



Independent Reporter

Office of Rail Regulation and Network Rail

Project Evergreen 3 - Phase 1 Main Line Works
(CH/010 – Part 2)

Final Report – Exec Summary

January 2011

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Contents Amendment Record

This report has been issued and amended as follows:

Issue	Rev	Description	Date	By	Checked	Approved
2.	0.3	Final Report – Exec Summary	12/01/11	IM & KLF	GB	DS
2.	0.4	Final Report – Edited Exec Summary	20/01/11	IM	GB	DS

1 Executive Summary

1.1 Scope of the Mandate

1.1.1 The purpose of the ORR mandate is to review the new Evergreen 3 Phase 1 schedule and Quantified Schedule Risk Assessment (QSRA) to determine the deliverability of the project objectives to a May 2011 timescale. The Independent Reporter has been mandated by ORR to scrutinise the following:

- Does the revised schedule demonstrate robust and credible delivery of the planned enhancements in time for the May 2011 timetable;
- Have risks to the schedule in terms of achieving the May 2011 timetable been identified and managed effectively;
- Based upon the review of the new schedule and the QSRA output, the Reporter is asked to identify whether the project is likely to deliver on time.

1.1.2 The Independent Reporter has been limited to reviewing the programme and QSRA output only. The Independent Reporter is therefore only able to answer the mandate to the extent that this evidence permits.

1.1.3 The causes of delay and disruption, to the extent that any has occurred, are precluded from this review. The Independent Reporter offers no opinion on the culpability of any party for delay and disruption that has or might be incurred.

1.2 Methodology

Overview

1.2.1 In reviewing the evidence, the Independent Reporter has sought to determine whether or not the Evergreen3 schedule is robust in view of its stated objectives. The Independent Reporter has sought to identify Critical and Secondary issues that the programme should address in order to achieve its stated objectives, along with Observations of Good Practice. These issues and observations are distinguished as follows:

- **Critical Issues** – have high potential impact on project outcome / success. These are issues of a level that would suggest the project is, in the Independent Reporter's opinion, at serious risk of not achieving its stated objectives. Such issues typically require fundamental reconsideration of objectives and delivery;
- **Secondary Issues** – lower impact, but still with potential to detrimentally affect project outcome. Resolution of these issues is generally less urgent. These issues require action;
- **Good Practice Observations** – Observations which recognise good practice which should be shared with other projects and programmes.

1.2.2 In this report the Independent Reporter has recorded nine Critical Issues and two Secondary Issues. The Independent Reporter has made recommendations against each of the issues identified.

1.2.3 The mandate was carried out as follows:

Mobilisation – The scope of review was agreed with ORR and Network Rail.

Review Meeting – A single review meeting took place with Chiltern Railways, BAM Nuttall, Atkins and EQUIB.

Desk Top Review – Two drafts and the final version (v4.0) of the QSRA report by EQUIB have been reviewed by Halcrow specialists.

Forensic Analysis of Updated P6 Schedule and Oracle Risk File (QSRA) – the Primavera P6, filename “QSRA Programme of works - 2 DEC 2010.xer” was subject to forensic analysis. The objective of this analysis is to test the schedule against best practice for the creation and management of programmes (work schedules), including work breakdown structure, lags/leads, logic, constraints, critical path etc. The Oracle risk file used for the draft QSRA (1.0) was also subject to a similar forensic check.

Reporting – This draft report states the Independent Reporter’s opinion, determined through the review carried out by the Halcrow team. The Independent Reporter’s opinions are based on our examination of the available evidence and interviews with CRCL and BAM Nuttall personnel.

1.3 Project Background

1.3.1 Chiltern Railways placed a Design & Build (D&B) contract with BAM Nuttall (BAMN) in December 2009. BAMN entered into a contract with Jarvis Plc for the design and delivery of the railway works.

1.3.2 Permanent way, power and telecoms implementation works are being undertaken by BAMN direct labour with support from a sub-contract with Colas. Signalling implementation works are being undertaken by Atkins, through a separate contract to the design order.

1.3.3 In June 2010, Network Rail invoked the Level 1 process for “Poor Quality Engineering Deliverables” defined under the Engineering Management Plan which has been provided to the CEM as part of the CEM acceptance process. Adherence to this procedure is mandated by the standard NR/L2/INI/02009. In a letter to Chiltern Rail Ltd¹, Network Rail stated “*We believe that the quality of the designs being submitted are significantly slowing down approval times by Network Rail, they are increasing the workload of Network Rail engineers and are creating significant amounts of re-work and re-review that otherwise would not occur*”. The Imposition required an improvement plan to be developed “with robust timescale for improvement”. Subsequently Network Rail instigated 100% checking of all design submissions.

¹ Chilterns - Letter Ref 110948AR142 Dated 25 06 10.pdf

1.4 Current Schedule Status

- 1.4.1 In October 2010, the Independent Reporter was instructed by Network Rail and the Office of Rail Regulation to undertake a review of the programme for Phase 1 of Project Evergreen 3 which resulted in the first report (issued November 2010)².
- 1.4.2 Since the issue of that previous Independent Reporter report on the Evergreen3 project, a new P6 schedule has been developed by BAMN with the objective of facilitating a QSRA analysis. Whilst BAMN has utilised its internal planning resource to modify the schedule, it has also employed an external consultant (EQUIB) to manage the QSRA exercise.
- 1.4.3 The final QSRA report was issued by BAMN, dated 17th December (rev4.0) which covered all stages of the schedule leading to the target end-date (8th May 2011). To support the report, a separate QSRA Action Plan was issued which indicates the actions required by BAMN management to support the QSRA conclusions.

1.5 Forensic Analysis of Updated P6 Schedule

- 1.5.1 The methodology of the forensic analysis carried out on the revised P6 Schedule provided by BAMN consisted of a series of checks, looking at key areas of the schedule. The objective of this analysis is to test the schedule against best practice for the creation and management of programmes (work schedules), including work breakdown structure, lags/leads, logic, constraints, critical path etc.
- 1.5.2 The Independent Reporter's opinion on the adequacy of the P6 Schedule provided by BAMN is as follows:

Check	Independent Reporter (IR) Finding
Network Integrity:	The IR is satisfied with network integrity
Critical Path	The IR is satisfied that a critical path is in place
Out of sequence (OOS) working	The IR is satisfied that there is no evidence of out of sequence working
Activities with actual dates greater than the data date	The IR is satisfied that there are no tasks with actual dates greater than the data date in the current P6 schedule
Milestones with invalid relationships	The IR is satisfied that there are no milestones with invalid relationships.
Work breakdown structure (WBS) and coding checks	The IR acknowledges that this appears to have been put together with a great deal of thought and recognises this as good practice
Activity total float:	The IR satisfied that there is no negative float in this schedule.

² TCAPTC112 Evergreen3 Phase 1 Draft Report v1.1.pdf

Check	Independent Reporter (IR) Finding
Leads and lags	The IR is satisfied that there is no evidence of inappropriate use of leads and lags with the possible exception of inconsistent tamping activities
Activity notebooks	The IR confirms that activity notebooks are not evident within the P6 schedule. Whilst this may be considered acceptable, the IR considers activity notebooks as a good practice approach to recording schedule information
Use of Constraints	The IR satisfied that there are no constraints within the P6 schedule which the IR considers good practice.
Resource Loading	The IR identifies that the P6 schedule is <u>not</u> resource loaded which the IR considers as a significant concern, particularly as the signalling testing and commissioning resource availability is identified as a key risk to project delivery by the project team

1.6 Conclusions from the Forensic Analysis

- 1.6.1 The Independent Reporter considers the updated P6 schedule to be a vast improvement on the previous P6 schedule provided by BAMN and has clearly been produced by a knowledgeable and experienced scheduler.
- 1.6.2 The Independent Reporter has noted that the schedule is not resource loaded and that critical resource loading has not been either identified or sourced, specifically critical signalling resource. It is recommended that the P6 schedule is resource loaded.
- 1.6.3 The Independent Reporter notes that there is no evidence yet of any overtime working (6 day calendar usage), which may be an opportunity for the recovery of work backlog.
- 1.6.4 The copy of the P6 Schedule provided to the Independent Reporter was last updated on the 13th November 2010. BAMN has advised the Independent Reporter that the schedule is normally updated monthly, however an updated schedule for December 2010 has not been evidenced.
- 1.6.5 Given the schedule slippage already incurred and the significant amount of work scheduled in the period from 13th November to the date of writing (12th January 2011) the Independent Reporter recommends that the schedule should be updated more frequently.
- 1.6.6 This will provide a focus on achieving the schedule. In the Independent Reporter's opinion monthly schedule update will reduce the potential to recover any further delay or disruption if it occurs. The Independent Reporter considers this a significant risk to delivering the schedule and recommends a move to more frequent reporting.

1.7 Conclusions from QSRA Review

- 1.7.1 The Independent Reporter carried out a review of the QSRA final report.

- 1.7.2 The 4.0 version QSRA report indicates the following headline results:
- Stage A ROGS deliverables ready as Planned (01/02/2011): <1% rising to 90% after 14 days
 - Stage B ROGS deliverables ready as Network Rail Requirement (08/03/2011): >95%
 - Completion of the Phase 1 works by 8th May 2011: <1% rising to 90% after 16 days (note this time period is unconstrained by access or working day restrictions)
- 1.7.3 This analysis indicates that there is zero probability of achieving the “planned date” of 8th May but >90% probability of achieving completion by the 26th May 2011.
- 1.7.4 CRCL confirmed that the planned introduction of the new timetable is 00.01hrs Sunday 22nd May 2011. Thus the Independent Reporter identifies that the latest completion date is midnight on the 21st May. Reading from the analysis output graph, the Independent Reporter considers that there is in fact a 60% probability of achieving completion by this deadline.
- 1.7.5 The analysis indicates over 56% of the tasks have a duration uncertainty distribution with a skew of 3, and over 45% with a factor of 5. A small majority have a factor of 10. This indicates that all the durations are “pessimistic” rather than a “normal” distribution. It is recommended that these values be reviewed.
- 1.7.6 The effect of setting the maximum duration of Network Rail approvals to the same value as the “most likely” value has the effect of constraining the simulation results. Whilst the Independent Reporter accepts that the agreed target for approval is 10 days, it may not be possible to achieve this in all cases. Some additional duration uncertainty should be assumed. Whilst the Independent Reporter accepts that this is the agreed “target” timescale, it is highly unlikely that all approvals will be achieved in 10 days. This seriously undermines the value of the QSRA and a more realistic “maximum” value should be applied.
- 1.7.7 Some risk events have now been taken into account in the QSRA but these do not appear to reflect all the risks listed in the project risk register that are identified as having an impact on the schedule. The QSRA should reflect key risks in the project risk register.
- 1.7.8 A key part of the QSRA process is to identify the key drivers and instigate suitable mitigation actions. An action plan has been submitted but the actions are not specific enough to address the top ten “drivers”. The “top ten” impact risk drivers should be addressed individually in the action plan with the objective of achieving early delivery if possible or mitigate against increased task duration.
- 1.7.9 The QSRA exercise was based on number of key assumptions e.g. that the current backlog of design approvals will not impact on the delivery and the Inter Disciplinary Checking (IDC) process will not delay the delivery, as well as assumptions on maximum duration of approvals (see 1.7.6). The Independent Reporter is of the opinion that these are not robust and thus seriously undermines confidence in the overall result of the QSRA. It is recommended that BAMN confirm that the assumptions are robust or amend the QSRA model accordingly.

- 1.7.10 The Independent Reporter expressed concern during the review that the basis for the QSRA exercise was the P6 dated 13th November. As there were a significant number of tasks due in the following weeks, any delays in these tasks would further undermine confidence in the QSRA result and it is recommended that a review of the updated schedule be undertaken to identify any slippage that would impact on the QSRA result.

1.8 Conclusions on Risks to Schedule

- 1.8.1 The current Risk Register provided by CRCL shows that key risks have been identified, mitigation action recorded and the impacts quantified.
- 1.8.2 CRCL submitted Independent Reporter with the latest Project Risk Register; in their response to the draft Part 2 report, BAMN has indicated that they had no visibility or input into this analysis. Whilst the evidence of the risk register indicates that risks are being identified and managed by CRCL, the lack of apparent involvement by BAMN and the absence of coordination with the QSRA exercise further reduces the value of the model output. The Independent Reporter recommends that the projects be assessed collectively and ensure all parties are consulted. Key risks to the schedule should then be reflected in the QSRA.

1.9 Conclusions on Resource Management

- 1.9.1 The Independent Reporter has noted the lack of resource loading in the P6 programme. In evidence supplied, the BAMN supply chain has indicated there are sufficient critical resources available but the actual numbers required for each possession has yet to be confirmed. It is recommended that the P6 schedule is resource loaded and critical resource requirements identified.

1.10 Independent Reporter Opinion

- 1.10.1 In this report the Independent Reporter has recorded nine Critical Issues and two Secondary Issues. The Independent Reporter has made recommendations against each of the issues identified
- 1.10.2 In response to the three questions posed in the mandate, the Independent Reporter concludes:
- Does the revised schedule demonstrate robust and credible delivery of the planned enhancements in time for the May 2011 timetable*
- 1.10.3 The P6 schedule provided does provide a functional planning tool for activities required to achieve the planned enhancements and enabled a full QSRA exercise to be conducted. However, the Independent Reporter is of the opinion that the lack of resource loading in the P6 schedule seriously detracts from the value of the schedule as a planning tool.
- Have risks to the schedule in terms of achieving the May 2011 timetable been identified and managed effectively*

1.10.4 The Independent Reporter has observed that the final QSRA report indicates that some external risk events have been included in the final simulation analysis. However, the Independent Reporter is of the opinion these do not reflect key risks to the project schedule. This is based on the fact BAMN has said that the QSRA risks have been assessed independently and that BAMN have had no visibility of the CRCL project risk register.

– Based upon the review of the new schedule and the QSRA output, the Reporter is asked to identify whether the project is likely to deliver on time

1.10.5 A final QSRA report has been issued which indicates the P90 completion date to be 16 days after the planned project date. The Independent Reporter is of the opinion that the current schedule does not demonstrate a robust and credible delivery in time for the introduction of the May Timetable (implementation date 22 May 2011).

1.10.6 This opinion is based on the specific concerns which will adversely impact on this result:

- The schedule that formed the basis of the QSRA exercise was not updated from 13th November 2010; there are a significant number of tasks are due to start since that date that may impact on the schedule
- The QSRA is based on a number of assumptions that are not sufficiently robust
- duration uncertainties assumed for Network Rail approvals have the same “most likely” and “max” value (10 days)

1.10.7 If successful delivery is to be achieved a concerted effort between all parties is required.

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January 2010

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