

Network Rail October 2007 Strategic Business Plan

Supporting document

Response to external efficiency studies

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1 Benchmarking SEU costs against European railways- Lloyds Register Rail

Background

Lloyds Register rail were commissioned by ORR to benchmark the cost of Network Rail's signalling renewals costs against those of a number of European railways. The report presented a very small number of schemes which were compared against the Network Rail SEU rate which included efficiency up 2003/04. Those schemes that were benchmarked fell broadly into two price groups, those which were within a similar scale and scope to the Network Rail SEU cost, and those which were clearly outliers much less complex schemes.

Observations

We make the following observations on the report.

General

The Conclusions of the report are repeated verbatim here:

- Within the study all participating railways were very engaged to provide the envisaged projects and information
- However, it turned out that the number of available projects is limited and projects differ a lot in their characteristics
- In personal visits these complex projects were discussed to get more insight into the reasons for the cost differences
- Even if within such a study not all questions can be fully answered, some conclusions are evident
 - SEU costs vary widely within Europe
 - Network Rail's SEU costs are still far above the sample and reveal room for improvements
 - The already planned cost decrease brings Network Rail much closer to the sample
- In addition to the SEU costs various "good practices" in signalling renewal were identified to help Network Rail's efforts to improve efficiency
- Very important aspects to carry out signalling renewal efficiently and at reasonable costs seem to be
 - competition on the supplier market by having at least two suppliers for the main signalling devices
 - guaranteed budgets that allow the railways to act more flexible
 - a well defined set of criteria when and how to renew the assets
 - a sound and transparent long term strategy for the signalling assets
- Furthermore standardisation is often discussed as crucial to set up an international *supplier market and eventually lower the project cost*

The Recommendations above are being addressed by the initiatives already presented in the CP4 Signalling Investment Plan, in particular standardisation across the supply base, competition where appropriate, augmented by framework contracts on large signalling contracts renewed on a value for money basis, and well defined criteria for renewing assets efficiently, and it is clear that Network Rail will continue to be challenged to meet the efficiency demands of the future.

However it is also clear that alongside this there is a need for a long term strategy, that integrates the long term asset stewardship plan (Capability Management Plan), a

Long Term Research and Technology Plan, and a long term Business Improvement Plan that clearly defines time based goals and delivery mechanisms over at least the life of the asset, i.e. 35 years. This will be vital in order to balance industrial capacity, with future capability demands and long term resource projections, both financial and headcount.

We will develop a programme on a territory basis that will map out similarly sized major projects over the lifecycle of all the signalling assets in that territory, facilitating efficiency gains through stable planning and execution cycles, stable teams, and embedding of lessons learned from project to project. This will be the natural continuation of the CP4 planning cycle.

Further observations on the report are detailed below

Context

The report does not make it clear that LLR was not required to explicitly benchmark any Network Rail practices and so the analysis is all based against an SEU value rather than the content of work actually carried out.

The conclusions and closing slides make no reference to those areas which we are already addressing, many of which are in the best practices list, which are contributing to the ongoing reduction of the SEU rate.

Unlike comparisons

The overall presentation does not make clear the differing complexities of scope, and that the lower cost projects appear to have a significantly more restricted scope that that which makes up the SEU rate.

Insufficient clarity is given to the comparison of composite costs over time against specific individual projects. And it is noted that comparisons should be seen in the fact that 33% of the analysis for other railway administrations is based on forecast rather than final costs and so subject to uncertainties and potential overrun of costs and use of any contingencies which are not visible here.

There is no reference to the scope of service provided to the client - nearly all European railway administrations carry out final testing and commissioning themselves and it is not included in the contract costs.

It is not clear that the study includes all the employer's costs – the Network Rail costs do.

Timing issues

One major criticism is that the analysis seems to compare periods in time. For example Network Rail figures based costs from actual costs up to 2000 are compared with others, including forecast costs based on 2006 – this makes the analysis misleading.

Conclusion

The conclusion does not make it clear that this is a very small sample of widely different projects and therefore no firm conclusions can be drawn from the work other than there are differences which need to be investigated further.

2 EWS Efficiency studies for freight only lines

Addressing our Stakeholder's concerns

As part of the 2008 periodic review (PR2008), the systems to allocate costs and set charges for freight-only lines are being reviewed. As a consequence, several studies

have been carried out in order to get a better understanding of costs. In this section, we analyse and comment on four studies commissioned by EWS:

- Comparison of Selected Maintenance and Renewal Practices: Network Rail (UK) and North America (CN), Brian Abbott, 4 November 2006
- Rail Freight Infrastructure Ltd: Initial Assessment on The Management of Freight only Lines, Dave Doggett (DTM Consulting) and Ian Smith (EWS), 20 December 2006
- Benchmarking of Network Rail's Freight charges and costs, LEK, 18 January 2007
- Track renewals efficiency opportunities, Lloyds Register Rail, 29 June 2007

As part of our on-going commitment with all the industry stakeholders, we have not only focused on the above four reports, but also taken into account EWS's concerns stated in its response (29 January 2007) for the ORR consultation "Charge to Recover the Cost of Freight Only Lines". EWS stated that "Freight operators require a) charges which do not discriminate between their customers, b) charges which their customers can see are cost reflective, c) charges which are easy and inexpensive to monitor and collect but above all d) charges which allow them to compete with other modes and deliver a return upon their investments."

3 Comparison of Selected Maintenance and Renewal Practices.

Network Rail (UK) and North America (CN), Brian Abbott, 4 November 2006

Brian Abbott, a former Canadian National track engineer, has prepared a brief report comparing track maintenance and renewal practices in Great Britain and Canada. Despite the fact of being based on a very small number of sites, from the Network Rail point of view, this report has been very useful. Firstly, because in many areas, it has confirmed that we are going in the right direction; and secondly, because it has also brought new opportunities to our attention. In order to provide feedback, we have grouped all findings and suggestions into the following six headings. On the other hand, there are some important issues with which we disagree.

In the final presentation meeting, it was acknowledged that recent work had already shown that we were achieving many of the proposed improvements at least in part of the network, and rolling this out will clearly be a major factor of our proposed savings for the remainder of CP3.

"By North American standards, track is prematurely renewed"

While there may be on occasion assets which are renewed prematurely in order to maximise the whole life cost of a larger scheme (i.e. the economies of scale outweigh the disruptive costs and lost service life), we would not generally carry out premature renewals. Abbott's comment can be understood in light of the different approaches for renewals in Canada where replacing individual components in order to sweat the asset appears to be a more normal approach than the type of fuller renewal undertaken in Europe. The European common practice, which we favour, is to optimise component replacement to minimise disruption to passengers and maximise the availability of the assets.

A major driver to these differences in approach is the traffic pattern encountered on the differing networks. The Canadian network tends to convey large and heavy freight traffic at a moderate speed with a significant time period between trains. In contrast with this the UK network is mixed traffic and higher speed. The freight traffic on the UK network tends to be of shorter and lighter formation than its Canadian equivalent,

but travels at higher speed in order to align more closely into the passenger timetable. This mixed traffic approach means that overall the UK network is significantly more congested, for example, on some of our primary routes a train passes once every four minutes. This creates a fundamentally different railway as the windows of opportunity available for individual component renewal which feature on the Canadian network do not occur on the UK network.

Our approach to renewals implies that in particular cases, some of the individual components (e.g. half set of switches and cast manganese crossing units) might have some residual life, and our practice is to recover these for use as maintenance spares.

We do not believe that it would be appropriate to modify our renewal standards for high speed passenger carrying railway. We have, however, built on this comment, in examining how we can most effectively relax our renewal specifications for freight-only and rural routes where the required outputs are less sensitive to speed, performance and access issues; and those changes are now reflected in our Infrastructure Cost Model.

The following is a summary of the evidence and assessments that supported the case for renewals. In other words, a technical, evidence-based rejection of Abbot's statement "By North American standards, track is prematurely renewed".

Innerwick S&C

This site was renewed based on the following factors:

- The timing for this renewal was determined following a strategic route review carried out by the Track Renewals Engineer (at former Scotland Zonal level) and the Track Maintenance Engineering Contractor, in 2003. This review, based on concerns about track geometry and the frequency of maintenance intervention, identified that the driver for the renewal was primarily ballast condition, with timber condition as a secondary factor. The proposed work was validated and the complete renewal was approved by the then Head of Track Engineering at his Peer Review in September 2004. (Track Engineering policy (RT/ENGP/01 Issue 2 – Section 6(n)) does not allow "reballasting-only" of timber S&C in Category 1 track due to problems regaining satisfactory track geometry)
- The track was sitting on poor to very poor condition ballast. Confirmed presence of "very dirty ballast from the base of the sleepers to the bottom of the excavation". "It verifies that the fines contaminating the very dirty ballast comprise products of ballast breakdown, airborne fines and ash" (Please refer to Site Investigation, Final Report, Scott Wilson, May 2006, Document: OT142/Scotland/S&C/INN/1);
- And Track Geometry data shows predominantly Poor track quality across the site which is consistent with the degraded ballast revealed by the investigation (HSTRC and Historic 1/8th Mile Data, as recorded for the above Report)

Longhoughton

This site was renewed based on the following factors:

- The timing for this renewal was determined following a proposal raised by the Jarvis Track Section Manager (Railtrack Item Number 24837) on 31/7/2001 which identified ballast condition and sleeper cracking as the drivers for renewal. The site had previously been deferred from 1998/1999 (item 20115).
- Ballast depth across the majority of the site did not comply with RT/CE/S/102, and ballast was generally dirty and has degraded in size (please refer to Trackbed Investigation Report, Scott Wilson, July 2003, Document: K195ABSLON1);

- Sleeper condition: centre bound cracking of Pandrol concrete sleepers (please refer to photos in Document: 24837.pdf);
- Track quality throughout the renewal was varying between Satisfactory and Poor but with particular 1/8th mile sections becoming Very Poor and worsening. The longer term picture shows the cyclical nature of the effect of tamping on track quality (reference document: Longhoughton_TQ_v3 (2).xls).
- The rail was renewed as part of the efficiency plan as it had a residual life less than 10 years under Guiding Principle 5. The rail age is recorded in the proposal documents and in Geogis. Typical service life for Category 1 track is 30 years. The decision to renew the 1974 rail was recorded in the Track Renewals Change Request 2006/7 Programme form Number PL/3008 after agreement between the Territory Track Renewals Engineer and the MP&I Programme Manager (reference documents: Longhoughton_GEOGIS.xls; PL3008 - 24837 Longhoughton Change Control doc.xls).

Network Rail would welcome further engineering reviews of the decision to renew those sites taking into account their use and condition.

“Possessions are too long”

Improving our productivity levels has always been a key objective, and in order to reduce our possessions, we have been analysing ways of improving productivity. Where possible we have already implemented initiatives like High Output Track Renewals equipment, and initiated the modular S&C programme that will reduce time on-site. We are also developing better possession utilisation techniques involving the UK interpretation of the Canadian TOP system, and new track renewal processes which will deliver 200 metres of conventional renewal in 8 hour possessions (known as 8/200). The drive to shorter possession is likely to be given further impetus by plans to provide greater track access time to train operators through reduced duration possessions, both weekday and weekend.

“Not enough focus on preventive maintenance”

Three of the four of Abbott’s site visits were to renewals on high speed routes, and the fourth one was to observe reballasting of S&C using the “Track Gopher” equipment.

The balance between preventive maintenance and renewal is enshrined in the asset policies and is mainly determined by the degradation characteristics of the asset, and this may be further impacted upon by the traffic mix and the type of route. The asset policies dictate the asset management regime, which includes maintenance and renewals, and these are justified on a whole life and whole system cost basis. On lightly used, lower speed, lower tonnage rural & freight-only routes the outputs are less sensitive to speed, performance and access. As a consequence very little renewal takes place and most asset replacement is achieved under preventive maintenance, which is to some extent analogous to the Canadian option. However, on high speed routes the emphasis is on minimising disruption and the impact on performance and this is best achieved through the complete renewal of specific assets.

Very little complete resleeper renewal is carried out on lower category routes until such time as renewal of the obsolete rail section occurs, then the replacement of sleepers is addressed. We have also re-introduced the practice, as a trial in the Western Territory, of recovering continuously welded rail (CWR) removed by the High Output Track Renewals Train (HOTRT) for re-use on lower category routes.

“Allocation of staff (from planning into delivery, from inspection to preventive maintenance)”

Our inspection levels and frequencies are contained within our company standard NR/SP/TRK/001, which is mandated by national Railway Group Standards, and are based on Track Category (a function of speed and traffic tonnage). We are looking at ways of reducing the inspection requirements and possibly introducing more inspection from vehicles and this is being actively driven as a maintenance efficiency initiative. However, rigorous risk assessments will need to be carried out before any proposal can be progressed to Company Standard status and become the norm.

Planning within our current environment and complexities (performance regime, access booking times, etc) is not easily comparable to Canada. We are, however, committed to continuously improve our efficiency, and are always analysing new ideas to reduce our costs, including the most effective use of our resources.

“Incentives to reduce expenditure”

Abbott judged that there was scope to incentivise the delivery contractors and to reduce costs by improved risk management. Network Rail operates within a high performance regime, not only driven by the regulatory model (RPI-X) but also by our own ambitions to become the best at everything we do. Therefore, we are under a lot of incentives to reduce expenditure and are permanently seeking efficiency improvements. Some examples of initiatives are:

- The rationalisation of our Track Renewals contracting supply base from 6 to 4 main contractors. This competition has already had some benefit in stimulating improved performance, and the step change is also expected to yield further savings by the end of 2007/8.
- The redesign of many aspects of our end to end (“E2E”) development and planning process for track renewals, to improve scope and activity efficiency.
- In conjunction with our S&C contractors we are implementing many short term improvements in construction practice through the application of lean 6-Sigma analysis, which is already resulting in significant savings in time and cost.
- The implementation of modular switch and crossings replacement.

“Asset management issues”

We have considered and taken on board many good ideas that were suggested through the study, and from observation of other operators on a worldwide basis. Indeed, we were already doing so in many cases, but this study has given greater confidence that we are making the right changes. For example we are adapting the Canadian Track Occupation Permit system (TOP) and are working with the Railway Safety & Standards Board (RSSB) to develop the concept for implementation in the UK. We are also implementing increased mechanisation of permanent way inspections, where we have already been developing Unmanned Geometry Measurement Systems (UGMS) and high resolution video collection and analysis equipment mounted on the New Measurement Train (NMT).

At the same time, some suggestions made in the study, such as introducing more bi-directional signalling, cannot be introduced easily and would be prohibitively expensive if done on a stand-alone basis rather than part of a full renewals. They are also subject to long gestation periods and would require rigorous cost benefit evaluation, and to be in full alignment with the Route Utilisation Strategies. However, where there is a clear case for such enhancements their inclusion will be fully considered in our plans. This is an important element of the work which is included in our costs for moving further towards a 7-day railway.

4 Rail Freight Infrastructure Ltd: Initial Assessment on the Management of Freight only Lines

Dave Doggett (DTM Consulting) and Ian Smith, 20 December 2006

We have found this report to be very useful and have already implemented many improvements, like the upgrade of ICM v2 in order to reflect fully the actual differentiation in our asset policies (improved costing of freight-only lines).

The approach and assumptions of this report are broadly sensible and aligned fairly well with the assumptions captured in ICM v2. Some specific issues such as 'hi-rail inspections' are not currently applied but we plan to investigate these further.

However, we note that a number of costs are stated to be excluded and therefore overall costs generally appear low. In particular, we are concerned that this report implies that labour costs are significantly lower than we are experiencing and there appears to be no allowance made to cover for non-availability or contingencies such as spare plant, cover for leave, sickness, training, etc.

5 Benchmarking of Network Rail's Freight charges and costs

LEK, 18 January 2007

Although this report is well structured and presented, we can not agree that US freight railroads are an appropriate benchmark for UK mixed-traffic railway as they are fundamentally different operations. Although we recognise that LEK has sought to adjust for a number of factors, the very different nature of the traffic means that can be maintained and renewed in a fundamentally different way which does not lend itself to incremental adjustments. This is not to say that we have nothing to learn from such railroads. To the contrary, we consider that these are very good opportunities to develop new ideas for our policies and practices.

However, it does mean that comparisons of high level unit costs are of limited value. We believe that European railways are much more similar and have focused our own benchmarking activity in Europe. For example, we continue to be active participants in the UIC Lasting Infrastructure Cost Benchmarking (LICB) studies. For further details, please refer to "Benchmarking Report" (NR/SBP/OCT07/EI01a).

The analysis is useful insofar as it suggests that there may be significant differences in costs. Since the networks are so fundamentally different, we consider that there is little to be gained from debating or from refining the attempted normalisation. In our opinion, there are so many assumptions all with varying degrees of uncertainty as well as omitted factors (for example, track accessibility), that the resulting figures cannot be considered robust.

From an overall perspective, average costs from large US networks are being compared with costs of UK freight-only lines which are generally short and often unconnected to each other. This report seems to ignore such intrinsic differences with an explicitly biased approach, called "conservative" by the authors (reference P7). In our opinion, their selective quantification of factors, aimed to bringing closer both railways, is a way of forcing a quantitative comparison that should not be attempted.

We do, however, believe that further effort could concentrate on identifying specific differences in policies and practices that have the potential to produce cost savings if applied by Network Rail.

As previously stated in response for the "Rail Freight Infrastructure Ltd" report, early versions of the Infrastructure Cost Model (ICM v1) produced costs for freight-only

routes higher than expected. The ICM has been reviewed, and we are implementing the following changes (key cost drivers):

- Revised definitions for freight-only lines;
- Application of customised Track Policies for freight-only lines, which will review the maintenance/renewal balance.

We are focused on extending life expectancy of freight-only lines while reducing costs, by increasing maintenance activity and reducing renewal projects.

6 Track renewals efficiency opportunities

Lloyds Register Rail, 29 June 2007

This report raised a number of opportunities in which we are already working on; however, it also raised some concerns:

- Lack of visibility (we have not seen the detailed report) only a presentation;
- A potential lack of consistency or transparent logic behind the derivation of the assumptions; the project methodology; and the cost estimating regime;
- There appear to be a number of unsubstantiated assertions, for example:
 - Savings are realisable within two years (“by investing in available plant and equipment or adopting changed asset management strategies and/or working practices”);
 - Half of “reballasting by trax” jobs can be converted into “reballasting by cleaning”;
- It makes extensive reference to and relies upon a “NERA Report” of which we have had no sight;
- It uses out of date data of S&C renewals to determine the volume of savings.

Despite the above, the study presented a number of positive ideas which we believe can be built upon, and in most cases are already contained in our efficiency initiatives for CP4.

With respect to specific areas of the report, the analysis used the Western territory and applied a general efficiency percentage on the assumption that the savings that apparently could be delivered on this territory could be applied nationally across the programme. We were not convinced by this logic, and decided that a better interpretation of the analysis would be to review the two main cost categories, which account for 70% (value) of the conventional work programme, and to reconcile the differences.

By reviewing the main categories (4 and 11) we have been able to triangulate the proposals using typical jobs from our workbank, our pre and post efficient unit rates in the submission and the reference Lloyds Register Rail study. Please see below tables.

Table 1 Cat 11 Unit cost (£k per km)					
	LLR / EWS	Pre -efficient unit rate ¹	Post efficient unit rate ²		LNE benchmark job
			Best Case	Most Likely	
Site costs ³	170	216	172	189	223

Materials & haulage	199	204	193	198	216
Total Direct Cost	368	420	365	387	439

Table 2 Cat 4 Unit cost (£k per km)					
	LLR / EWS	Pre -efficient unit rate ¹	Post efficient unit rate ²		LNE benchmark job
			Best Case	Most Likely	
Site costs ³	97	149	119	131	148
Materials & haulage	197	171	162	163	156
Total Direct Cost	224	320	280	294	304

Notes: 1) Pre-efficient unit rate is the exit rate assumed for CP3. 2) Most likely is the efficiency rate of 9% on direct costs and 3% on materials and haulage. 3) Site costs include contractor labour and plant

Overall the analysis appears to support the level of efficiencies assumed in the submission, or the differences can be reconciled. For Cat 11, the difference between LLR and our post efficient proposal for CP4 is not significant, giving credence to the level of efficiencies assumed in our submission. However for Cat 4 there is a significant difference (£56k per km) which appears to be driven by two main factors:

- The first factor (explaining £35k per km, two thirds of the difference), appears to be an error on the volume and pricing of materials. The quantum of rail required for the renewal appears to be understated –once this is adjusted for the material, and haulage appears in line.
- The second factor (that explains £21k per km, one third of the difference) is due to the estimate of plant requirements, primarily due to the omission of certain plant items (e.g. lighting) and the volume of tamping assumed in the follow up works.

This report suggests: “Reduce amount of full renewal in favour of life extension processes using proven European technologies”. We have considered refurbishment as an option, particularly on secondary and tertiary routes, and a series of new methods are currently being tested. However, scope for effective refurbishment on primary routes is very limited and full renewal is usually favoured on the basis of better whole life cost through less frequent disruption i.e. a refurbishment would not be expected to have the same life span as a renewal, therefore additional intervention(s) would be required over the same period of time, resulting in increased disruption. Network Rail normally runs a detailed study for each project that defines opportunities to carry out the most effective solution and identify the opportunity for scope efficiencies. It is therefore, very difficult to agree with the generalist assertion of this report as applied to the whole network, and more important with its derived cost saving opportunities.

Another relevant conclusion refers to “Modular S&C” and the associated cost savings. We are pleased to confirm that we have been developing this initiative well before this report, and currently have a well-established project team, which is seeking to deliver early benefits through phased approach.

Our Modular S&C programme has three main on-going elements:

- A review of our planning and site management processes to improve the organisation of work on site. This will be supported by improvements in the incentive regime for installation contractors.

- Deployment of a 'Mark 1' modular design (the first trial carried out at Innerwick). This gives the ability to renew S&C in shorter possessions by removing the need for temporary track used in our conventional method.
- Design, development and deployment of a new process and supporting systems for specification, design, manufacture, assembly, transportation, installation and maintenance of S&C.

This report also mentions the “implementation of TOP” as a key enabler for cost reductions. This idea was also presented in the “Brian Abbott report”, and as stated before, we have already started its detailed analysis as well as planning its implementation. Following a visit by Network Rail staff to Canada to observe the Track Occupation Permit system (TOP), we are working with the Railway Safety & Standards Board (RSSB) to develop the concept for implementation in the UK.