume or cost of maintenance to the track system, or • improve the performance of the track system

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23	The following renewal categories may be specified: • complete renewal of rails, sleepers and ballast (cats 4, 10, 14, 16, 23, (20+24) • renewal of rail only (cats 1+2) • ballast cleaning or renewal of ballast only by ABC (cats 5&20)
29	In quadrant 2a tactical use shall be made of high output renewal methods where appropriate
68	Partial renewal or refurbishment shall be considered as an alternative to complete renewal at planned service life where either the output targets for the S&C can still be met sustainably, or partial renewal would create the potential for abandonment or complete renewal to be carried out in conjunction with planned resignalling or enhancement schemes in future years

Table 5-3: Summary Review of selected Policy Statement Applicability

5.3 Documents Reviewed – Phase 2

T10	Great Western 2012/13 Track Workbank
T11	Wessex Route 2012/13 Track Workbank
T12	Problem Statements
T13	Particular Specifications
T14	Track geometry trend reports
T15	Rail defect reports

Table 5-4: Documents Reviewed

5.4 Phase 2 Findings – Meetings

5.4.1 The route clarified the Phase 1 findings and further explained the way in which workbanks are created.

5.4.2 Each job is identified for possible inclusion in the workbank by first being put forward to the Route Asset Manager (RAMT) by the Track Maintenance Engineer (TME).

5.4.3 The TME is responsible for the inspection and day to day maintenance of track, and for identifying lengths of track whose condition has deteriorated due to age

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and use to a point where it is no longer economical to keep it in a safe and reliable condition by maintenance activities.

5.4.4 The timing of the judgement of each scheme is important, as the engineer must allow for a period of 3 or 4 years before a submitted item is likely to be renewed or refurbished.

5.4.5 Following submission the RAMT has the item inspected and a decision is taken to either accept the item into a future renewal programme, or advise the TME that it should remain in maintenance. A new form is created, the Plain Line or S&C Particular Specification, which describes the item in detail, comments on the condition and defines the engineering specification and year for renewal.

5.4.6 At a date each year the Route's proposed work bank for track renewals is put together and using unit rates a budget is prepared. There are target unit costs that need to be met together with a target budget. Prior to submission for financial authority to turn the draft work bank into an approved programme of work, a peer review of selected items in the work bank is undertaken by the Professional Head (Track) and Head of Asset Management (Track).

5.4.7 The peer review has two purposes, firstly it ensures that a consistent approach is being taken by the Route to apply the Track Policy and secondly it seeks to understand and approve or otherwise selected items where strict adherence to the policy is not being proposed.

5.4.8 In early 2010, when the revised Track Policy for CP4 was introduced, an authorised programme of work existed for 2010/11 and the 2011/12 programme was just about final. A parallel process would have planned the required track access to deliver the programmes for these two years, thereby limiting the immediate impact of the new policy. This left the 2012/13 and 2013/14 programmes, to which it was possible to apply the policy and review documentation for items of work that had commenced the process to a part of an approved programme of work.

5.4.9 The organisation of Network Rail in 2010 was still centralised, although Routes had been created with Route Asset Directors and functional Asset Managers in 2009. The Director, Track Asset Management, who had led the work to develop the new Track Policy with the Head of Track Engineering, was the line manager to whom the Route Asset Managers Track reported. A conference was therefore called and attended by the RAMTs at which the new policy was explained and the RAMTs were asked to review their developing 2012/13 renewal plans, in particular SRSs that fell into quadrant 2b (low tonnage, low speed) and identify items that could be treated by refurbishment rather than renewal to meet policy outcomes.

5.4.10 During the meetings with both Wessex and Western the respective RAMTs confirmed that they had been briefed on the new policy and commenced a review of their outline work banks for 2012/13 in February 2010 with a view to identifying sites where refurbishment was a viable option.

5.4.11 In Wessex as early as 2010/11 a small refurbishment budget within Renewals had been established. One of the constraints to an immediate application of the Policy was that the immediate forward plans for track access and contractor resources were frozen.

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5.4.12   Both Routes, with approval from the Director Maintenance, had started to undertake refurbishment work with staff supplied from Maintenance depots. This source of skilled labour has been developed further since then, and Maintenance depots in 2012/13 have their own work bank of authorised renewal items to deliver, including refurbishment.

5.4.13   In the course of the development of refurbishment programmes, a dialogue was maintained with the Head of Asset Management (Track), in order to resolve questions on the policy and in so doing refine certain aspects of the scope of refurbishment.

5.4.14   On Western a particular site that would have been ideal for a refurbishment resulted in a renewal due to local circumstances and the lack of suitable bespoke machinery to resolve the problem. This was a site formed of Continuously Welded Rail (CWR) with concrete sleepers in Quadrant 1a installed in 1995. The concrete sleepers had started to split longitudinally, possibly due to a flaw in their manufacturing process, and needed to be replaced as they were starting to affect the security of the rail fastening housings. Rail and ballast were of an age and condition that they did not justify renewal, although there was some RCF present on the rails. The problem was the site characteristics. The track ran alongside a retaining wall, preventing the concrete sleepers from being removed laterally. The retaining wall also prevented the use of the Matisa sleeper renewal train, which meant that the only solution to remove the sleepers was to cut the CWR into 10 metre lengths and lift them out. This presented a minimum rerail, resleeper item. With rail and sleeper panels removed it made sense to renew the 15 year old ballast.

5.4.15   In order to implement the lowest life cycle cost option for a major intervention, Network Rail should consider investment in new bespoke plant and machinery. Issues such as concrete sleeper renewal or ballast cleaning in locations of restricted lateral space.

5.4.16   Refurbishment has also been applied to S&C items in both Wessex and Western workbanks for 12/13. Western in particular are applying medium refurbishment to S&C items that would otherwise be renewed in CP4, but are due to be remodelled under the Crossrail project in 2016/17.

5.4.17   In Wessex they were able to commence some refurbishment work soon after the policy had been introduced. As early as 2010 the Route had access to a refurbishment budget in their 2010/11 renewal programme. This was created following a detailed review of the current and future workbanks at the time. It was soon realised that applying the policy based on age of components was not sufficiently granular. Asset condition also had to be taken into account.

5.4.18   On Wessex, it was further realised that to stay within budget ceilings they could not apply the Policy without prioritisation. When they tried to include all of the pre-1976 rail in their re-railing programme and remove all of the legacy fastening systems such as lockspikes in Pan 8 baseplates in their resleepering and renewal programmes, target budgets were being exceeded. On site inspections and dialogue with TMEs was required in order to prioritise those items most likely to impact on performance if not included, and agree items that could wait until CP5.

5.4.19   A common issue with both RAMTs was the need to encourage TMEs to make early submission of Problem Statements for track that contained assets that the Policy stated were now obsolete and non-compliant, for example, bull head CWR, F19 sleepers, and non Pandrol plain line fastenings. This would help the

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RAMTs understand the full scope of future work leading to Policy compliance and the formulation of future programmes of work.

5.4.20   With the CP4 Policy, Routes have not undertaken specific whole life cycle cost (WLCC) calculations, but expect that by following the policy that they will be delivering WLCC costs. We believe this is a reasonable approach for CP4. An illustration is the scheme at Tolworth, for example, where the scope of the original refurbishment is being extended to include full retimbering and ironwork, but not following the full renewal specification with concrete bearers, thereby keeping additional expenditure to a minimum.

5.4.21   We have reviewed the maintenance aspects of the policies for each of the disciplines. Maintenance is an integral part of the Track Asset Management and the policy contains frequent references to maintenance, which tend to be general in nature, for example (Track–52) 'the preferred method of S & C geometry maintenance is tamping'. Maintenance Policy issues have been covered in our review where they are relevant to the project we selected.

5.4.22   In summary, at both meetings Network Rail was able to demonstrate that the 2010 Track Policy had been introduced during 2010 and was being applied in the formulation of track renewal programmes. This had been further confirmed by scrutiny of the 2012/13 workbanks from both Routes.

Policy Statement	Commentary
2	At neither meeting were the Route Asset Management Plans for track reviewed. Instead both meetings focussed on the 2012/13 workbank for track renewals and refurbishment, and the work the Route had done to prepare a workbank compliant with policy, especially for SRSs in quadrants 2a and 2b, where policy was focussed to translate renewals into refurbishments. We were pleased to note that both Routes had a mix of renewals and refurbishments in their 2012/13 workbanks.
10	We found the timing in the life of track assets critical in being able to specify refurbishment. For example, in order to give 30 year old S&C a further 15 years life by replacing 25% of the timber bearers, then the remaining bearers must have good life remaining and the ballast conditions be good enough for geometry treatment by tamping or stone blowing. We found 3 sites where this was not the case and the required scope of work exceeded the available budget. (Tolworth, Strawberry Hill & Newton Abbott).
23	A review of all workbanks presented showed compliance with this policy.
29	The site at Starcross on Western Route was a possible site for High Output. Further investigation would be required, as high output ballast cleaning is based on programmes made up of selected sites within geographical areas.

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68	The S&C track refurbishment sites at Dawlish and Newton Abbott were excellent examples of this policy application.

Table 5-5: Summary of Review Meeting Findings

5.5   Phase 2 Findings – Wessex Site Visits

5.5.1   Network Rail provided a copy of their 2012/13 track renewal programme for the Wessex Route from which Arup selected 5 sites for a detailed inspection.

5.5.2   During the site visit, Network Rail provided copies of the documents that had been prepared to support the business case for capital expenditure on the items. These included:

- Initial Problem Statement
- Proposed renewal specification
- Track geometry history
- Annual Tonnage
- Permissible Speed

5.5.3   The 5 sites were inspected in detail to understand the following parameters:

- actual maximum speed of trains over the track
- is the track straight, on a regular curve or transition?
- evidence of increased maintenance activity to maintain the track system performance
- recent rail defect history
- recent track geometry recordings
- poor geometry and evidence that intervals between interventions have reduced in the last 3 years?
- wet beds evident
- ballast contaminated with fines so as to prevent good drainage
- drains not working
- indentation on sleepers/timbers due to worn pads
- rail gall
- rail sidewear
- rolling contact fatigue
- cracked sleepers
- loose fastenings
- is the track in a cutting?
- is the track on an embankment?
- what is the prevailing vegetation?
- is the track in an incline or falling grade?

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- is it still possible to maintain good geometry by tamping?
- do the fastenings appear sound and is there evidence of maintenance to pads and insulators?
- age of rail and type of welds. Any evidence of rails being changed due to defects?
- any evidence of voiding observed by passing trains?
- whilst an increase in maintenance activity can be expected in the last few years of serviceable life, reduced performance of the track system is not acceptable on a Primary Route

5.5.4   For switches and crossings the following were added:

- have switches and/or crossings been changed and when?
- what are the joint conditions like at crossings (if not fully welded) and at insulated block joints?
- how many timbers have been changed?
- is the gauge good and consistent?
- any evidence of rolling contact fatigue in the rails?
- is the approach alignment good?
- do any baseplates move under passing trains?

BTH3 19m 0012y: Epsom – Ashtead End 849 A&B points

5.5.5   This 3rd rail electrified CV 9¼ crossover was installed in 1976 and allows trains to be berthed in a carriage platform behind the point from which the photograph in Figure 2 was taken. Epsom station is approximately 100 metres in the distance. The line speed on the Up is 60 mph; however there is a 20 mph PSR 80 metres from the tips of 849A points, so the maximum speed can be taken as 30 mph.
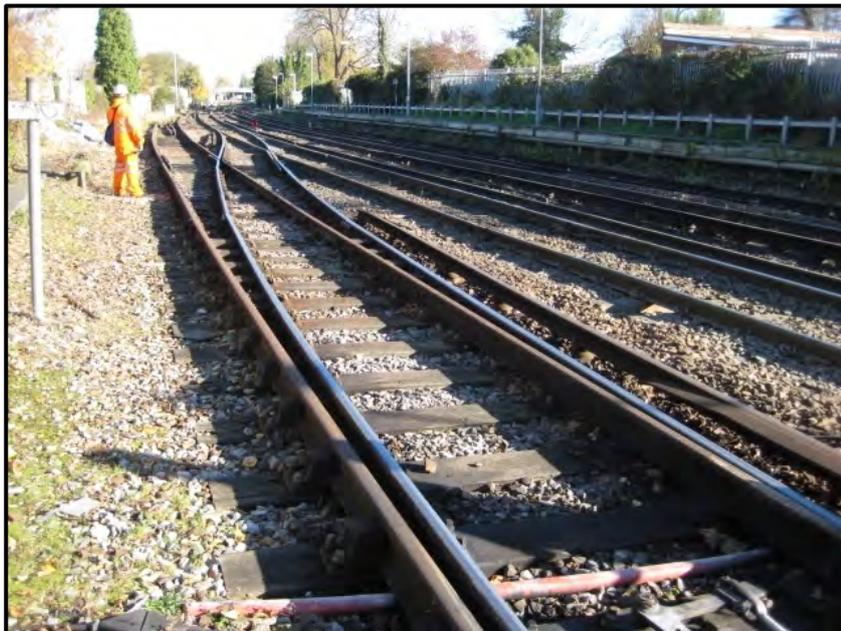
Figure 5-2 The B end of the crossover (siding)

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5.5.6 Earlier in 2012 both switches of the A end have been renewed with strengthened blocks. See Figure 5-3.

Figure 5-3 2012 Switches with strengthen blocks

5.5.7 Gauge is fairly consistent on the through track at 4 – 7 mm wide. The hardwood timbers are showing decay on their tops through age. New maintenance chairscrews have been fitted with new ferrules. See Figures 5-4 and 5-5.

Figure 5-4 Decayed and splitting timber bearers

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Figure 5-5 Maintenance coach screw

5.5.8   This crossover is in a suitable condition to have a medium refurbishment in 2012/13.

5.5.9   The Epsom – Ashead section we reviewed is in Track Quadrant 1B. Our review found that the planned work:

- Conforms to Policy 6 by refurbishment/upgrade of switches and crossing to make the A end of the crossover fully CWR compliant.
- Conforms to Policy 10 Refurbishment to extend life.
- Conforms to Policy 62 – Site will be Tamped to design as part of renewal of adjacent Crossovers. Evidence to suggest that manual lifting and packing has been used to maintain geometry.

MPC 12m 0374y: Tolworth 4A, 5 A&B points

5.5.10   The proposal at Tolworth is to refurbish a crossover and single lead into sidings. Tolworth is on the Chessington Branch, which has a line speed of 60 mph and each track has an annual tonnage of 4 EMGTPA. The crossover is used by aggregate trains to gain access to a supply depot. The point control is from a ground frame.

5.5.11   The crossover is inclined 1 in 10 with C switches, installed in 1965. Timbers generally in poor condition (See figure 5-6) with 12 having been replaced. See figure 5-7.

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Figure 5-6 Typical poor timber condition in 5A Pts
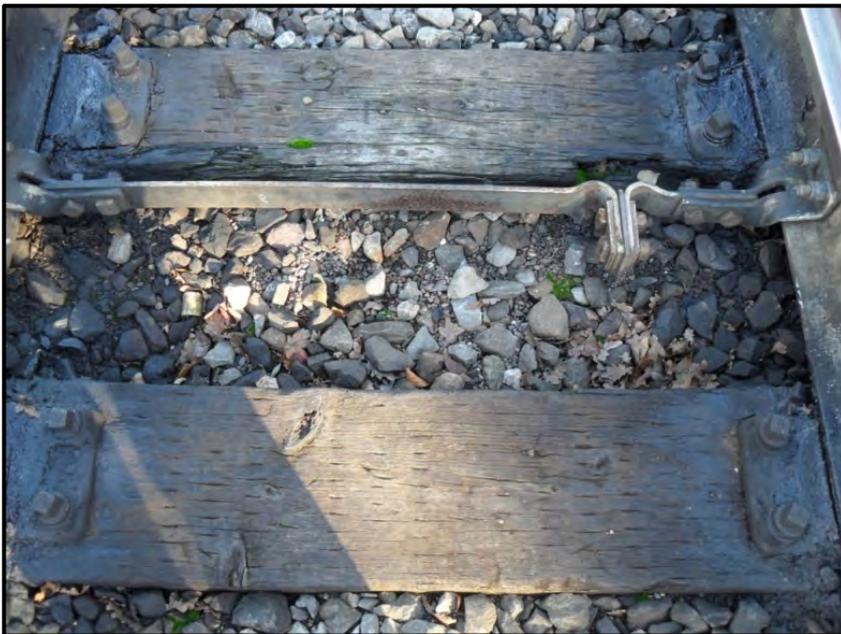
Figure 5-7 Replacement timbers in 5A Pts

5.5.12   Evidence of maintenance screws and ferrules having been used. See Figure 5-8. Slightly wide gauge, within limits and consistent. Crosslevel was found to be very poor. Ballast condition was dry with no evidence of cohesive materials working through.

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Figure 5-8 Maintenance coach screws

5.5.13   The single turnout on the down line was installed in 1970 with B switches and a 1 in 7½ crossing. Timbers are slightly worse than the crossover: very poor. (Figure 5-9) There is no evidence of any replacements. On the day of inspection there was a 30 mph condition of track speed restriction on the down line due to a "super red" track geometry fault.

Figure 5-9 Typical Original timber bearer in single turnout 4A pts

5.5.14   The timber condition is so poor that all timbers need replacement. This item should be considered for an extended refurbishment with all new timbers and ironwork. Subject to sampling the ballast a skim dig may be sustainable.

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Advantage should be taken of the opportunity to replace the existing inclined S&C geometry with a more modern vertical layout.

5.5.15   The Route Asset Manager Track will retain this item within his overall S&C refurbishment budget for 2012/13

5.5.16   The Tolworth section we reviewed is in Track Quadrant 2A. Our review found that the planned works:

- Conforms to Policy 68 – Partial renewal or refurbishment of S&C shall be considered as an alternative to complete renewal at planned service life where the output targets for the S&C can still be met sustainably.

TSJ 12m 0594y: Strawberry Hill 636 points & 637 points & Double Junction, 635C points (single lead)

5.5.17   This item is a refurbishment of a double junction and single lead immediately adjacent to Strawberry Hill station and road level crossing. The single lead on the up line is the entrance/exit to Strawberry Hill traction depot. Line speed is 60 mph and the annual tonnage on each track 7 EMGTPA.
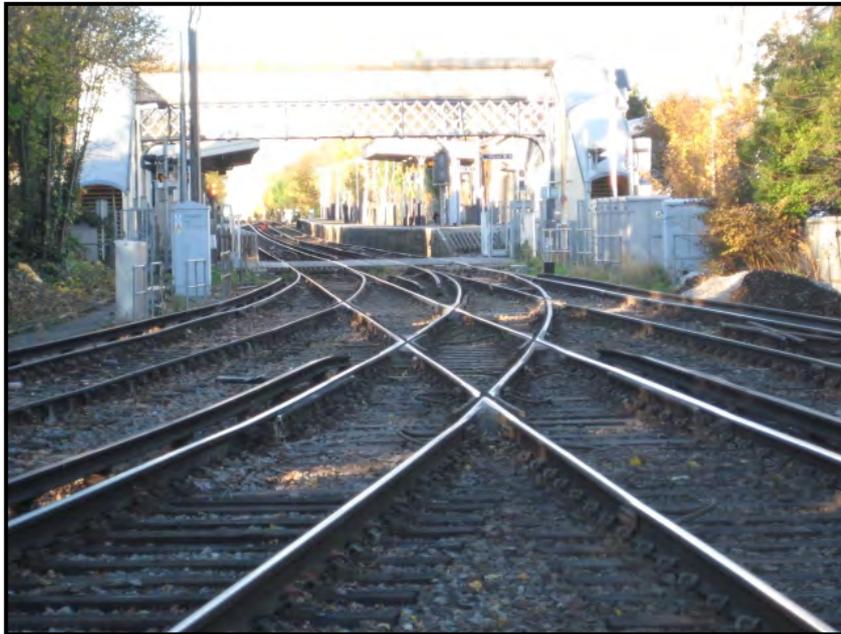
Figure 5-10 Strawberry Hill Double Junction

5.5.18   The junction was installed in 1970. It is vertical 113lb FB on hardwood timbers with D switches and 1 in 10¾ common crossings. The left hand switches of 637 points on the down were changed in 2007. See Figure 5-11.

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Figure 5-11 637 Pts Left hand switch (RH as viewed) replaced – note differing slide chair blocks.

5.5.19   The diamond is made up of a 9 ¼ 1975 monoblock crossing with the other 3 units having been renewed most recently in 2009 (2 x 1 in 7½) and 2003 (1 in 6½). Some 20 timbers under and adjacent to the diamond have also been renewed, possibly in 2009. See Figure 5-12. Gauge in the diamond was good.
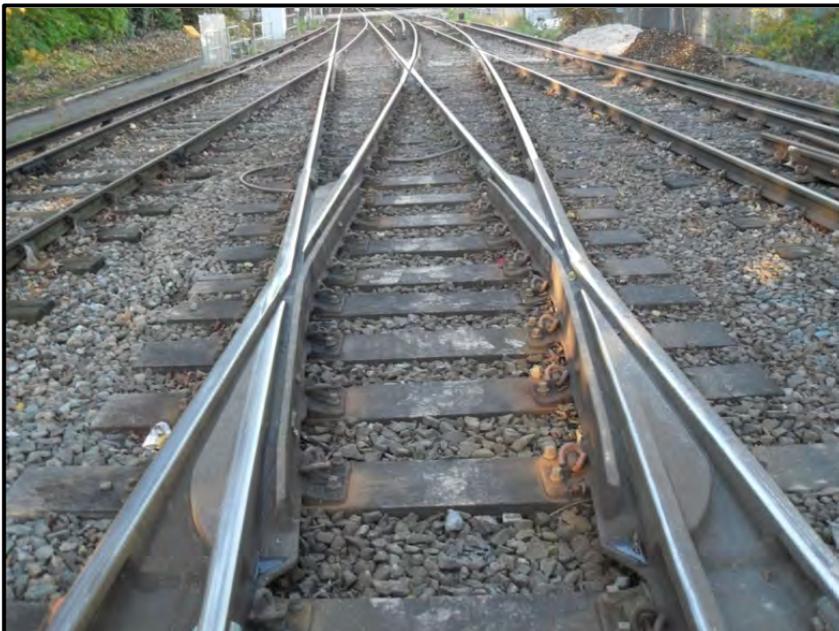
Figure 5-12 Re-timbering under diamond

5.5.20   The remaining timbers are however in a poor condition exhibiting splits and general signs of decay. See Figure 5-13.

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Figure 5-13 Typical Split and Decayed Timber

5.5.21 The layout was continuing to suffer from wet bed areas (See Figure 5-14) however there was evidence of recent work to reballast the cribs across six long timbers (see Figure 5-15). The excavated old ballast was piled in the cess, showing heavy cohesive soil contamination. The adjacent cess drain was dry, implying that water was unable to run off the ballast/formation interface.

Figure 5-14 Wet bed area under crossings

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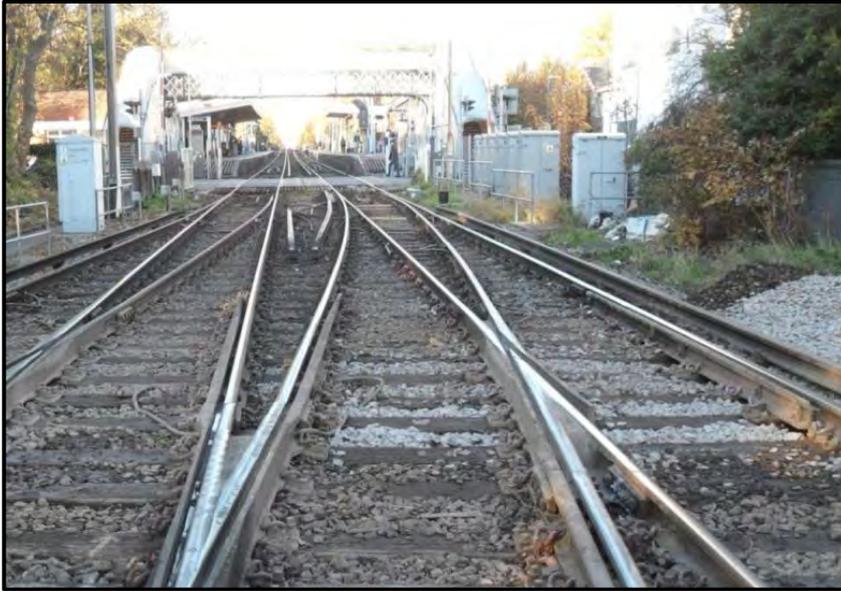
Figure 5-15 Reballasting under common crossing

5.5.22 Spalling and shelling of the rail head was observed at the joint at the back of the common crossing of 636Pts (see Figure 5-16). Corrugation and squat defects were observed on the 9 ¼ Common crossing of the diamond. The nose of the 10 ¾ had previously received a weld repair which was now beginning to break up. See Figure 5-17.

Figure 5-16 Rail head spalling at crossing joint

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Figure 5-17 Degraded weld repair to crossing nose

5.5.23   635C points (trailing connection into the depot) is an inclined FB C 1 in 9, with timbers in fairly good condition, having been spot renewed some 7 years ago (Figure 5-18). Loose jaw blocks were observed on some of the slide baseplates of the switches (see Figure 5-19).

Figure 5-18 Renewed timbers at 635C Pts

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Figure 5-19 Loose Jaw Blocks

5.5.24   The ironwork at the fabricated crossing was not in such good condition, with loose bolts and a heavily worn check rail – Figure 5-20. This had contributed to the poor ballast condition reverting to a series of wet beds under the crossing – Figure 5-21.

Figure 5-20 Worn Check rail

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Figure 5-21 Wet beds

5.5.25   During the site visit to Strawberry Hill 636 points & 637 points & Double Junction, 635C points (single lead), Network Rail and Arup independently concluded that the ballast conditions are so poor that should a refurbishment be undertaken the track geometry of the junction would be very difficult to maintain. Therefore this site should be subject to complete renewal, possibly in timber with 113A rail, with full ballast renewal and attention to a graded formation and water run off into the drainage system which should be proved or renewed.

5.5.26   Strawberry Hill was originally scoped as a refurbishment item during the RAMP review in April/May 2010. The refurbishment work was scheduled to take place during CP4. The conclusion drawn during out site visit that refurbishment was no longer appropriate means that this will not take place. It must be assumed that the rate of ballast degradation has increased compared to what was predicted or anticipated in 2010 when the refurbishment decision was made.

5.5.27   A post site inspection enquiry with the Strategic Planning Engineer to HAM(Track) has confirmed that Strawberry Hill is still being discussed with the RAMT however a scope to include it in the Feltham Resignalling scheme whereby it would be rationalised (from a double junction to 2no. turnouts) has been proposed. This would need to be incorporated into the CP5 plan which has yet to be agreed.

5.5.28   Feltham Resignalling scheme is due to be delivered in 2016/17, suggesting that the earliest opportunity that this layout could be renewed is therefore 2016, and meaning that a further 3 years of life must be injected into the existing layout through maintenance intervention, some of which will be ballast intensive.

5.5.29   Initially this intensive ballast work required to prolong the life of the junction would seem like poor value for money. However the situation now is an interesting one. Had the RAMP review in 2010 identified Strawberry Hill as a renewal item then it may well have been renewed in a like for like manner thereby perpetuating the future maintenance liability of the diamond crossing for example. However by electing to refurbish the double junction effectively until 2016, the RAMT is able to take advantage of the Feltham Resignalling scheme

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which will allow the junction to be rationalised to some extent thus reducing the future maintenance liability.

5.5.30   Strawberry Hill is categorised as a Quadrant 2A line section. In policy terms, the planned work which we reviewed conforms with:

- Policy 13 Formation Treatment;

- Policy 14 Drainage: Refurbishment or renewal; and

  Policy 66 Renewal Criteria states that S&C shall be considered for complete renewal if geometry Policy 66 targets cannot be met by maintenance at economic intervals.

WPH1 43m 0176y: Haslemere Station Platform 3

5.5.31   Haslemere station platform 3 was last renewed in 1961. The line speed is 30 mph, with most trains stopping in the station. It is 95 lb BH track on softwood sleepers. 50% of the rails have been renewed together with up to 50% of the sleepers, but not necessarily at the same time. The remaining sleepers are in a poor condition (see Figure 5-22). The ballast conditions are poor, with vegetation growing in the four foot and two localised wet beds present – Figure 5-23.

Figure 5-22 Split timber and chair indentation

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Figure 5-23 Poor ballast conditions: Wet beds and vegetation in 4ft.

5.5.32   The geometry is good, implying that the loading is being withstood by the poor ballast. Gauge is within maintenance tolerances. The majority of the joints were observed to be well maintained and free from dipping.

Figure 5-24 Haslemere Up Platform 3

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5.5.33   Refurbishment is an appropriate treatment. It would be good to be able to address the worst of the ballast when the work is done (we note that this is an ideal site for the ballast vacuum machine).

5.5.34   The track section at Haslemere Station is in Quadrant 1A. The planned works conform to Policy 10 Refurbishment

GTW2 53M 0088y: Farnborough North

5.5.35   This site is on the line from Guildford to Reading and is non-electrified. Line speed is 70 mph and the annual tonnage 6 million. Relayed in 1973 with 113lb FB jointed on hardwood sleepers with Pan 8 baseplates and lockspikes, it looked in fairly good condition, the only geometry maintenance requirement being a need to lift and pack occasional joints. A wet bed had developed at one of the joints which needed remedial work. Timber condition was generally very good. Work had been undertaken to mitigate the risk of failing corroded lockspikes by the insertion of Titgermeyer screws(see Figure 5-25). Two 60ft length of rail had been replaced in 2009 however the remaining rail dated from the time of the original installation.

Figure 5-25 Pan 8 baseplate with Titgermeyer screw

5.5.36   Work was in progress to replace the Pan 8 baseplates with Pan 11s utilising the existing sleepers (see Figure 5-26). Fresh ballast had been unloaded in preparation for the full refurbishment item which would include completing the exchange of baseplates and renewing the jointed track with new rail welded up to form CWR.

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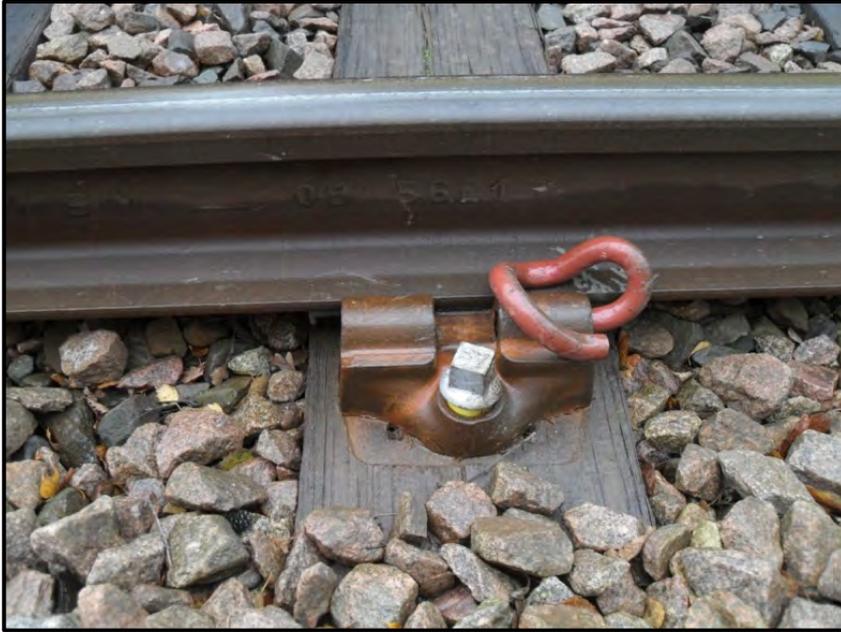
Figure 5-26 Pan 11 baseplate replacement for Pan 8. (Note that the rail is one of two 60ft lengths replaced in 2009.)

Figure 5-27 The line to be refurbished nearest to the camera. (Note new fastenings.)

5.5.37   Although the rails are 1973, pre-concast, and therefore due to be renewed (to be compliant with the policy) this should be challenged in the following way. The ultrasonic rail flaw detection history should be reviewed. As this is a light tonnage route, should there be no history of rail defects that require urgent removal, then the jointed rails should be cropped and welded insitu into CWR, making this an even more efficient track refurbishment.

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5.5.38 Although these visits have been to a very small number of sites, two key issues have emerged when applying a medium refurbishment policy:

- If the ballast conditions are not good enough to enable the newly strengthened track with replaced timbers, fastenings and rails to be brought to a good geometry by tamping, then medium refurbishment is too late in the ballast life cycle. Only heavy refurbishment or renewal with full ballast replacement can provide a sustainable track.
- If the timber or sleeper conditions are too poor to permit a 50% replacement to give a half-life extension, then again the planned medium refurbishment is too late in the sleeper or timber life cycle, and either heavy refurbishment or renewal will be necessary.

5.5.39 Both of these issues therefore rely on the timely identification of potential renewal candidate sites. Should a site be identified too late to refurbish or its condition deteriorates faster than anticipated thus forcing at into a renewal, a delay is incurred until it can be included in the renewals workbank. During this delay some maintenance or refurbishment must be carried to maintain an operational railway; however, by this point it is not a midlife refurbishment but an uneconomical intervention or series of interventions with no long term value.

5.5.40 In our opinion, the proposed treatment for Farnborough North, which is a Quadrant 2B section of line, complies with the appropriate component of Policy 10, Refurbishment.

5.6 Phase 2 Findings – Western Site Visits

5.6.1 Network Rail provided a copy of their 2012/13 track renewal programme for the Western Route from which Arup selected four sites for a detailed inspection.

5.6.2 All of the sites selected were from the Track Policy grouping Quadrant 2B. This grouping includes 55% of the Network Strategic Route Sections and is considered the type of track most suitable for refurbishment rather than complete renewal.

5.6.3 Prior to the site visit, Network Rail provided copies of the documents that had been prepared to support the business case for capital expenditure on the items, including:

- Initial Problem Statement
- Proposed renewal specification
- Track geometry history
- Annual Tonnage
- Permissible Speed

5.6.4 Unfortunately it was not possible to undertake the site inspections as on the day Arup were in Taunton because of adverse weather causing landslips and floods in the Exeter area. Therefore in lieu of the visit the site documents and photographs were reviewed in detail to understand the parameters listed in paragraphs 5.5.3 and 5.5.4. The following paragraphs describe our review and findings.

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MNL1 Exeter St. Thomas 195mp to 195m 12ch Up main

Fig 5-28 Exeter St Thomas. Note that some sleepers have already been changed.

5.6.5   This is a 239 yard section of serviceable CWR on 1961 wood sleepered straight track with Mills clip fastenings, part on a viaduct . Annual tonnage is 8.75 EMGTPA and PSR 75 mph. Some re-sleepering has been undertaken. The proposal is to complete the strengthening of the track with one in three re-sleepering with hardwood sleepers. This is supported by the Route Asset Manager in his renewal specification and approved in the Routes' 2012/13 programme.

5.6.6   This decision is supported following a review of the supporting documentation and is compliant with Policy 10: Refurbishment.

MNL1 Starcross Station 202m 20ch to 202m 45ch Down Main
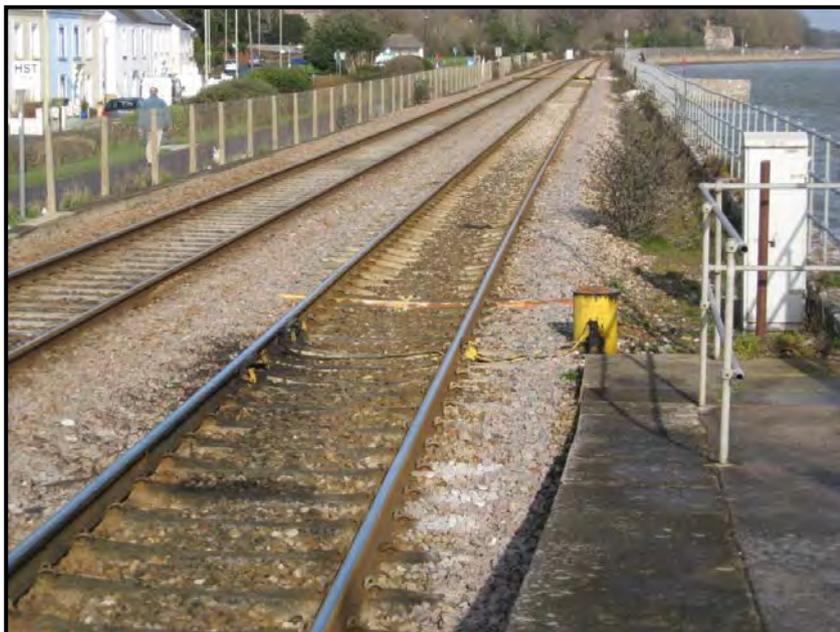
Fig 5-29 Down main Starcross Station looking towards London

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5.6.7 The proposal at Starcross was originally put forward in 2007 to totally renew the Down Main over 550 yards due to poor ballast conditions (manifesting as very poor 'top' or vertical geometry) in 2012/13. The track is 113lb CWR on EF23 sleepers with pandrol fastenings and was installed in 1971. It carries 10.1 EGMTPA at a line speed of 75 mph and rail and sleeper condition are good. Therefore in October 2011 this item was specified for refurbishment (ballast renewal) in 2013/14. It has since been deferred to 2014/15 due to delivery difficulties in 2013/14. The preferred method of ballast renewal is by high output ballast cleaner however at Starcross the proximity of the sea wall adjacent to the Down Main prohibits this type of operation. The alternative solution considered was the RailVac ballast cleaner.

5.6.8 The cost quoted by the operator of the RailVac plant to undertake this work was £350,000 which is approaching the cost of a complete track renewal, therefore making the RailVac method unattractive to the RAMT despite it offering the best engineering solution - the key advantage of the RailVac is that the reballasting can be undertaken with the rail in situ therefore the rail does not need to be cut.

5.6.9 We believe that the supplier owned RailVac reballasting unit is not on any form of long term contract. We believe that its suitability may be something that has arisen recently as a consequence of the introduction of refurbishment in the CP4 policy, and suggest that the full potential for the use of RailVac machines in track refurbishment should be fully explored by the Track Asset Management Team. The lowest cost solution to renew the ballast is to use traditional re-ballasting technique of cutting track into panels and lifting out to manually excavate the ballast. This will introduce additional welds to those already present thereby increasing failure modes in the track upon reinstatement. In whole life cost terms this is not necessarily the cheapest solution.

5.6.10 From observation of the geometry data and photographs of ballast trial pits, refurbishment is supported and is compliant with Policy 10: Refurbishment.

5.6.11 It is unfortunate that the work cannot be done in 2013/14 as the 35m top has already been recorded as poor. Provision should be made in the maintenance budget for attention to geometry faults during 2013/14 until the work can be undertaken.

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MLN1 Dawlish Warren Switches and Crossings

Fig 5-30 S&C at the Plymouth end of Dawlish Warren Station (Down Loop) 921 points and 922 crossover

5.6.12   In 2011 at Dawlish Warren the Route Asset Manger Track inspected the switch and crossing units that enable trains to access the up and down loops into and out of the station platforms, together with a facing crossover at the Plymouth end. The layouts had been installed in 1986 and are 113lb vertical with full depth switches and cast crossings on hardwood timbers. Main line speed is 80 mph and for each line EMGTPA is 10. The site had previously benefited from stone blowing to maintain good geometry.

5.6.13   Following dialogue with the TME a site validation was undertaken using the RAMT's S&C Partial Renewal Assessment Tool. This uses a series of condition statements which the inspecting engineer is able to agree or disagree with. There are statements for each constituent component of the S&C unit which are weighted depending on track category. The assessment tool generates a score which informs the user as to the most appropriate action to take at each S&C unit. Following detailed site inspections the following refurbishment specifications were put forward for approval:

- 916 points (trailing connection from up loop to up main) no refurbishment work required.
- 917 points (facing connection from down main to down loop) 1 in 4 retimber
- 920 points (facing connection from up main to up loop) 1 in 3 retimber
- 921 points (trailing connection from down loop to down main) 1 in 3 retimber
- 922A points (facing point in down main crossover to up main) 1 in 3 retimber
- 922B points (facing points in up main crossover to down main) 1 in 3 retimber

5.6.14   Included in the refurbishment specification for these 5 S&C units will be re-gauging of each unit with, if necessary, pulling through and refastening baseplates to sound timbers.

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5.6.15 The positive aspect of this initiative by the RAMT to inspect the units at Dawlish Warren before the TME deemed a problem statement was due, is that the units will be strengthened after 27 years of life to give another 13 or so years at a time when the general condition is fair and with reasonable ballast conditions, track geometry can still being undertaken by tamping machines.

5.6.16 The refurbishment specification is supported and is compliant with Policy 10:Refurbishment.

## MNL1 Newton Abbot West Jcn 214m 43ch
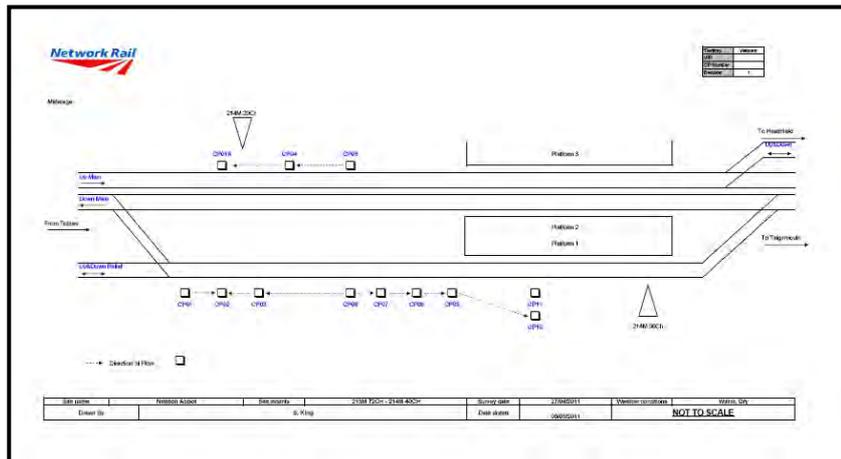
Fig 5-31 Newton Abbot West Jcn (associated drainage survey with 942 points crossover to the left side of the diagram)

5.6.17 Newton Abbot West Junction comprises four crossovers to the west of the two platform station and forms the junction where the Totnes line diverges away from the main line to Plymouth. Installed in 1984 and 1986, the four crossovers are 113lb FB vertical with cast crossings and full depth switches, on hardwood timbers. As nearly all trains stop in Newton Abbot, main line speeds are less than the published 60 mph PSR, and annual gross tonnage is in the region of 10 million.

5.6.18 As with Dawlish Warren, the RAMT arranged detailed inspections using the S&C Partial Renewal Assessment Tool, however here they were done in March 2012. They resulted in the following being put forward for approval in a refurbishment programme:

- 942A down relief 1 in 4 retimber
- 942B down main 1 in 4 retimber
- 943A up main 1 in 3 retimber
- 943B down main 1 in 3 retimber
- 944A down main full retimber
- 944B up/down relief 1 in 3 retimber
- 945A down main full retimber
- 945B up main full retimber

5.6.19 In parallel with the track inspection a full track drainage survey was conducted. This has resulted in a specification to renew a cross drain under the down relief line.

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5.6.20   Whilst the resulting outcome of the drainage survey was a relatively small work item, the importance of associating proposals for track renewal with associated drainage has been recognised. An initiative to review and inspect an important junction approaching 30 years of life has resulted in a specification for refurbishment which should provide a further 15 years of asset life before the next major intervention and is compliant with Policy 10 Refurbishment.

2010 Track Policy Compliance Database

5.6.21   The Western Route Asset Manager Track also evidenced a validation exercise they had undertaken in which they reviewed 44 items in their 2012/13 track renewal programme for compliance with the 2010 Track Policy. Non-compliances to policy were justified as part of the exercise.

5.6.22   Although due to severe weather problems including flooding and bank slips it was not possible to visit the above sites, sufficient evidence in the form of problem statements, job specific specifications and notes of Network Rail's own site inspections demonstrated that the refurbishment options selected were in compliance with the new track policy.

5.6.23   The Route's initiative to undertake site visits and inspections of switches and crossings with between 25 and 30 years of used life has been justified in that this has lead to refurbishment interventions being developed at the appropriate stage in the track's life such that a minimum whole life cycle cost can be optimized. A good relationship with the area TME appears to be invaluable for timely site inspections by the RAMT.

5.6.24   Deciding on the right time for a refurbishment intervention appears more important that the intervention specification itself.

5.6.25   The 2010 Track Policy that introduces refurbishment as a track renewals specification policy has been adopted on the Western Route as evidenced by the documents presented.

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5.7 Conclusions & Recommendations

General

5.7.1 A number of conclusions have emerged from the review of the policy application. These lie at both the strategic and project specific levels. Table 5-6 summarises these findings.

Issue	Commentary
Strategic Level	
Application of the Policy	The policy has been applied to Wessex and Western Routes with items being listed in the 2012/13 authorised workbank for refurbishment.
Use Made of the Policy	The Route Asset Manager Track understands the policy and has taken a leadership role in using it on the Route. Track Maintenance Engineers appear less familiar with the application of the policy on tracks within the low tonnage low speed quadrant and are being guided by the Route Asset Management team.
Relevance of the Policy	The Policy is directly relevant to the efficient management of the track asset as it defines criteria for a new approach, refurbishment, which is the renewal or strengthening of one or more elements of the overall track system to extend life before the next complete renewal.
Project Level	
Authority Submissions	Policy compliance has been confirmed by identifying specific items against the policy in the description of the work to be done. Policy compliance has been checked by the work type definition, e.g. renewals or refurbishment. Further confidence has been provided by the peer review scrutiny process.
Project Scope	The scope of work has not only to meet the policy requirement, but also be relevant to the asset condition at the time the work is to be done. Three of the site visits (Tolworth, Strawberry Hill and Dawlish) found that asset condition had worsened since the original scope had been drawn up and the items could no longer be refurbished and would have to be renewed or have the scope of refurbishment increased. This has resulted in the scope and cost increasing, thereby possibly requiring other work to be put back a year so as not to exceed the workbank budget for the year in question. The new policy allows a similar volume of track to be in a renewal workbank for a lower budget by introducing refurbishment.

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Issue	Commentary
Asset Condition	Our review has identified that asset condition and the timing of delivery of a specific policy statement is critical.

These are factors that need to be understood and learned through experience by Track Maintenance Engineers and others involved in track asset management. From discussion with Route Asset Managers Track, they have a key role in getting this aspect of policy application right. We were supportive of the initiative made on Western to prepare S&C Particular Specifications in advance of receipt of Problem Statements at Dawlish and Newton Abbot. |
| **Project Prioritisation** | Prioritisation takes place in the Route Asset Manager Track team, where items are reviewed and discussed with the maintenance team before the workbank is put forward for financial authority. It is a key element of the role of the asset manager and the critical to the application of policy. |

Table 5-6: Summary of Conclusions

5.7.2   As described above, asset condition and the timing of delivery of a specific policy statement is critical. These are factors that need to be understood and learned through experience by Track Maintenance Engineers and others involved in track asset management. We suggest that the experience level of staff should be carefully thought about for the implementation of CP5 track policies to ensure that the Routes have sufficiently qualified and experienced staff available to inspect assets, and that there is a succession plan in place that will demonstrate that key positions will be occupied by competent staff who can effectively manage and implement the Track policy.

5.7.3   In addition to the above, our general recommendations *RG1 – RG5* also apply to Track.

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6 Asset Specific Findings – Signalling

6.1 Phase 1 Findings

6.1.1 In developing our proposed methodology for Signalling we have considered the following key references.

SI 1	Network Rail, Strategic Business Plan - Supporting document - Asset management, Oct 2007
SI 2	Network Rail, SP&C Product Efficiency Scorecard: LNWS 112280, Apr 2009
SI 3	Network Rail, CP4 Route Asset Management Plan: Strategic Route Section B.01, Version 1.0, Dec 2010
SI 4	Network Rail, Crewe Change Paper.xls Ref. 128872, 2011
SI 5	Network Rail, London North Eastern Route, Route Asset Manager (Signalling) Deferred Renewals Register, Jan 2012
SI 6	Network Rail, Signalling Control Period Impact Report, Mar 2012
SI 7	Network Rail, Authority Request: Watford Junction PSB Resignalling, Ref. OP 112280, Apr 2012
SI 8	Network Rail, Guidance and Principles Document

Table 6-1: Key Documents

6.1.2 We met with the Signalling HAM on 18th April and the following paragraphs are based on those discussions.

6.1.3 The 2009 SBP Signalling Policy was new for CP4 and is still current. NR views the CP4 Policy as enabling greater consistency through greater control from the Centre. The workbank for signalling is expected to be based on a bottom-up approach for the foreseeable future. The development period for signalling projects is usually a long one. The Policy (Ref. SI 1) is primarily condition-based, with age a secondary factor. It consists of 71 statements, grouped as follows:

- General (16 No.)
- Signalling Control Systems (28 No.)
- Train Detection (7 No.)
- Train Protection (4 No.)
- Signals and Indicators (5 No.)
- Point Operating Equipment (3 No.)
- Level Crossings (8 No.)

The key policy statement in relation to renewals is Signals-3, which states:

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Signalling assets shall be replaced according to either their condition as defined by SICA or due to the changing engineering, operational or business needs, or a combination of these factors.

In Signalling, technology driven policies can drive change – for example, the introduction of axle counters on route (which is Signals-47).

6.1.4   A full list of the Policy statements can be found in Appendix E.

6.1.5   The SICA (Signalling Infrastructure Condition Assessment) database and toolset is used to control the workbank programme. Planned work items in SICA currently look ahead as far as 2025. SICA covers both Interlockings and Level Crossings (LXs). SICA looks at Condition, Safety and Standards compliance at an individual asset level. Asset condition data is held in SSADS (Signalling Schemes Asset Data Store). SICA was introduced in 1996 and is now at Version 4.

6.1.6   The signalling workbank has four key elements:

- Reactive renewals – like for like – replacements, routes and maintainers plan budgets annually (typically about £40m annually)
- Minor works, which require design through the Asset Management Organisation

6.1.7   Packaged Minor Works forming projects – with the aim of working efficiently

- Interlocking and major signalling renewals.

6.1.8   Assets are added into the Workbank at the time of commissioning, assuming a life of 35 years. This is then refined through the inspection process as the asset's age increases.

6.2   Approach

6.2.1   The aim of the study with regard to Signalling is to determine if, and to what extent, the 2007 Policy is being applied in the identification and development of schemes in the Routes.

6.2.2   The study's review of policy application will be carried out in the context of the 2007 Policy (Ref. SI1).

6.2.3   In order to determine the application of the Policy with respect to planned works a number of projects were selected for review. In each case the study reviewed the associated documentation for the sample project.

6.2.4   The documents which have been used in this review of the application of the Signalling policy are generally those supplied by Network Rail associated with the seeking of authority for works, or the Project Manager's remit. This was the standard Network Rail Authority Request template. These forms were generally backed up with evidence showing condition inspections for the particular assets.

6.2.5   The sample projects were selected from schemes recently completed or in progress in Anglia and LNE Routes. Fifteen schemes were selected from the Anglia route and 25 from LNW. The sample selection was designed to cover a variety of scheme types and costs.

6.2.6   Supporting information was provided for all schemes that were requested.

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6.2.7   Following on from the review of the associated documentation five of the projects were selected for a more in-depth examination, which was undertaken through a meeting with the RAM team and site visits where possible.

6.2.8   These five projects were selected on the basis of their diversity and included schemes which may be considered 'out of the norm' for various reasons.

6.2.9   Due to constraints on time and staff availability it was necessary to concentrate site investigations within a representative geographical area. To that end, the schemes were selected from an area stretching from Yorkshire to North Cambridgeshire.

6.2.10   The in-depth review of five projects was undertaken only on LNE Route schemes.

6.2.11   Table 6-2 provides a summary of the schemes which were reviewed. Those Scottish projects which are shaded in orange are those subject to the in-depth review.

Scheme	Scheme
LNE	**Anglia**
Scarborough (Falsgrave) S&C	Colchester Signalling Centre
Capacity Relief to ECML	Norwich - Yarmouth - Lowestoft ERTMS
Immingham East Jcn SB	Cambridge (Interlocking Replacement)
Re-instatement of Boldon East	East Anglia Minor Works 2012/13
Selby Swing Bridge Gate Box Renewals	Bollo Lane Wire Degradation
Tallington and St Neots Lineside Renewals	Kings Lynn Signalling Renewals
Maltby Colliery Life Extension	Stansted Tunnel Axle Counter Pre-Olympic Works
Gosberton Re-Signalling	Liverpool St. IECC & SSI Data Rectification
Blyth & Tyne Line Signalling Renewals	Upminster IECC Level Crossing CCTV System Renewals
Grantham Lineside Renewals	Dullingham Level Crossing Renewals
Cleethorpes & Filey TDM Renewals	EYN Modular Resignalling
Bowesfield TDM and Level Crossing	Stansted Tunnel Axle Counter Pre-

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Scheme	Scheme
Renewals	Olympic Works
Warsop Junction Superloc Area LEW	
Beighton & Woodhouse Renewals	
Peterborough North Area Level Crossing Renewals	
Hull River Swing Bridge - Provision of Additional Bridge Alignment Detector	
Brigg Level Crossing Renewals	
Hillam Gates & Sherburn in Elmet Level Crossing Renewals	
National Ops Strategy LX's	
Low Gates AHB Level Crossing Renewals	
Holmes Junction & Brinsworth Street Level Crossing Renewals	
Associated British Ports (ABP) & Dawes Lane Level Crossing Renewal	
Signalling Area Minor Works	
North Yorkshire Signalling Renewals	
Neville Hill Depot Renewals	
LED SL35 Lamps	
York Area Aster Track Circuit Conversions	
Harrogate Area Signalling Ren	
Tallington And St Neots Lineside Renewals	
Grantham Lineside Renewals	
Thrumpton Interlocking Renewal	

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Scheme	Scheme
Immingham East Jcn SB	
Sudforth Ln Whitley Br Hensall	
North Doncaster Chord (Shafthome Flyover)	
North Lincolnshire Re-signalling	

Table: 6-2: Summary of Sample Signalling Projects

6.2.12   For the 5 highlighted schemes, the relevant documentation for each project was reviewed and links drawn to the key signalling policy statements. These statements are listed in Table 6-3 below.

6.2.13   In effect, evidence was sought that the individual projects were compliant with the eight key policy statements where relevant.

Policy Statement	Commentary on Relevance and Application
1	The average condition of signalling interlockings, measured in average remaining life across all interlockings, shall not significantly deteriorate from year to year. Renewals and life extension activities shall be implemented to ensure this objective is met.
11	Options for the provision of bi-directional signalling will be considered on a project by project basis should RSPG consider that such a facility has overall benefits to the railway and a positive business case exists.
13	Complexity of design, including intervention requirements shall be minimised by the adoption of standard layouts and signalling which reduce conflict opportunities to ALARP.
14	When adopting technology new to UK applications, systems of operation and maintenance where this technology has a proven record should be reviewed and considered for parallel deployment.
16	System architecture including interdisciplinary issues, power and remote or centralised interlockings for main control centres shall be designed as far as practicable to support emergency and degraded mode operation, maintenance and localised renewals.
18	A combined operational and systems strategy shall be developed in conjunction with Operations and Customer Services. This strategy will identify operational requirements as well as the location and span of control for all future signalling control centres and the migration plan to such centres.

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Policy Statement	Commentary on Relevance and Application
21	Duplicate or emergency signalling control panels/systems shall not be provided. Further analysis shall be undertaken to determine if a cost effective emergency system can be developed for future major signalling control centres.
23	Enhanced functionality ARS known as ARS+ shall be developed and fitted to all large control facilities.
24	The need for ARS+ on other projects including upgrades to the existing IECCs shall be determined on the basis of the business case for provision and the need as determined by human factors assessment.
28	Existing systems shall be supported by updates to both software and hardware as necessary in order that they can be maintained and operated until such time as an economic case for their replacement can be made or they require replacing due to other business needs such as the renewal of the associated interlocking systems, enhancement/rationalisation opportunities or operational considerations.
31	Relay interlockings shall be maintained such that their designed principles of operation and capability are sustainable. Modifications to relay interlockings should be carried out in accordance with the standards to which the circuits were originally designed where these are documented and understood e.g. Western Region E10k. Where the functionality of originally designed circuits is at variance to current requirements, an assessment shall be carried out to determine if the current functionality is practicable to provide, in which case it shall be incorporated. Otherwise non-compliances against existing functionality shall be sought where appropriate.
35	The overall replacement of mechanical interlockings with other types of interlocking technology cannot be currently justified from a business case perspective. Where significant life extension/minor works are required at specific locations (or line of route) then individual business case justifications may be possible. Where a business case exists for the replacement of mechanical interlockings they shall be replaced by electronic interlockings.
36	Geographical interlockings shall be modified and/or refurbished where this presents the most economical solution, provided suitable spares or refurbished items are available. Additional free-wired circuitry may be used but is non-preferred and standard geographical connectivity and design should be perpetuated where possible.
40	All new, digital, signalling systems are will be capable of operating using open communications principles on non-dedicated bearers.

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Policy Statement	Commentary on Relevance and Application
43	Event logging shall be fitted to new interlocking systems. They shall also be fitted to existing interlockings when associated with life extension activities or where a business case exists to justify fitment by reducing the time required to analyse and fix failures. Intelligent algorithms shall be developed to allow real time monitoring of key system components to allow preventative maintenance to be implemented where appropriate.
44	New electronic interlockings will only be considered where they demonstrate a significant whole life benefit compared to existing systems or enable the introduction of other benefits (such as ERTMS).
53	AWS shall be perpetuated at its current fitment level. Further fitment of AWS shall be determined by examination of the case for fitment dependant line and traffic type, risk etc.
62	Replacement point operating equipment shall be according to our document Sig/Policy/001 "Point Operating Policy" which details which machines shall be used with various points layouts.
63	Point remote condition monitoring shall be installed, with emphasis on specific components, depending on the business case for specific point machines at specific locations
65	The preferred method of controlling the level crossing operation shall be low-cost interlockings and/or modular level crossing controllers.
71	Event logging shall be fitted to new level crossings and existing level crossings where the risk profile from a safety or performance consideration justifies such fitment. Intelligent algorithms shall be developed to allow real time monitoring of key system components to allow preventative maintenance to be implemented where appropriate.

Table: 6-3: Signalling Policy Statements

6.2.14   As stated previously the main objective of this study is to determine whether the requirements of the relevant policy documentation are being adhered to in the identification and development of individual schemes. To that end the project documentation was reviewed to identify evidence of compliance with policy.

6.3   Documents Reviewed Phase 2

SI9	2012/13 Signalling Workbank
SI10	Project Requirement Specifications

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SI11	Authority Requests
SI12	Asset Condition Inspection Reports
SI13	Investment Papers

Table 6-4: Documents Reviewed

6.4 Phase 2 Findings – Desk Based

6.4.1 The outcome of this review provided a tabulation of the individual projects mapped to the eight policy statements. The results of this review are included in Appendix F.

Scheme	Scheme Description
North Yorkshire Signalling Renewals	The scheme involved numerous Life Extension Works at Hammerton & Hessay as well as two signal safety funded projects at Poppleton Level Crossing – Provision of Standing Man signage and the re-location of a PSR board at Shipley. The works were stated to be mainly safety driven and included the renewal of a mechanical signal post due to severe rusting (metal support collar currently fitted) and the renewal of various signalling location cases and other spot renewals. The provision of a Standing Man sign at Poppleton Level Crossing was consistent with the proximity of the crossing to a school recently relocated closer to the crossing. The relocation of the PSR Board was to address a sighting issue which had resulted in multiple SPADS involving L4031 signal.
Low Gates AHBC Renewals	The scheme involved the replacement of obsolete and life expired BRB Mk.1 'penguin' barrier equipment due to stated reliability and spares availability. Three level crossings were involved in the scheme, Brompton, Rounten and Welbury, all supervised by Low Gates Signal Box. All barrier machines, road lights and associated operating circuitry had been replaced. The scheme had recently been completed but the completion date was not supplied.
Thrumpton Interlocking Renewal	The scheme involved the replacement of 3 old relay based interlockings at West Barton, Clarborough and Thrumpton with SSI interlockings and all control managed from a new control panel in Thrumpton signal box. All external signalling and operational telecommunications equipment was to be renewed with the exception of level crossing ground equipment at Rusheys Sidings, Mansfield Road, Gringley Road, Leverton and Westbrecks.

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Scheme	Scheme Description
Sudforth Lane and Whitley Bridge	The scheme involved the renewal of Sudforth Lane and Hensall Signalling Control Areas with Processor Based technology (Westlock) including the renewal and conversion of 6 level crossings to CCTV operation from Ferrybridge Signal Box. The scheme was primarily intended to address obsolescent equipment such as the wheel driven boom gates at Hensall, P style relays and micro-core cable operated remote control at Whitley Bridge and security of signalling cables. However, the scheme also resulted in a reduction in the number of operators by 21. The scheme also built on recent S&C renewals as well as addressing rationalisation of the Pway layout at Sudforth lane to address non compliance issues.
Peterborough North Area Level Crossing Renewals	The scheme was described as the replacement of the AHB Type 1 (Penguin) barriers at Bainton and Bainton Green level crossings with modern equivalent types and the renewal of all road lights with LED type lights. However, the RAM team stated that it was also intended to convert the crossings to MCB's and equip them with Obstacle Detectors (OB). It was further stated that an increase in line speed was being considered due to an anticipated increase in traffic for Stansted Airport.

Table 6-5: Scheme Descriptions

6.4.2   A meeting was arranged with the RAM on 10/12/12 to discuss the schemes chosen but unfortunately the RAM could not attend due to other commitments. Two other members of the RAMs team had been asked to attend at short notice and were able to provide the majority of the requested background data but did not have access to any detailed fault or train delay data.

6.4.3   Table 6-6 below summaries the key discussions and findings for each project.

Scheme	Commentary
North Yorkshire Signalling Renewals	Policy numbers 01, 17, 33, 56, 59 and 60 apply and evidence was provided in the form of LNE Route Project managers Remit, Poppleton Improvement documents and LNE Project Mangers Remit – Nether Poppleton AHB Pedestrian Safety Improvement document. It was confirmed verbally that the renewals were all safety related which was consistent with the documentation provided.
Low Gates AHBC Renewals	Policy numbers 01, 02, 03, 09, 64, 69 and 71 apply to the scheme and evidence was provided in the form of the National Level Crossing Team Final Option selection report. The RAM representatives present were unable to provide detailed fault or train delay data associated with the crossings although it was noted that the TOC had provided input as a stake holder. The main driver would seem to be the lack of spares availability for the aging Mk1 Barrier machines. The view expressed was that SICA did not accurately reflect the

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Scheme	Commentary
	difficulty in managing long lead times for obsolete barrier components such as the hydraulic packs.
Thrumpton Interlocking Renewal	Policy numbers 01 - 05, 07 - 09, 17 - 20, 25, 26, 30, 33, 34, 37, 38, 42, 44, 50, 53, 56, 57, 59 - 62, 64, 65, 69, 70 and 71 apply to the scheme and evidence was provided in the form of the LNE territory Signalling Renewals Engineering document and the LNE territory Signalling Renewals Client Remit to the Sponsor document. The RAM representatives present were unable to provide detailed fault or train delay data associated with the scheme. The main driver is general degradation of asset condition as well as difficulties posed by the servicing of redundant equipment.
Sudforth Lane and Whitley Bridge	Policy numbers 01-05, 07-09, 12, 17-20, 25, 26, 30, 33, 34, 37, 38, 42, 44, 50, 53, 56, 57, 59 – 62, 64, 65, 69, 70 and 71 apply and evidence was provided in the form of an Authority request for the resignalling. The RAM representatives present were unable to provide detailed fault or train delay data associated with the scheme. The main driver is general degradation of asset condition as well as difficulties posed by the servicing of redundant equipment.
Peterborough North Area Level Crossing Renewals	Policy 01-03, 05, 07, 09, 14, 64, 65, 69, 70 and 71 apply and evidence was provided in the form of the National Level Crossing Team Final Option Selection Report – Bainton AHB and National Level Crossing Team Final Option Selection Report – Bainton AHB Level crossing Renewal. The RAM representatives present were unable to provide detailed fault or train delay data associated with the scheme. The main driver is general degradation of asset condition as well as difficulties posed by the servicing of redundant equipment. It was stated that there were some wire degradation issues which were being managed by maintenance staff. It was intended to use existing cable routes where possible. The two evidence documents provided for this scheme both had the same document reference numbers.

Table 6-6: Summary of In-Depth Review Meeting Findings

6.4.4   In summary there would appear to be little deviation from the requirements of the policy in the execution of the process to identify and progress the delivery of the schemes sampled.

6.4.5   There was a wide variance in the quality of documentation supplied with some being very obviously of an uncontrolled nature. For instance, the 2 documents provided for Bainton and Bainton Green AHB crossings were virtually identical down to the reference and version numbers and neither was dated. It does not instil very much confidence that such documents should be in circulation let alone be provided as part of audit evidence.

6.4.6   Further, each scheme was at a different stage in the GRIP process and the information provided seemed to be only for the current stage. Given more time it

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would have been better to be able to trace the scheme progress from initial submission through the stages to final commission.

6.4.7   The policy contains reference to signalling maintenance requirements being detailed in NR standards. We have not reviewed compliance with these policy clauses, which we consider to be of low relevance to the core mandate requirement to review the application of policy to the development of workbanks.

6.5   Phase 2 Findings – Site Visits

6.5.1   Following the meeting with the RAM team a series of site visits to observe the works first hand were conducted. The following tabulation identifies the outcomes of the visits:

Location	Site Visit
North Yorkshire Signalling Renewals	A representative from the project organisation conducted a guided tour of the selected sites at Poppleton, Hammerton and Hessay. Inspections were undertaken from public access areas at the level crossings and from the platforms at Hammerton and Hessay.
	There were no queries identified on site. The renewals works identified were seen to be consistent with the requirements to maintain signalling apparatus in a serviceable state in line with signalling asset policy requirements.
Low Gates AHBC Renewals	A representative of the project organisation conducted a guided tour of the project sites at Low Gates and Brompton. Inspections were undertaken from public access areas at the level crossings. Access to Low Gates Relay Room was possible via the car park.
	All works had been completed, and the sites were tidy and installed to an acceptable standard. A new rack had been installed in Low Gates Relay room containing new level crossing control equipment. It was noted that provision for data logging had been provided.
	No queries were raised as a result of the site visit.
Thrumpton Interlocking Renewal	A representative of the project organisation conducted a guided tour of the project sites at Clarborough and Thrumpton. Inspections were undertaken from public access areas at the level crossings.
	The condition of the existing assets viewed were consistent with the details noted in the provided reports. All barrier equipment had been renewed at Thrumpton and a new compound Power Supply provided in readiness for the new Relay Room.
Sudforth Lane and Whitley Bridge	A representative of the project organisation conducted a guided tour of the project sites at Sudforth Lane, Hensall Level Crossing, and Whitley Bridge Level Crossing. Inspections were undertaken from public access areas at the level crossings.
	The condition of the existing assets viewed was consistent with the details noted in the provided reports. I
	Sudforth Lane LC is currently fitted with 2 long booms, one of which was affected by the prevailing wind and frequently required

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Location	Site Visit
	manning in high winds. It was also noted that the crossing was not equipped with any warning lights.
	Hensall LC was seen to be equipped with booms that were driven over by wheels powered by electric motors. The equipment was extremely rare and spare parts hard to source. There were no flashing road lights fitted.
	Whitley Bridge LC, the barriers were noted to be of the motor operated type (power up and power down) which present reliability and spare part problems for the maintenance staff. The skirts were noted to be in poor condition. Project staff confirmed that the cantilevered gantry on the platform was to be re-used as was the CCTV column and winch gear.
	Site findings confirmed the reasons stated in the provided documentation and discussions with the RAM team. It was noted that existing equipment was being re-used where it complied with current standards and had an acceptable life expectancy
Peterborough North Area Level Crossing Renewals	A representative of the project organisation conducted a guided tour of the project sites at Bainton and Bainton Green Level Crossings. Inspections were undertaken from public access areas at the level crossings.
	The condition of the existing assets viewed was consistent with the details noted in the provided reports, the existing location cupboards were in a sound condition but with some flaking of paint. The locations at Bainton were noted to be very close together.
	A new REB was on site at Bainton Green and new Flashing Road lights had been fitted by the maintenance organisation. Those at Bainton were showing signs of corrosion.

Table 6-7: Commentary on Site Visits

6.5.2   The site visits largely confirmed the statements made in the evidence documentation and no unexpected issues emerged from the trips.

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6.6 Conclusions

6.6.1 A number of conclusions have emerged from the review of the policy application. These lie at both the strategic and project specific levels. Table 6-8 summarises these findings.

Issue	Commentary
Strategic Level	
Application of the Policy	There is evidence from the review that the policy is largely being complied with. However, it was not possible to establish whether the relevant Signalling Policies had actually been considered in the processing of various schemes. A check back demonstrated that schemes followed the policies as required, but there was no way of telling if this was fortuitous or intended
Use Made of the Policy	Given the above there was little evidence of direct use made of the policy. Other than the requirements driven by other imperatives – such as asset degradation, obsolete equipment – there is little direct use made of the policy.
Relevance of the Policy	From the review of the documentation provided and the discussion with the RAM representatives in York, it was clear that the schemes sampled had been proposed for reasons that aligned with a variety of the 71 CP4 Signalling policy statements. However, there was no documented evidence that the policies had actually been used to drive the projects and it was not clear that Route Asset Maintenance staff actually knew of the existence of the Policy. The policies were sensible and relevant to safety, stewardship and performance enhancement of signalling assets. As such, they should be visibly interwoven with the scheme selection process such that traceability back to the relevant policy is possible.
Project Level	
Authority Submissions	From the review of the individual project documentation there would appear to be little requirement to demonstrate compliance with the policy in seeking funding. These documents contain a lot of detail regarding the financial justification for the scheme without overtly demonstrating compliance with the Policy. The quality of the requests varied widely across the 2 different routes, with some document control issues clearly evident in the supporting documentation.

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Project Scope	The Signalling schemes reviewed were necessary for the routes to deliver the required performance to support operational need
Asset Condition	There is evidence that the inspection reports and asset condition are used to inform the decision to replace/renew signalling equipment. There is a clear 'line of sight' between the inspection regime and the generation of work items.

Table 6-8: Summary of Conclusions

6.6.2   In summarising the assessment of the application of there would appear to be a number of fundamental issues in addition to the general recommendations *RG1-RG5*:

6.6.3   There is a large variance in the quality of justification documentation supplied with some being very obviously of an uncontrolled nature. This does not instil very much confidence that such documents should be in circulation let alone be provided as part of audit evidence. We recommend that the higher quality documentation submitted for review (Secondary SICA surveys undertaken for numerous schemes on Anglia Region described in 6.6) should be taken as an example of industry good practice to allow the creation of new documentation templates which should then be adopted across all Routes. *(Recommendation SI1)*

6.6.4   By comparison, the Secondary SICA surveys undertaken for numerous schemes on Anglia Region (not LNE) were seen to be of a highly detailed and consistent nature. The engineer had included photographs to highlight detailed concerns and also provided written descriptions of assessment criteria such as wire degradation. This should be regarded as an example of industry best practice to be adopted.

6.6.5   It was not possible to establish how the relevant Signalling Policies had been considered in processing the various schemes due to a lack of mandatory inclusion in the Authority Requests. A reverse check of the selected schemes demonstrated that the appropriate policies were being adhered to, but there was no evidence to prove whether this was fortuitous or intended.

6.6.6   The maintenance engineers' apparent lack of awareness of the Policy is a cause for concern. It is recommended that RAMs are required to ensure that all of their team members involved with workbank development are fully briefed on Asset Policy and its wider context.*(Recommendation RG5)*

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7 Asset Specific Findings – Civils

7.1 Phase 1 Findings

7.1.1 In developing our proposed methodology for Civils we have considered the following key references.

CI 1	Network Rail Strategic Business Plan Control Period 4 - October 2007
CI 2	Network Rail, Civils Business Plan Change Control Procedure, July 2008
CI 3	Network Rail, Transformation Programme – Visible and Agile Workbank Planning (VAWP) Strategy and Targets, Version 3.1, Aug 2009
CI 4	Network Rail, Asset Management (B&C) Business Planning Process and Guidelines, Oct 2009
CI 5	Network Rail, Network Rail Asset Management Policy Justification for Civil Engineering Policy, Mar 2010
CI 6	Network Rail, Civil Engineering Asset Policy, Mar 2010
CI 7	Network Rail, Buildings Business Planning and Investment Authority Process and Guidelines, Sep 2010
CI 8	Network Rail, CP4 Route Asset Management Plan: Strategic Route Section K.03, Version 1.0, Dec 2010
CI 9	Network Rail, B&C Business Plan Extract, 2010 - 2011
CI 10	Network Rail, B&C Asset Change Panel Register, 2010 - 2011

Table 7-1: Key References

7.1.2 We met with the Civils HAM on 8th May 2012 and the following paragraphs are based on these discussions. Further meetings were held on (9th May to discuss business planning, 10th May to discuss efficiencies and application of policy.) We also met with the Geotechnics and Drainage HAM on 18th May.

7.1.3 Following issue of the mandate there has been a discussion between NR and the ORR about the status of the March 2010 asset policy for Structures. NR have stated that they view the 2007 Policies (A,B,C Policies) as current (Ref CI 1). This is because the 2010 Asset Policies were not formally accepted by ORR, and so NR did not implement them / brief them out to the Routes.   The NR CP4 Business Plans are apparently based on the 'ABC' Policies.

7.1.4 Accordingly, we have used the 2007 'ABC' Policies as the basis for our review. (We note that in our Report prepared under Mandate AO/007, we reviewed Civils Asset Management in the context of the 2010 Policy).

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7.1.5 In the 2007 'ABC' Policy there are five policy statements, labelled A-E. NR state that in practice Policy A is used by exception, (typically for Grade 1 Listed Structures, Major Structures and some Rock Cuttings). Similarly Policies D and E are little used. The great majority of structures will therefore be managed under Policies B or C, which are as follows (A is included for reference):

7.1.6 Policy A – return and maintain the asset to a sustainable state by the use of maintenance activities that will improve performance levels and extend the remaining life;

7.1.7 Policy B - maintain the asset condition and capability by carrying out interventions that achieve the lowest whole life cost, without incurring condition led operational restrictions to the railway;

7.1.8 Policy C - allow assets to deteriorate until interventions are essential to maintain safety standards or raise performance levels to an acceptable level for continued railway operations. When work is required it should restore an acceptable level of performance and minimises the remaining whole life cost of the asset;

7.1.9 In the commentary to the Policies, NR state:

"Although policy B provides the minimum whole life cost solution for managing the civils infrastructure portfolio, the selective use of policy C enables a balance to be achieved between delivering current route capability and train performance, lowest whole life cost and the level of funding available. Consequently, for CP4 policies have been applied to the different categories of route as shown below.

Figure 5	Policy application by route category for CP4
Route category	**Policy**
Primary	B
London and south east	B
Secondary	B
Rural	C
Freight only	C

Figure 7-1 Application of Structures Policy by Route Category

However, whilst this table details the overall generic policy approach at the route level; in some cases a more complex approach is required as rigid application of policy to individual assets could have a disproportionately negative effect on the performance of the route."

7.1.10 The text of the Policy statements can be found in full in Appendix D.

7.1.11 The principal difference between policies B and C are the initial statements *'maintain the asset condition' and 'allow assets to deteriorate until interventions are essential.'* Policy C requires deterioration to affect performance prior to intervention, whereas B does not. We note that NR has written a caveat into the policy in relation to this statement quoted above. We consider these statements taken together have potentially a very wide interpretation, particularly at the margins, and we concluded in Phase 1 that it may become very difficult to differentiate Policy B from Policy C.

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7.1.12 In addition to reviewing the application of the A, B and C Policies, there is a further set of 23 Policy statements which add more substance and detail which we have reviewed as part of this study.

7.1.13 One of the responses by NR to the CP4 Determination for Civils was to initiate a programme known as VAWP (Visible and Agile Workbank Planning), which aimed to streamline the planning of projects through minimising engineering, accelerated planning, and early contracting. VAWP is a business process and does not appear to influence or be influenced by Policy per se but it does provide a clear procedure for workbank planning and subsequent changes.

7.1.14 During CP4 there have been organisational changes, which appear to have altered reporting lines, but the principal functions of RAM, HAM and Professional Head seem to have been maintained.

7.1.15 In common with other disciplines, most of the 2012/13 workbank appears to have been put in place in about 2009. The Business Plan is a rolling document which holds at plans ahead at least five years, with varying degrees of completeness.

7.1.16 We consider that the BCAM Transformation programme, set up in response to the findings of Independent Reporter Mandate AO/007, has not materially affected the 2012-13 workbank.

7.2 Phase 2 Approach

7.2.1 As discussed above, the study's review of policy application will be carried out in the context of the 2007 Policy (Ref. CI 1), and has been restricted to Structures.

7.2.2 In order to determine the application of the Policy with respect to planned works a number of projects were selected for review. In each case the study reviewed the associated documentation for the sample project.

7.2.3 The documents which have been used in this review of the application of the Civils policy are generally those supplied by Network Rail associated with the seeking of authority for works, and in addition the latest detailed examination report.

7.2.4 The sample projects were selected from schemes in the 2102-13 and 2013-14 workbanks in LNW and the 21012-13 workbank for Sussex. A total sample of 52 projects was selected. The sample selection was designed to cover a variety of structure types (e.g. viaducts, under- and overbridges), and different project scales (e.g. >£10.0m to < £75k). NR provided information related to 49 of these projects.

7.2.5 Following the review of the associated documentation six of the LNW projects were selected for a more in-depth examination, undertaken through a meeting with the RAM team and site visits to three locations.

7.2.6 Table 7-2 provides a summary of the schemes which were reviewed. Those projects which are highlighted were selected for the in-depth review.

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Location	Asset	Estimate	Location	Asset	Estimate
LNW			**Sussex**		
DSE Br 39 Queens Drive/	Structure		Crookspond Viaduct	Structure	£2.555M
Arnside Viaduct	Structure	£10.8m	Landsdown Hill	Structure	
CBC3 Br 132 Cummersdale Viaduct	Structure	£44k	Elm Grove Footbridge	Structure	£362k
CGJ2/61 & CHW1/77 Acton Grange	Structure	£1.493M	Battersea Park Road underbridge	Structure	£18k
LHJ BR 94 Vicar's Bridge	Structure		Thurlow Park Underbridge	Structure	£500k
CGJ6 Gubberford Lane	Structure	£864k			
CGJ6 Hollins Lane	Structure	£348k			
HAJ UB 54 Dinting Vale Viaduct	Structure	£15k			
GSJ2 UB 22A over the M5 Motorway	Structure	£2k			
TSB UB 57 Wawensmere Road	Structure	£814k			
DCL Fenny Compton Drainage	Structure	£239k			
Tebay Drainage	Structure				
WSJ 2 Overbridge	Structure				
CHW1 – UB Jones'	Structure				
WSJ2 UB 371	Structure				

Table 7-2: Summary of Sample Structures Projects

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7.2.7   In each case relevant documentation for the project was reviewed to provide evidence of compliance with the main Policy options (A,B,C) and the thirteen key civils structures policy statements, listed in Table 7-3 below.

Number	Policy Statement
1	Examination of civil engineering assets shall be carried out at regular intervals, selected to achieve the optimum balance between cost and risk, and the condition of each asset inspected shall be recorded
2	Examination results shall be used to develop a bespoke plan for each asset, consistent with the policy selected for the asset, to remedy the defects found, if any, in order to maintain the asset's functionality
3	Each civil engineering asset shall be identified as being managed under policy A, B or C
4	The selection of the maintenance work to be carried out shall take into consideration: • asset condition and strength required • short term and long term historical changes in the asset condition • the overall policy for the asset (policy A to C) • the requirements of the route on which the asset is located • the life cycle cost of each viable alternative (including cost of possessions and track outages) • statutory requirements, including the rights of users and heritage requirements
5	Assets shall be replaced only when the policy applicable to the asset requires it and it is cheaper, in whole life cost terms, than the maintenance needed to continue to meet the requirements of the route
6	Where replacement of any asset is necessary this shall be selected on the basis of the least whole life cost solution that would meet the route's performance requirements.
7	Replacement work shall take into account the same considerations as listed under Civil-4
8	Each bridge shall be allocated a Condition Marking Index from 0 to 100 to reflect the condition found on detailed examination.
9	The Route Availability of each underbridge shall be maintained to be consistent with the requirements of the route on which the underbridge is located.
10	Overbridges within the remit of Bridgeguard 3 shall be assessed to check their ability to carry 40 tonne vehicles and any necessary strengthening

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Number	Policy Statement
	work to meet Network Rail's obligations implemented.
20	Each major structure shall be allocated a Condition Marking Index from 0 to 100 to reflect the condition found on detailed examination.
21	A maintenance manual shall be produced for each major structure.
22	As far as it is economic to do so major structures shall be maintained so that the need for complete replacement is avoided.

Table 7-3: Civils Structures Policy Statements

7.2.8   As stated previously the objective of this study is to determine whether the requirements of the relevant policy documentation are being adhered to in the identification and development of individual schemes. Therefore the project documentation was reviewed to identify evidence of compliance with policy.

7.3   Documents Reviewed Phase 2

CI11	2012/13 Civils Workbank
CI12	2013/14 Civils Workbank
CI13	Asset Condition Inspection Reports
CI14	Authority Requests
CI15	Scheme Development Proformas
CI16	Change Control Documents

Table 7-4: Documents Reviewed

7.4   Phase 2 Findings – Desk Based

7.4.1   The outcome of this review provided a tabulation of the individual projects mapped to the thirteen structures policy statements. The results of this review are included in Appendix F.

7.4.2   Table 7-5 provides a summary of the findings of the review of the overall sample portfolio by each of the policy statements.

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Policy Statement	Commentary
1	Examinations are being carried out and this statement is broadly complied with. Interventions are planned based on the Inspection Reports received for each scheme. During CP4, NR has introduced variable frequencies for detailed examinations. Our Mandate AO/007 report questioned specific aspects of the method used in determining these frequencies; this is being addressed by the BCAM Transformation Programme.
2	Authority Requests Documents mention "following inspections" or similar. NR is not routinely producing bespoke plans for each asset – we do not consider this to be a priority at asset level. The approach adopted in Policy on a Page, which is based on asset sub-groups is considered to be more appropriate. Interventions are planned in detail, as discussed elsewhere in this report..
3	Policy application, A,B or C is listed within the workbank document. We have analysed the workbank and set out our findings below.
4	The Authority requests detail the one or more of the bullet points. We have seen no evidence that lifecycle costs of viable alternatives have been assessed (except for Arnside).
5	Authority Requests do not provide evidence that WLCCs have been evaluated (Arnside excepted).
6	As Civil-5
7	From our observations and wider experience, structures replacement work broadly follows the items listed in Civil-4.
8	This SCMI score is detailed within the authority requests.
9	Route Availability data is defined in the Sectional Appendix and held in Structures VERA+ database. Not reviewed this within this study.
10	Assessment Reports Received where applicable
20	SCMI scores were recorded for Arnside Viaduct, which is possibly an exceptional case for a Major Structure. This evidence contradicts other (newer) statements by NR that Major Structures are not part of the BCMI system because each is unique.
21	This was not checked in detail as part of this study, but other evidence (SBP Draft Structures Policy) indicates that it has not been fully implemented in CP4.

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Policy Statement	Commentary
22	LNW are replacing the complete deck on Arnside Viaduct - this is an instance where the intent of the Policy has not been complied with. Policy A is generally accepted as being applicable to Major Structures. – see Table 7.6 for further details.

Table 7-5: Commentary on Policy Statements

7.4.3   As described in Section 7.2.7 of this report six projects were selected for a more in-depth review. These projects were discussed with the RAM team at meetings in Manchester on 13th and 27th November 2012.

7.4.4   The meeting began with a discussion on the RAM team's interpretation of both the Policies A, B and C and in particular the policy statements. This was designed to set the scene for the subsequent discussion on the individual projects. It also to provide some indication of the relevance of the Policy to scheme development.

7.4.5   Table 7-6 provides a summary of the discussion on the policy statements.

Policy Statement	Comments
1	Detailed and Visual examinations are carried out by the CEFA contractor; these are managed by the RAM's team. Standard NR/L3/CIV/006/1C which mandates variable inspection intervals according to risk has been implemented.
2	NR provided evidence that CARRS holds a Plan for each structure in the form of a list of outstanding work. However, it is not possible to generate a full Unconstrained Workbank list from this data. The recommendations from detailed examinations are either rejected or put into CARRS, where they are held until they are moved into business plan (>£50k) or issued as minor works (<£50k). Process is based on prioritisation. Rejected items get re-dated and set for review at next examination. Decisions made at peer review meeting.
3	Structures are assigned to a Policy by the asset stewards using qualitative judgement. For CP4 this was mainly a continuation from CP3, when guidance was briefed out. Policy A is not relevant in many cases. For CP4 majority were put into C for financial reasons. LNW has several Policy Bs in the workbank. LNW's view is that economics make application of Policy C inefficient. It is primarily used for schemes which are nearing end of life.
4	NR considers that Critical structures will have been put onto assessment list in the past. Asset Engineers and assessment team discuss and agree if there is a need for updated assessment in the light of examination data - and fed into the decision making process. Changes in condition are assessed by reviewing previous exam reports. WLCC - for smaller structures - generally qualitative / subjective approach

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Policy Statement	Comments
	in peer review. STAMP used for large schemes (e.g. Arnside). The list of Listed Structures is maintained by NR's Town Planning team.
5	Replacement vs. maintenance is covered as part of challenge process during authority process - risks are a key part of this - HCE etc.
6	Asset replacement to be selected on the basis of the least whole life cost – LNW use a 2 stage process – replace or not?, Then what to replace with? This is done generally on a qualitative basis using judgement and experience. RAM is looking forward to having new tools to support decision making . There is a trade-off between Lowest Initial Cost and WLCC. Combining renewal and enhancement schemes can be more efficient (track lowering vs. replacement) – if the saving from track lowering is taken into account, bridge replacement can be more cost effective in gauge clearance projects.
7	This is considered as Business as usual by the RAM
8	BCMI scoring is considered as Business as usual by the RAM
9	Route Availability of each underbridge - RA and Line Speed held in Sectional Appendix and captured in VERA+. LNW noted in discussions that they work assessments hard - interventions tend to be condition driven, although there are significant numbers of strengthening schemes in the workbank. RA information is not routinely included in project authorisation document.
10	Bridgeguard 3 assessments – NR maintain a separate list of public road overbridges (some bridges outside the process). Bridgeguard is an ongoing programme, once a BD21assessment is completed, risks can be identified and need for mitigation which needs to be agreed with highway authority.
20	The LNW Structures RAM policy considered that coding Major Structures for SCMI would be a major undertaking. We are not aware that NR is generally applying this Statement.
21	We are aware that some asset management plans for Major Structures exist, but not in a common format. The Draft SBP Policy commits to completing these for all Major Structures by the start of CP5.
22	Arnside Viaduct – Major Structure. Deck replacement discussed in detail – decision to replace was based on resulting line speed, capability and maintainability improvements, whole life cost assessment, and rail condition. There was good evidence to support this decision, and the contract price made the project even more cost-effective.

Table 7-6: Summary Review of Policy Statement Applicability

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7.4.6 The RAM team interpretation of the application and relevance of the statements, as described above, was generally accepted by the study team.

7.4.7 The Civils Policy contains two generic references to structures maintenance – Civils - 4 which is a general statement and Civils – 5 which refers to maintenance in the context of Whole Life Cost terms. Civils maintenance is carried out under Minor Works and were contained within the workbanks which we reviewed; however, none of the schemes we selected for detailed were maintenance work.

7.4.8 We have analysed the 2012/13 workbank to find out if there are significant differences in treatment types, route types or cost between policies B and C. The results are shown in Table 7-7 and 7-8.

Policy B UBs Works Breakdown for 12-13					
Treatment	No	Ave. Cost (£k)	Route Type	No	Ave. Cost (£k)
Preventative	11	258	Freight Trunk	1	94
Repair	5	99	L & SE	2	14
Replacement	2	65	Other Freight	0	0
Strengthen	1	678	Primary	2	166
Waterproofing	0	0	Rural	5	208
			Secondary	9	291

Table 7-7: Breakdown of Policy B Activities

Policy C UBs Works Breakdown for 12-13					
Treatment	No	Ave. Cost (£k)	Route Type	No	Ave. Cost (£k)
Preventative	26	236	Freight Trunk	4	208
Repair	56	124	L & SE	6	108
Replacement	41	203	Other Freight	4	47
Strengthen	15	262	Primary	38	167
Waterproofing	15	224	Rural	35	119
3rd Party Contribution	3	-163	Secondary	69	233

Table 7-8: Breakdown of Policy C Activities

7.4.9 This illustrates the shift to categorising projects as Policy C, 136 schemes compared with 19 carried out under Policy B, although for the overall CP4 workbank there is a closer balance between the two policies. Policy B should be applied to secondary routes, but in practice the great majority of schemes on secondary routes are being carried out using Policy C. However there are 41 replacement schemes labelled as Policy C, which could equally qualify as application of Policy B. The average cost of Policy B schemes is £220k, and Policy C schemes is £190k.

7.4.10 Approximately one third of the Policy C projects in the 2012/13 Workbank arise as a result of performance issues, which is one of the criteria for Policy C. However, 80% of these schemes are on the route categories where Policy B should be applied. This may imply that there is a significant backlog of

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performance related interventions on the higher category routes and also that the Policy in respect of route categorisation is not realistic.

7.4.11   The five projects singled out for particular scrutiny were reviewed against each of the eight policy statements to determine whether, in practice, these statements were being adhered to when schemes were being identified and put forward for investment funding.

7.4.12   The tables for the individual projects in Appendix F provide a description of this mapping of the evidence to the policy statements. A summary of the key points of this is provided in Table 7-9.

Policy Statement	Commentary
1	For each of the assets reviewed in detail we reviewed visual and detailed examination reports. For Arnside Viaduct, NR provided 32 No. Detailed Examination reports.
2	The discussion on the individual projects provided evidence of the diversity of factors which can influence the need and type of intervention, and the consequent need for thorough planning of interventions. Important factors which are not mentioned in the Policy statements include NR's liabilities, external stakeholders. The intervention plans reviewed addressed the issues raised by the examination. For Arnside, efficiencies were realised by combining track and structural renewal.
3	Policies were nominated for each of the structures. Policy B OXW Br 13 Arnside Viaduct and DJH/103 are Policy B. Arnside is a major deck replacement, which results in line speed and capacity improvements; DJH/103 Settle Road No 2 is one of a set of 5 repainting schemes, and includes HCE work, but not waterproofing. Policy C CHW1 UB 9 Jones' is a short span deck replacement, Vicars Bridge LHJ Br94 is the removal of a redundant overbridge in extremely poor condition, WSJ2 Stafford Junction Bridge is the replacement of a cast iron girder road bridge with a footbridge WSJ 2 BU371 Station Road, Albrighton is the replacement of a underbridge deck with failed waterproofing, tied in with platform work. It is difficult to understand why CHW1 and WSJ2 have been declared as Policy C because they do not appear to be presenting clear safety or performance risks, whereas Arnside has speed and capacity issues but is classed as Policy B.

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Policy Statement	Commentary
	This demonstrates the need for more clarity in the wording of the Policies..
4/5/6/7	Of the six schemes reviewed, Settle Rd is the only maintenance scheme and provided NR are confident about the condition and longevity of the waterproofing, we consider the scope fits the observed defects. The remaining schemes are deck replacements. The reasons for Arnside (capability), Stafford Jn (Cast iron beams) and Vicars Br (overall condition) make these structures clear candidates for replacement. The Policy requires a whole life cost assessment to compare replacement and ongoing maintenance of the structure. We have not seen evidence of any assessments of whole life costs and optional strategies, except for Arnside –which is a project on a different scale to the others we have reviewed. We consider that a WLCC analysis might indicate that refurbishment of the decks at UB 9 Jones' and Albrighton is more cost effective and would have informed a decision on whether to renew the waterproofing at the same time as repainting. We observe that there can be other valid criteria for replacing structures – in this case safety risk. There is therefore a conflict between the Policy C statement and Civil-5. In other respects the schemes we have reviewed comply with these statements.
8	The processes and application of SCMI scoring have been covered under other Mandates and we have not reviewed this area in detail.
9	Bridge capability is referred to in the documentation for UBs Arnside, Station Road Albrighton, and Jones', but not Settle Road. The capacity of OB Stafford Jn is stated, and the capacity shortfalls at Vicars Lane are evident because the live load has been removed from the bridge.
10	Not applicable to the schemes reviewed in detail
20	See item 20 in Table 8-5 above
21/22	We have already commented that the work at Arnside is not consistent with Policy; however, NR has presented comprehensive evidence which fully justifies the scope of work which has been developed. The deck replacement has become necessary as a result of decisions and actions which were taken many years earlier. The Arnside example adds emphasis to the need for NR to complete the production of robust Asset Management Plans for Major Structures.

Table 7-9: Summary of In-depth Review Meeting Findings

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7.4.13 In summary, we have found general compliance with the Policy and policy statements. Our principal finding is that the wording of the Policies B and C is such that in practice it is difficult to differentiate between them. This is illustrated by the example of the number of interventions based on performance requirements on Routes where Policy B should be applied. Our view is that the Policy does not drive renewal and maintenance activity, however retrospectively it can be seen to apply.

7.5 Phase 2 Findings – Site Visits

7.5.1 Following the meeting with the RAM team consideration was given to undertaking a series of site visits to observe at first hand the planned works. The following tabulation identifies where the site visits took place.

Location	Site Visit
CHW1 UB9 Jones'	Underbridge on a secondary route spanning approximately 5m over a farm access track, built in 1884. Assumed to have adequate strength. At Peer Review stage proposal was to repair steelwork and refurbish the structure at an estimated cost of £210k, with construction to be considered. The current business plan indicates replacement of the deck at an estimated cost of £400k. Our site inspection confirmed that the items scoped were reasonable. However, the need to replace the structure was not evident, and without a WLCC assessment, there is doubt about whether the most efficient solution has been adopted. The bridge also appears to be a candidate for infilling. We consider that each of these options should have been explored more fully prior to determining the most appropriate course of action.
WSJ2 BU 371 Station Road Albrighton	Steel underbridge (skew span) with transverse trough girders with central and two outer main girders. Failure of waterproofing system has led to corrosion of localised of the trough ends. The situation with this structure is similar to Jones' – a Peer Review proposal for repairs becomes a Business Plan entry for reconstruction at £540k..
WSJ2 BO No.404 Stafford Junction Bridge	Peer review to strengthen / replace 3 span bridge with cast iron girders supporting timber deck over Secondary line at £280k. Business plan proposal is to replace bridge with a footbridge, estimated at £475k. We support the decision to replace the structure because of the risk of failure of the cast iron beams in bending.

Table 7-10: Commentary on Site Visits

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7.5.2 The site visits largely confirmed the statements made in the evidence documentation, but the condition of two of the three bridges reviewed raises doubts about the efficiency of replacing the bridge decks.

7.6 Conclusions

7.6.1 A number of conclusions have emerged from the review of the policy application. These lie at both the strategic and project specific levels. Table 7-11 summarises these findings. In addition, the general recommendations *RG1-RG5* apply to civils.

Issue	Commentary
Strategic Level	
Application and Relevance of the Policy	We have found general compliance with the Policy and policy statements, except as noted below. Our principal finding is that the wording of the Policies B and C is such that in practice it is difficult to differentiate between them. Our view is that the Policy does not drive renewal and maintenance activity, however retrospectively it can be seen to apply. Policy B should be applied to secondary routes, but in practice the great majority of schemes on secondary routes are being carried out using Policy C, although a significant number or replacement schemes could equally be classified as Policy B.. 80% of the performance related schemes are on the route categories where Policy B should be applied, and interventions should take place before performance is affected. This implies that there may be a significant backlog of performance related interventions on the higher category routes and also that the Policy in respect of route categorisation is not realistic.
Use Made of the Policy	Evidence of compliance with the policies has not been shown explicitly and there is not a clear audit trail..
Project Level	
Authority Submissions	From the review of the individual project documentation there would appear to be little requirement to demonstrate compliance with the policy in seeking funding. These documents contain a lot of detail regarding the financial justification for the scheme without overtly demonstrating compliance with the Policy. It was however possible to infer compliance in a number of areas without this being explicitly stated.

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Issue	Commentary
Project Scope	The site visits largely confirmed the statements made in the evidence documentation, but the condition of two of the three bridges reviewed raises doubts about the efficiency of replacing the bridge decks.
Asset Condition	There is a clear connection between the inspection regime and the generation of work items in the workbank, but in practice the connection to Policy is not being made.
Whole Life Costing	The Policy requires a whole life cost assessment to compare replacement and ongoing maintenance of the structure. We have not seen evidence of any assessments of whole life costs and optional strategies, except for Arnside –which is a project on a different scale to the others we have reviewed. We consider that a WLCC analysis might indicate that refurbishment of the decks at UB 9 Jones' and Albrighton is more cost effective.

Table 7-11: Summary of Conclusions

7.6.2   NR is currently working to implement the wide-ranging recommendations made under Mandate AO/007 (Civils Asset Management) and therefore we have not made further recommendations in this Report.

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8 Asset Specific Findings – Operational Property

8.1 Phase 1 Findings

8.1.1 In developing our proposed methodology for Operational Property (OP) we have considered the following key references:

OP1	Network Rail: Asset Management (B&C) Business Planning Process and Guidelines - October 2009
OP2	Network Rail: Operational Property Asset Policy - March 2010
OP3	Network Rail: Buildings Business Planning and Investment Authority Process and Guidelines - September 2010
OP4	Network Rail: CP4 Route Asset Management Plan: Strategic Route Section K.03, Version 1.0 - December 2010
OP5	Network Rail: B&C Business Plan Extract - 2010 - 2011
OP6	Network Rail: B&C Asset Change Panel Register - 2010 - 2011

Table 8-1: Key References

8.1.2 The study team met with the Operational Property HAM on 26th April 2012 and the following paragraphs are based on these discussions.

8.1.3 Network Rail advised that the Operational Property Policy was developed between 2007 and 2010 hand in hand with the development of their Operational Property Asset System (OPAS). The Route based teams were involved in this process, particularly with the derivation of the key components of the Policy.

8.1.4 In the 2010 Policy (Ref. OP2), Network Rail states:

'Since October 2007 the level of understanding of the assets has increased considerably which enables more detail to be added to the policies, at portfolio and asset level. The overall policy principles remain the same as follows:

> *1. Retain safe performance*

> *2. Sustain overall condition*

8.1.5 It is undoubtedly true that the creation of the OPAS database has allowed Network Rail to be more informed about its operational property assets which in turn has contributed to the Policy.

8.1.6 To sustain overall condition, Network Rail states that the 2010 Policy: *'represents a difference in approach, rather than a wholesale change, and utilises the increasing volume and detail of asset data held within our asset management system to drive consistent and robust decision-making, rather than the empirical, condition led, approach. The policy defines trigger levels for interventions, based on the safety and performance impact of the assets condition assessed through our defined inspection programme'*.

8.1.7 In the Policy, stations are divided into six categories – from 'A', National Hub Stations to 'F', small un-staffed stations; and Light Maintenance Depots into four. In addition, the Policy covers about 6,500 Lineside buildings, Maintenance Delivery Unit buildings and also National Delivery Service buildings.

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8.1.8 The 2010 Policy also states that:

> '*given the diversity of assets within our portfolio it is not practical to address all asset types within this policy document, however, Asset Management Teams will be able to use the principles outlined in this guidance and apply them appropriately*'.

8.1.9 For the purposes of this review this has been taken to mean that where non-station or depot buildings are to be considered in the sampling that the Policy still applies in principle if not in detail.

8.1.10 The Policy contains eight policy statements - Ops Prop 1 through 8. The first of these provides three specific asset intervention policies A, B and C for managing all OP assets, which are described in some detail in the document. The Policy explicitly defines thresholds for maintenance works / minor interventions – C1/C2 & B1/B2 (Ref. OP2, Section 4.1). These definitions did not previously exist, whereas minor works are now integrated into spectrum of repairs / renewals.

8.1.11 In operating the new Policy, OPAS data is used to assess the Asset Risk Score (ARS) and the Percentage Asset Remaining Life (PARL). Asset Remaining Life (ARL) was previously a function of condition.

8.1.12 The OP Business Process sets financial targets derived from and aligned with the Determination. There are separate targets for each of the main OP asset groups. Network Rail is committed to a long term agreement with TOCs to invest in each portfolio in line with long term change. Prior to CP4 there was a bottom up workbank which drove the plan.

8.1.13 At the start of CP4, Network Rail instigated Integrated Station Planning (ISP) – working with TOCs, PTEs, and taking account of commercial development. The purpose of ISP was to bring about efficiency from within the whole of the industry. Network Rail spent £1.1bn out of the total expenditure of £3.2bn in ISP. This includes enhancement and third party schemes.

8.1.14 With respect to maintenance which is carried out by TOCs under the terms of their leases, Network Rail advised that it has the right to review maintenance plans. However, this is done with varying degrees of success. Currently, TOCs benefit little financially by Network Rail having a robust asset maintenance strategy. As assets are fairly resilient to short periods of maintenance neglect, the longer term impact of shorter asset lives and increased renewal cost only impacts Network Rail (and ORR / DfT) and is not reflected in TOCs' business models. Network Rail considers that this may change as a result of devolution (e.g. Wessex Partnering where a closer business relationship is working between the Network Rail Route and the dominant Train Operator). The current expectation is that under the current round of franchise renewals TOCs are likely to be required to take on full station maintenance responsibilities.

8.1.15 The OP HAM considered that Business Plans will gradually evolve so that they are compatible with RAMPs. However, whereas RAMPs represent a point in time, Business Plans are live, evolving documents which will be maintained in CP5 as part of the business planning process. Since the start of CP4, the OP team has maintained a five year workbank of schemes.

8.1.16 The Business Plans indicate which policy has been applied to each line item. Routes develop appropriate outcomes based on the state of their assets. An

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expenditure profile was developed in CP4 at a Route level. A weighting measure was also developed centrally in Network Rail to distribute money between Routes, which was driven by asset condition.

8.1.17   Scheme delivery is recorded at the end of a project, when it is handed back to asset managers. OPAS is not updated at the end of the scheme, but through normal cycle. The intention is to ensure consistent reporting of SSM in line with ORR requirements. Detailed examinations update ARS and PARL as part of monitoring SSM. Visual inspections only update the condition of the key assets. Therefore there is a lag before OPAS is updated to reflect the changed state of the assets.

8.1.18   However, there is strong support for refreshing the data held in OPAS as part of the handback of assets when a significant investment has taken place. This was the subject of a previous Independent Reporter recommendation.

8.2   Phase 2 Approach

8.2.1   The study's review of policy application will be carried out in the context of the 2010 Policy (Ref. OP2). Although it is noted that a revised policy document was issued in September 2011 and this has been used as the basis of the CP5 submission.

8.2.2   In order to determine the application of the Policy with respect to planned works a number of projects were selected for review. In each case the study reviewed the associated documentation for the sample project.

8.2.3   The documents which have been used in this review of the application of the Building policy are generally those supplied by Network Rail associated with the seeking of authority for works, or the Project Manager's remit. This was the standard Network Rail Authority Request template. These forms were generally backed up with evidence from the OPAS database showing a relevant condition commentary and 'scores' for the particular assets. In some cases the supporting documentation was a Project Manager's Remit associated with the development or delivery of the works.

8.2.4   The sample projects were selected from schemes recently completed or in progress in Scotland and Wales Routes. In each Route a sample of twenty-five projects were selected. The sample selection was designed to cover a variety of location types (e.g. stations, signal boxes, depots), a range of asset (e.g. buildings, platforms, plant equipment), and different project scales (e.g. >£1.0m to < £75k).

8.2.5   In the event supporting information was only provided for seventeen Scotland Route projects and twenty-two on Wales Route.

8.2.6   Following on from the review of the associated documentation five of the projects were selected for a more in-depth examination. The more in-depth review was undertaken through a meeting with the RAM team and site visits where appropriate.

8.2.7   These five projects were selected on the basis of their diversity and included schemes which may be considered 'out of the norm' for various reasons.

8.2.8   The in-depth review of five projects was undertaken only on Scotland Route schemes.

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8.2.9 Table 8-2 provides a summary of the schemes which were reviewed. Those Scottish projects which are shaded in orange are those subject to the in-depth review.

Location	Asset	Estimate	Location	Asset	Estimate
Scotland			**Wales**		
Motherwell	Platforms	£1.08m	Borth	Canopy	211k
Hillfoot	Footbridge	£141k	Flint	Retaining Wall	£355k
Corkerhill	CET	£90k	Porth	Lighting	£264k
Craigentinny	Jacks	£85k	Cardiff	Water Tower	£57k
Stirling	Canopy Roof	£62k	Cadoxton	Lighting	£228k
Aberdeen	Canopy	£1.04m	Cardiff	Canopy	£324k
Mount Florida	Footbridge	£185k	Church Stretton	Lighting	£210k
Craigentinny	Shore Supplies	£347k	Haverfordwest	Lighting	£378k
Perth	Carriage Washer	£1.19m	Pembrey & Burry	Footbridge	£95k
Edinburgh	Main Building	£3.8m	Trehafod	Lighting	£228k
Hamilton	Platforms	£280k	Swansea	Platform	£501k
Scotstounhill	Footbridge	£250k	Bridgend	HVAC	£274k
Cowdenbeath	Footbridge	£245k	Pontypridd	Lift	£194k
Johnstone	Retaining Wall	£350k	Shrewsbury	Fire Escape	£328k
Prestwick	Building Roof	£80k	Swansea	Wiring	£798k
Glasgow	Roof	£318k	Penmaenmawr	Signal Box	£40k
Various	Rationalisation	£7.04m	Buckley	Platform	£300k
			Waun-gron Park	Lighting	£270k
			Hengoed	Footbridge	£235k
			Trefforest	Footbridge	£241k
			Whitland	Footbridge	£98k

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Location	Asset	Estimate	Location	Asset	Estimate
			Cynghordy	Lighting	£85k

Table 8-2: Summary of Sample Operational Property Projects

8.2.10 In each case relevant documentation for the project was reviewed and links drawn to the eight operational property policy statements as referred to above in the Policy. These statements are listed in Table 8-3 below.

8.2.11 In effect, evidence was sought that the individual projects were compliant with the eight policy statements where relevant.

Policy Statement	Commentary on Relevance and Application
Ops Prop 1	Each operational property asset type shall be identified as being managed under a specific policy. These policies shall be risk based taking account of the safety and performance impact and likelihood, as defined by asset category. The policies shall be sub-divided across different asset categories to enable a differential approach depending on use.
Ops Prop 2	Work with customers and other stakeholders, when considering the type and priority of repairs, maintenance and renewal, to achieve wider industry aspirations, within overall funding and programme constraints.
Ops Prop 3	Examination of operational property assets shall be carried out a regular intervals, selected to achieve the optimum balance between cost and risk. The condition of each asset inspected shall be recorded in the Operational Property Asset System (OPAS) .
Ops Prop 4	Examination results shall be used to drive maintenance and renewal plans for each asset, consistent with the policy selected for the asset, to remedy the defects found, if any, in order to maintain the safety, performance and functionality of the asset and its related elements or features.
Ops Prop 5	The selection of the maintenance activities shall aim to maintain the overall condition taking into consideration: o The specific feature's condition in the context of the overall condition of the asset e.g. A failed pain of glass in a canopy in otherwise good condition, or a failed pane in a canopy in generally poor condition. o Short and long term historical changes in the asset condition o The overall policy for the asset o The requirements of the route on which the asset is located o The lifecycle cost of each viable alternative (including cost of possessions and track outages) o Statutory requirements, including the rights of users and heritage requirements
Ops Prop 6	Each station and light maintenance depot shall be assessed and given a numerical rating of its condition
Ops Prop 7	New, substantially altered or replacement stations that are not subject to Listed Building status shall adopt, where appropriate, a modular approach to the design, detail procurement and implementation of station components.
Ops Prop 8	Where possible, assets will be right sized which will include long term plans for the removal (or possible redeployment elsewhere in the portfolio, if appropriate) of redundant assets. Interventions will take account of projected customer and stakeholder demand, where supported by a business case.

Table 8-3: Operational Property Policy Statements

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8.2.12 As stated previously the main objective of this study is to determine whether the requirements of the relevant policy documentation are being adhered to in the identification and development of individual schemes. To that end the project documentation was reviewed to identify evidence of compliance with policy.

8.3 Documents Reviewed Phase 2

OP7	2012/13 Operational Property Workbank
OP8	Asset Condition Inspection Reports
OP9	Authority Requests
OP10	Scheme Development Proformas
OP11	OPAS Screen Grabs

Table 8-4: Documents Reviewed

8.4 Phase 2 Findings – Desk Based

8.4.1 The outcome of this review provided a tabulation of the individual projects mapped to the eight policy statements. The results of this review are included in Appendix F.

8.4.2 Table 8-5 provides a summary of the findings of the review of the overall sample portfolio by each of the policy statements

Policy Statement	Commentary
1	For those schemes where the Route categorisation of the applicable policy intervention was known there was generally a high level of compliance. There were however a small number of schemes where the PARL, asset type and station category did not match the project classification.
2	There was generally a poor level of evidence of stakeholder consultation to support the scheme. However, there was some evidence that it may have been the documentation which was poor rather than the practice.
3	All sites had current inspections for the assets under consideration. Note that this was not necessarily true of other elements at a particular site.
4	Generally high level of translation from inspection to scheme however there appeared to be a consistent mismatch when considering the lighting schemes at stations in Wales. There were other minor disconnections.
5	Generally not relevant to the schemes sampled
6	Some checks were made on this however the use made of these numbers was not apparent in the documentation reviewed. Since the 'scores' are generated out of OPAS and (see above) this was generally

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	in date then it could be assumed that these figures too were current. Clearly where OPAS data conflicted with the proposals then these figures are not likely to be relevant.
7	The use of modular construction had little relevance to the selected projects.
8	The 'right sizing' of assets was directly applicable in one case however, the opportunity to consider the reduction in facilities was not evident from the documentation and thus it is possible that some downsizing opportunities may be being missed.

Table 8-5: Commentary Against Policy Statements

8.4.3   As described in Section 8.2.7 of this report five projects were selected for a more in-depth review. These Scottish projects were discussed with the RAM team at a meeting in Glasgow on 22nd November 2012.

8.4.4   The meeting began with a discussion on the RAM team's interpretation of the Policy and in particular the eight policy statements. This was designed to set the scene for the subsequent discussion on the individual projects. It also to provide some indication of the relevance of the Policy to scheme development.

8.4.5   Table 8-6 provides a summary of the discussion on the policy statements.

Operational Property Policy Statement	Comments
1	This statement covers the interventions which apply at various times in the lifespan of an asset. It identifies three policies (A, B and C) and describes their respective content and applicability based on a series of degradation curves. The identification of the use of Policy B and C interventions is prescribed in Section 4.2 of the Policy document (Ref. OP2). Policy A – refers to a renewal where there is an enhancement Policy B – covers renewals where there is no enhancement and for which the scale of the renewal is a lot less than policy A's complete renewal. Examples quoted included: Edinburgh Waverley Roof Glazing would be a B1 for the renewal of the full canopy glazing and steelwork. Where the works covered the glazing only this would be categorised as B2. Policy C – describes maintenance repairs of differing scales. Examples – a large scale resurfacing of a platform would be a C1 whereas the re-pointing the platform copes would be classified as C2.
2	This statement requires the project sponsor to demonstrate that there has been adequate consultation with the relevant stakeholders to ensure that the scheme is delivering the right outputs. It also requires that they be consulted if their approval is required for the works – for example in the case of dealing with a Listed building.
3	Operational Property policy statement 3 requires the RAM team to have compliant examination surveys in place for the assets. In the case of the building portfolio this requires the complete asset to have been subject to detailed inspections every five years and visual inspection of key assets on an annual basis.

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Operational Property Policy Statement	Comments
4	Policy statement 4 requires there to be a clear linkage between the outcomes from the CEFA inspection regime and the works which are planned. This, of course, can change in extremis and the meeting discussed the very necessary response required by Network Rail to the problems caused by frost heave over the last two winters.
5	This statement covers the policy approach to maintenance activities. It was noted at the meeting that there is a limit of £50k on maintenance activities thus anything above this level, by definition, is not maintenance but is classified as renewal. This limit is taken from the Section 2.10 of document Ref. OP3. In the case of all of the schemes under review they are budgeted as greater than £50k thus Ops Prop 5 will not apply to those projects.
6	As part of the prioritisation of the investment there is a requirement to determine the Asset Risk Score and the stewardship measures. These between them define the safe performance and sustainability condition of the investment. These figures are automatically derived from OPAS as an output from the CEFA inspection F1 to F5 assessments.
7	This policy aims to make the most of modular construction as a means of reducing costs and simplifying the design process. With regard to the sample of schemes which are being reviewed as part of this commission Ops Prop 7 is not applicable.
8	There is a legacy in the rail industry of redundant assets. This policy statement seeks to reduce this redundant stock of assets by requiring the asset stewards to consider 'right sizing' the asset base. There is a clear overlap between compliance with this policy and Ops Prop 2 – stakeholder consultation.

Table 8-6: Summary Review of Policy Statement Applicability

8.4.6 The RAM team interpretation of the application and relevance of the eight policy statements, as described above, was generally accepted by the study team. There were no significant aspects of the statements made which gave cause for concern that there was a disconnection between the policy intention and its interpretation in the Route.

8.4.7 The five projects singled out for particular scrutiny were reviewed against each of the eight policy statements to determine whether, in practice, these statements were being adhered to when schemes were being identified and put forward for investment funding. A summary description of the main points of the discussion is provided in the meeting notes in Appendix B.

8.4.8 The tables for the individual projects in Appendix F provide a description of this mapping of the evidence to the policy statements. A summary of the key points of this is provided in Table 8-7.

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Policy Statement	Commentary
1	None of the planned works are covered by Policy A. All of the schemes have been identified as Policy B interventions. This is because they all represent a significant level of renewal work, but are not complete renewal in accordance with the definition. The activities planned at Hamilton and Aberdeen were classified as 'B1' indicating a more substantial level of 'renewal' compared to the overall quantum of the asset. In this regard the cost of the works is not necessarily an indicator of whether work is 'B1' or 'B2'. This is because the cost could be driven by additional charges as a result of access requirements, for example possession and isolation costs, and the classification is driven by: the station category; the particular asset involved; and the percentage asset remaining life.
2	It is clear that there has been a degree of liaison between Network Rail and the TOC with regard to all of the schemes. For each project the RAM team were able to state how the interaction had occurred, be it from notification of failed equipment or driven by pubic complaints. Whilst there had been dialogue on other projects regarding the potential enhancement of an asset there was some evidence however that in the case of the CET works at Corkerhill the extent of the necessary replacement had not been challenged as might be expected under this policy.
3	All of the sites have a current CEFA survey.
4	From an examination of the Data Extract Reports for the five sites there is clear evidence in four out of the five cases that failures or degradation of the asset elements has been identified by the CEFA surveyor. Photographic evidence within the documentation supports the assessment made by the surveyors regarding condition.

Works at the fifth site (Aberdeen) are not being driven by condition but rather compliance with Listed building regulations. |
5	As previously stated all of the items which were discussed required funding in excess of £50k which, by the set definition, meant that they were outside the scope of maintenance. Thus policy statement five does not apply to the planned works.
6	The safety performance and sustainability scores are calculated by OPAS following the inspection. Given that all of the structures have current inspections then these 'scores' will equally be current. It is noted however that such 'scores' do not form part of the authority request submission. Thus there does not appear to be a requirement to demonstrate compliance with this policy statement when seeking project funding.
7	By the nature of the projects selected for review modular construction is not relevant to any of them since each will be bespoke to the individual circumstances.

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Policy Statement	Commentary
8	The recovery of redundant assets is not directly relevant to these schemes. Failed equipment will be removed from site during the course of the works but this is required as part of the replacement process and does not represent a reduction in the overall asset base of Network Rail.

Table 8-7: Summary of In-Depth Review Meeting Findings

8.4.9   In summary there would appear to be little deviation from the requirements of the policy in the execution of the process to identify and progress the delivery of the schemes sampled.

8.4.10   During the course of the discussion on the process and the prioritisation of works much was made of the requirement to deal with works arising on an emerging basis. Specifically the works arising from the particularly severe winters which badly affected the surfaces and support walls for certain station platforms. The significant number of such failures resulted in a complete re-prioritisation of the work plan to deal with potentially dangerous situations leading to slips and trips, but also more seriously the potential for platform copes to topple onto the track. Whilst this may not appear to accord with the eight policy statements there is an overriding requirement in the document (Ref. OP2) to "*direct interventions to high safety and performance issues*". In this respect these changes would appear to reflect the requirements of the policy.

8.5   Phase 2 Findings – Site Visits

8.5.1   Following the meeting with the RAM team consideration was given to undertaking a series of site visits to observe at first hand the planned works. The following tabulation identifies where the site visits took place.

Location	Site Visit
Hillfoot Footbridge	tba
Corkerhill Controlled Emission Toilet Equipment	No site visit undertaken. The equipment in the depot does not display any signs of failure in themselves so it was considered of little use observing the equipment first hand. Nevertheless the RAM team provided more detailed photographs of the equipment than were included in the evidence documentation provided. (AWAITED!!)
Aberdeen Canopy	Little benefit considered to be obtained from site visit to this location since condition of asset was not the driver.
Hamilton Platforms	tba
Johnstone Retaining Wall	Site visit undertaken with the RAM team on 21 November. This confirmed the condition of the asset and provided the opportunity to explore alternative solutions and the means by which the remedial work (which was underway) was being carried out.

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Table 8-8: Commentary on Site Visits

8.5.2 Of the assets inspected, none appeared to be in a differing condition than that recorded in the evidence documentation. There were also no further unexpected issues arising from the site inspections.

8.6 Conclusions

8.6.1 In addition to our general recommendations (*RG1, RG3, RG4 and RG5*), a number of conclusions have emerged from the review of the policy application. These lie at both the strategic and project specific levels. Table 8-9 summarises these findings.

Issue	Commentary
Strategic Level	
Application of the Policy	There is evidence from the review that the policy is largely being complied with. This is more associated with the fact that the policy reflects the RAM team's current method of working and thus it is easy to 'backfit' the activities to the policy. It is noticeable that the authority request documentation does not specifically mandate the author to evidence compliance with the policy requirements in the submission. Whilst the inference can be drawn in some cases that there is compliance – as in the case of Ops Prop 02 – it is not always explicitly stated.
Use Made of the Policy	Given the above there was little evidence of direct use made of the policy. Certainly for the categorisation of the work which is being done there is reference to the policy however even then there were variations from what would appear to be set intervention requirements. Nevertheless other than the requirements driven by other imperatives – like the building inspection regime – there is little direct use made of the policy.
Relevance of the Policy	From the review of the documentation and the discussion with the RAM team in Scotland the study sought to determine the relevance of the policy to the day-to-day management of the asset portfolio. When directly challenged on the relevance of the Policy it was stated that it was a useful document as check but largely contained common sense statements which were being applied in any event. This has led the study to question the relevance of the document given that it would appear to be a validator of decisions that were being made rather than a driver. This seemed to be particularly true when specific events required attention – as in the case of the frost heave brought about by poor weather condition – when there was a clear imperative to tackle these from the perspective of safety which overrode job prioritisation based on policy compliance.

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Issue	Commentary
Project Level	
Authority Submissions	From the review of the individual project documentation there would appear to be little requirement to demonstrate compliance with the policy in seeking funding. These documents contain a lot of detail regarding the financial justification for the scheme without overtly demonstrating compliance with the Policy. It was however possible to infer compliance in a number of areas – e.g. stakeholder consultation without this being explicitly stated.
Project Scope	As a result of the lack of supporting information on the dialogue which has taken place with the stakeholders it was sometimes not possible to determine if the scope and scale of the proposed works truly reflected the business need. It was believed that the policy includes consultation with the stakeholders for this purpose (amongst others) and thus if there is no specific evidence in this area then this may be something of a weakness.
Asset Condition	There is a clear 'line of sight' between the inspection regime and the generation of work items. However, in practice, in a number of cases, that connection is not being made. An example would be a number of the lighting schemes in Wales where at some locations the OPAS data did not support the planned renewal. Nevertheless there appeared to be some substantial evidence to support the works despite the lack of corroboration in OPAS.
Project Prioritisation	Compliance with the policy requires the development of a 'score' for safety and sustainability (Ops Prop 06). There was some evidence that at a national level there is some prioritisation taking place of the individual schemes however this did not emerge during the review of the documentation. It was however mentioned in the discussions of the individual schemes.

Table 8-9: Summary of Conclusions

8.6.2   In summarising the assessment of the application of there would appear to be two fundamental issues:

8.6.3   The relevance of the Policy to the day-to-day management of the portfolio would appear to be limited. This is not to say that the contents of the policy are not being adhered to in the management of the buildings but rather that the way in which this is being done is already in compliance with the policy. It was termed to be "common sense and something we would do anyway". In response to a direct question it was conceded during the interviews that if the policy had not existed the RAM team would in all probability have taken the same course of

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action. It was however conceded that the policy provided a good check on what is required.

8.6.4 This assertion did not necessarily tie into the findings for individual projects where, as can be seen in Appendix F, there was not necessarily compliance across the board.

8.6.5 However, this leads into the second issue which emerged. Having set the policy it could be naturally expected that there would be an onus on the Routes from the Centre to demonstrate compliance. In the documentation which was reviewed there appeared to be no attempt to present a list of outputs to show how the individual scheme linked to Policy. This was considered to be surprising particularly given the overall level of compliance with the policy it was felt that this should have been at least sought by the authorising body. Thus it is not clear where the policy lies in relation to the authorisation of funding and central support for a scheme. It is recommended that NR should amend the Authority Request form to include robust and specific evidence of compliance with (or deviation from) the discipline asset policies, thus clearly evidencing a line of sight from Policy to implementation *(Recommendation RG2)*.

The Authority Request process was found to have a number of weaknesses in respect of policy implementation within Network Rail planning, and this needs to be strengthened as NR moves into CP5:

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9 Asset Specific Findings – E & P

9.1 Phase 1 Findings

9.1.1 In developing our proposed methodology for Electrification & Plant we have considered the following key references.

EP1	Network Rail, E&P Asset Policy, Oct 2007
EP2	2012/13 E&P Workbank
EP3	Delay Information
EP4	Asset Condition Inspection Reports
EP5	Authority Requests
EP6	Failure data/records
EP7	Record drawings covering each scheme and also the immediate area

Table 9-1: key references

9.1.2 We met with the Electrification and Plant (E&P) HAM on 26th April 2012 and the following paragraphs are based on these discussions.

9.1.3 The E&P Policy was not amended in 2010, and our review is carried out on the basis of the 2007 SBP Policy. The Policy sets very clear performance objectives which should drive the asset management decisions making. These are as follows[3]:

- *to achieve 28% improvement in performance by the end of CP4 compared to 2006/07, as measured by the number of incidents caused by failures of overhead lines or conductor rails that result in train performance delays in excess of 500 minutes*

- *to ensure that signalling power supply failures that result in train performance delays are managed to support the achievement of our train reliability targets (70 failures over 500 delay minutes in CP4)*

- *to improve the remaining life of electrification distribution assets*

- *to maintain existing capability (and capacity) except where changes are initiated by modified by network requir*ements.

9.1.4 The Policy is defined by a set of 65 policy statements covering the following topic areas:

- General
- Overhead Line Equipment (OLE)
- High Voltage Switchgear
- HV Cables
- DC LV Cables

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[3] NR Oct 2007 Strategic Business Plan Supporting document – Asset management

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- Booster transformers
- Transformer / rectifiers
- Protection relays
- Conductor Rail
- SCADA
- Points heating
- Signalling power supplies
- HV distribution systems

9.1.5   In general, the Policy is based on replacement at explicitly defined ages, with a few condition requirements, and includes statements about replacement requirements and consideration of whole life cycle costs. It is not clear to us how these statements relate to the objectives given in 9.1.3 above and this was raised at the route meetings.

9.1.6   NR considers that the current workbank has been developed to comply with 2007 policies. We are advised that NR is now moving Policy towards the next stage; in place of the age based approach Policy is now evolving towards a condition based approach, which seeks to strike a balance between asset condition and life. This uses criticality and proxy condition to define five levels of condition which are defined for each asset group. Periodic inspections are carried out and recorded in Ellipse.

9.1.7   In developing a project, the scope is determined on case by case basis and subject to internal review through the business planning process. The 2007 Policy was briefed out to the Routes in the normal way. An Access database is used to hold the project based workbank; it has an integrated change control function and also stores financial details for each project. NR advises that the workbank is developed generally around programmes of work, driven by condition and then prioritised. Renewals are based on replacement with modern equivalents.

9.1.8   The degree of 'match' between Workbank and Delivery, post – investment is controlled by GRIP Stage 8, lessons learnt and also the business planning process (change control). The HAM requires assurance on completion of agreed scope, which is validated through the close-out reports.

9.2   Phase 2 Approach

9.2.1   The E&P Asset Management Policies are reproduced in Appendix D. The Policies which have been directly quoted in the project documentation submitted for audit (and reviewed further on in this section) are shaded in red, whilst the Policies which could be relevant are shaded in green. Those Policies remaining un-shaded, have therefore, not been covered by the information submitted for Audit and so there is no evidence of their consideration or relevance.

9.2.2   In general, the Policies appear to be based on replacement of equipment at explicitly defined ages, with few condition requirements.

9.2.3   In developing a project, the scope is determined on case by case basis and subject to internal review through the business planning process. The 2007 Policy was briefed out to the Routes in the normal way. An Access database is used to hold the project based workbank; it has an integrated change control function and also

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stores financial details for each project. NR advises that the workbank is developed generally around programmes of work, driven by condition and then prioritised. Renewals are based on replacement with modern equivalents. In our Phase 2 visits to Routes we will seek to ascertain the degree to which replacement is being determined by age and condition.

9.2.4 The degree of 'match' between Workbank and Delivery, post-investment is controlled by GRIP Stage 8, lessons learnt and also the business planning process (change control). The HAM requires assurance on completion of agreed scope, which is validated through the close-out reports.

9.2.5 The sample projects were selected from schemes recently completed or in progress in Kent and East Midlands Routes where 10 and 3 projects were selected respectively.

9.2.6 Following on from the review of the associated documentation, five of the projects were selected for a more detailed review which was undertaken through a meeting with the RAM team and site visits where appropriate, for the Kent Route schemes only.

9.2.7 Table 9-1 provides a summary of the schemes which were reviewed. Those Kent projects which are shaded in orange are those subject to the in-depth review.

Project Number	Project Description
103131	HV Switchgear Renewals Stage Gate 1-8
FF731A	25kV Oil Switchgear Renewal Programme Tranche One
KEN05	Continuous Transformer Monitoring Product Trial
BBE500	HV Switchgear Renewals Stage Gate 5-8
GGRM68	MML (Bedford to St Pancras) OLE Renewals
103079	Navigation Lighting Renewal Stage Gate 1-8
103459	Pumps Renewal Stage Gate 1-8
EEPB04	Renewal of Rectifier Transformers
105336	Replacement of ABB OCAD Stage Gate 1 to 8
BBK930	Sole User Asset Renewal
130232	DC Feeder Cable Renewal – Southwark Substation
BBL010	Substation Domestic Rewiring Stage Gate 1-8
106358	Sussex Conductor Rail Renewal

Table 9-2: Summary of Sample Electrification & Plant Projects

9.2.8 In each case relevant documentation for the project was reviewed and links drawn to the 25 key Electrification & Plant policy statements as shown in appendix E.

9.3 Phase 2 Findings – Desk Based

9.3.1 The outcome of this review is provided by a tabulation of the individual projects, mapped to the twenty five E&P policy statements, which were either directly quoted in the information submitted, or were found to be relevant during the review.

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9.3.2   Table 9-3 below, provides a summary of the findings of the review of the thirteen projects examined, by each of the policy statements.

Policy Statement	Commentary
E&P-4 (Inspection of OLE Components)	This policy appeared to be relevant in one case, project GGRM68 (MML OLE Renewals), but there was no evidence in writing, of it being considered.
E&P-5 (Periodic assessment of OLE Asset Condition)	This policy appeared to be relevant in one case, in project GGRM68, but there was no evidence in writing, of it being considered.
E&P-6 (OLE Asset Performance)	This policy appeared to be relevant in one case, in project GGRM68, but there was no evidence in writing, of it being considered.
E&P-7 (OLE Emerging Defects)	This policy appeared to be relevant in one case, in project GGRM68, but there was no evidence in writing, of it being considered.
E&P-8 (OLE Campaign Changes)	This policy appeared to be relevant in one case, in project GGRM68, but there was no evidence in writing, of it being considered.
E&P-13 (OLE Bimetallic Interfaces)	This policy appeared to be relevant in one case, in project GGRM68, but there was no evidence in writing, of it being considered.
E&P-16 (OLE Climatic Conditions)	This policy appeared to be relevant in one case, in project GGRM68, but there was no evidence in writing, of it being considered.
E&P-19 (Oil Filled HV Switch Gear)	This policy was directly quoted in one of the Audited projects (103131 HV Switchgear Renewals), but also seemed to be relevant to projects FF731A (25kV Oil Switchgear Renewal) and BBE500 (HV Switchgear Renewals).
E&P-20 (Replacement HV Switch Gear)	This policy was directly quoted in one of the Audited projects (103131 HV Switchgear Renewals), but also seemed to be relevant to project BBE500. However, there was no evidence in writing that this policy had been considered in the latter project.
E&P-26 (Oil Filled HV cables)	This policy appeared to be relevant in four cases, projects; 103131, FF731A, BBE500 and EEPB04 (Renewal of Rectifier-Transformers). However, there was no evidence in writing, in any of these projects, that the policy had been considered in any of these projects.
E&P-27 (Pilot & Aux Cables)	This policy seemed to be relevant to project EEPB04, but there was no evidence in writing of it being considered.
E&P-28 (Cable Routes)	This policy appeared to be relevant to projects FF731A and EEPB04. However, there was no written evidence in the information submitted for either of these projects, of the policy being considered.

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E&P-30 (DC Cable Renewal)	This policy is directly quoted in project 106358 (Sussex Conductor Rail Renewal). It also appears to be relevant to projects EEPB04 and 130232 (DC Cable Renewals), but there is no written evidence within the information submitted for the last two projects.
E&P-31 (Cable Route Refurbishment)	This policy appeared to be relevant in projects EEPB04 & 130232, but there was no written evidence in the information submitted for either of these projects, of the policy being considered.
E&P-34 (Transformer-Rectifiers)	This policy appeared to be relevant to KEN05 (Continuous Transformer Monitoring) and EEPB04, although there was no evidence in writing in the submitted information, to confirm that this policy had been considered in these projects.
E&P-37 (Type of Replacement Protection Relay)	This policy appeared to be relevant in projects FF731A, 103131, BBE500 and EEPB04, but there was no written evidence in the information submitted for either of these projects, of the policy being considered.
E&P-38 (Replacement of Protection Relays)	Again, this policy appeared to be relevant in projects FF731A and EEPB04, but there was no written evidence in the information submitted for either of these projects, of the policy being considered.
E&P-40 (Hook Switches)	This policy directly quoted in project 106358, but also seems to be relevant to project 130232, although there is no mention of it in writing, in the information submitted for this latter project.
E&P-41 (GRP Insulators)	This policy appears to be relevant to project 106358, but there is no mention of it being considered in the evidence submitted.
E&P-42 (Conductor Rail Material)	Again, this policy appears to be relevant to project 106358, but there is no mention of it being considered in the evidence submitted.
E&P-47 (SCADA Remote Terminal Units)	This policy appeared to be relevant to project EEPB04, but there was no evidence in writing of the policy being considered.
E&P-49 (RTU Replacement)	This policy appears to be applicable to projects 103131, BBE500 and EEPB04. However, no evidence in writing could be found in the information submitted for Audit.
E&P-50 (SCADA Architecture)	This policy appears to be applicable to project EEPB04. But again, no evidence in writing could be found in the information submitted for Audit.

Table 9-3: Commentary of the applicable E&P Policy Statements against the 13 Projects Audited.

9.3.3   In summary, there were only six of the 25 policy statements that were found to be relevant, which had been directly quoted in the submitted documentation. This leads to a recommendation, that in future, relevant E&P Policies should be directly quoted in Project documentation, to provide a more auditable record of what was considered at the conception stage.

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9.3.4   A meeting took place with the Route Asset Manager for Kent, on the 15th February 2013, at the Network Rail Waterloo General Offices in London.

9.3.5   Table 9-4 below, provides a summary of the discussion on the policy statements.

Relevant E&P Policy Statements	Comments
Renewals orientated statements*	The RAM advised that renewals did not have business cases as they were technically led replacements of existing equipment, where failures would affect the performance targets. In contrast, other projects, such as 'Faster and Safer Isolation' did have business cases, to demonstrate the financial advantages that could be gained by adopting a different approach and/or new technology.
Train Performance Delay Target (E&P)	Initially, at the start of CP4, failures causing delays over 500 minutes were monitored. This was subsequently amended during CP4 to monitoring delays over 300 minutes, and more recently, this has now been amended to delays over 10 minutes. The monitoring criterion has therefore been significantly tightened through CP4.
Key Performance Indicators	In response to a question about the defined outputs for E&P in the CP4 Asset Policy documentation, and how they related to the 65 Asset Policies. The RAM advised that the Key Performance Indicators (KPIs) relevant to E&P were listed in the 'Asset Stewardship Index', and were as follows: • OLE Condition • Conductor Rail Condition • DC Substations Condition • AC Switching Stations Condition It was interesting to note, that the first two items (above) were directly related to the wear (and hence usage) of the corresponding contact systems.
Section 4 (Grid Supply Points)	There were occasions where a very long term view had to be taken in regard to major HV infrastructure projects undertaken by the DNO/National Grid, and Network Rail had to express provisional requirements at an early stage, in order for these to be considered. An example of a new 275kV substation in the South London area was cited – where this would provide reinforcement options for traction power in a number of years' time.
E&P-1 and E&P-2	The RAM was asked in regard to Asset Policies E&P-1 (Maintenance Regimes and minimum whole life cost) and E&P-2 (Least whole life cost that will meet performance targets) and how these related to the E&P Asset Types. The RAM advised that he was confident that the least whole life costs had been thoroughly examined by Network Rail, but more could be done to communicate these conclusions in writing.

*E&P Policy Statements that are considered to be renewals orientated (46 of the 65 Policy Statements in total) are shown in the table in Appendix D

Table 9-4: Summary Review of Policy Statements in discussion with the RAM

9.3.6   In summary, the meeting with the RAM was positive and open, and provided a useful further insight into the issues which were raised. The meeting provided confidence that the Asset Policies were being considered in their proper context. However, it was felt that direct reference to the appropriate Policy numbers, in

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the project documentation, would still provide a more auditable record of what had been considered.

9.3.7   The five projects which were singled out for further scrutiny were then discussed with key project personnel.

9.3.8   The findings were then reviewed against each of the relevant policy statements to determine whether, in practice, these statements were being adhered to when schemes were being conceived, designed and then implemented.

9.3.9   A summary of the applicable policies, and the findings from the visits to each of the five projects, are set out in Table 9-5 below.

Policy Statement	Commentary
Section 16 'Major Plant Installation and Portfolio of Small Plant Installations'	Horley Pumps Renewal (Project 103459) is not applicable to any of the specific Asset Policies. However, it is relevant to Section 16 of the 2007 E&P Asset Management document, although this reference was not found in writing in the project documentation reviewed.

The project, in its outturn, did appear to comply with the requirements of the E&P Asset Management document in terms of the pumping installation itself. Although there were some related issues (such as apparent water ingress) and durability of some materials used (e.g. wooden boxed pipework) which could have been considered in more detail as part of the project.

The Navigation Lighting Renewal at Canon Street (Project 103079) also relates to Section 16 of the 2007 E&P Asset Management document, where Figure 116 states that assumed lifespans of Navigation Lighting should be 15 years after refurbishment, and 35 years after replacement.

Also there was no specific reference in the documentation for this project. However, it appeared that the new installation was entirely suitable for the 35 year lifespan requirement in practice. |
| E&P-30

E&P-31

E&P-40 | The DC Feeder Cable Renewal – Southwark Substation project, appeared to be relevant to Asset Policies E&P-30 (DC Cables), E&P-31 (DC Cable Routes) and E&P-40 (Hook Switches), but only the last policy appeared to have been directly considered in the project documentation initially supplied.

However, in practice, the project was found to have been very well managed in its implementation (particularly the multidisciplinary aspects), and it seemed to have entirely met the requirements of the Asset Policies listed, in practice. |
| None Applicable | The replacement OCAD (Open Circuit Arm Detector) project did not have any applicable Asset Policies, and there was no mention of such devices in the 2007 E&P Asset Management document. This is not surprising, as the OCAD system effectively forms part of a 'Transformer-Rectifier' which provides DC power to switchgear, and then to the third rails.

However, in practice, this was another well managed and documented project, which achieved its objective of releasing strategic spares to keep existing equipment in operation elsewhere, as well as providing a 'model' for conversion of similar installations in the future. |

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Policy Statement	Commentary
Section 4 'Grid Supply Points'	The Sole Asset Renewal project does not have any specific E&P Asset Policies that are applicable. However, Section 4 of the Policy document does provide some guidance on what is required. Unfortunately, there was no evidence of this policy requirement being referenced, in the submitted information.
	However, the subsequent discussion with the former DPE (Designated Project Engineer) revealed that the Croydon B project was driven by renewal of the entire Grid Take Off point, which happened to also provide two supplies to Network Rail, as well as electricity to a large part of the South Croydon area.
	The implementation of the project was further enhanced by the consequential works of replacing significant sections of Network Rail 33kV cable infrastructure, which involved multidisciplinary works and third party agreements. The project was well managed, successfully implemented, and had effective good quality record documentation.
	There is no doubt that the project ended up being in accordance with the limited information in the Asset Policy document.

Table 9-5: Review of applicable E&P Asset Policies against five projects visited.

9.3.10   In summary, all of the projects visited appeared to be in accordance with the 2007 E&P Asset Policy Document, but direct references to the applicable policies or section of the document, would have provided a much more effective audit trail.

9.4   Phase 2 Findings – Site Visits

9.4.1   Following the meeting with the RAM team consideration was given to undertaking a series of site visits to observe at first hand the planned works.

9.4.2   Table 9-6 provides a summary of the five sites visited (by project).

Location	Site Visit
103459 Pumps Renewal Stage Gate 1-8 – Horley.	This project was well implemented from a pumping installation point of view, and a number of problems had to be overcome during construction.
	The record documentation was well produced, and was of good quality.
	However, further consideration could have been given to other issues, such as the apparent water ingress, and the durability of wooden boxed pipework.
103079 Navigation Lighting Renewal Stage Gate 1-8.	This project generated significant challenges in agreeing a suitable solution with the Port of London Authority. However, a breakthrough was made by the project team after a meeting with the London Harbour Master, who suggested an existing installation on Westminster Bridge, could be used as a basis. The Network Rail personnel then sought details from Westminster Council, which then provided the basis for this project.
	Overall, the project was well documented, and the quality of the final installation was found to be very good.

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130232 DC Feeder Cable Renewal – Southwark Substation.	This was another project with its own challenges, notably a temporary repair that had been made to cables, following a fire, and a brick built 'riser' which had ended up being an informal rubbish chute. The work involved multiple engineering disciplines, which were well co-ordinated. Availability of a nearby railway arch premises was obtained, which greatly facilitated the works. The documentation of the project was found to be very good, and the quality and workmanship in the final installation was found to be of an excellent standard.
105336 Replacement of ABB OCAD Stage Gate 1 to 8.	This was an unusual project in that it was replacement of components in a system, which provides an essential monitoring role for DC Traction Power Supplies. The end solution was well engineered, and implemented by an above average contractor. The resulting modified O&M documentation (from the original installation) was found to be well integrated with the details of the new equipment. It was however, disappointing to find that the salvaged components (which were intended to be reused), were stored in a hap hazard manner in a workshop at Three Bridges, with no visible records of which components were actually reusable. Those spares that are found to be reusable will need to be crated up (with antistatic protection of any circuit boards), with an inventory of the contents in each crate. The crates then need to be stored in an orderly fashion, in a more secure location. A further copy of the inventory then needs to be made available to maintenance personnel, so that they are familiar with the reusable components that are available.
BBK930 Sole User Asset Renewal	Unfortunately, it was not possible to visit the Croydon B Grid Take Off point on the day of the visit, as there were no suitable personnel from UK Power Networks available at the time. A discussion took place with the former DPE instead at Network Rail's office in Croydon. The project was found to be very well documented, which enabled a useful assessment to be made in any case. The work had been well executed and the multi-disciplinary aspects of the project had been well co-ordinated.

Table 9-6: Commentary on Site Visits

9.4.3   All the personnel met during the visits (without exception) were fully co-operative, were open with their experiences and the challenges they had had during implementation of the various projects. Project and record documentation was well presented and produced throughout, which was welcome after reviewing the very variable quality of documentation originally submitted.

9.4.4   The site visits confirmed that the Asset Policies were being followed, although as previously stated, the documentation of which policies, (or parts of the Asset document) that had been considered, could be greatly improved.

9.5   Conclusions

9.5.1   A number of conclusions have emerged from the review of the policy application. These lie at both the strategic and project specific levels. Table 9-7 summarises these findings.

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Issue	Commentary
Strategic Level	
Application of the Policy	There are some direct references to specific Asset Policies in the submitted documentation for the Projects audited, but in the majority of cases, only a general reference was made to 'Asset Policies'. Direct reference to appropriate policies would provide a more auditable record of what was considered at the project conception stage.
Use Made of the Policy	Although specific policies or the selection criteria were not always quoted, it appeared that consideration has been taken of the appropriate policies during the project lifecycle. However, this could be more effectively recorded in the project documentation to provide a more auditable record (***Recommendation RG1***)
Relevance of the Policy	The policies all seemed to be relevant, the majority of them being age related. In some cases, the service life quoted by relevant Network Rail standards did not fully accord with the requirements of the Asset Policies. There were some areas where there are no relevant policies (e.g. Grid Supply Points, Rewiring of Substations), where perhaps, there should be some more specific requirements. However, it is appreciated that the number of policy statements needs to be kept reasonable.
Project Level	
Authority Submissions	The majority of Project Managers Remits were complete, signed off, and contained relevant details of authorities which were in place. Some projects were supplied with further re-authority requests, following changes in scope and/or timescales. However, the reasons for submission of unsigned and/or incomplete documentation need to be investigated.
Project Scope	The majority of the submitted projects were correctly scoped, and found to be appropriate for renewals works. However, one project (Continuous Transformer Monitoring) did not seem to have a clearly identified outcome and cost benefit.
Asset Condition	Poor Asset Condition is cited in a number of projects as the primary reason for the corresponding renewal works. However, details of the actual condition and likely failure scenario could be recorded in more detail. The Selection Criteria also needs to be more explicitly stated, together with the actual age of existing equipment, which should be available from the Asset Database and/or rating places on the equipment itself.
Whole Life Costings	Although the RAM stated that Whole Life Costings had been determined for all E&P Asset Types, there was little evidence of this in writing. Availability of this information in future, would facilitate a more effective audit of projects against policies.

Table 9-7: Summary of Conclusions

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9.5.2   There was a wide variance in the quality of documentation submitted for audit, with some being very obviously incomplete. This does not instil much confidence that such documents should be provided as part of audit evidence. We suggest that NR ensure that information submitted for Audit purposes has been completed, signed off by all parties, and is applicable to the Control Period under review (with an explanation, or further documentation, if it seems to relate to another Control Period). We also suggest that an internal investigation into how incomplete documentation was submitted for Audit would be useful.

9.5.3   The Age and Condition of equipment to be replaced should be more explicitly stated and considered in the context of both the renewal and specification aligned Asset Policies, which should be directly quoted in the Project Managers Remit, where applicable. (*Recommendation E1*)

9.5.4   The review of the thirteen projects revealed that only six of the E&P Asset Policies (identified in orange in Appendix D) had been quoted directly in the submitted information. There were a further 50 Policies which could be relevant, but they were not directly referenced (identified in green in the aforementioned table). The Authority Request form should be amended to include a section requiring robust and specific evidence of compliance with the discipline asset policies. (*Recommendation RG2)*

9.5.5   There are inconsistencies between service life stated in some Network Rail Standards, and the maximum service life quoted in some Asset Policies. We recommend that a review is undertaken and either the policies or the NR standards are amended to ensure that the requirements align. *(Recommendation E2)*

9.5.6   Where several projects cover replacement of the same type of equipment, we suggest that references to previous projects should be included in subsequent projects, to indicate more clearly how they relate to one another.

9.5.7   With reference to the KEN05 – Continuous Transformer Monitoring Product Trial, we recommend that trials of monitoring equipment should have clearly defined purposes, and details of the cost benefits that are intended to be gained, should be clearly identified. The suitability of existing equipment to be monitored during a trial, should be identified (including age and condition). *(Recommendation E3)*

9.5.8   We recommend that the context of the two General E&P Asset Management Policies (E&P-1 and E&P-2) in relation to each E&P Asset Type should be documented and should be referenced in Project Managers Remits, alongside directly quoting the relevant Asset Policies applicable to a project. *(Recommendation E4)*

9.5.9   The visits to the five selected projects provided much more information about how each was conceived, was then developed into a detailed design, and subsequently implemented. Three projects had been very well implemented and all the documentation reviewed for those was found to be of a high standard.

9.5.10   The replacement OCAD project had similarly been well documented and implemented, but was let down by poor storage of the spare parts gained, which could jeopardise their reuse in other installations.

9.5.11   The Horley Pumping installation appears to have been implemented effectively, but it appears that further consideration could have been given to where the

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excess surface water could have been originating from. Consideration perhaps, could also have been given to insulated pipework, contained in a more durable enclosure.

9.5.12   However, the issues noted above with the OCAD and Horley projects do not appear to constitute non-conformances to the relevant Asset Policies.

9.5.13   The meeting with the RAM for the Kent area was very open and productive, and the information gained allowed the context of the Asset Policies to be more clearly considered in this document.

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10 Asset Specific Findings – Telecoms

10.1 Phase 1 Findings

10.1.1 In developing our proposed methodology for Telecoms we have considered the following key references.

TE1	Network Rail, Telecoms Asset Policy, Sep 2009
TE2	2012/13 Signalling Workbank
TE3	Asset Condition Inspection Reports
TE4	Authority Requests
TE5	Dilapidation Reports
TE6	Manufacturer End Life Notices
TE7	Fault Logs
TE8	Proof of complaints of equipment Performance

Table 10-1:Key References

10.1.2 We met with the Telecoms HAM on 27th April 2012 and the following paragraphs are based on these discussions.

10.1.3 Telecoms sits outside the Route Team Structure; this is intended to enable a focus on service delivery rather than being asset focused, allowing an end to end view to be taken.

10.1.4 Telecoms is responsible for national asset systems – FTN (Fixed Telephone Network) and GSM-R (Global System for Mobile Communication - Railway (European Railway Wireless Standard). Telecoms still have RAMs who report to the HAM, and not the Route Managing Director.

10.1.5 The primary tools used by the Telecoms Asset Managers are the (Telecoms) DST (Decision Support Tool) which is an Excel spreadsheet which uses macros to apply policy to assets at a system level, and Ellipse, which is the main database for maintenance, which operates at individual asset level.

10.1.6 The Telecoms Policy was updated in September 2009 and this version is used in our assessment. The primary change was the extension of some asset expected lives, which were updated in DST. The Policy consists of 17 policy statements, which apply to three technology areas:

- Operational Communications;
- Communication Networks;
- Station Information and Surveillance Systems (SISS).

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These cover eight main systems which include for example bearer systems for electrification and signalling control and Driver Only Operation (DOO) CCTV.

10.1.7   Ellipse holds asset data, records of maintenance tasks and planned inspections based on standards. Faulting is managed through fault control. Minor works are small / semi-reactive tasks with a budget of less than £25k work limit. These are not captured in CP4 policy but are becoming more prominent in the plans for CP5.

10.1.8   Technology has a considerable influence on the telecoms asset management. As well as condition deteriorating over time, existing systems can become obsolete because, for example, spares are no longer available or the software becomes incompatible with current standards. NR's technology team works with suppliers to develop solutions which are then trialled, followed by product acceptance at which point the system or product starts to be fed into other projects. The new technology then gets planned in by engineers as part of renewal and enhancement projects.

10.1.9   The Telecoms Asset Management process operates in a similar way to signalling in that assets are given an expected life when new. At the midlife point, the AM team starts asset condition assessment, and uses the condition report to reforecast renewals dates. Assets are scored by condition, performance, reliability, maintenance parameters. Projects are also packaged together.

10.1.10 The Business Plan contains all packages of work and is maintained by central Business Planner. The Plan has a ten year time horizon. Telecoms projects frequently form parts of other projects, primarily signalling, but also track and stations projects, and the telecoms programmes need to be meshed with these other functions.

10.1.11 The Business Plan contains a continuous programme of projects typically of 18-24 months duration, which is shorter than signalling projects. Current projects will complete within CP4 window. The Telecoms team is trialling some CP5 policies already, which demonstrates that Policy is not static. Telecoms assets do not always map to route critically.

10.2   Phase 2 Approach

10.2.1   Table 10-2 provides a summary of the 20 schemes which were reviewed. Those SEA projects which are highlighted are those subject to the in-depth review.

Scheme	Estimate	Scheme	Estimate
SEA		**Other**	
Woking Concentrator Renewals	£566k	LNE Concentrator Renewals 2012/13	£1.917M
Victoria Signalling Centre	£2.103M	LNE Telecoms CCTV Transmission 2012/13	£1.998M
Cable Route Quarry Line	£851k	LNW Blackburn Station SISS Renewals	£1.672M

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Scheme	Estimate	Scheme	Estimate
SEA Level Crossing Telephones Renewals	£67k	LNW Midlands Area PA Systems Renewals	£1.179M
Waterloo PA/VA	£2.87M	LNW Liverpool Lime Street PA/VA	£1.116M
SEA Cable Route Works 12/13		LNW Merseyrail Overground CCTV and Guards Renewal	£1.672M
SEA Resilience Works		LNW Manchester Piccadilly CCTV Cameras	£1M
		NAT IVRS Handset Replacement 2012/13	
		SCO Dunfermline LLPA (53 Stations)	£3.22M
		SCO Scotland PA Renewals	£727k
		WES Telecoms SISS Renewal: FGW (Phase 3)	£5.788M
		WES Western Route Voice Recorder Renewals	£189k
		Plymouth DU – Targeted Cable Route Renewals	£419k

Table 10-2: Summary of Sample Telecoms Projects

10.2.2   This was followed up with a detailed meeting with the SEA National Telecoms Asset and Performance Manager and the Senior Renewals Engineer. The meeting discussed the five selected business cases for projects being implemented in the SEA route. The findings from this meeting are described in section 10.4.

10.2.3   In each case relevant documentation for the project was reviewed and links drawn to the selected policy statements. These statements are listed in Table 10-3 below.

10.2.4   In effect, evidence was sought that the individual projects were compliant with the policy statements where relevant.

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Policy Number	Policy Statement
1	Telecommunications Assets shall be managed to deliver the required performance, functionality and capability to meet the defined outputs at the lowest whole life cost.
2	Technical Strategies for each technology group shall be implemented that: • Define asset vision; • Determine the process to capture user requirements; • Define the overall performance, functionality and capability required of telecommunications assets; • Define product strategy; • Define nominal equipment lifecycles; • Define nominal maintenance intervention cycles.
3	Route telecommunications requirements shall be determined using Route Requirements Plans and shall specify the required performance, functionality and capability of telecommunications assets particular to the Route. For across Route assets, such as GSM-R and FTN, network requirement plans may be necessary.
4	Maintenance intervention shall be undertaken on Telecommunications Assets only when: • The risk of a reduction in performance has become unacceptable; • The required functionality and capability cannot be assured.
5	Telecommunications Assets shall be renewed when: • Maintenance intervention is not able to sustain the required asset condition, performance and capability; • The risk of non-repairable failure has become unacceptable; • The equipment is obsolete, spares availability is restricted or not available and manufacturers support, where vital, is discontinued; • Continued maintenance (including support costs) would cost more than replacement.
6	Cross industry standard commercial off-the-shelf products shall be used where possible.
7	The bearer network and associated system performance shall be pro-actively monitored using centralised network control, to enable maintenance and faulting response to meet the Train Service Performance and Network Availability requirements. Where not integral, telecommunications systems shall be capable of connection to remote condition monitoring equipment through industry accepted protocols.
8	The bearer network shall be designed to be cost effective and provide the resilience and availability appropriate for business needs, taking account of changes to the future capacity requirements of each route where these have been agreed. The proximity of transmission nodes and client system requirements shall be taken into account when specifying cable capacity and capability.

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Policy Number	Policy Statement
9	Cable routes shall be appropriate to the security requirements of the Route, be constructed of lowest whole life cost materials and shall consider current and future capacity requirements.
10	Radio system coverage, capacity and performance shall be sufficient to meet the defined KPIs.
11	Secure communications for drivers and signallers shall be provided by the national GSM-R radio system, which is replacing existing legacy radio systems.
12	The NRN/ORN, CSR and RETB networks shall be life-extended to maintain network availability until they are replaced by the national GSM-R network.
13	Prior to full GSM-R deployment, emergency communications systems shall be provided where determined by risk assessment as being necessary to complement axle counter schemes.
14	Operational lineside communications systems shall be rationalised where GSM-R or other suitable systems are available subject to risk assessment.
15	Rail Industry stakeholders shall be engaged to redefine and re-engineer level crossing public voice communication presentation and functionality.
16	Station Information & Surveillance Systems (SISS) shall: • Where capacity is available, use the Network Rail Fixed Telecoms Network (FTN) for station to station and station to control system/centre links; • Use IP as the primary means of interface connectivity; • Use open protocol systems to allow common interface with other systems; • Operate over common infrastructure cabling at stations - wireless connectivity shall be utilised where appropriate and practical; • Derive source data from Network Rail systems to maintain accuracy and consistency.
17	At stations where the Station Facility Owner (SFO) is not Network Rail: • There shall be clear demarcation of asset ownership - drawings and equipment shall be labelled accordingly; • Network design shall allow use of Train Operating Company (TOC) Wide Area Networks (WAN) as well as Network Rail FTN (where capacity is available).

Table 10-3: Telecoms Policy Statements

10.2.5   Due to the nature of the schemes relating to the SEA route being renewals based on life expired equipment, it was felt , based on the evidence we had already reviewed, that site visits to view the schemes would not add any value to the review.

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10.3   Phase 2 Findings – Desk Based

10.3.1   The following five projects were investigated in further detail through conversations with the SEA National Telecoms Asset and Performance Manager and the Senior Renewals Engineer.

- Woking Concentrator renewal
- Victoria signalling centre
- Cable route quarry line
- SEA level crossing telephone renewals
- Waterloo PA/VA

10.3.2   Of the five schemes reviewed, four (Woking concentrator renewal, Victoria signalling centre, SEA level crossing telephone renewals and Waterloo PA/VA) were driven by the need to replace equipment which had reached the end of its service life. The improvement works to the fifth scheme (Cable route quarry line) were required to make good an existing asset as part of ongoing maintenance.

10.3.3   The five projects singled out for particular scrutiny were reviewed against each of the policy statements to determine whether, in practice, these statements were being adhered to when schemes were being identified and put forward for investment funding.

10.3.4   A summary of the key points of evidence provided regarding the adherence to key policy statements is provided in Table 10-4.

Policy Number	Commentary
1	Our conversation with the asset engineers did not seek evidence against this policy statement. However, it should be noted that telecoms renewals are based on approved NR equipment and there is therefore little opportunity for the route to select alternative products which may (or may not) offer improved performance, functionality or an improved whole life cost.
2	The selection of technology solutions and equipment type is governed by NR standards and the approved product database. However where the Route feels that the current catalogue of approved products is not providing the appropriate level of performance, a project may take on the risk of selecting a new product / manufacturer and sponsor the product approvals process. One notable example is the selection of the Northgate MX One concentrator in place of the Siemens HiPath. Although the Siemens HiPath would have been the obvious choice, it was discounted due to performance issues encountered at the Slough installation. It can be argued that this demonstrates the Route's willingness to define its own asset vision and product strategy in order to deliver the required performance and functionality, thus meeting with the requirements of this policy statement.
3	We did not seek evidence of compliance with the Route Requirements Plan. It should be noted that in most instances, the telecoms renewals were driven by end of service life, product obsolescence and limited manufacturer support.
4	There was evidence of compliance with this policy statement in most of the business cases reviewed.

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Policy Number	Commentary
	The route did present extracts from the DST to support the decision to carry out a renewals project. One notable examples from the five schemes discussed in detail are summarised below: **Waterloo PAVA System** Estimated to have been installed in the early 90's, the legacy station PA system was not compliant with current NR standards and was therefore not delivering the required performance levels. The system was life expired and the poor performance was attracting numerous complaints from the train operating companies and passengers. This lead to a decision to replace the system, which was supported by an acoustic performance report produced by the consultants, Arup, in 2005.
5	There was evidence of compliance with this policy statement in most of the business cases reviewed. The route did present extracts from the DST to support the decision to carry out a renewals project. One notable examples from the five schemes discussed in detail are summarised below: **Woking Concentrator Renewal** Installed in 1996, the KDX 300 was manufactured by Kestrel Telecoms, a small company specialising in railway products. Siemens bought the rights to the KDX in 2001 but returned it to Kestrel in 2006. This however left Kestrel without the ability to manufacture any more spare parts. Instead, they have focussed on providing maintenance support. This left the Route with Limited support and an issue with the limited number of working spares. NR therefore chose to replace the KDX 300 with a STS (Space Technology Systems) Concentrator solution. STS make the unit specifically for the railway and NR is happy with performance and support is good. The recovered Kestrel parts will be taken into the existing spares holding and used to extend the service life of the remaining Kestrel installations until they are replaced under the NOS strategy. This will lead to reduced maintenance cost for the remaining Kestrel installations.
6	There are instances where cross industry products are used (e.g. CCTV cameras, PA loudspeakers) however there is equipment which is manufactured specifically for the railway sector (e.g. concentrators) although we are now seeing the emergence new suppliers (e.g. Northgate) who are configuring their standard off the shelf products for use on NR infrastructure.
16	The ability of a particular SISS renewals project to comply with this policy statement is dependent on the scale of the SISS renewal. For example, for common cabling to be considered for all SISS assets, whole sale renewal / upgrade of the station systems would be required. All of the SISS related schemes reviewed consisted of the renewal of a single SISS asset type, e.g., Waterloo PA/VA and Liverpool Street PA/VA. This would not have made a common cable infrastructure more viable.

Table 10-4: Summary of In-Depth Review Meeting Findings

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10.3.5   We were provided with evidence to demonstrate that the works were being carried out, or had been completed as per the scope of works described in the Authority Requests. The evidence provided included sample images taken during and after the works (e.g. Quarry Line cable route, Victoria Signalling Centre). The route also provided us with a letter from the Contractor proving that the renewed Waterloo PA/VA system was performing at the required Sound Pressure Level (SPL).

10.3.6   Following the review meeting, evidence was provided to further support the Route's decision to renew the equipment described in the five schemes:

- Decision Support Tool (DST) extracts for the Woking Concentrator Renewal and Victoria Signalling Centre;

- Sample images were provided showing the condition of the Quarry Line cable route which demonstrated the need for renewals;

- Waterloo PA/VA Sound Pressure Level (SPL) measurement confirmation letter which demonstrated the correct performance of the replacement system.

10.3.7   Ellipse is not used to provide maintenance data as it is not considered reliable enough and not as well populated as it might be. Work is going on to align the DST and Ellipse.

10.3.8   During the discussion it was stated that the primary tool used to aid the decision to renew or replace an asset is the DST. All Operational Telecoms assets are captured in the DST. SISS assets however were not put into DST until recently (2 years ago). Specific asset dilapidation surveys are generally not carried out.

10.3.9   In order to choose replacement products, projects are currently guided by the NR New Technology team who select products and sponsor new products through Product Approval.

10.3.10   Where projects identify a catalogue weakness, they take on the risk of Product Approval. This generally works for small items but becomes considerably more risky and difficult for bigger items such as concentrators. As NR is not a big player in telecoms market (given the size of the work bank), enterprise switch providers (who manufacturer COTS products) do not see the business benefit in developing products specifically for the rail market (as STS and Kestrel have done in the past).

10.3.11   In the past, NR have tended to stick with the smaller, bespoke manufacturers and suppliers as they find it difficult to keep up with fast changing markets, and the impact this has on operating systems and physical requirements. However, they have now recognised the importance of manufacturers guaranteeing long term support for products and have started to factor this into their choice of product. This can be seen from the recent selection of Northgate for the Victoria Signalling Centre concentrator renewal.

10.3.12   The SEA route recognises that the National Operating Strategy (NOS) will be a new way of managing, controlling and operating rail services on the network, which in turn may not justify the decision to replace an asset which in the long term will be phased out. In this scenario, a life expired asset may be kept in service until it is no longer required. Alternatively, selective renewals is performed, so that the spares holding of a life expired asset can be enhanced through strategic recoveries.

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10.4 Conclusions

10.4.1 A number of conclusions have emerged from the review of the policy application which lie at both the strategic and project specific levels. Table 10-5 summarises these findings.

Issue	Commentary
Strategic Level	
Application of the Policy	It is noticeable that the authority request documentation does not specifically mandate the author to demonstrate compliance with the policy requirements in the submission. Whilst the inference can be drawn in some cases that there is compliance it is not always explicitly stated.
Use Made of the Policy	Given the above there was little evidence of direct use made of the policy. Nevertheless other than the requirements driven by other imperatives – like equipment approaching end of service life, obsolescence, unavailability of manufacturer support – there is little direct use made of the policy.
Relevance of the Policy	The majority of policy statements are more relevant at a strategic level rather than to specific route level projects. The exceptions are policy statements which influence the design of a system or define when renewals or maintenance intervention should occur. Although the policy covers all operational telecoms and SISS assets, the 20 schemes reviewed predominantly covered the following assets: - SISS (CCTV and PA/VA) Renewals - Level Crossing Telephones Renewals - Concentrator Renewals - Cable Route repairs This left much of the remaining policy statements covering Radio and Bearer Network (e.g. FTN) with little or no relevance to the schemes.
Project Level	
Authority Submissions	From the review of the individual project documentation there would appear to be little requirement to demonstrate compliance with the policy in seeking funding. These documents contain a lot of detail regarding the financial justification for the scheme without overtly demonstrating compliance with the Policy.

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Issue	Commentary
Project Scope	The telecoms schemes reviewed were necessary for the routes to deliver the required performance to support operational need.
Asset Condition	There is evidence that the DST is used to inform the decision to replace / renew operational telecoms assets. There is however less evidence to support the decision to renew SISS assets, although the renewal schemes reviewed were triggered by end of service life or equipment obsolescence.

Table 10-5: Summary of Conclusions

10.4.2 In addition to the above findings our general recommendations (*RG1-RG5*) are applicable to Telecoms.

10.4.3 We are satisfied that the SEA route applies telecoms policy (where applicable) to its telecoms work bank. However, there is no clear audit trail which evidences this.

10.4.4 It should however be noted that the majority of telecoms renewals are driven by the need to replace life expired equipment which is difficult or costly to maintain due to shortage of spares and limited manufacturer support.

10.4.5 Where possible (e.g. Woking Concentrator Renewal), the Route has used recovered equipment to increase the existing spares holding, thus extending the asset life and possibly reducing ongoing maintenance.

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11   Summary of Recommendations

11.1.1   The review has highlighted a number of key areas where improvements in the overall process could be made, these are summarised in the Table 11-1 below.

Recommendation Number	Problem	Recommendation
RG1	We have found little evidence of the Route teams actively considering policy during the Problem Statement stage.	We recommend that compliance with Policy shall be explicitly demonstrated at the Problem Statement stage.
RG2	Policy relevance is not recorded within Authority Request documentation.	The Authority Request form should be amended to include a section requiring robust and specific evidence of compliance with the discipline asset policies.
RG3	No standardised tools are available to allow Routes to calculate the whole life costs of various intervention options	NR should be supplied with a suitable set of tool kit which complements the policies and that is ready for use in CP5
RG4	Asset condition could deteriorate during the time between the original scope being drawn up and works beginning on site meaning that scope and cost of works could increase.	NR should develop methods by which the intervals between finding defects and implementing interventions can be reduced to avoid the possibility that more intrusive refurbishment/renewal is required
RG5	Awareness of Policy	It is recommended that RAMs are required to ensure that all of their team members involved with workbank development are fully briefed on Asset Policy and its wider context.
SI1	There is a large variance in the quality of justification documentation supplied with some being very obviously of an uncontrolled nature	A review of documentation should be undertaken and industry best practice be identified to allow the creation of new documentation templates which should then be adopted across all Routes

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E1	Poor Asset Condition is cited in a number of projects as the primary reason for the corresponding renewal works. However, details of the actual condition and likely failure scenario are limited..	The Age and Condition of equipment to be replaced should be more explicitly stated, and considered in the context of appropriate Asset Policies, which should be directly quoted in the Project Managers Remit, where applicable
E3	There are inconsistencies between service life stated in some Network Rail Standards, and the maximum service life quoted in some Asset Policies.	We recommend that a review is undertaken and either the policies or the NR standards are amended to ensure that the requirements align
E4	With reference to the KEN05 – Continuous Transformer Monitoring Product Trial, the project did not appear to have a measurable conclusion, and there were no details of the perceived benefits, either operational or financial.	We recommend that trials of monitoring equipment should have clearly defined purposes, and details of the cost benefits that are intended to be gained, should be clearly identified. The suitability of existing equipment to be monitored during a trial, should be identified (including age and condition)
E5	Discussions with the RAM found that, although there was confidence that the whole life costs had been thoroughly examined by Network Rail, more could be done to communicate these conclusions in writing.	We recommend that the context of the two General E&P Asset Management Policies (E&P-1 and E&P-2) in relation to each E&P Asset Type should be documented and should be referenced in Project Managers Remits, alongside directly quoting the relevant Asset Policies applicable to a project

Table 11-1: Summary of Recommendations

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Appendix A

Mandate

A1   Mandate AO/026

Mandate for Independent Report – Asset Management

Audit Title:	Application of CP4 asset policies
Mandate Ref:	TBC
Document version:	Draft C
Date:	2 December 2011
Draft prepared by:	Matt Wikeley
Remit prepared by:	
Network Rail reviewer:	Andrew Newby

Authorisation to proceed

ORR		
Network Rail		

Purpose

This mandate sets out the scope of work for the Part A independent reporter (Arup) to review the application of Network Rail's revised CP4 asset policies in its asset planning and implementation. The review will assess if there is a clear auditable trail from the policy to workbank to work completed on the ground.

Background

Network Rail issued revised asset policies in March 2010, in support of its Control Period 4 (CP4) Delivery Plan update 2010. ORR reviewed these asset policies, concluding that all asset policies passed a robustness test and all but Civil Structure passed a test of sustainability. It is expected that, two years after being issued, these revised CP4 asset policies will be part of business-as-usual for the company's planning of maintenance and renewals.

The independent reporter is to be used to review if maintenance and renewal work, planned and implemented, is consistent with the CP4 revised asset policies. This review will be part of ORR's programme to monitor if Network Rail is taking a sustainable approach to delivering its plans in CP4. The findings of this review will also be used to inform ORR's annual assessment of Network Rail's efficiency in 2012.

Scope

The independent reporter will review documentation, information and processes to understand and assess the robustness of the link from the CP4 asset policies to:

- the CP4 Delivery Plan updates 2010 & 2011;
- CP4 route asset management plans and associated workbanks;
- work completion certificates; and
- updated asset registers.

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The key objective is to review the robustness of the audit trail and to demonstrate the clarity of the linkage from the asset policy to planned work. If the plans have been changed, for example in the light of new information, it is expected that there will be clear documentation explaining the robust process to agree this change.

Performing the review to the standard required will require team members to have a good working knowledge of asset planning, project sponsorship and management and implementation standards.

The CP4 asset policies were first published on Network Rail's website in support of the PR08 Strategic Business Plan. Network Rail revised the asset policies for several asset groups in 2010. The application of the following versions of CP4 asset policies is to be reviewed in the scope of this review:

Asset Group	Asset policy to be considered in review
Track	Published 1 November 2007 (PR08 SBP) – excl. part 4 Published 31 March 2010 (Delivery Plan Update 2010) – updated part 4
Signalling	Published 1 November 2007 (PR08 SBP)
Civils*	Published 31 March 2010 (Delivery Plan Update 2010)
Operational property	Published 31 March 2010 (Delivery Plan Update 2010)
Telecoms	Published 31 March 2010 (Delivery Plan Update 2010)
Electrification and Plant**	Published 1 November 2007 (PR08 SBP)

* Note 1: although ORR concluded Network Rail's Civils asset policy did not pass their test of sustainability, it is included in the scope of this audit. This is to ensure there is a line-of-sight from policy to workplan. There has been substantial review and improvement planning in relation to Network Rail's management of civil structure s since the above policy was published in March 2010. The independent reporter should take this into consideration when completing the review.

** Note 2: Network Rail states it updated the CP4 electrification and plant policy, however this has not been submitted to ORR or published on Network Rail's website.

- Asset policies published on 1 November 2007 can be found at the following link: http://www.networkrail.co.uk/aspx/4355.aspx
- Revised asset policies published on 31 March 2010 can be found at the following link: http://www.networkrail.co.uk/aspx/6648.aspx

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Objective: the objective of the project is to assess the robustness of the audit trail from CP4 asset policies to planned and completed maintenance and renewals. Any shortcomings in the process should be highlighted in the final report with related recommendations to resolve these issues. This is in part to inform ORR's assessment of Network Rail's delivery of its asset policies and as an input to ORR's assessment of Network Rail's efficiency.

Interfaces: this review should take into account and not duplicate work completed, including: work carried out for the annual reviews of regulatory accounts and unit costs, AMCL's 2011 AMEM capability assessment, the current review of Network Rail policies to support IIP and the review of Network Rail's management of civil structures. The systems and methodology reviewed as part of these audits may also be used to demonstrate the link from policy to workbank.

Methodology

The reporter will deliver the scope of work described above in two stages:

1. Scoping phase: an initial review of documentation and meetings with key Network Rail and ORR staff to gain an understanding of the process and produce an interim report. This interim scoping report should propose a methodology for conducting the review, including the level of sampling to be employed. The interim scoping report will be reviewed and agreed by ORR and NR before proceeding.

2. The detailed review: The reporter will carry out the review and produce its draft and final reports based on the agreed detailed scoping report.

Deliverables

The first deliverable of this project is an interim scoping report. This should recommend the detailed scope of the review stage of the project to be agreed by ORR and NR before proceeding.

The main deliverable, at the end of the project, will be a report that:

- describes the methodology adopted and analysis carried out;
- reviews the link from the asset policy to work delivered;
- provides an overview of how this process is managed in Network Rail by each of the asset teams;
- highlights any areas where asset policy has not been delivered in Network Rail's plans and if there is an auditable trail of the reasons for these changes;
- identifies any shortcomings in the process; and
- recommends actions to resolve any issues identified.

Governance process for issuing Independent Reporter reports is included in Appendix A.

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Timescales

Indicative dates:

• Initiate scoping phase	1 February 2012
• Arup issues interim scoping report	17 February 2012
• Detailed scope agreed by all parties by	24 February 2012
• Initiate detailed review	27 February 2012
• Draft A report issued	11 May 2012
• Final report issued	25 May 2012

The governance process for issuing Independent Reporter reports is outlined in appendix B.

Independent Reporter remit proposal

The Independent Reporter shall prepare a proposal for review and approval by the ORR and Network Rail on the basis of this mandate. The approved remit will form part of the mandate and shall be attached to this document.

The proposal will detail methodology, tasks, programme, deliverables, resources and costs.

Appendix B
Governance process for issuing Independent Reporter reports

Revision	Purpose	Outcome
Draft	Review for factual correctness and comments	First drafts of the report should be issued to ORR and Network Rail, who have fourteen days to review the contents before a tri-partite session is arranged at which feedback is provided to the reporter. Network Rail may choose to provide Director level input at this stage.
Final draft	Review	The Reporter will issue a final draft report to both ORR and NR within five working days of the tri-partite meeting All three parties agree contents and recommendations as far as possible via correspondence or meetings as appropriate. Further comments shall be provided within five working days.
Final report		The Reporter will issue its final report to both the ORR and NR. If agreement over its contents has not been reached the report will contain the Reporter's independent assessment together with opinions from ORR and NR to document their positions ORR will publish the report on their website It is anticipated that the issue of the final report (i.e. version 1) would take no longer than 1 working week after receiving the final report.

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Appendix B

Documents and Meetings

B1   Documents Supplied

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B2   Meetings and Workshops

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Appendix C

Figures & Diagrams

Appendix D

Asset Policies

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Appendix E

Key Policies

Appendix F

Scheme Review Spreadsheets

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