Final Report

RAILTRACK'S NMS2000 - REVIEW OF THE IOS PROGRAMME AT BUILD 3

Office of the Rail Regulator

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1. INTRODUCTION

Extent of Study

1.1 Since July 1999, the Shadow Strategic Rail Authority (sSRA) has been undertaking a consultation process aimed at identifying incremental improvements in output throughout the network which it may wish to procure during the next control period. These improvements are known as the Incremental Output Statement (IOS) programme. The consultation process began with a series of route-based meetings with train operators and stakeholders, followed by a series of zonal meetings to assess Railtrack's response regarding the infrastructure works which might be required to deliver the specified outputs.

1.2 As part of our review of the latest Network Management Statement (NMS 2000), we have assessed Railtrack's response to sSRA's IOS programme. The objective was to ensure that Railtrack's customers and funders obtain value for money; that Railtrack has been consistent in its assessment of costs; and that outputs can be directly related to the costs incurred. Our initial review was based upon Railtrack's 30th March 2000 submission to the Office of the Rail Regulator (ORR), which gives a slightly updated view and more detail of Railtrack's IOS response than that given in the Network Management Statement. Railtrack's response to the IOS programme is being developed through a number of discrete development stages, termed "Builds", with the 30th March iteration being termed Build 2.

1.3 Our review consisted of an examination of the IOS process at a global level - including programme organisation, procedures and treatment of risk and contingency - as well as a series of zonal workshops at which we examined a cross-section of representative IOS schemes in order to review Railtrack's response to the IOS programme in greater depth. The 27 schemes examined in this way (and referred to as the IOS Call-In schemes) are listed in Appendix A.

1.4 Subsequent to our review of the Build 2 submission, a further submission termed Build 3 was issued by Railtrack on 19th May. We have consequently reviewed this document, and section 6 of this report deals with our key findings regarding the Build 3 iteration.

The IOS Programme

1.5 sSRA's consultation exercise led to the development of a package of 324 IOSs which were notified to Railtrack on 14th December 1999 as a schedule to a letter from the Franchising Director. This package of IOSs was accordingly included in the NMS, although the number had been reduced by one at the time of Railtrack's 30th March IOS submission. IOSs can be categorised into three groups according to their objectives:

> ***Capacity***: The intention of IOSs in this category is to raise capacity between specified points on the rail network. Generally, capacity improvements are expressed in terms of trains per hour, appropriately qualified to provide for even timetable spacing.

Journey Time: Journey Time IOSs are aimed at reducing journey time between specified points on the rail network, expressed either in terms of quantified reduction from existing journey times or in terms of absolute journey time aspiration. These IOSs are qualified to take into account rolling stock type and required stopping patterns.

Operational Flexibility: These IOSs are generally more prescriptive than Capacity and Journey Time IOSs, in that in many cases they specify particular infrastructure improvements rather than the outputs required from them. Typically, Operational Flexibility IOSs require local layout changes, for instance provision of additional crossovers or re-commissioning of station platforms.

1.6 Further categorisations of the IOS programme have been undertaken by Railtrack. The 30th March IOS Submission divides the programme into four groups relating to Railtrack's assessment of the technical feasibility of undertaking each :-

Group 1: "Outputs which are relatively straightforward to deliver, anticipated in the first half of the second control period";

Group 2: "Outputs which are more complex to deliver, anticipated in the second half of the second control period";

Group 3: "Outputs which it is not technically feasible to deliver with the constraints specified";

Group 4: "Outputs which overlap significantly with existing network development commitments, or operator aspirations which are currently being developed, which Railtrack proposes to deliver as an integrated part of a free-standing enhancement proposal".

1.7 The categorisation by Group was given in the 30th March submission as follows:-

Table 1: IOS Categorisation

Form of response	Group 1				Group 2				Group 3				Group 4				
Zone	C	J	O	Total	C	J	O	Total	C	J	O	Total	C	J	O	Total	Total
East Anglia	4	3	5	12	1	4	2	7	0	0	0	0	3	0	1	4	23
Great Western	4	5	20	29	8	14	22	44	0	1	0	1	2	1	3	6	80
London North East	6	0	2	8	6	16	3	25	0	0	0	0	9	1	2	12	45
Midlands	4	1	11	16	2	5	11	18	0	0	0	0	4	4	3	11	45
North West	2	7	8	17	4	7	5	16	0	1	0	1	2	0	0	2	36
Scotland	5	2	5	12	10	9	6	25	0	1	0	1	1	0	0	1	39
Southern	2	3	5	10	4	8	8	20	0	5	1	6	3	10	6	19	55
Grand Total	27	21	56	104	35	63	57	155	0	8	1	9	24	16	15	55	323

C=Capacity, J=Journey Time, O=Operational Flexibility

It should be noted that the total of 323 schemes in the summary table differs from the 335 schemes which are actually detailed in the same document. The difference relates to the inclusion in the Build 2 submission of successive iterations of the same schemes (notably for Scotland Zone) where re-interpretation of scheme requirement had been required.

1.8 Railtrack's 30th March submission also categorises IOSs by the financial provision required to deliver each of the Groups. This indicates a requirement of £470m for Group 1 (down from £650m given in the NMS), £3,750m for Group 2 (up from £2,000m) and £2,110m for Groups 3 and 4 (down from £3,000m). The net effect of these changes is that the overall provision of £5,650m given in the NMS was increased to £6,330m to reflect a better understanding of likely delivery costs following further refinement of estimates.

1.9 sSRA has more recently undertaken a categorisation exercise to reflect its priorities in delivery of the IOS programme, the results of which were communicated to Railtrack on 5th May. The highest priority category ("A*") embraces 117 schemes for which Railtrack estimated the total cost at Build 2 to be £698m. The second priority category ("A") includes schemes where sSRA continues to have an interest, but has indicated that further development work by Railtrack can proceed at a slower pace than category A*. The 94 schemes in Category A were estimated by Railtrack at Build 2 to have a total cost of £1,763m. The last category - category B - includes those projects where sSRA has indicated that it no longer wishes to see developed as part of the IOS process. The 124 IOSs in category B had a total estimated cost at Build 2 of £3,706m.

1.10 It is important to recognise the development status of cost information given in the 30th March submission. The development status is expressed as a level between 0 and 5, (as integer numbers or to one place of decimals), where Level 0 indicates that a conceptual idea for a scheme exists and Level 5 indicates that Railtrack can contract to offer scheme outputs for a fixed price. Each of the cost estimates underpinning financial information in the 30th March submission was to Level 2 status, defined by Railtrack as follows:-

- Project pre-feasibility work nearing completion/completed
- Outline project scope developed and major elements of work & options identified
- Outline programme developed
- Workstream costs developing from order of magnitude estimate
- Project contains high level of uncertainty and risks
- Project developed to the point of commercial feasibility phase

1.11 This demonstrates that there remained a high level of uncertainty regarding much of the cost information at Build 2. However, Railtrack continued to develop cost estimates for the A* schemes in particular, having expressed the intention to be in a position to deliver Level 4 estimates for most A* schemes by 19th May 2000.

2. PROGRAMME ORGANISATION

2.1 Railtrack's response to sSRA's IOS programme is being developed at two levels. A Central Programme Team (CPT) has been set up to plan and co-ordinate Railtrack's response to the sSRA, whilst development of individual IOS schemes is the responsibility of Railtrack's Zones. Zone Delivery Teams work to the procedures established by the CPT.

2.2 Railtrack states that its goals for the IOS programme are:-

1. To provide the business and key stake-holders with a programme framework which allows the IOS programme to be delivered in line with the sSRA's expectations
2. To demonstrate to the rail industry and particularly the sSRA and ORR that Railtrack is professional in its approach to implementing projects to meet TOC requirements
3. To develop a consolidated IOS programme that will support Railtrack's offer to the sSRA and ORR, demonstrating the case for incremental funding

2.3 The programme goals are supported by a more detailed set of objectives which are set out in Table 2:-

Table 2: Railtrack's IOS Programme Objectives

	Objective	Measure of success
1	Ensure that risks are identified and quantified, and either removed, transferred or mitigated	Existence of a comprehensive set of risk processes and QRA output
2	Develop a prioritisation process that will inform negotiations with sSRA should funding or other constraints materialise	Existence of a clear process, well understood in the Zones, that can be used flexibly to prioritise the programme
3	Baseline the agreed programme and implement a change control process	Existence of a cost loaded schedule in Primavera 3 for all 324 projects
4	Identify how the portfolio of projects within the programme can be measured against their initial objectives	Existence of a process which will support the ongoing monitoring of the portfolio of 324 projects
5	Negotiate a position with the sSRA and ORR which represents an acceptable level of risk and commercial return	Portfolio of projects with clearly understood scope, well understood costs and minimised risks
6	Develop a packaging philosophy to support the development of a procurement strategy	Zone buy-in to the packaging that maximises procurement leverage and resource utilisation
7	Deliver 324 projects to level 2, class 3* criteria by March 2000	sSRA/ORR acceptance of output to give required robustness to level 2 detail
8	Deliver tranche 2 and 3 projects to level 4, class 2** criteria by May 2000	sSRA/ORR acceptance of output to give required robustness to level 4 detail

* Class 3 defined in Railtrack's Guidance Notes for the Production of Capital Cost Estimates, Feb2000, ref C&S/CP-003 (Issue 1) as "an estimate to provide budget prices for each element of a project based on quantified scope and rates obtained from Railtrack's "MultiEst" estimating database or other defined data sources. This estimate is prepared during the pre-feasibility phase of the project, to provide project definition clearly linking scope with cost and providing an initial framework for the control of the project. The estimate can be prepared by any authorised party but must be endorsed by the Zone Estimator prior to its publication."

** Class 2 defined in Railtrack's Guidance Notes for the Production of Capital Cost Estimates, Feb2000, ref C&S/CP-003 (Issue 1) as "an estimate to provide an initial project cost plan based on quantified elements using MultiEst price data, supplier's estimates and costed resources forecasts. This estimate is prepared during the feasibility phase of the project, at the direction of the Project Manager, but must be endorsed by the Zone Estimator prior to its publication."

Central Programme Team

2.4 Railtrack's Central Programme Team is responsible for the following aspects of the IOS programme:-

- Ownership of the IOS estimation process
- Ownership of the IOS scoping process
- Ownership of the IOS risk process
- Ownership of the IOS planning process
- Programme support

2.5 The two key individuals within the IOS team are the IOS Sponsor and the IOS Programme Manager. The IOS Sponsor is responsible for liaison with Railtrack plc, Railtrack Strategy and Planning, Railtrack Regulation and Government, sSRA and ORR. The IOS Sponsor also represents the IOS CPT on the IOS Steering Group, a body which is intended to meet fortnightly and to report progress to Railtrack's Head of Capital Investment, Director of Network Development and Director of Strategy.

2.6 To support the requirement for consistency in delivery of the IOS programme, the CPT has developed a number of procedures and guidelines, both to steer its own work and to direct the efforts of the Zone teams. These documents augment Railtrack's existing project control and development procedures and include:-

IOS Programme Execution Plan, Ref IOS/ST/PO/002

IOS Build 1 Estimating Guidelines, Ref IOS/WI/ES/001

IOS Build 2 Estimating Guidelines, Ref IOS/WI/ES/002

Database Change Control Overview, Ref IOS/WI/DU/001

sSRA Query Tracking Overview, Ref IOS/WI/DU/002

IOS Programme Level 4 Outputs, Ref IOS/WI/PO/001

Zonal Teams

2.7 Development of each individual IOS is the responsibility of the zonal teams. These are typically led by the Zone Business Development Managers, supported by appropriate technical, estimating and external consultancy support as is deemed appropriate. The Zone teams have been responsible for developing scopes of works and associated costs for each IOS in compliance with the procedures and guidelines imposed by the CPT. We have identified some significant differences in the approaches adopted in the generation of IOS cost estimates. These differences are reviewed in section 3.

2.8 Railtrack has a rigorous programme control organisation in place which resulted in good progress to the Build 2 stage against very challenging targets. However, some of the techniques

and processes used by the CPT have tended to increase the estimated cost of the schemes. These issues are discussed in greater detail in sections 3.10-3.16.

IOS SCOPE DEVELOPMENT

2.9 The initial task facing the zonal teams was to develop an appropriate solution for each IOS. Whereas for some IOSs a timetabling solution was appropriate, obviating the need for physical works, the majority of IOSs were found to require infrastructure improvement.

2.10 Whilst generally we found that the Zones had undertaken fairly rigorous option analysis through a process of internal and external consultation (the latter via the IOS workshops with sSRA), it was evident that in some cases works had not been scoped to minimise cost.

2.11 One particular example, a project aimed at capacity enhancement, required the extension of two passing loops with 40 mph run-in/run-out speeds. This required replacement of all four turn-outs associated with the loops together with a further turn-out half way along one loop which served an industrial siding. Although we acknowledge that the 40 mph requirement was signed off by SSRA following the consultation process, we note that a reduced-scope option providing the lengthened loops but without the higher speed requirement might well have delivered a substantial proportion of the benefits for a significantly reduced cost, and perhaps might thus have been presented by Railtrack to sSRA as a non-compliant option.

3. BUILD 2 COST ESTIMATING

3.1 Development of cost estimates for the IOS programme is a two-stage process. The Zone teams are responsible for producing basic cost estimates which are processed by the CPT to produce a final cost estimate that is submitted as a price to sSRA.

Zone estimates

3.2 Zone estimates for Build 2 were intended to have been worked up to the Level 2 development stage (see section 1.10). In practice, the accuracy of the estimates supplied to the CPT was highly variable. In some cases, IOSs represent articulations of improvement schemes that had in the past already been the subject of feasibility studies, and in these cases we found that fairly detailed estimates were usually available despite the nominal "Level 2" status of the estimate. In contrast, those IOSs which are effectively new proposals were characterised by less developed estimates, with greater uncertainty.

3.3 The basis for estimates was generally Railtrack's "MultiEst" estimating database, combining work volumes with unit rate information and adjustments for specific circumstances to give a project price. There were, however, instances where MultiEst-based estimates had been rejected by the Zone teams and replaced by higher figures. These instances usually related to signalling modifications, where the experience of zonal signalling teams suggested that the MultiEst figures, although developed in a structured manner, would be insufficient to take account of local circumstances.

3.4 Examples of IOS schemes where MultiEst-based signalling estimates were replaced by higher figures on the basis of the professional judgement of Zone signalling specialists are shown in Table 3.

Table 3: Zonal signalling estimate amendments

Scheme	MultiEst signalling figure	Zone Engineer's figure
21.048, Havant	£0.468m	£1.200m
23.022, Wokingham	£0.374m	£2.600m

3.5 The estimates produced for Build 2 did not separately categorise renewals or accelerated renewals from genuine enhancement expenditure. Many IOS schemes will undoubtedly include an element of renewals expenditure which would otherwise be required in the future. For regulatory purposes, it will be necessary to find a mechanism for separately identifying these sums over the next two control periods.

3.6 An example of potentially mis-allocated expenditure related to IOS schemes for East Anglia Zone, where zonal staff considered that line speed increase works would trigger a requirement for TPWS. The rationale for charging the works to the IOS was that, without the line speed upgrade, the line would be treated as a secondary route and TPWS would not therefore

take place for some years. Railtrack's assumption, therefore, was that line speed upgrades would be the "trigger" for accelerated provision of TPWS, and that associated costs could therefore be charged to the IOS. Given that our understanding is that TPWS would in any case need to be installed, a more rational approach might be to charge the differential cost of implementing the works earlier to the IOS, rather than the full cost. Alternatively, the future savings in renewal cost would need to be identified.

3.7 A further consideration at Build 2 was that ongoing operating costs and cost savings triggered by IOSs had not been identified. Potential peripheral benefits of some IOS schemes will include maintenance cost savings and staff savings. The significance is that these issues will be included at later stages of the IOS programme. In some cases, these costs and benefits can be expected to have a significant effect on the price quoted to sSRA.

3.8 A further "operating cost" identified by LNE Zone and not by any other zone related to the impact on operating performance. For two Capacity schemes which we reviewed, no physical works were deemed to be necessary, but a cost of delivering increased capacity was nevertheless reported to sSRA. The explanation was that the reported cost was the modelled cost of additional train delays which would be triggered by providing for additional services through specific network nodes. Again, the concern was that Level 2 estimates for other schemes might include similar congestion charges which, so far, had not been reported. Given the proposed change to the structure of charges, such an allowance would result in double counting and would either need to be removed or separately identified so that the increased capacity charge could be taken into consideration.

3.9 We further noted sSRA's explicit instruction to Railtrack, contained in the 14th December 1999 letter from the Franchising Director, that the cost of additional train delays should not appear in a compliant response to an IOS. We therefore welcomed the fact that Railtrack has subsequently indicated to us its intention to remove these costs from any further iterations of the Build process, and that their original inclusion was erroneous.

CPT Estimate Overlays

Project Overhead

3.10 The zonal estimates were processed by the CPT for Build 2 to include in a consistent manner a number of project overheads. The percentages shown below against each overhead category are the overlays applied by CPT against the zonal base estimates, at Build 2.

Business Development	1.5%
Project Management & Delivery Management	15.0%
Feasibility	1.0%
Design Development*	6.0%
TOC Compensation	10.0%
Construction insurance	2.5%
Property/Land costs	Nil
Transport & Works Act (if applicable)	7.5%

*Except for Signal design costs, which are included in zonal estimates

3.11 We were not convinced that the blanket application of these project overhead assumptions was appropriate. As an example, the CPT included for each IOS requiring physical works a 10% cost overlay relating to TOC compensation. However, we were informed that the only schemes likely to trigger a TOC compensation figure of 10% or more were major schemes involving extensive remodelling and disruption. Given that the bulk of IOSs categorised as A* (i.e. high priority) do not fall into this category, we concluded that the 10% assumption was probably too high for this group.

3.12 One particular example which highlighted the TOC compensation issue was found in one Zone. For three schemes, the Zone had estimated the TOC compensation itself, and had concluded that an allowance of just 2.5% be made for two of them, whilst an overlay of just 2% was made for the other. This contrasts markedly with the 10% overlay applied by CPT, and was explained by the fact the Zone had established at an early stage that the work could be concluded mostly within the Rules of the Route. We anticipate that many A* IOS schemes will similarly require smaller provision for TOC compensation than the assumed cost of 10%.

Risk

3.13 A further overlay applied by the CPT rather than at Zone level related to risk and contingency. A proxy for a full Quantified Cost Risk Assessment was applied for Build 2. The process worked by requesting from the Zones not only the estimated cost of each output, but also the minimum likely outcome and the maximum likely outcome. The methodology assumed a uniform probability distribution between the minimum and maximum points, with the Build 2 reported figure being the P80 outcome (i.e. there is a 20% probability of the P80 cost being exceeded). As the assumed probability distribution was uniform, the P80 figure was in most cases the sum of the minimum estimated cost plus four fifths of the difference between the minimum and maximum costs (as illustrated below)

Illustration: Build 2 risk application

Cost estimate (with overheads)	£125,000
Minimum cost	£100,000
Maximum cost	£200,000
P80 reported cost	£180,000

3.14 In the (theoretical) example above, the P80 cost reported to sSRA would be £180,000, nearly 50% higher than the zonal estimate of £125,000. This example is not unrepresentative, as

the average minimum/maximum distribution around the base estimate was -6% to +65%. This means that the average risk loading on the base estimate was +50%.

3.15 Whilst this risk loading was transparent to us, we were not convinced that the loading did not duplicate risk contingencies already contained in zonal estimates. An example was the Hereford capacity IOS (10.008) where the zonal estimate was £4.35m, of which £4m was for signalling. In this case, the min/max distribution reported to the CPT was -10%/+30% (leading to a P80 risk loading of +22%), although within the zonal estimate the base signalling estimate was an indicative £2.5m - £4.0m. This indicated that the final outcome was more likely to be lower than the base estimate rather than higher.

3.16 The Regulator's has suggested in the April 2000 periodic review document that mean values may generally be more appropriate than P80s. Since a uniform distribution has been assumed, the mean will be the same as the P50 estimate. In the theoretical example shown above the mean would be £150,000 or 20% higher than the Zonal base estimate.

4. PROGRAMMING ISSUES

4.1 Given that the final content of the IOS programme has yet to be determined, we have not undertaken any analysis of resourcing requirements. However, it is clear that delivery of the full programme would require major resources, particularly for signalling. Given the context of other major enhancement programmes taking place in parallel during the second control period, resourcing issues will clearly require careful planning.

5. ISSUES FOR FUTURE DEVELOPMENT OF IOS PROGRAMME

5.1 A number of issues were identified that would need further consideration as the IOS programme is developed further. Whilst the initial review was confined to the Build 2 programme, it nevertheless raised a number of generic concerns that should be addressed at future stages of the programme.

IOS linkages and double-counts

5.2 The interaction between different IOSs is in many cases quite complex, and is the subject of consultation between sSRA and Railtrack. However, a number of generic types of interaction were identified during the course of our review:-

Mutual exclusivity: where it would be possible to deliver either of two IOSs but not both;

Mutual dependence: where delivery of the benefits for one IOS would be dependent on implementation of another separate, but linked, scheme;

Duplication: where delivery of an IOS would, at the same time, deliver the benefits associated with another;

Route synergies: where, overall, the benefits of delivering all or most IOSs associated with a specific route might outweigh the benefits of implementing any individual IOS in isolation; and

Delivery synergies: Packaging groups of IOSs, or IOSs with other site works (such as renewals and other enhancement schemes) could yield economies in terms of reduced project overhead and increased productivity.

5.3 We concluded that these inter-dependencies could have a significant impact on both the composition and the total cost of the final package. Whilst these linkages have to some extent been explored during our review, and also during consultation workshops with sSRA, it is clear that these factors should be made more explicit at later stages of the programme and their effects catalogued.

Ongoing costs and benefits

5.4 A significant number of IOSs will result in ongoing costs and benefits for Railtrack. Whilst we anticipate that incremental operating costs will be incorporated in Level 4 estimates, we would similarly expect that Railtrack's benefit streams be quantified. Costs and benefits likely to be generated through IOS implementation include:-

- Maintenance costs increases where additional infrastructure is provided or more intensive use of infrastructure is proposed; or possibly reductions where an IOS results in newer equipment which is less maintenance intensive;

- Staff cost savings where IOS implementation triggers resignalling and revised signal control arrangements;

- Performance penalty payment reductions for Railtrack where improved operational flexibility reduces train delay minutes; and

- Additional usage and capacity charges.

Unit costs of IOS delivery

5.5 We recommend that unit costs associated with IOS implementation should be reviewed in more detail when the IOS cost estimating process reaches Level 4 stage. The MultiEst rates will need to be validated to ensure that they are representative of the way in which works are actually implemented. For instance, a weekend blockade might result in a project being delivered at a significantly reduced cost compared with MultiEst, where different, less productive possession arrangements may be assumed.

Performance charges

5.6 A cost element which only one Zone had appeared to seek to pass on to sSRA was performance charging as discussed in section 3.8 above. This relates to train delay modelling which calculates the cost of congestion generated by more intensive train services at specific locations. It must be made clear at subsequent development stages of the IOS programme precisely how this issue will be treated.

Renewals content of IOS schemes

5.7 Railtrack had not considered at Build 2 to what extent the schemes developed to the Level 2 estimating stage might contain renewals elements, but clearly some schemes contain a very high renewals content. In these cases, it is appropriate that only the incremental costs associated with enhancements be passed on to sSRA. An agreed mechanism should therefore be developed to apportion IOS costs between renewals and enhancements, with an appropriate methodology developed for the treatment of accelerated renewals.

Project overheads and risk

5.8 The application of project overheads and P80 risk provision typically resulted in a doubling of cost by the CPT compared with the base zonal estimate. Whereas in some cases this might be appropriate, in other cases we considered that CPT risk contingency replicates zonal contingency, and that the central project overhead overlay might result in an artificially high cost estimate at Build 2.

5.9 Railtrack advised us that the standard project overhead and risk methodology will, at future stages of the programme, be replaced by project-specific overhead and risk assignment. Accordingly, we recommended that from Build 3 onwards, overhead and risk provision be reviewed on a sample basis to ensure that the standard allocations are replaced with more appropriate provisions.

6. BUILD 3 OVERVIEW

Introduction

6.1 We subsequently carried out an initial review of the IOS Programme at Build 3, using the data provided by Railtrack in its submission dated 19th May 2000 ("Incremental Output Statement – Cost Submission"), and its internal report of 18th May ("IOS Original Remit – Lessons Learnt & Management Information").

6.2 On 5th May 2000, the sSRA wrote to Railtrack setting out its "updated draft prioritisation of the Incremental Outputs". This document categorised schemes as A* (117 schemes), A (94 schemes) and B (the remainder). Railtrack was effectively instructed to cease work on the category B schemes, and to give greatest priority to the category A* schemes. The document stated that "the sSRA is minded to include [the A* schemes] in its final decision on the contents of the baseline for the next charges, although the final decision will depend on a number of factors, including the outcome of further development, the Rail Regulator's review of costs, and further refinement of the benefits".

6.3 Railtrack's 19th May submission provided cost data for the A and A* schemes only. Our analysis of the submission reviewed the overall costs of the total population of A* schemes, and also the costs of the sample of schemes which we reviewed at the Build 2 stage (the Call-In schemes). The Call-In schemes include a number of schemes in both the A* and A categories.

6.4 A delay to the development of the programme was apparent in that Railtrack had been able to achieve Level 4 status for only a small minority of the IOS schemes. The categorisation of the A* schemes as at Build 3 is as follows:

Level	Number
0	3
1	16
2	58
3	36
4	4
TOTAL	**117**

6.5 Railtrack's 19th May submission stated that the reasons for the delay in developing schemes to Level 4 status have included:

- sSRA's delay in prioritising the schemes to be developed
- sSRA's request for Railtrack to process 39 amendments to individual IOS schemes
- Railtrack's consequential inability to concentrate development resources on a more limited number of schemes, and to consider the inter-dependencies between IOS schemes on the same line of route

6.6 Annex B of the 19th May submission gives a timetable for anticipated Level 4 development of the A* schemes. 40 schemes will achieve this level by 31st July; a further 46 by 30th August; and the remainder at various dates through to 31st March 2001.

Summary of the A* Schemes and the Call-In Sample

6.7 The A* schemes comprise 117 schemes with a total estimated P80 cost at Build 3 of £955 million. In this analysis, one output (16.001 London – Norwich journey time) has been excluded: with an estimated cost of £167 million, there is (according to sSRA) no prospect of its proceeding in its present form.

Lead Zone	Total (£million)
EA	30.1
GW	128.8
LNE	127.7
MZ	37.1
NW	140.4
SC	92.7
SO	231.3
Total	**788.0**

6.8 The equivalent cost of the same schemes at Build 2 and at P80 was £697.7 million The principal cost movements for individual A* schemes between Build 2 and build 3 are listed in Appendix C.

Risk Assessment

6.9 Railtrack is still using a uniform distribution of risk rather than a distribution based on detailed assessment of individual risk factors. We have compared the P05, P50, P80, and P95 costs with the zone estimates including on-costs but excluding risk contingency. For the total of all A* schemes, these costs were +2.3%, +26.5%, +41.4% and +51.2%. (The figures for individual schemes have a much wider range).

6.10 The equivalent figures for the sum of the Call-In schemes are +0.9%, +27.2%, +43.4%, and +57.8% respectively. This indicates that the Call-In schemes are broadly representative of the total of the A* population, in terms of the overall spread of risk.

6.11 As the cost estimates are developed to Level 5 status, the spread of risk can be expected to diminish. Equally, the spread of risk of the total programme can be expected to be less than for the sum of the individual schemes.

Factors Which Will Affect the Final Cost of the IOS Programme

- **The Size of the Programme**

6.12 At this stage it is not possible to predict the final size of the programme, as sSRA's benefit:cost analysis is not yet complete. We understand that it is likely that the present total of 117 A* schemes represents the upper bound (albeit with some substitution of schemes between A* and A categories).

- **Inter-Dependencies in the Programme**

6.13 Railtrack has priced the programme as stand-alone schemes. However, 69 of the A* schemes (59% of the total) are on routes which have a total of 4 or more A* schemes. It is not yet possible for us to assess the savings which integration of these schemes might achieve, either in terms of eliminating duplication or in terms of packaging for procurement. However, based on experience of similar programmes, it is possible that the total saving might be in the order of 5-10%.

- **Construction Costs**

6.14 We are generally satisfied that the estimation processes used for the development of the programme are appropriate, as outlined above. Some costs will change significantly as solutions are worked up in detail, but we are satisfied that this factor is covered in overall terms through the quantified risk assessment process.

- **Sponsor Team Costs**

6.15 Sponsor Team costs have been estimated by Railtrack to be 1.5%. This compares with 1.0% for the West Coast Route modernisation (WCRM) project. It is possible that the figure could be higher for the IOS programme than for WCRM, because the former comprises a large number of relatively small schemes. Nevertheless, at least a part of the sponsor team costs comprise zonal staff costs which are included in Railtrack's operating cost base. We therefore suggest that the range of sponsor team costs is likely to be 1.0-1.5%.

6.16 An appropriate part of the abortive sponsor team costs for those IOS schemes which are not taken forward will require separate settlement. (See also 6.17 Design Costs).

- **Design Costs**

6.17 As noted in 3.10 above, a blanket figure of 6.0% was used by the CRT for design costs at Build 2 (apart from Signal design costs, which are included in the zone estimates). For Build 3, Railtrack has used specific feasibility and design development costs for each class of asset, as outlined in Table 1 of Railtrack's May 19th submission. We are satisfied that the figures used for Build 3 are appropriate for that level of cost development.

6.18 Abortive design and development costs for those IOS schemes which are not taken forward will require separate settlement.

- **Project Management Costs**

6.19 As in Build 2, project management costs have been applied as a mark-up to the base capital cost estimate of 15%. This compares with a figure of 7% for WCRM. We understand that the 15% figure is based on historic data, and that some saving on this should be possible by using appropriate procurement arrangements. We understand that 8% represents accepted best practice for zonal project management costs.

- **Insurance Costs**

6.20 As in Build 2, a standard percentage mark-up of 2.5% has been allowed for construction insurance. We have requested further information from Railtrack to support the need for such insurance for the IOS schemes. We have assumed a range of 0-1.5% at this stage.

- **TOC Compensation Costs**

6.21 As in Build 2, a standard percentage mark-up of 10.0% has been allowed for TOC compensation costs. We have asked Railtrack to provide evidence to support the statement in their May 19th submission that this is "typical of the compensation paid by Railtrack to operators under Network Change for a broad spectrum of project types". The Joint Project Team report on the West Coast Route Modernisation states that there are only a limited number of projects undertaken in recent years for which TOC compensation has been applicable. Furthermore, we would expect many IOS schemes to be completed within the Rules of the Route. Issues related to Schedule 4 payments are currently under review by the Regulator. Nevertheless we assume that the cost of TOC compensation for the IOS schemes be 5% on average. The majority of schemes comprise the A* sub-set of low to medium cost projects which should not trigger compensation payments as high as 10%. Some evidence for this is contained in 3.12 above.

- **Accelerated Renewal**

6.22 In its Build 3 estimates, Railtrack has identified some specific sums for planned renewals in the first two years of the second control period, which would be avoided as a result of carrying out the IOS scopes of work. Railtrack also stated that an allowance has been included for AMP type renewals in later years, which would be avoided. However, we note that in one of our Call-In schemes, (19.104), no sum has been identified in relation to accelerated renewals at Chelsea River Bridge, in the Build 3 estimates.

6.23 It will be necessary to examine this issue further, and we recommend that the Level 4 estimates should make specific reference to the question of renewals which are accelerated as a result of an IOS output. We are unable to estimate the impact of this factor at the present time.

- **Changes to Operating and Maintenance Costs**

6.24 In the May 19th Submission, Railtrack estimated that the net incremental annual maintenance cost for the A* schemes would be £2.34m, excluding the incremental costs which would be re-imbursed through vehicle-related variable track access charges. We have not audited this figure.

6.25 The submission also refers to a net annual saving of operating costs of -£0.4m, and one-off redundancy costs of +£0.5 m.

- **Performance Effects**

6.26 The May 19th submission notes that the performance cost of operating additional services should be remunerated through the Regulator's proposed congestion tariff. The congestion costs referred to in section 3.8 of this report have therefore been removed by Railtrack in the May 19th submission.

- **Contractual Issues**

6.27 It is not yet clear how the sSRA will procure the IOS schemes from Railtrack, but we understand that this may be based on some form of "contractor" model.

6.28 We have not considered the impact which alternative contractual models would have on the price to be paid for these schemes.

- **Risk and Contingencies**

6.29 As explained above, Railtrack has derived P80 and mean cost estimates from assumptions about the likely range of costs and an assumption that the distribution is uniform. For the A* schemes in aggregate, this results in a mean (P50) cost estimate which includes 26.5% risk premium over the zonal estimate plus on-costs. Similarly the P80 estimate includes a 41.4% premium over the zonal estimate plus on-costs.

6.30 As more IOSs are developed to level 4/5 status, specific risks will be quantified in more detail. The overall spread of risk can therefore be expected to diminish. In addition, as mentioned in 6.11, it can be expected that the spread of risk of the total programme will be less than for the sum of the individual schemes. Railtrack has already carried out some preliminary analysis to demonstrate this, but the results should probably be considered as illustrative at this early stage of scheme development.

6.31 Our judgement at this stage is that Railtrack's P50 and P80 risk contingency percentages are at the upper level of risk values expected from the original zonal estimates. The range of schemes within the IOS package includes projects which although at the varying stages of scoping, planning etc. cover standard types of enhancement schemes. Therefore an average risk contingency of around 30% at (P80) and 20% at mean would be more reasonable. Risk values consistently higher than the 20 to 30% range would be associated with novel elements or lack of scope.

Conclusions

6.32 We attach as Appendix D a table which illustrates the impact of the changes outlined above, on the estimated cost of the package of A* schemes at Build 3. (As stated in paragraph 6.7 above, we have omitted the costs of output 16.001 in this analysis).

6.33 Railtrack currently estimates the P80 cost of the A* schemes to be £788 million at Build 3. As shown in Appendix D, we estimate that the cost of this package of schemes to lie around £578 million at P80, and £533 million at P50.

6.34 In addition, in Appendix E we show the cost of each of the individual A* schemes (and also the category A schemes which were included in the Call-In sample at Build 2), showing the estimated cost if the same percentage factors are applied to the individual schemes as have been applied the total of A* schemes in Appendix D.

6.35 The figures for individual schemes can be expected to change significantly as they progress through Railtrack's scheme development process. The figures in Appendices D and E also exclude any adjustments which may be necessary as a consequence of accelerated renewal, or changes in operating and maintenance costs or performance impacts, or the form of contractual arrangement agreed between sSRA and Railtrack.

APPENDIX A: SCHEDULE OF IOS CALL-IN SCHEMES

IOS No.	Priority Category	Lead Zone	Description	Output	Build 2		Build 3	
					Zone estimate £000	Railtrack P80 £000	Railtrack P80 £000	Level
4.002	A*	Great Western	Paddington - Plymouth via Newbury and Taunton	J	8,189	13,308	12,290	2
5.005	A*	Midland	Leicester to Derby	J	387	1,738	2,393	2
5.012	A*	Midland	Derby to Sheffield	J	2,740	5,097	864	2
7.031	A*	Midland	Coventry - Leamington	O	303	626	507	3
10.001	A*	Great Western	Cardiff Central - Crewe	C	8,940	14,468	27,088	2.6
13.026	A*	LNE	Dore Junction	O	6,858	12,512	17,239	2.6
14.007	A*	Scotland	Edinburgh Waverley	O	13,391	21,751	1,644	2.5
14.015	A*	Scotland	Edinburgh - Glasgow	J	22,362	33,261	-	2.5
14.102	A*	Scotland	Edinburgh - Dundee	J	22,362	33,897	-	3.8
15.016	A*	East Anglia	Peterborough - Stansted	J	9,470	17,544	16,665	2
17.017	A*	East Anglia	Upminster - Grays	O	1,918	6,527	2,894	3.3
19.214	A*	Southern	Victoria - Eastbourne	J	2,500	4,692	7,060	3
21.048	A*	Southern	Havant	O	4,035	7,847	24,119	3
23.022	A*	Southern	Wokingham	O	3,436	5,221	8,465	3
31.010	A*	LNE	Sleaford - Lincoln	C	200	272	-	2
32.013	A*	North Western	Chester	O	809	1,349	2,755	3.6
37.010	A*	LNE	Sunderland - Middlesborough	C	650	884	-	2
Total A* Call-in					**108,550**	**180,994**	**123,982**	
7.037	A	Midland	Fenny Compton loops	O	7,810	11,916	8,453	3
14.003	A	Scotland	Aberdeen - Inverness	C	12,478	19,464	19,326	2.6
16.008	A	East Anglia	Ipswich - Lowestoft	C	6,607	11,424	3,837	3.3
17.014	A	East Anglia	Upminster - Grays	C	9,461	17,816	18,032	2
19.104	A	Southern	Clapham Junction - Mitre Bridge	C	2,110	3,874	8,256	2.9
Total A Call-in					**38,466**	**64,494**	**57,904**	
10.008		Great Western	Hereford	O	4,351	7,218	-	
11.001		Midland	Shrewsbury	O	9,711	15,697	-	
21.049		Southern	Bournemouth	O			-	
33.001		North Western	Manchester - Blackpool	J	10,312	15,962	-	
36.029		North Western	Leeds - Carlisle	C	140,984	234,128	-	
Total B Call-in					**165,358**	**273,005**	**-**	

Notes:

Output J - Journey time improvement
C - Capacity improvement
O - Operational flexibility

Zone estimates excludes on-costs

Source: Railtrack

APPENDIX B - IOS BUILD 2 CASE STUDIES

	IOS No.	Scheme	Issues illustrated
1.	**10.008**	**Hereford flexibility**	**Treatment of risk/contingency**
2.	**07.037**	**Fenny Compton**	**Base estimates, renewals content**
3.	**37.010**	**Sunderland/Middlesbrough**	**Congestion and performance**

1. 10.008 Hereford, Operational Flexibility

This IOS, led by Great Western Zone, calls for reversible working for passenger trains in two through platforms at Hereford station, and the ability to run with passenger trains to/from Worcester to the bay platform.

Railtrack's assessment was that the existing electro-mechanical interlocking was incapable of being modified to reflect the revised site layout that would be required to deliver the IOS. Accordingly, Railtrack's proposal at Build 2 was for a completely new SSI signalling installation and track layout modifications.

The "rough order of costs" assessment of signalling was given as £2.5m - £4.0m, although the figure rolled forward to the summary estimate was the top limit of this range, £4.0m. The track modifications were estimated at roundly £351k. The figure reported by the Zone to CPT was, therefore, £4.351m.

The CPT then overlaid its standard provision for project overheads of 36% and then a further provision for P80 risk contingency. The minimum/maximum range around the Zone's base estimate was given as -10%/+30% (which appears to be at odds with the spread assessment given by the Zone's signalling engineers). Applying the methodology described in section 3.13 gives a P80 risk overlay of +22%. The overall effect of these overlays is considered in the following set of calculations, along with a comparator calculation showing how this project might more appropriately have been reported given the £2.5m - £4.0m signalling cost estimate spread initially provided by the Zone.

Exhibit: Double application of risk contingency (all figures, £000)

	Railtrack	BAH Comparator
A. Signalling	4000	2500
B. Track & Civils	351	351
C. Sub-total (A+B)	**4351**	**2851**
D. Project Overhead (36% of C)	1566	1026
E. Project total (C+D)	5917	3877
F. P80 Risk contingency %	+22%*	+48%**
G. P80 Risk contingency (E*F)	1301	1861
H. Grand total (E+G)	**7218**	**5738**

*Calculated as the point 80% of the way from -10% to +30%, these being the min/max figures reported by the Zone.

**Calculated as the point 80% of the way from 0% to +60%, 60% being the difference between the £2.5m minimum figure and the £4.0m maximum figure for signalling originally reported by the Zone.

This example demonstrates that the possible double-count for risk at Zone and CPT level led to a cost figure of £7.218m being reported to sSRA, whereas our assessment shows that a figure of £5.738m might have been more appropriate. It should also be noted that even this lower figure probably still includes an element of renewals expenditure (some life extension works have

recently been proposed for Hereford signal box), and possibly an over-generous TOC compensation figure. The final cost to sSRA might therefore be substantially less than £5m.

SSRA has subsequently decided that this scheme will be in category B. As a result, it has not been developed for Build 3.

07.037 Fenny Compton Loops

IOS 07.037 requires provision of loops on both tracks at Fenny Compton sufficiently long to berth trains of 775 metre length, with entrance/exit speeds of at least 40 mph. Railtrack's response to this IOS is led by Midland Zone.

Railtrack's response at Build 2 was to cost the following works:-

- extend the two existing loops at the site,
- provide two new 40 mph turn-outs at the extended end of the loops,
- replace the existing low-speed turn-outs at the other end of the loops with new 40 mph turn-outs,
- replace a fifth low speed turnout currently located along one of the loops and which provides a link to Kineton MOD Depot, with a new turn-out designed for 40 mph operation
- Fully re-signal the site

The cost estimate provided by Railtrack was as follows (£000s):-

Signalling	5,318
Permanent Way	2,397
Other	95
Zone Total	7,810
36 % assumed CPT overhead	2,812
Total project cost	10,622
P80 risk contingency	996
Grand total at P80	11,618

Our concerns with the cost information provided for Fenny Compton were two-fold. Firstly, the MultiEst estimate for signalling and certain track works appeared extremely high, and secondly the cost estimate in this case certainly contained a large proportion of renewals expenditure. Each of these issues is considered below:-

Unit costs:-

Signalling

The cost estimate of £5.3m was derived from a simple model in MultiEst that successively overlays provision above a base sum to take account of site circumstances:-

Base cost: 8km at £164,384	£1,315,068
+50% for "resignalling as part of remodelling scheme"	£ 657,534
+50% for "railway with nothing but disruptive possessions available"	£ 657,534
+50% for "complex junction layout with dense traffic"	£ 657 534
+40% for SSI technology	£ 526,027
+100% for full bi-directional system	£1,315,086
Other adjustments	£ 180,235
Total	£5,318,000

The effect of the successive overlays shown in the above analysis is to produce a final cost which is four times the base cost. Whilst we recognise that, with simplistic modelling techniques like this, there is a need to build in provision for complexity, technology and site circumstances, it does appear that in this case the allowances taken together have resulted in a final calculated cost which is too high. An independent assessment (at a comparable "Level 2" estimate status) of the likely costs of resignalling a comparable site in the Netherlands gave an indicative cost estimate of £2.3m, a difference which is sufficiently marked to support our doubts.

Track

We have not undertaken an exhaustive review of the unit cost assumptions made by Railtrack for Fenny Compton. Instead, we have focused on some of the unit rates given in MultiEst and compared against the rates quoted in the 1999 Edition of Spon's Railway Construction Price Book. Although most rates appeared reasonable, and some indeed directly cross-referenced Spon's, we noted some disparity for installation of turn-outs.

Railtrack has assumed a figure of £215,943 for the installation of an EV turn-out at Fenny Compton. Analysis of Spons data for verification purposes is slightly problematic in that the price of an EV turnout is not quoted. However, the price of an EV crossover (a double ended layout) is given as £91,460 (assuming the most expensive Spons price band which reflects the highest level of possession constraints). Given that Spons reports the price of a single turn-out as generally 60% of the cost of a comparable double-ended layout (and certainly no higher than 80%), the cost of an EV turnout should lie between £55,000 and £72,000. Railtrack suggests that the difference can be explained by the omission of labour, preliminaries and material haulage charges from the Spons cost (although we understand that labour costs certainly are included in the Spons

rate). However, even adding these back to the £72,000 calculated above, and making appropriate adjustments for inflation, still only gives a total of approximately £140,000, still markedly below the Railtrack figure.

Renewals content

The final issue at Fenny Compton relates to the treatment of renewals content. The cost estimate reported to sSRA was the gross cost of undertaking the work, although it is known that major resignalling works are scheduled to take place on this route during the course of the second control period. Accordingly, we consider that the only signalling expenditure associated with this IOS which should correctly be passed through to sSRA relates to the incremental cost of site-remodelling for IOS functionality. Given that most signalling equipment at the site - both indoor and outdoor - will require renewal, the incremental cost to sSRA should be far lower than the gross cost of £11.62m quoted at Build 2.

At Build 3, Railtrack had reduced the P80 estimate to £8.45m, the development stage now being at Level 3.

37.010 Sunderland/Middlesbrough Capacity

This IOS requires Railtrack to provide two paths per hour between Sunderland and Middlesbrough, one service being limited stop and the other stopping at all stations. Railtrack's response is being developed through LNE Zone.

Railtrack's assessment was that this IOS could be achieved through timetabling measures alone without the need for additional or modified infrastructure. Nevertheless, an implementation cost of £884,000 was reported to sSRA in the Build 2 submission. The rationale for this charge was that it represented the capitalised cost to Railtrack of the incremental network congestion caused by the utilisation of the extra paths sought by sSRA. LNE Zone had applied a congestion modelling tool ("MERIT") which quantified in financial terms the additional congestion by multiplying delay minutes by an assumed cost-per-minute multiplier. The model calculated two distinct congestion costs, one being the annual Railtrack cost (£118,758) and the other being the industry congestion cost (£174,695). The Railtrack annual cost was then capitalised over six years, at an assumed 3% discount rate, to give a zonal "project" cost of £650,000. This figure had then been increased to £884,000 by the CPT to allow for project overhead (although Railtrack acknowledged that this should not have been done, and would be removed in successive Builds).

No other Zone applied this congestion charge modelling in developing their IOS Build 2 cost estimates. Equally, none had sought to quantify the potential benefits associated with reduced congestion for schemes where IOSs might delivery improved operational flexibility.

At Build 3, Railtrack had reduced the cost estimate to zero.

APPENDIX C: TOP 34 COST MOVEMENTS, BUILD 2 TO BUILD 3

IOS Scheme Ref	RT Zone	Build 2 P80 Value	Build 3 P80 Value	Delta	Zones Comments
14.102	SC	33,896,520	0	-33,896,520	Reduction in Infrastructure scope to produce a reduced target journey time that has been agreed between Scotland Zone and the sSRA. Reduced scheme sought by sSRA not viable.
14.103	SC	33,660,890	0	-33,660,890	Initially the whole line of route was considered from Edinburgh to Aberdeen. Reduced scheme sought by sSRA not viable.
14.015	SC	33,261,350	0	-33,261,350	Output achieved through Scheme 14.007 so costs deducted to avoid duplication
14.105	SC	35,662,660	12,497,910	-23,164,750	Build 2 contained further improvements over and above the output requirement. These have been removed
14.007	SC	21,751,050	1,643,926	-20,107,124	The option identified avoids the major remodelling included in Build 2
39.014	SC	19,981,150	4,796,619	-15,184,531	The Build 2 scope of work allowed for resignalling Shields Junction to Paisley. Further development has identified that only a number of signals need to be repositioned
04.001	GW	13,308,180	0	-13,308,180	Costs quoted at Build 2 were for Scheme 4.002 in error. Should be nil cost.
14.107	SC	31,794,050	19,872,840	-11,921,210	The signalling scope of works has been reduced from Build 2
26.011	EA	13,028,520	2,483,041	-10,545,479	Costs have reduced at Build 3 due to development work which has identified sufficient box capacity
11.111	MZ	11,002,560	811,360	-10,191,200	The range used at Build 2 was incorrect, this has been adjusted at Build 3
16.001	EA	175,409,100	167,212,200	-8,196,900	Costs have not changed from Build 2, the revised figure represents a different sample from the risk model

39.007	SC	8,994,333	1,278,002	-7,716,331	Development work on the loop at Orton has reduced both the scope of works and costs
39.001	SC	8,990,039	1,434,865	-7,555,174	Development work on the loop at Orton has reduced both the scope of works and costs
30.003	MZ	9,136,692	2,180,259	-6,956,433	At Build 3 a simpler engineering solution has been identified.
14.104	SC	6,118,357	0	-6,118,357	Output now achievable at nil cost
39.102	SC	0	6,459,192	6,459,192	Reported as 39.017 previously
22.031	SO	1,935,423	8,941,771	7,006,348	Additional DC Sub-Station and rectifiers identified at Build 3
31.016	LNE	24,479,660	31,638,530	7,158,870	Costs have not changed from Build 2, the revised figure represents a different sample from the risk model
04.035	GW	3,210,877	11,050,630	7,839,753	The scope of work has increased from Build 2 to include for double track between the re-doubled junction at Weston station, with associated crossovers and a second platform at Weston Milton
21.009	SO	1,863,567	12,783,000	10,919,433	The scope of work is significantly different at Build 3
19.105	SO	7,137,108	19,380,560	12,243,452	Additional AC electrification and immunisation allowed for at Build 3
04.002	GW	0	12,289,580	12,289,580	See comment against 4.001
10.001	GW	14,467,840	27,088,290	12,620,450	Revised loop design includes for addition length and higher speed exit and entry turnouts. Additional signals included between Harlescott and Wem
01.001	NW	2,531,126	15,956,620	13,425,494	Development work has identified interlocking computability / capacity problems.
20.001	SO	3,695,034	19,213,330	15,518,296	The scope of work at Build 3 now includes for additional signalling at Barnham. Further platform and bridge works identified
21.048	SO	7,846,553	24,118,980	16,272,427	The scope of work at Build 3 now includes for additional signalling. Further platform and bridge works identified

20.004	SO	4,247,040	21,603,390	17,356,350	The scope of work at Build 3 now includes for additional signalling and significant permanent way and bridge works
33.002	NW	15,962,030	36,024,960	20,062,930	Scope of work increased from Build 2 particularly within signalling, permanent way and bridges
12.001	NW	6,249,081	28,260,060	22,010,979	The Build 3 feasibility study has increased the length of track slewing required plus additional trackside cable and troughing
29.005	GW	7,728,116	30,941,930	23,213,814	The revised cost is based upon additional work identified during the engineering development to Build 3. Also incorporates costs for 29.013 and 29.014
23.000	SO	11,806,790	43,463,930	31,657,140	The scope of work at Build 3 now includes for additional signalling and significant permanent way and bridge works
33.104	NW	10,065,460	46,081,570	36,016,110	The feasibility report has identified that considerable permanent way work is required to achieve the output, this was not envisaged at Build 2
06.018	SO	0	40,903,130	40,903,130	The scope of work at Build 3 now includes for significant additional permanent way not identified at Build 2

APPENDIX D:

	Factor (Railtrack Build 3)	Factor (BAH mean)	All A* schemes (Railtrack Build 3)	All A* schemes (BAH mean)
Asset Cost, Zone Estimate			£418,758	£418,758
Less Interdependencies	0.0%	-10.0%		-£41,876
Sub-Total			£418,758	£376,882
On Costs:				
Sponsor Team	1.5%	1.0%		
Design	4.0%	4.0%		
Project Management	15.0%	8.0%		
Insurance	2.5%	0.0%		
TOC Compensation	10.0%	5.0%		
Sub-Total	33.0%	18.0%	£138,263	£67,839
Asset Cost plus On-Costs			£557,021	£444,721
P80 risk	41.4%	30.0%	£230,601	£133,416
P50 risk	26.5%	20.0%	£147,470	£88,944
TOTAL (P80)			**£787,622**	**£578,137**
TOTAL (P50)			**£704,491**	**£533,665**

Note: Ignores renewal, operating, maintenance, and performance impacts