

Office of Rail Regulation and  
Network Rail

**Part A Reporter Mandate AO/017:  
Initial Industry Plan (IIP) 2011  
Review**

**Summary Report - Observations and  
Conclusions**

209830-17

Issue 1 | 16 December 2011

**Ove Arup & Partners Ltd**  
13 Fitzroy Street  
London  
W1T 4BQ  
United Kingdom  
[www.arup.com](http://www.arup.com)

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

It is not intended for and should not be relied  
upon by any third party and no responsibility is  
undertaken to any third party.

Job number 209830-17

**ARUP**

Doc # 437702.01



# Document Verification

<b>Job title</b>		Part A Reporter Mandate AO/017: Initial Industry Plan (IIP) 2011 Review		<b>Job number</b>		209830-17	
<b>Document title</b>		Summary Report - Observations and Conclusions		<b>File reference</b>			
<b>Document ref</b>		209830-17					
<b>Revision</b>	<b>Date</b>	<b>Filename</b>					
Draft A	25/11/11	<b>Description</b>	Issue for review by ORR / NR for factual correctness and comments				
			Prepared by	Checked by	Approved by		
		Name	Mark Rudrum / Alastair Jackson / Richard Spoor / Hugh Fenwick	Alastair Jackson / Mark Rudrum	Stefan Sanders		
		Signature					
Issue 1	16 Dec 2011	<b>Filename</b>	2011-12-16 IIP Review Report Final_Issue1.docx				
		<b>Description</b>	In place of this text, record a summary of revisions since the last				
			Prepared by	Checked by	Approved by		
		Name	Mark Rudrum / Alastair Jackson / Richard Spoor / Hugh Fenwick	Alastair Jackson / Mark Rudrum	Stefan Sanders		
		Signature					
		<b>Filename</b>					
		<b>Description</b>					
			Prepared by	Checked by	Approved by		
		Name					
		Signature					
		<b>Filename</b>					
		<b>Description</b>					
			Prepared by	Checked by	Approved by		
		Name					
		Signature					

**Issue Document Verification with Document**





# Contents

---

	Page
<b>Glossary</b>	<b>i</b>
<b>1 Executive Summary</b>	<b>1</b>



## Glossary

---

AMCL	Asset Management Consulting Limited
AMEM	AMCL Asset Management Excellence Model <sup>TM</sup>
BCMI	Bridge Condition Marking Index (previously SCMI: Structure Condition Marking Index).
CARRS	Civil Asset Register and electronic Reporting System.
CECASE	Civil Engineering Cost And Strategy Evaluation
CEFA	Civil Examination Framework Agreement
CP4	Control Period 4
DfT	Department for Transport
DST	Decision Support Tool
HLOS	High level Output Specification
FMECA	Failure mode, effects and criticality analysis (FMECA)
IIP	Initial Industry Plan 2011
ISBP	Interim Strategic Business Plan
NR	Network Rail
OPAS	Operational Property Asset System
ORR	Office of Rail Regulation
POG	Planning Oversight Group ( a Group which involves representatives of Network Rail, passenger and freight train operators and suppliers)
RSHI	Rock Slope Hazard Index
RA	Route Availability
RSSB	Railway Safety and Standards Board
RUS	Route Utilisation Strategies
SBP	Strategic Business Plan
SCMI	Structures Construction Marking Index
SRM	Safety Risk Model
SSHI	Soil Slope Hazard Index
SSME	Senior Structure Maintenance Engineer
TCMI	Tunnel Condition Marking Index
TSR	Temporary Speed Restriction





# 1 Executive Summary

---

## General

**1.1.1** This report presents the findings from the progressive assurance review undertaken in response to Independent Reporter Mandate AO/017 'Initial Industry Plan 2011 Review'. The review has been undertaken between June and November 2011 by Arup in our role as Part A Independent Reporter.

**1.1.2** This report is our Final Summary Report. It has been prepared following comments from both Network Rail (NR) and the Office of Rail Regulation (ORR) on our Draft A Summary Report dated 25th November 2011.

## Purpose

**1.1.3** The purpose of Mandate AO/017 was to support ORR in assessing the degree to which the NR Asset Policies and associated material underpinning Initial Industry Plans (IIP) give confidence that robust and sustainable output will be delivered by NR. Specifically review of NR IIP submissions was required to support ORR in:

- Assessing the robustness of NR's contribution to the IIP for the purpose of providing Advice to Ministers in February 2012;
- Gaining assurance that sufficient progress is being made in the development of NR's Strategic Business Plan (SBP);
- Confirming that NR will comply with the Network Licence particularly Section 1 relating to Network Management.

## Scope

**1.1.4** The agreed scope was for the Part A Reporter (Arup) to review the Asset Policies for the following asset groups:

- Track (Plain Line and Switches & Crossings)
- Structures (Bridges, Tunnels, Retaining Walls, Rivers, Coastal and Estuarine)
- Earthworks
- Drainage
- Buildings
- Fleet

For these asset groups, Arup was also asked under this Mandate, to review the model principles embedded in the 'top-down' (Tier 1) models that NR has used to derive volume and cost predictions for CP5 to CP11.

In support of lifecycle planning and policy selection, NR are developing a series of Whole Life Cycle Cost (WLCC, Tier 2) models and Mandate A0/017 included for Arup to review both the model principles and input data for the above asset groups plus Signalling and

Telecoms assets. At the time of writing (November 2011) these models are still being validated by NR and have not been made available to us. Accordingly we have not been able to undertake our review.

**1.1.5** In parallel, the Part B Reporter (AMCL) were asked to review the following other asset groups:

- Level Crossings
- Signalling
- Electrical Power and Fixed Plant
- Telecoms

**1.1.6** Specifically both Independent Reporters have been asked to consider the extent to which the NR policies are Robust and Sustainable as defined in ORR letter dated 1 June 2010<sup>1</sup> where ‘Robust’ and ‘Sustainable’ are defined as :

***Robustness:** Is it reasonable to believe that the policy can deliver the required CP4 outputs, for England & Wales and for Scotland? Note that as Network Rail is committed to deliver the outputs, this test is relatively weak; a policy will pass the test unless there are strong grounds to believe that it would not deliver the outputs.*

***Sustainability:** If demand on the network were to remain steady, would application of the same policy continue to deliver the outputs specified for the final year of CP4 indefinitely? This is a stronger test to ensure that, in managing within CP4 finding, Network Rail is making genuine efficiencies and is not deferring essential work at the cost of inefficiently higher expenditure in later control periods.*

**1.1.7** In their Policy Review Note (See Appendix D), ORR further clarified that our work should include consideration of efficiency, as follows: ‘it is implicit in the Licence that the outputs to be delivered should be clearly defined and delivered in the most effective way at lowest whole life cost and whole system cost taking into account efficiency improvements with time.’

**1.1.8** In addition, we were asked to consider qualitatively the following four topics:

- i. Fitness for purpose of supporting data
- ii. Translation into delivery on ground on routes
- iii. Means by which efficiency improvements are being achieved
- iv. Adequacy of modelling tools

---

<sup>1</sup> <http://www.rail-reg.gov.uk/upload/pdf/asset-policies-conclusions-010610.pdf>

## Approach

- 1.1.9** A phased approach to the Mandate has been adopted to reflect that fact that Network Rail (NR) have been developing their input to the IIP submission during our review period. We have provided several interim presentations to Office of Rail Regulation (ORR) over the five month review period and attended over twenty formal ‘Policy Challenge Workshops’ with NR where our emerging findings were discussed.

## Overall Findings

- 1.1.10** NR have made significant progress with developing their Asset Policies since the last review in early 2010. It is of particular note that they have produced additional specific policies for the management of Drainage and Earthworks, and that all the policy documents follow a standardised ‘10 Step’ format as set out in their Asset Management Strategy dated Feb 2011.
- 1.1.11** Overall a coherent picture of is emerging as to how NR intend that ‘top-down’ decisions will be used in practice to influence local asset maintenance and renewal choices. This is clearly work in progress, and as yet not fully defined but the direction looks promising.
- 1.1.12** Our review has identified following general findings that apply to a greater or lesser extent across all the asset groups that we have reviewed.

## ‘Line of Sight’

- 1.1.12.1** We have had difficulty for many of the assets in identifying a clear relationship from NR Business Objectives (performance, demand, capacity etc) through Asset Policy down to specific asset outputs that can be reflected in the Route Management Plans. This is an area for development.

## System-wide Approach

- 1.1.12.2** As noted above, we find it very positive that NR is developing a Drainage Asset Policy and has accepted that Track Support options need to be considered as part of a more system-wide, cross asset approach. We believe that significant overall maintenance and renewal savings can be achieved by better considering these aspects. This is an area for development by NR.

## Lifecycle Option Selection and Strategies

- 1.1.12.3** In our view the Asset Policies should consider and present a series of clear alternative lifecycle strategies that can be selected to suit different asset objectives / priorities. Typical strategies may include a ‘Do Minimum’ strategy, a ‘Pro-active’ or ‘Preventative’ Strategy, and other appropriate Targeted Strategies with interventions aimed towards aspects such as Minimising network disruption or delivering a particular condition or risk score. It is recommended that a uniform set of strategies is developed and used across assets by NR.

## Policies and Tier 2 WLCC Models

- 1.1.12.4** We would expect to see a clear linkage between lifecycle calculations and the Lifecycle Options presented in the Asset Policies. It is extremely positive that NR is developing tools for explicit lifecycle modelling for its top 30 assets ( Tier 2 WLCC Models).
- 1.1.12.5** We note that many of the Tier 2 Models are still being validated, and so the direct linkage to Asset Policies is generally weak at the moment. This is an area for development by NR.

## Optimum Policies to deliver Outputs

- 1.1.12.6** We have not generally seen evidence that Asset Policies are being optimised at an asset specific level or at a ‘whole network’ level. This is an area for development.

## Application of ‘Asset Policy’

- 1.1.12.7** We understand that NR are in the process of developing an overall asset management framework and their RAMP procedures to document how ‘top-down’ decisions based on Asset Policy will be used in practice by the Routes to influence local asset maintenance and renewal choices. This is an area for development.

## Risk based Approach

- 1.1.12.8** It is very positive that for many assets (e.g. Earthworks) NR are moving forward from a condition based management approach to a more risk based intervention selection. It is recommended that this continues to be developed and extended by NR.

## Output Scenarios

- 1.1.12.9** We note that ORR provided POG with guidance on specific scenarios to be considered for the IIP<sup>2</sup>. At an asset level, this seems to have been interpreted as a general baseline requirement to achieve the outputs in CP5 at least as good as CP4 exit condition. We believe that it would be useful for a wider range of Output Scenarios with associated costs, benefits and risk to be presented to facilitate discussion as to ‘appropriate’ and ‘affordable’ levels of performance for particular assets.
- 1.1.12.10** It would be also useful to agree a consistent set of terminology, as the terms ‘Scenarios’, ‘Options’, ‘Strategies’ etc. seem to be used interchangeably.

---

<sup>2</sup> ORR-#421118-v1-20110719\_ORR\_PR13\_extract\_of\_draft\_guidance\_to\_POG\_on\_scenarios  
209830-17 | Issue 1 | 16 December 2011

## Interface with ongoing Programmes

**1.1.12.11** NR are undertaking a significant number of improvement / transformational programmes in the area of asset management. It would be useful to more explicitly communicate how particular Programmes will contribute towards the development of updated Asset Policies and Procedures in the time between now and Strategic Business Plan (SBP). This would provide increased confidence of robust delivery.

## Quantified Risk Assessment (QRA)

**1.1.12.12** It is positive that NR are adopting an QRA analysis approach to estimating their future required budgets. We have been provided with an initial QRA analysis for Asset Renewal expenditure. This is an early output from NR work and it is recommended that more information is provided on the assumptions and in particular the ranges and distributions adopted for individual asset types.

## Embedded Efficiencies

**1.1.12.13** It is understood that NR have identified various scope (volume) efficiencies that can be delivered through change from CP4 to CP5 policies. It would be useful if these were explicitly documented for each asset group so that that ORR can reach a view as to the robustness of the NR assumptions.

## Asset Specific Findings – Track

**1.1.13** The new track Asset Policy document has been prepared by undertaking a lot of good work to improve the understanding of track behaviour.

**1.1.14** The development of a hierarchy of 5 Criticality Bands for the routes on the Network is commended. This should be followed up with the production of unit costs for renewals and heavy maintenance for each Criticality Band, thereby further recognising the unit costs necessary to achieve differing levels of performance.

**1.1.15** The policy promotes a high track system specification for the top Criticality Bands, whilst recognising that component asset lives can be maximised by refurbishment in the lower bands.

**1.1.16** Whole life cycle costing has been applied to help define the optimum intervention for plain line and switch and crossing renewals. The adoption of this principle to other areas of track asset management, such as initial construction quality, especially for switches and crossings, has the potential deliver similar benefits over the life of new track.

**1.1.17** The track policy appears robust from a technical perspective.

**1.1.18** Knowledge of track drainage is poor as is the knowledge of the locations where the track formation is weak. The adoption of a system-wide approach is discussed above.

**1.1.19** Sustainability is not clear. Analysis of the Tier 0 track performance outputs suggests that track geometry quality remains fairly constant, whereas the used service life of rail, sleepers and ballast increases over successive control periods.

- 1.1.20** More work needs to be done, particularly in the lower Criticality Bands, to develop a clear relationship between used component service life and sustainability.
- 1.1.21** There are no detailed plans to show how track renewal volumes will be delivered in CP5 in a way that will deliver the stated efficiencies. However, the early development work is commendable.
- 1.1.22** Deliverability of a large volume of partial track renewals is a concern. This changed maintenance practice will necessitate a workforce with additional skills and competencies both from Network Rail and its suppliers. The need for this has been recognised but the scope of this training and development has not been quantified.

### Asset Specific Findings – Structures

- 1.1.23** The Structures Asset Policy document does not contain explicit Policies for the management of Network Rail’s Structures assets. A significant amount of development of the Asset Policy will be required before SBP.
- 1.1.24** We understand that the Building and Civils Asset Management Transformation Programme will be leading on this policy development; however, at the time of writing we have not seen a clear timescale for this development work. This potentially poses a significant risk.
- 1.1.25** Our current view is that the Structures Asset Policy dated September 2011 is not robust, from which it follows that it is also not demonstrably sustainable or efficient.
- 1.1.26** Improved asset data and knowledge is required to underpin the asset policy and planning for all asset groups. We consider it will be necessary to plan and undertake a comprehensive programme of data collection, which is likely to include data not normally collected, and assessments to bring asset knowledge. For bridges this will include extracting data from historical records and further detailed in-situ measurements to improve understanding of and confidence in degradation rates and the condition of critical elements for both masonry and metallic bridges. In addition, taking action to ensure that accurate, repeatable measurements can be reliably made in future. For ‘minor’ assets – culverts, retaining walls, rivers and coastal assets – and major structures, the programme should be aimed in initially at a clearly documented condition assessment of these assets.

### Asset Specific Findings - Earthworks

- 1.1.27** NR are making significant progress towards understanding the nature of their asset base and the root causes of failures. Of particular significance is the ongoing work to move towards a management of the earthworks asset using a risk based approach. Development of the risk based approach is hampered by
- the reliability of the earthworks inventory;
  - the extent of condition data available for the earthworks and the current classification of condition;
  - the lack of clear performance / outcomes for the earthworks asset and a ‘line of sight’ linkage to overall CP5 goals and objectives.

- 1.1.28** We consider that only having two Asset Policies for operational earthworks (Policy B and C) is unduly restrictive and is likely to hamper effective lifecycle planning. Similarly we would have expected more lifecycle options (such as ‘Do Minimum’, ‘Do Something’ etc.) to be considered in the lifecycle planning.
- 1.1.29** The practical application of the ‘Asset Policy’ and linkage through to delivery is unclear at present. Specifically the relationship between ‘top down’ guidance, ‘bottom up’ required volumes from an unconstrained workbank (based on specific defects) is unclear and requires definition.
- 1.1.30** In summary, NR have made very significant progress on the earthworks asset policy since March 2010, but work is ongoing and it is difficult to say with any confidence that the NR proposed IIP volumes and costs are yet robust or sustainable. In terms of efficiency NR are anticipating a significant efficiency gain (20%) from additional maintenance expenditure but we have not seen substantiation for this assumption.

### Asset Specific Findings - Drainage

- 1.1.31** Although the Asset Policy is clearly developed and logically constructed, the acknowledged lack of reliable asset information – inventory, condition, performance and deterioration – means that the Policies cannot be considered to be robust at the present time.
- 1.1.32** With further development, and the acquisition and application of increased asset knowledge (both quality and quantity), we consider that the Asset Policy has the potential to form the foundation of a robust approach.
- 1.1.33** For the same reasons, the tests of sustainability are not passed at this time.
- 1.1.34** Regarding efficiency, we believe there is good scope for developing efficient programmes and methods of working which would enable significant efficiencies to be realised – see comment in 1.1.12.2 above.

### Asset Specific Findings – Buildings

- 1.1.35** It is considered the CP5 Buildings volumes and costs remain generous and hence are likely to deliver the required outputs. On this basis the Policy is judged to be Robust.
- 1.1.36** The SSM scores for all station Categories have improved between 2007/8 and 2010/11 and the scores for 2010/11 are already better than the CP4 Regulatory Targets, this also suggests that the funding is generous.
- 1.1.37** NR has made considerable progress since mid-2010 in developing cost models for the Buildings assets. At present the modelling has been applied only to the assessment of Franchised Station and LMD future expenditure. It is considered the modelling may be over-predicting required volumes of work for the future. On this basis it is accepted that for Franchised Stations and LMDs the Policy is Sustainable.
- 1.1.38** The volumes and costs for Managed Stations are based upon bottom up work banks for CP5. The proposed expenditures from CP6 onwards are 10% to 20% lower than the proposed CP5 expenditure. As there has been much investment in improving Managed Stations condition over the past 20 years this reflects the expected expenditure pattern. The Policy is

considered to be Sustainable but a long-term strategic plan for maintenance and renewal of each of these large and important assets should be developed for the CP5 Strategic Business Plan to confirm this conclusion.

- 1.1.39** It is not clear how efficiency is measured for the Buildings assets. This should be clarified. It is recommended that different efficiency measures be introduced for the different asset groups.
- 1.1.40** Buildings costs are very much a function of Work Specification. It is recommended that the Buildings Work Specifications should be reviewed with the objective of reducing costs while maintaining functionality, durability and low maintenance.
- 1.1.41** Currently there is no reporting of volumes of activity and associated costs for Buildings. It is recommended that volume and rates reporting be introduced for the whole of the Buildings portfolio.

### Asset Specific Findings – Fleet

- 1.1.42** NR own a diverse collection of rail and road vehicles, each with their own particular operating and maintenance requirements.
- 1.1.43** The Policy scope is to support and be complementary to the Track Asset Policy.
- 1.1.44** A significant weakness of the policy scope is that it excludes those specialist vehicles not owned by NR, such as the tamping fleet, and road-railers. Therefore it is very difficult to draw any conclusions as to whether NR has the right policy for “yellow plant” that it needs to deliver its CP5 track M&R volumes. Accordingly, our current view is that is not demonstrably robust, from which it follows that it is also not demonstrably sustainable or efficient.

### Asset Specific Summary

- 1.1.45** Our findings are shown pictorially in Figure 1.1 below.



	Robust ?	Sustainable ?	Efficient ?
Track			
Signalling			
Structures			
Buildings			
Electrical Power			
Telecoms			
Earthworks			
Drainage			
Fleet			

**Figure 1.1 Summary ‘Traffic Light’ Representations**

**Acknowledgement**

**1.1.46** 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.