

Office of Rail Regulation
(ORR)

HS1 Cost Review

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Contents

	Page		
1	Important Notice	1	
2	Executive Summary	2	
	2.1	Reviewing HS1's budgets	2
	2.2	Indicators as to the efficiency of HS1's management of costs	2
	2.3	HS1's recovery of costs from operators	3
3	Background and introduction	4	
4	Basis of our review	6	
	4.1	HS1's budget to 2013 / 14	6
	4.2	Data available	10
	4.3	Operational changes	10
5	Top-down view	12	
	5.1	Benchmarking HS1 against [S&C]	12
	5.2	Benchmarking HS1 against other international comparators	13
6	Bottom-up view	15	
	6.1	Underlying O&M costs	15
	6.2	Case studies	16
	6.3	Case studies – Summary of findings	22
	6.4	Changes in staff costs	22
	6.5	Movement in the efficiency frontier	23
	6.6	HS1's approach to funding renewals	24
7	How HS1 intends to recover operating, maintenance and renewal costs from train and freight operators	25	
	7.1	Identifying the total cost to be recovered from operators	25
	7.2	HS1's principles for apportioning costs between operators	25
	7.3	Calculation of access charges	26
8	Conclusions and recommendations	29	
9	Appendix A: HS1's methodology for apportioning costs between services	30	

1 Important Notice

In accordance with the terms of reference set out in your engagement letter dated 12 May 2009, we enclose our final report.

This document is private and confidential and is intended only for the information of the ORR until agreed otherwise. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Our findings are inevitably limited due to the limited time available to extract and assess the technical, financial and commercial data concerning HS1 and NR(CTRL)'s operating OMR costs, and by the continuing changes to the proposed budgets which arise from the ongoing restructuring of the businesses.

2 Executive Summary

2.1 Reviewing HS1's budgets

The Office of Rail Regulation (ORR) has asked Arup for a short report which reviews High Speed 1 (HS1) costs, identifies any gaps and assesses whether the work done by HS1 is reasonable. This report comes ahead of a planned transfer of regulatory responsibilities for HS1 from the Secretary of State to the ORR, planned to take place on 1 October 2009.

This review has been undertaken against a background of significant change, with both the business itself and almost all of the key contracts underpinning the budget subject to ongoing renegotiation. As a result, Arup was not in a position to assess a final set of numbers for the first control period. The budgets presented and reviewed used in our review of HS1's proposed access charges were in line with those used by High Speed 1 Ltd for the purpose of its 4th consultation on HS1 access charges, with an opening budget of around £77.5m for 2009/10. However, this report also refers to and draws on analysis of other assumptions about HS1's cost base, some of which have since become outdated.

2.2 Indicators as to the efficiency of HS1's management of costs

In reviewing HS1's budget with the management team and Infrastructure Manager NR(CTRL), we have been able to identify a set of high-level indicators relating to the efficiency with which they appear to be controlling the railway's cost base. Our views are based on a limited amount of benchmarking analysis and some bottom-up evidence provided by management.

We have reviewed benchmarking analysis provided by HS1, comparing HS1's performance against a range of European comparators. Those benchmarking exercises indicate that HS1's unit costs may be around 7% higher than the comparator to which HS1 feels it is most comparable, and somewhat more than double those incurred by other Infrastructure Managers in maintaining high speed rail infrastructure.

We have also benefited from a series of discussions with HS1, their advisers and the Infrastructure Manager, NR(CTRL). Those discussions enabled us to develop a high-level picture of how HS1's cost base is managed. Given the uncertainties relating to the evidence base, we would suggest that ORR undertake further research along these lines ahead of future regulatory reviews for which it will be responsible.

The involvement of NR(CTRL), although limited, was important in this review, given their role in managing the majority of HS1's costs, and HS1's reliance on them for the delivery of any future efficiency savings. Our findings from the discussions we held were that the Infrastructure Manager relies heavily on the French standards in developing its maintenance plans and budgets, and that its commercial position in buying services is weaker than its European comparators. We believe that as the Infrastructure Manager's understanding of the assets increases with time, there may be scope for reducing costs without compromising safety or performance.

HS1's view is that the evidence and findings set out above do not necessarily indicate any inefficiency in its performance, as the railway's characteristics do not allow the business to achieve unit costs in line with some European comparators, and the 7% difference with what it views as the most comparable Infrastructure Manager is within an acceptable margin of error. In particular, they cite as differences the line's size, standalone nature, location, status as a work in progress, and the restructuring and impending sale. Nevertheless, the differences in unit costs revealed by the work described suggest that as a priority, the ORR should undertake work to establish what a long term efficiency frontier for HS1 should be.

2.3 HS1's recovery of costs from operators

HS1's regulatory regime will allow it to recover its costs from operators. HS1 has developed a methodology for apportioning its costs among operators, following the principles set out below:

- Directly incurred costs are those which are only incurred as a result of running particular classes of services will be met solely by the operators running those services
- Common costs are those which remain after directly incurred costs have been apportioned among the appropriate operators
- If HS1 is unable to recover from freight operators the costs directly incurred by running freight services, the shortfall will be made good by the domestic franchisee

These principles translate into a proposed charging structure used to calculate charges to each operator. The charges referred to here are designed to recover HS1's annual budget, i.e. the £77.5m figure for 2009/10 referred to above. They are to be considered separately from HS1's 'Investment Recovery Charges', which are outside the scope of this review. As part of our review, we asked HS1 to demonstrate that the calculations made in their model were consistent with the approach summarised above. We reviewed the model with reference to a particular service (St. Pancras to Ashford), and were satisfied that the calculation reflected the building blocks set out above. However, a comprehensive audit of the model was not within the scope of our review.

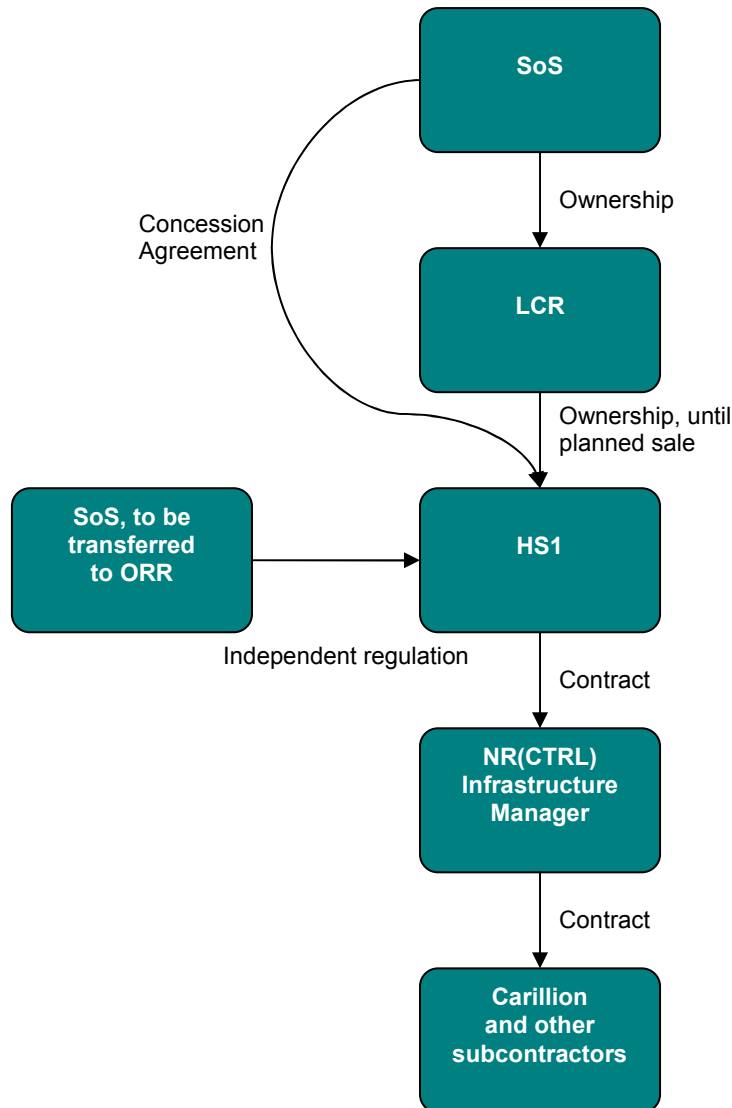
3 Background and introduction

HS1 Ltd is a subsidiary of London and Continental Railways (LCR), and the holder of a new Concession from the Secretary of State to operate and maintain HS1. LCR's other key subsidiaries comprise the UK arm of Eurostar (EUKL) and London and Continental Stations and Property (LCS&P). Although LCR was originally an entirely private venture, a series of restructurings led to it being classified as a non-financial public corporation by the Office of National Statistics (ONS) in February 2006, and its equity is now owned by the Secretary of State.

The changes arising from the restructuring of the HS1 project and delivery vehicles supported successful completion of the construction project, on time and within budget. However, the structure put in place may be less suitable for long term operations, and may present risks to long term levels of efficiency. In particular, historical government guarantees of LCR's debt and EUKL's access charge payments, and the long term operator contracts which were put in place with NR(CTRL) have not yet been subjected to independent regulation.

To respond to those risks, the government and LCR are presently implementing a long term restructuring of LCR's businesses, with the aim of placing them at arms length from the Government on a commercially sustainable basis. The proposed restructuring is understood to address those risks directly, to a large extent through a new capital structure and a significant renegotiation of the operator contract with NR(CTRL) and the major subcontract with Carillion which sits underneath it and presently accounts for close to half of the NR(CTRL) budget. Figure 1 illustrates the key parties and relationships as they now stand. For the foreseeable future, the role played by NR(CTRL) in managing HS1's cost base is likely to remain important.

Figure 1 - Parties and relationships



Source: Arup

Within the context of the present restructuring, responsibility for regulating some aspects of HS1's business is to be transferred from the Secretary of State to the ORR. Alongside that transfer, ORR expects the future Concession Agreement between the Secretary of State and HS1 to introduce independent regulation of the business's cost base, with Control Periods (CP), spanning 5 or 6 years. The Concession Agreement will also oblige HS1 to take a 40 year view of asset condition, and to meet minimum operating requirements and industry best practice. Ahead of the changes set out above, ORR has asked Arup to prepare 'a short report which reviews HS1 costs, identifies any gaps and assesses whether the work done by HS1 is reasonable'.

4 Basis of our review

4.1 HS1's budget to 2013 / 14

As set out above, our review has taken place against a moving landscape, with both the business itself and almost all of the key contracts underpinning the budget subject to ongoing renegotiation. We note that the proposed budget has changed since our review began (as a consequence of HS1's progress towards renegotiating the Operator Contract), and that it is likely to change again as the renegotiation continues, and as progress is made towards delivering other elements of the restructuring.

The budget presented by HS1 for the purpose of this review therefore presumes a significant set of changes from the last year's cost base, but remains subject to change. The tables at figure 2 show HS1's budgets up to 2013 / 14, a year before the end of what has since been set as the first Control Period.

Figure 2a – Total HS1 budget to 2013 / 14

Total HS1 budget (£ m)	2009/10	2010/11	2011/12	2012/13	2013/14
Total NR costs	49,054	48,152	47,268	46,401	45,552
Total HS1 Ltd costs	7,760	7,353	7,274	7,197	7,120
Total pass through costs	15,882	16,971	18,782	19,450	19,957
Total renewals annuity	4,834	4,834	4,834	4,834	4,834
Total HS1 budget	77,531	77,310	78,158	77,882	77,463

Source: Information provided by London and Continental Railways

Figure 2b – Breakdown of total NR costs

NR (CTRL) Costs (£ m)	2009/10	2010/11	2011/12	2012/13	2013/14
Managing Director	1,113	1,121	1,078	1,055	1,028
Business Manager	1,107	1,097	1,069	1,050	1,028
Operations	6,775	6,711	6,542	6,424	6,290
Safety & Assurance	805	798	778	764	748
Outside Parties	375	371	362	355	348
Track	4,693	4,649	4,532	4,450	4,357
Civils	4,072	4,034	3,933	3,861	3,781
Signals	3,141	3,112	3,034	2,979	2,917
Electrification & Plant	7,243	7,175	6,995	6,868	6,725
Contracts	8,686	8,604	8,388	8,236	8,065
Strategic Planning	651	645	629	618	605
Renewals/component Replacement	987	540	741	659	680
Daylight Track Inspections	-	-	-	-	-
Fees - Annual + Performance	7,265	7,186	7,108	7,032	6,957
NRIL Costs (£ m)					
GSMR	160	158	156	153	151
Operations & Maintenance - S1	520	513	505	498	491
Operations & Maintenance - S2	1,039	1,025	1,011	997	983
Ripple Lane Sidings	420	414	408	403	397
Total NR costs	49,054	48,152	47,268	46,401	45,552

Source: Information provided by London and Continental Railways

Figure 2c – Breakdown of HS1 Ltd costs

HS1 Ltd Costs (£ m)	2009/10	2010/11	2011/12	2012/13	2013/14
Flat detection system	67	67	67	67	67
NGC Fees	462	456	449	443	437
Staff Costs	2,322	2,290	2,258	2,227	2,196
HR	94	81	79	78	77
Consultants	263	200	197	194	192
Technical Support	818	305	301	297	293
Rent	179	201	199	196	193
Rates & Service charge	20	20	20	20	20
Service changes	18	17	17	17	17
Computers & Office Equipment	508	430	424	418	413
Light & Heat & Water	16	18	18	17	17
Cleaning	18	18	18	17	17
Telephones	11	11	11	10	10
Mobiles/blackberries	24	24	23	23	23
Photocopiers	54	36	35	35	34
Other Office Running Costs (postage, couriers, archive etc)	108	106	104	103	101
Statutory Audit	61	74	74	74	74
Other Audits (Safety, Environment etc.)	40	43	43	43	43
Legal & Professional Fees	170	251	248	245	241
Regulation costs	1,000	1,000	1,000	1,000	1,000
ORR Safety Levy	456	456	456	456	456
Rescue Locomotives	70	69	68	67	66
Grays Warehouse	146	146	144	142	140
Environmental initiatives	49	30	29	29	28
Travel & Conferences - Travel/hotels/expenses	36	75	74	73	72
Subscriptions & Donations	60	59	58	58	57
Sponsorship	10	10	10	10	9
Corporate Memberships	16	11	11	11	11
Corporate Subscriptions	5	5	5	5	5
Professional subscriptions	4	4	4	4	4
Entertaining, events	18	17	17	17	17
Team Events	29	30	29	29	28
Business Development	11	44	43	42	42
Environmental Bonds	40	32	32	31	31
Bank charges	28	28	28	28	28
Conferences, roadshows, events	33	32	31	31	30
Training	67	51	51	50	49
Marketing/branding & PR	430	609	600	592	584
Total HS1 Ltd costs	7,760	7,353	7,274	7,197	7,120

Source: Information provided by London and Continental Railways

Figure 2d – Breakdown of pass through costs

[X]

Source: Information provided by London and Continental Railways**Figure 2e – Breakdown of renewals annuity**

Composition of renewals annuity (£ m)	2009/10	2010/11	2011/12	2012/13	2013/14
Routine Rail and points replacements	2,589	2,589	2,589	2,589	2,589
Civil renewals - S & C	562	562	562	562	562
Civil renewals - Fencing	102	102	102	102	102
Civil renewals - Drainage	266	266	266	266	266
Civil renewals - Bridgeworks	181	181	181	181	181
Routine signalling/ telecoms renewals	110	110	110	110	110
OLE renewals	76	76	76	76	76
Routine control systems renewals	85	85	85	85	85
General Electro - Mechanical replacements	863	863	863	863	863
Total renewals annuity	4,834	4,834	4,834	4,834	4,834

Source: Information provided by London and Continental Railways

As stated previously, the budgets summarised above will remain subject to change until all aspects of the restructuring of HS1 Ltd and its associated companies has been completed. The changes made already, together with those which may be made in the future, relate primarily to commercial negotiations between HS1 and other parties, rather than to changes in the bottom-up estimates of costs.

The changes expected by HS1 reflect:

- Efficiency savings to be achieved principally through renegotiating the operator agreements with NR(CTRL) so that the Infrastructure Manager takes a material degree of risk on outturn costs, and to ensure that appropriate activities are undertaken at a level of cost that is economic and efficient
- Organisational changes, both through reducing staff numbers and bringing in-house the management of work presently delivered via NR(CTRL)'s subcontract with Carillion
- Movements in the efficiency frontier, i.e. the most efficient performance level possible (whether that is HS1 or a comparator)

We note at this point that the proposed budget does not include any further cost reductions which might be delivered through:

- Catch-up savings, as HS1 moves towards the efficiency frontier. HS1's analysis assumes that the initiatives outlined above (i.e. renegotiating its major contract and removing excess staff) would take it to a reasonably defined efficiency frontier if such a frontier were to be defined relative to the most appropriate comparator and taking into account the status of HS1 as a work in progress, the ongoing sale process, and the degree of uncertainty in analysis of this type.
- Savings achieved through a step-change in the extent to which HS1 can benefit from synergies with other Infrastructure Managers. HS1's management recognise

that the long term sale of the business may enhance the opportunity and incentive to deliver such synergies, regardless of who purchases it. HS1's view is that it would be inappropriate to reflect such savings in the budget at this point because it would effectively pre-empt and adversely impact the sales process.

Many of these changes are yet to be delivered, which means that neither we nor ORR can yet assess a definitive budget proposal for the first control period. However, as long as HS1, LCR and the Government are able to deliver the planned restructuring of the businesses it is reasonable to expect that the above plan will represent HS1's annual budget.

4.2 Data available

In the course of our review, we have drawn on data including:

- More detailed budget information which set out the underlying sources of cost which HS1 and NR(CTRL) expect to incur in operating and maintaining the railway
- Analysis underpinning HS1's assumptions regarding the cost reductions which can be achieved via the means set out above
- Details of benchmarking exercises undertaken for HS1, comparing its cost base with that of European comparators
- Discussions with management to seek clarifications and subject the budget to further scrutiny

The ongoing changes to the data supporting the proposed budgets, together with the expectations about the level of detail for this review, mean that:

- Our review of the benchmarking exercises has not sought to recreate the work, rather we have commented on the nature of what HS1 has shared with us
- We have not been able to undertake a detailed series of cost reviews with a broad range of management and front line staff, or to verify statements made to us by management about the processes which they follow (e.g. explanations of competitive processes undertaken to procure works, or underlying schedules of rates set out in the Infrastructure Manager's subcontract with Carillion)

We are confident in our identification of the high level signs which indicate significant differences in unit costs between HS1 and the costs incurred by some potential comparators. However, given the uncertainty over what might constitute efficient performance for HS1, we are not in a position to quantify whether, and if so the extent to which this difference might be the result of inefficiency.

4.3 Operational changes

We also note that operational changes (such as the introduction of high speed domestic services, or the Infrastructure Manager's intention to bring management of the work presently managed by Carillion in house) present significant changes. These changes present a set of risks and opportunities with regard to possible future trends in HS1's cost base. Examples include:

- Possessions regime – To date, NR(CTRL) has been able to obtain 7 hour possession each night. Now that the domestic services are beginning, maintenance time availability will reduce, putting pressure on net unit costs
- Train delay times - Upon opening Section 1, infrastructure-related delays to trains on HS1 were around 15 seconds per train. They then reduced to 5 seconds per

train by the time Section 2 had opened. After Section 2 opened, those delays increased to 10 seconds per train, but have since fallen to 7 seconds per train. An increase is expected when the domestic services start in 2009, and at any future recasting of services or train mix

These are significant changes, but as they have not yet been implemented, we are unable to review their likely impact on outturn costs. We suggest that reviews of these changes are undertaken in future, to ensure that their impact can be properly considered at future Periodic Reviews.

5 Top-down view

This Section sets out the findings from our review of the top down (benchmarking) data which HS1 has presented. HS1 presented its review of an exercise to benchmark its cost base against [X], and (in less detail) the results of a benchmarking exercise against other European comparators.

5.1 Benchmarking HS1 against [X]

[X]

5.2 Benchmarking HS1 against other international comparators

HS1 has also sought to benchmark its cost base (assumed to be £77.0m in Q1 2008 prices) against a set of other European high speed rail Infrastructure Managers. For this set of comparators, we have noted HS1's commentary, i.e. that the availability of cost (and traffic) data is more limited, and the understanding of how to interpret that data is also poorer than it is for the [X] benchmarking exercise. Figure 5 shows the result of that benchmarking exercise.

Figure 5 - HS1 view of efficiency benchmarked against another European comparator

	HS1 ¹	IM X ^{2,3}
	Core maintenance with NR(CTRL) (and excluding frontier shift)	
Core maintenance costs⁴ per km index (HS1 = 100)	100	41

Source: PwC

The benchmarking set out above against the other European comparator suggests a large difference in unit costs between HS1 and the other selected Infrastructure Manager. Although we note HS1's view about the relative reliability of this exercise and the benchmarking against [X], we identified the following issues which reinforce the resulting uncertainty that the benchmarking result set out in Figure 6 creates about whether, and if so the extent to which, HS1's costs are less than efficient:

- HS1's view is that much of this difference can be explained by the differences in scale between HS1 and other larger infrastructure managers, and other factors such as differences in labour costs. If this data or similar comparators are to be used in future to support ORR's analysis of HS1's cost base, we believe there would be benefit in undertaking research to explore how far scale and those other factors may be responsible for any apparent differences in cost
- Although the comparator set out above indicates a difference in unit costs of around 60%, we understand from HS1 that when they sought to benchmark their cost base against further European comparators, the gaps were larger still. Set against this, however, we understand that the example given above was selected on the basis that HS1 had a higher degree of confidence in the extent to which data from that infrastructure manager was fully reported than it did in the data from the other infrastructure managers
- We understand from HS1 that the benchmarking data was not adjusted to reflect purchasing power parities, and that making those adjustments might have had a material effect on the size of the apparent efficiency gaps
- The potential scale of the gap in unit costs between HS1 and the other European comparator appears to be similar to the efficiency gap of ~50% between Network Rail and the upper quartile of European infrastructure managers based on unit costs, estimated by ORR and drawing on BSL's work for Network Rail as part of

their 2008 SBP update. Given NR's role in operating and maintaining HS1, this correlation is potentially significant

In summary, we note that due to availability of data it is difficult to make firm conclusions on the comparison with European railways. Nevertheless, the analysis indicates a significant difference in unit costs between HS1 and a range of potential comparators. The data presently available does not allow for a definitive interpretation of the significance of those differences. We would suggest that if this or comparable data is to be used in future, ORR should undertake further work to allow for any necessary adjustments to the datasets before they can be compared.

6 Bottom-up view

This Section sets out the findings from our review of the bottom-up data which HS1 shared with us, and which we explored further during discussions with both HS1 and NR(CTRL). Our review of the data took the form of a broad discussion about the approach to operating, maintaining and renewing the railway, supplemented by more focused discussions about particular line items in 2009 / 10 budget. Those more focused discussions are the case studies set out in this Section. We would like to draw particular attention to the importance of NR(CTRL)'s costs as the key driver of any future efficiency savings in HS1's cost base. The majority of those costs to be subjected to the planned efficiency savings are managed by NR(CTRL) under the Operator Contract.

6.1 Underlying O&M costs

We understand from HS1 and NR(CTRL) that asset management plans and budgets are driven by manufacturer recommendations, together with standards adapted from the equivalent French standards for high speed railways. HS1 and NR(CTRL) tell us that HS1 is maintained under an asset-based regime, rather than a condition-based regime. We understand that the standards followed have been adapted in a limited number of areas from the French standards, with the benefit of experience gained by HS1 and NR(CTRL) staff in maintaining the Channel Tunnel and now HS1 itself. Both HS1 and NR(CTRL) advised us that the approach to maintaining the railway is consciously risk averse, taking into account that assumptions about asset lives remain untested, and their expectation that the future Concession Agreement will oblige them to take a 40 year view of asset quality, meet minimum operating requirements and adopt industry best practice.

Our view is that this may be a reasonable approach for HS1 to be taking at this stage. The assets are new, and the Infrastructure Manager's experience of maintaining them is limited; the business is younger than the expected life of its key assets, and has not yet tested how different maintenance regimes might affect long term asset quality.

In our discussions, HS1 and NR(CTRL) recognised that in time, there may be scope for reducing maintenance frequencies for some assets without compromising safety or performance. However, their present level of experience and understanding of the assets does not yet enable it them to make those judgements in many cases. In our view, this suggests that there will be scope for reducing unit costs in the medium and long term, as the Infrastructure Manager becomes more familiar with the true maintenance and renewal requirements of the railway.

We believe that the picture set out above - gained through general discussions with HS1 and NR(CTRL) - is borne out by some of the case studies which are summarised below.

6.2 Case studies

During discussion with NR(CTRL), we selected several random items from their 2009 / 10 OMR budget, and sought brief explanations from them about how the budgets for those items were prepared, and what the issues were in delivering the associated programmes of work.

6.2.1 Case study 1 - Rail grinding

Figure 6 - Extract from NR (CTRL) budget, 2009/2010

[X]

Source: NR(CTRL)

Our discussion with NR(CTRL) about the budgets for rail grinding drew out the following key points:

- Frequency of maintenance is standards-driven, and varies according to the curvature of the railway at different points. Depending on curvature, grinding ought to take place every 2 years, 18 months or 1 year
- In practice, the planned works in each period also reflect the length of time for which the grinding machine will be needed, and the additional works which can be programmed within that window. NR(CTRL)'s grinding activity is managed over a three month period in the Summer, and it does not have its own machine to complete the works
- [X] NR(CTRL) has experimented with use of subcontractors who maintain the UK classic network, but took the view that the quality of finish achieved by those contractors was not appropriate for HS1
- [X]
- NR(CTRL) seek to liaise with Eurotunnel in programming these works. Achieving that synergy can allow the two Infrastructure Manager's to share in part in the cost reduction to the contractor
- Grinding for the present financial year will be undertaken under a contract which specifies unit rates, so budgeting for the likely costs is a relatively mechanical exercise
- [X]
- [X]

The bottom-up evidence from this case study suggests the heavy reliance on French standards for maintaining and renewing the railway, the need for active engagement with the market to ensure that works are delivered, and that the Infrastructure Manager's negotiating position with its subcontractors appears not to be strong.

6.2.2 Case study 2 – Points and swingnose crossings

Figure 7 - Extract from NR (CTRL) budget, 2009/2010

[X]

Source: NR(CTRL)

Our discussion with NR(CTRL) about the budgets for points and swingnose crossing drew out the following key points:

- This is an enhancement to replicate the fitting of point rollers, which have been successful on the France high speed network
- The budget has been prepared with the benefit of market testing, NR(CTRL) having received quotes from 3 alternative suppliers. NR(CTRL) took the mean of the 3 quotes.
- They have since selected Vossloh as their preferred tenderer. Vossloh also undertook the same work on the French Mediterranean high speed railway

The bottom-up evidence from this case study indicates NR(CTRL)'s reliance on the French experience in formulating the asset management regime for HS1, and its active engagement with the supplier market in preparing its budgets.

6.2.3 Case study 3 – Designated earthing points and installation

Figure 8 - Extract from NR (CTRL) budget, 2009/2010

[✕]

Source: NR(CTRL)

Our discussion with NR(CTRL) about the budgets for designated earthing points and installation drew out the following key points:

- The works are to be undertaken this year by Carillion, under their long term contract. The price is based on the fixed schedule of rates in that contract. HS1 management emphasised that the Carillion contract was awarded following a competitive process, so the applicable rates have been market tested. The extension of the contract to cover Section 2 of the railway was also dependent on Carillion meeting certain performance criteria in their work on Section 1. HS1 inform us that the key reason they and NR(CTRL) now believe the contract no longer represents value for money is that the rates agreed for the contract are not adjusted with time to capture any share in the cost savings which Carillion has delivered
- NR(CTRL) is basing its longer term assumptions for this cost item (and others under the Carillion contract) by rolling forward Carillion's rates, but reducing them by an amount which presently reflects Carillion's cost savings on the works done. The budgets presented and discussed for this review draw on budgets which reflect Carillion's cost schedules, not revised bottom-up estimates of the price for which NR(CTRL) might deliver them.

The bottom-up evidence from this case study indicates NR(CTRL)'s historical reliance on historical prices for establishing the baseline cost for operating, maintaining and renewing the railway. Although the Carillion contract and others were awarded via a competitive process, control over the operation of HS1 is now changing significantly, and we would expect NR(CTRL) to approach those costs differently once they have direct control over them.

6.2.4 Case study 4 – Drainage

Figure 9 - Extract from NR (CTRL) budget, 2009/2010

[]

Source: NR(CTRL)

Our discussion with NR(CTRL) about the budgets for drainage drew out the following key points:

- The budgets presented are allowances, based on frequencies. Some but not all of the costs are expected to fall under the contract with Carillion
- Like most other civil and structural works, drainage activity is condition-driven. This is possible at an early stage in the asset's life because failures are rarely safety-critical, so is an area in which the Infrastructure Manager may already have been able to establish the most efficient maintenance regime

The bottom-up evidence from this case study indicates NR(CTRL)'s willingness, where it is already feasible, to manage a condition-based approach to maintenance. As stated elsewhere in this report, we believe that in time there will be scope for extending such an approach across a greater portion of HS1's cost base.

6.2.5 Case study 5 – Manual correction to PL track geometry

Figure 10 - Extract from NR (CTRL) BUDGET, 2009/2010

[<]

Source: NR(CTRL)

Our discussion with NR(CTRL) about the budgets for manual correction of PL track geometry drew out the following key points:

- Costs are budgeted to fall at the beginning and in the middle of the year, reflecting the timing of planned inspections
- The costs reflect the rates agreed in the Carillion contract, as is the case with the planned costs for 'Designated earthing points and installation'

The bottom-up evidence from this case study is a further sign of NR(CTRL)'s reliance on external contractors for establishing the HS1 cost base, which raises similar issues to those set out in other case study summaries.

6.2.6 Case study 6 – Tamping

Figure 2 - Extract from NR (CTRL) budget, 2009/2010

[&]

Source: NR(CTRL)

Our discussion with NR(CTRL) about the budgets for tamping drew out the following key points:

- Maintenance frequencies are based on track quality rather than fixed frequencies
- A tamping unit is hired from France each Summer, and a workbank is developed which can be accommodated within the window of time for which it is there
- The tamping machine unit is suited to the track system's European railweight and sleeper type, which are heavier than the UK standard units. It provides the necessary track quality, which NR(CTRL) believe UK units cannot
- The European units are built to European structure gauge, which is larger than the UK gauge. This means that such units cannot be used on similar work elsewhere in the UK, which precludes efficiency savings through deployment of the same unit elsewhere in the UK, or manufacturing a similar unit for efficient use in the UK
- However, in low-speed areas such as at the St Pancras throat, it is possible to work to a lower track standard using UK gauge and weight plant
- There is a limited number of European-based suppliers of tamping services, and NR(CTRL) has limited purchasing power due to the levels of business it is offering its subcontractors. However, NR(CTRL) does seek to identify and capture any synergies with Eurotunnel to mitigate unit costs

We saw the key lessons in this case study as being the reliance on French standards, the need for relatively active engagement with the market (in which the Infrastructure manager's negotiating position is relatively weak), and NR(CTRL)'s desire to capture value from synergies with Eurotunnel where they exist.

6.3 Case studies – Summary of findings

The case studies summarised above provide a small number of insights into how HS1 is operated and maintained, and how budgets are prepared. In reviewing the evidence which they drew out, we developed a number of tentative conclusions, which ORR might seek to test further in the context of the first regulatory reviews for the railway:

- The Infrastructure Manager relies heavily on the French standards which have been developed and implemented over a long period of time for operating, maintaining and renewing high speed railways. Whilst we accept that that is a reasonable approach for them to take as their understanding of the assets is still developing, we would expect that with time, a better understanding of the assets' condition should create scope for reducing cost in some areas without compromising safety or performance
- The Infrastructure Manager presently relies heavily on historical prices for planning future budgets. Given the scale and nature of the present restructuring and changes (e.g. commencement of domestic services, contractual incentivisation of the Infrastructure Manager, and bringing Carillion in house), we see a significant possibility that that approach may not give accurate results.
- There may be reasons why the Infrastructure Manager might never be able to reduce efficient operating costs to levels in line with some international comparators. HS1's size and its location at the periphery of Europe's high speed network means that contractors based in continental Europe are likely to incur greater costs in servicing HS1 compared with an equivalent stretch of railway in (for example) France. The supplier market is limited, and other railways (e.g. the French LGV) provide those suppliers with far greater proportions of their business than HS1 does. In the long term, some of these may prove to be a limiting factors in how close HS1's unit costs can be brought to those of its comparators.

6.4 Changes in staff costs

HS1's budget for CP1 staff costs reflects their fixed price contract with NR(CTRL). That contract's price is intended to incorporate NR(CTRL)'s view of the cost reductions achievable by bringing Carillion in house.

HS1 had previously undertaken its own analysis of the scale of savings which might be delivered through organisational restructuring along those lines. That analysis had suggested that the net impact of such changes would be to reduce costs. However, as this change has been subsumed within the fixed price contract now agreed with NR(CTRL), we are not in a position to isolate and identify what cost reduction has been passed on to HS1. We recommend exploring this issue further.

6.5 Movement in the efficiency frontier

In our discussions, HS1 management shared with us the list of costs (in addition to 'pass through' costs) which were classed as 'at risk', but not reduced downwards in their future budgeting assumptions as a result of expected movement in the efficiency frontier. That list is included below, at Figure 12. We have not verified whether the items included in this list are consistent with any equivalent list that is applied to NRIL's cost base.

Figure 3 - Where HS1 budgets vary owing to movement in the efficiency frontier

HS1 'at risk' costs to which the efficiency frontier is <i>not</i> applied	HS1 'at risk' costs to which the efficiency frontier is applied
Rates & Service charge	Managing Director
Fees - Annual + Performance	Business Manager
Flat detection system	Operations
Statutory Audit	Safety & Assurance
Other Audits (Safety, Environment etc.)	Outside Parties
Regulation costs - eg ORR Fees for regulation, challenges, reporting etc	Track
ORR Safety Levy	Civils
Bank charges	Signals
	Electrification & Plant
	Contracts
	Strategic Planning
	"Renewals/component Replacement
	Daylight Track Inspections
	NGC Fees
	GSMR
	Operations & Maintenance - S1
	Operations & Maintenance - S2
	Ripple Lane Sidings
	Staff Costs
	HR
	Consultants
	Technical Support
	Rent
	Service changes
	Computers & Office Equipment
	Light & Heat & Water
	Cleaning
	Telephones
	Mobiles/blackberries
	Photocopiers
	Other Office Running Costs (postage, couriers, archive etc)
	Legal & Professional Fees
	Rescue Locomotives
	Grays Warehouse
	Environmental initiatives
	Travel & Conferences - Travel/hotels/expenses
	Subscriptions & Donations
	Sponsorship
	Corporate Memberships
	Corporate Subscriptions
	Professional subscriptions
	Entertaining, events
	Team Events
	Conferences, roadshows, events
	Training
	Marketing/branding & PR
	Business Development
	Environmental Bonds
	NB EDF fees now treated as 'pass-through' costs

Source: PwC

As well as excluding the costs set out above, HS1 has also excluded 'pass through' costs from the application of the efficiency frontier. Those costs include insurance, rates and power. We have not verified whether the items included in this list are consistent with any equivalent list that is applied to NRIL's cost base.

Within the budgets discussed for the purpose of this review, of the £77.5m budgeted for 2009/10, £52.7m is budgeted to decrease in line with the efficiency frontier. Of the remaining budget, £15.9m of costs are deemed to be 'pass through', £4.8m is an annuity paid into an escrow account to fund future renewals, and £4.1m are other costs to which the efficiency factor has not been applied.

Our view is that the approach adopted by HS1 is reasonable, although the significant differences between HS1's unit costs and those of its comparators mean we cannot confirm HS1's view that its current performance in managing costs is at the efficiency frontier.

6.6 HS1's approach to funding renewals

HS1's approach to funding regular renewals (e.g. minor items such as pumps, fans and clips), is to establish a sinking fund. A benefit of this approach is that it allows the level of charges passed through to operators to remain stable over time. Given the uncertainty over the timing of some of these items, and the desire to maintain stable access charges for operators, we view this as a reasonable approach. We share HS1's view that the discount rate used for calculating the sinking fund annuity should be more than the risk free rate of 1.5%, but less than the 7.07% which HS1 estimate as their future Weighted Average Cost of Capital (WACC). That view is based on our understanding that other risks to be borne by HS1 (notably traffic) are likely to be significantly greater than the risks associated with managing regular renewals. However, we would also draw attention to the desirability of avoiding a scenario in which cash outlay on renewals exhausts the proposed annuity fund.

We understand that the present intention is to fund major renewals (e.g. replacement of signalling system) through an addition to the investment recovery element of the HS1 track access charge. However, management does not yet have a clear picture of the levels of investment likely to be funded in this way, owing to uncertainty over the technology which will be available when it occurs, and the timing of the investment. Given that uncertainty, we agree that it is reasonable to manage that source of future expenditure separately. However, we note that such investment may have a material step change impact on the affordability for operators of future access charges, particularly if no funding is set aside for such investment until the moment at which it is needed.

7 How HS1 intends to recover operating, maintenance and renewal costs from train and freight operators

7.1 Identifying the total cost to be recovered from operators

HS1's starting point for identifying the costs to be recovered from operators is its budget. That budget sets out annual cost assumptions, developed along the lines referred to in Section 6 of this report. To give a flatter profile to the costs passed through over the Control Period, those operating and maintenance costs which it classifies as 'at risk' (as discussed at Section 6.5 of this report) are averaged out over the CP to reflect the value of money decreasing with time (using the same discount rate as is applied to the values required to fund long term renewals). The values are then increased using an escalation factor set at RPI + 1.1%. This reflects the assumption for input price inflation adopted by the ORR in its last Periodic Review of NRIL. Our view is that this approach is not unreasonable considering the timing of the two reviews and the fact that there are some obvious similarities within the two companies' cost bases, although we note that since that figure was set in October 2008, ORR has seen substantial changes in rail and construction industry costs, and believes that the IPI for NR is not necessarily appropriate to HS1 due to the differences in their cost bases. Costs classified as 'pass through' are reviewed and adjusted annually. We note that HS1 is presently negotiating a fixed price contract with NR(CTRL) to underpin the certainty over its budget for CP1.

Having reviewed the methodology and assumptions set out above, our view was that the approach adopted by HS1 appears reasonable. The following paragraphs review how HS1 plans to recover those costs from train and freight operators.

7.2 HS1's principles for apportioning costs between operators

HS1 proposes to recover its operating and maintenance costs (as well as most of its renewals costs) through the track access charges which it intends to apportion between operators.

In determining OMR costs to be recovered from each operator, HS1 has drawn a distinction between costs directly incurred as a result of operating particular classes of train services (i.e. international passenger services, domestic passenger services, or freight services), and 'common costs', which would be incurred to keep the railway open regardless of the particular services which run on it.

In structuring its proposed access charges, HS1 has followed the following principles:

- Costs directly incurred as a result of running particular classes of services (e.g. international passenger services) will be met solely by the operators running those services. For example, only operators of international passenger services would pay charges which reflected the cost of maintaining track between Ashford and the Channel Tunnel, and only freight operators would meet the cost of maintaining freight loops.
- 'Common costs' are apportioned between operators of international and domestic services alone (i.e. not freight operators). Those costs which increase in proportion with an operator's use of the railway line (e.g. costs associated with maintaining track and signals) are apportioned on the basis of the time spent on those shared parts of the railway. Other 'common costs' (e.g. administration costs) are apportioned on the basis of expected time spent on the railway as a whole.

- In the event that HS1 is unable to recover from freight operators the costs directly incurred by running freight services, the shortfall will be made good by the domestic franchisee.

HS1 has articulated clearly how it believes the methodology to be consistent with the relevant EU and UK legislation, although providing any opinion on legal compliance is beyond the scope of this review.

Our view is that the approach developed is reasonable and pragmatic. In the first instance, it seeks as far as possible to recover costs from operators in line with the particular works from which each operator will benefit. Beyond the costs which can be allocated in that way, the apportionment of common costs seeks to strike a balance between what is acceptable from a regulatory perspective, the Government's willingness to pay subsidy to support its policy objectives, and the commercial ability of the operators to pay. As stated above, it is not within the scope of this review to provide opinions on the proposal's compliance with EU and UK law. For the same reason we are not able to comment on the ability of commercial operators of freight or passenger services to meet the costs which HS1 proposes to recover from them.

The methodology allows limited scope for under or over recovery of costs by HS1, depending on the accuracy of its traffic assumptions. HS1 has proposed that where variations exceed 4% (either in total or within any class of service), costs per service can be adjusted. We note that this introduces a limited element of additional risk for HS1, where it would have been possible to introduce a balancing mechanism to eliminate this risk. However, we see no reason to conclude that the proposed approach is inappropriate.

7.3 Calculation of access charges

As part of our review, we asked HS1 to demonstrate that the calculations made in their model were consistent with the approach summarised above. We reviewed the model with reference to a particular service (St. Pancras to Ashford), and were satisfied that the calculation reflected the building blocks set out above, as well as the overall budgets which the charges seek to recover, as set out in Figure 2a. However, a comprehensive audit of the model was not within the scope of our review.

Figures 13 and 14 show the outcomes of HS1's proposed access charging methodology, as it impacts both on costs per minute and costs per service. Figure 15 replicates the bottom-up calculation of charges for Eurostar UK Ltd.

Figure 13 – HS1 schedule of proposed prices per minute

Price per minute (£ in 09/10)				
	DI	LTOP	CNSEFT	TOTAL
International Services				
London-Paris	19.42	19.32	8.59	47.33
London Br (disc)	19.42	19.32	8.59	47.33
London Br (undisc)	19.42	19.32	8.59	47.33
Disney	19.42	19.32	8.59	47.33
Other	19.42	19.32	8.59	47.33
Domestic Services				
St P-Ash	5.83	22.44	8.59	36.86
St P-Springhead	5.83	22.44	8.59	36.86
St P-Ebbs Up	5.83	22.44	8.59	36.86
St P-Ebbs Down	5.83	22.44	8.59	36.86
Freight Services				
<i>Charge is per km, not minute</i>				
High Speed - prior to discount	7.10	0.00	0.00	7.10
High Speed - after discount	4.00	0.00	0.00	4.00
Gap charged to Domestic	3.10	0.00	0.00	3.10

Source: London and Continental Railways

Figure 14 – HS1 schedule of proposed prices per service

Price per service (£ in 09/10)					
	minutes	DI	LTOP	CNSEFT	TOTAL
International Services					
London-Paris	31.0	602.02	598.92	266.29	1,467.23
London Br (disc)	31.0	602.02	598.92	266.29	1,467.23
London Br (undisc)	31.0	602.02	598.92	266.29	1,467.23
Disney	31.0	602.02	598.92	266.29	1,467.23
Other	31.0	602.02	598.92	266.29	1,467.23
Domestic Services					
St P-Ash	31.0	180.73	695.64	266.29	1,142.66
St P-Springhead	16.5	96.20	370.26	141.74	608.19
St P-Ebbs Up	14.0	81.62	314.16	120.26	516.04
St P-Ebbs Down	15.0	87.45	336.60	128.85	552.90
Freight Services					
<i>NB, kms, not minutes</i>					
High Speed - prior to discou	88.20	626.22	0.00	0.00	626.22
High Speed - after discount	88.20	352.80	0.00	0.00	352.80
Gap charged to Domestic	88.20	273.42	0.00	0.00	273.42

Source: London and Continental Railways

Figure 15 – Calculation of EUKL LTOP charge for 2009 / 10

Calculation of EUKL LTOP charge for 2009/10		
A	Non traffic related track costs (2009/10) (£K)	40471
B	Non traffic related track costs - annuity (£K)	38911
C	Common share of track costs (70% based on relative track lengths) (£K)	27308
D	EUKL share of common track costs (28% based on minutes on common track) (£K)	7674
E	Fixed cost (2009/10)	11394
F	Fixed costs - annuity	10825
G	Mothballing costs (£K)	140
H	Total annualised fixed costs (£K)	10966
I	EUKL share of fixed costs (33% based on total minutes) (£K)	3577
J	Total EUKL fixed and common costs (D + I) (£K)	11252
K	Total EUKL minutes	603446
L	EUKL common and fixed costs per minutes (J / K * 1000) (£/min)	18.65
M	EUKL renewal common cost per minute (£/min)	0.67
N	EUKL LTOP cost per minute (L + M) (£/min)	19.32
O	EUKL minutes	31
P	EUKL cost for Paris Brussels (N * O) (£ per train)	599

Source: ORR

The costs included in the tables above reflect HS1's methodology for apportioning costs. The detailed methodology for apportioning these costs is set out at Appendix A, provided by London and Continental Railways.

8 Conclusions and recommendations

Top down benchmarking evidence suggests that it is unclear whether HS1's unit costs are as low as they could be.

- Benchmarking against what HS1 believes to be the best available comparator suggests an efficiency gap of around 7%, which HS1 see as a difference within a tolerable margin of error for analysis of this type. However, if this or similar analysis is to be used by ORR in future, we believe further work would be required. That work should include analysis to enable ORR to confirm whether that comparator's performance is at the efficiency frontier, and to allow ORR to identify whether there are operational or design differences between the two railways which would create a need to adjust the cost data which they report before those data could be compared with confidence
- Due to availability of data it is difficult to make firm conclusions on the comparison with other potential European comparators. Nevertheless, the analysis indicates a significant difference in unit costs between HS1 and a range of potential comparators. The data presently available does not allow for a definitive interpretation of the significance of those differences. We would suggest that if this or comparable data is to be used in future, ORR should undertake further work to allow for any necessary adjustments to the datasets before they can be compared

Based on the limited bottom-up evidence gathered in the course of this review, our view is that:

- The Infrastructure Manager relies heavily on the French standards. Whilst we accept that that is a reasonable approach for them to take now, we would expect that with time, a better understanding of the assets should create scope for reducing cost without compromising safety or performance
- The Infrastructure Manager relies heavily on historical prices for planning future budgets. Given the significant changes ahead, we see a significant possibility that that approach may not give accurate results
- There may be reasons why the Infrastructure Manager's might never be able to reduce efficient operating costs to levels in line with some international comparators. HS1's size and its location at the periphery of Europe's high speed network means that contractors based in continental Europe are likely to incur greater costs in servicing HS1 compared with an equivalent stretch of railway in (for example) France. The supplier market is limited, and other railways (e.g. the French LGV) provide those suppliers with far greater proportions of their business than HS1 does. In the long term, some of these may prove to limit the extent to which HS1's costs might be able to approach the levels experienced on the continent

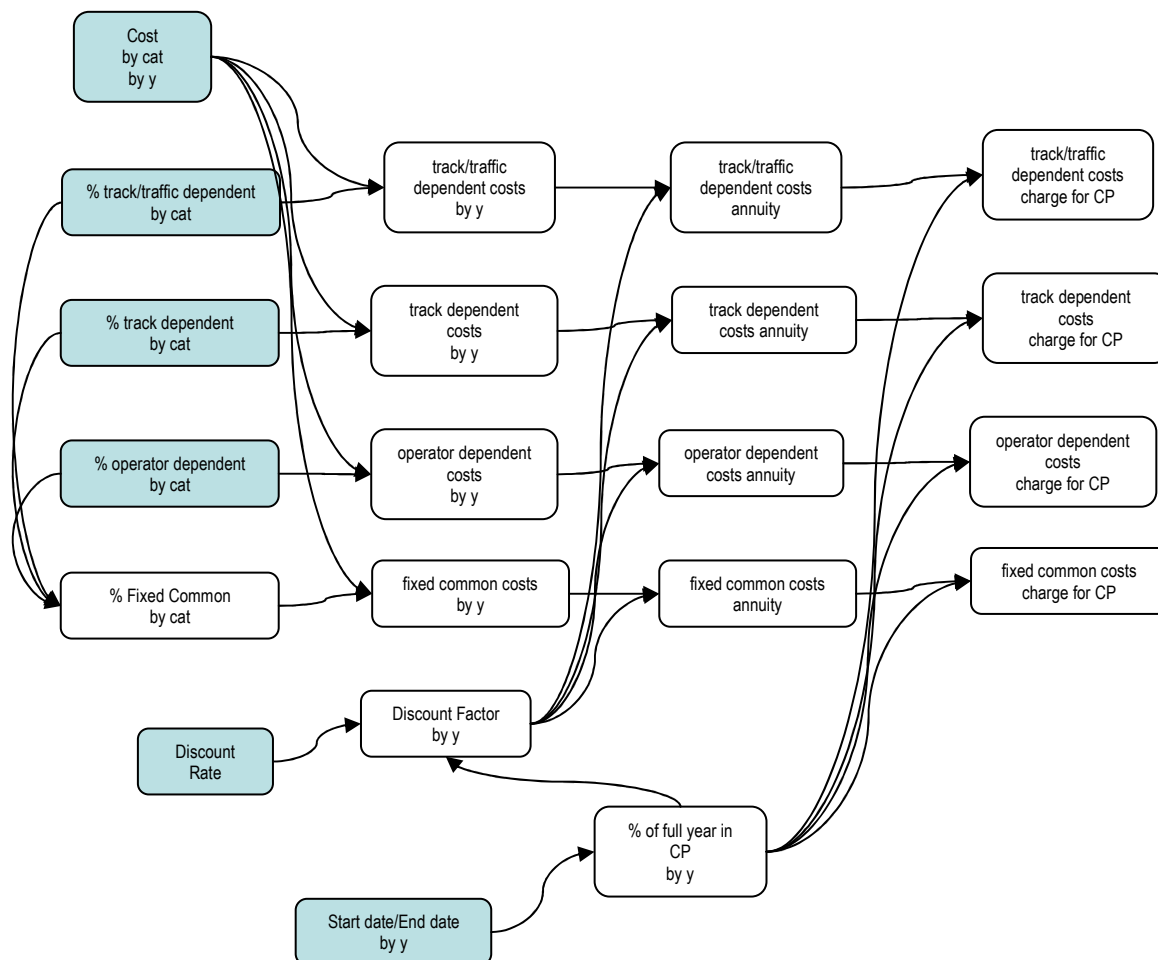
In conclusion our view is that both the top-down and bottom-up evidence available indicate uncertainty over whether HS1's cost base is as low as it could be. Ahead of future ORR reviews of the company's cost base, we have suggested that ORR undertaken further research, principally in two areas:

- To explore what adjustments might have to be made to available benchmark data to enable fair comparisons between HS1 and potential comparators
- To review HS1's asset management practices and benchmark them against industry best practice

9 Appendix A: HS1's methodology for apportioning costs between services

This appendix was provided by London and Continental Railways

Step 1 – Calculate total cost in each cost apportionment category



$$\text{track/traffic dependent costs}_y = \sum (\text{Cost } y1 \text{ prices}_{\text{cat},y} \times \% \text{ track/traffic dependent}_{\text{cat}})_{\text{all cats}}$$

$$\text{track dependent costs}_y = \sum (\text{Cost } y1 \text{ prices}_{\text{cat},y} \times \% \text{ track dependent}_{\text{cat}})_{\text{all cats}}$$

$$\text{operator dependent costs}_y = \sum (\text{Cost } y1 \text{ prices}_{\text{cat},y} \times \% \text{ operator dependent}_{\text{cat}})_{\text{all cats}}$$

$$\% \text{ Fixed Common}_{\text{cat}} = 1 - (\% \text{ track/traffic dependent}_{\text{cat}} + \% \text{ track dependent}_{\text{cat}} + \% \text{ operator dependent}_{\text{cat}})$$

$$\text{Fixed common costs}_y = \sum (\text{Cost } y1 \text{ prices}_{\text{cat},y} \times \% \text{ Fixed Common}_{\text{cat}})_{\text{all cats}}$$

$$\% \text{ full year in CP}_y = (\text{End Date}_y - \text{Start Date}_y) / 365 \text{ rounded to 1 dp}$$

$$\text{Discount Factor}_y = \text{IF } y = 0 \text{ THEN } 1 \text{ ELSE } \text{Discount Factor}_{y-1} / (1 + \text{Discount rate})^{\% \text{ full year in CP}_y}$$

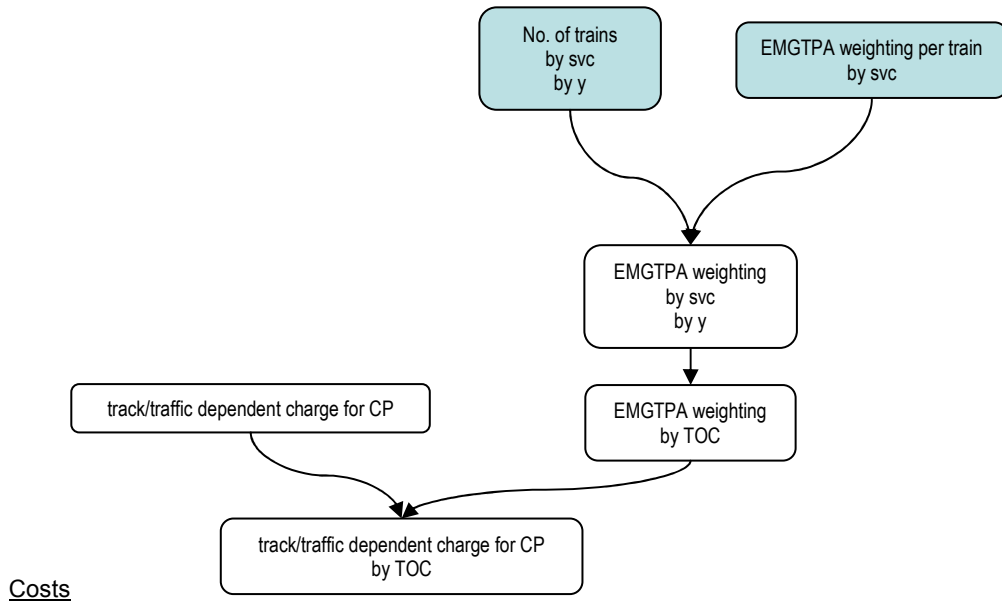
For each apportionment cost category

$$\text{Annuity} = \sum (\text{Costs}_y \times \text{Discount factor}_y) / \sum (\text{Discount factor}_y \times \% \text{ of full year in CP}_y)$$

$$\text{Charge for CP} = \text{Annuity} \times \sum (\% \text{ of full year in CP}_y)_{\text{all years}}$$

Step 2 – Apportion costs between Train Operators

Track/Traffic Dependent

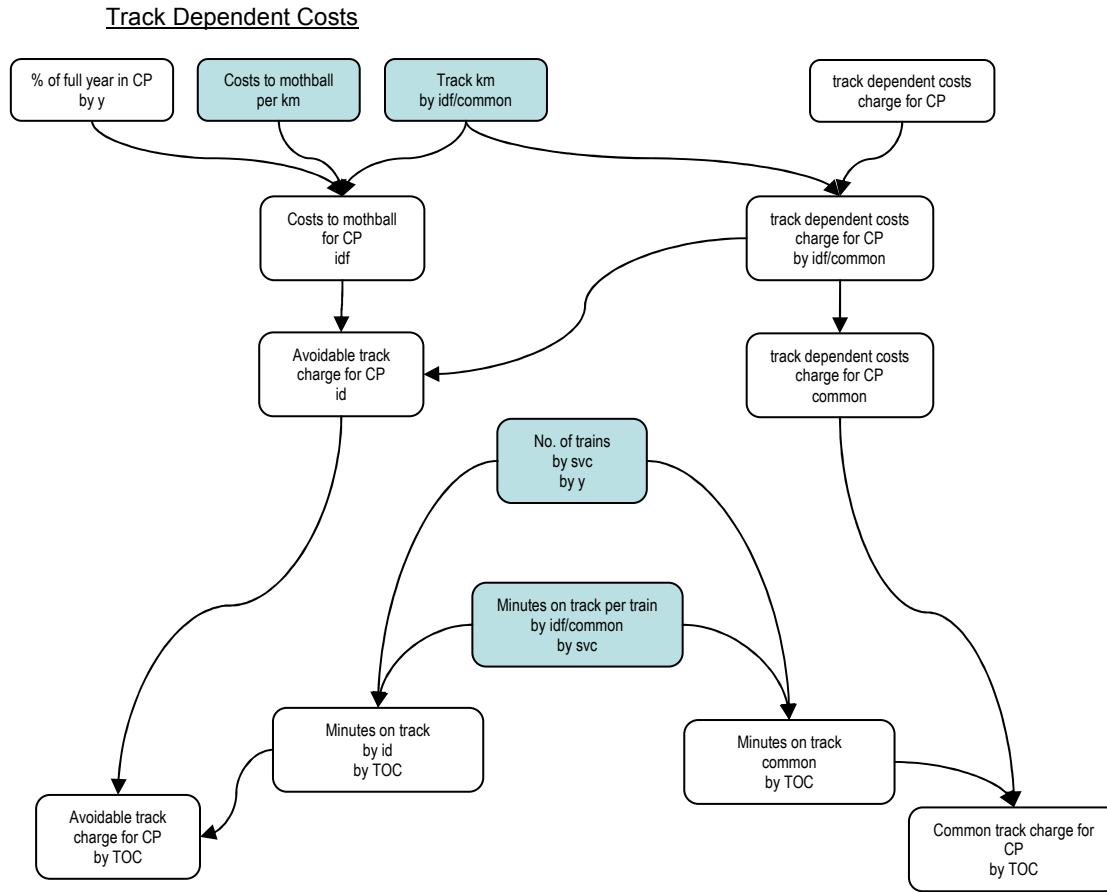


Costs

$$\text{EMGTPA weighting}_{\text{svc,y}} = \text{No. of trains}_{\text{svc,y}} \times \text{EMGTPA weighting per train}_{\text{svc}}$$

$$\text{EMGTPA weighting}_{\text{TOC}} = \sum (\text{EMGTPA weighting}_{\text{svc,y}})_{\text{all years and where svc belongs to TOC}}$$

$$\text{Track/traffic dependent charge for CP}_{\text{TOC}} = \frac{\text{Track/traffic dependent charge for CP} \times \text{EMGTPA weighting}_{\text{TOC}}}{\sum (\text{EMGTPA weighting})_{\text{all TOCs}}}$$



Costs to mothball for CP_{idf} = **Costs to mothball per km** x **Track km_{idf}** x $\Sigma(\text{full year in CP})_{\text{all years}}$

Track dependent charge for $CP_{idf/common}$ = Track dependent charge for CP x % Track km_{idf/common}

Avoidable track charge for CP_{id} = Track dependent charge for CP_{id} – Cost to mothball for CP_{id}

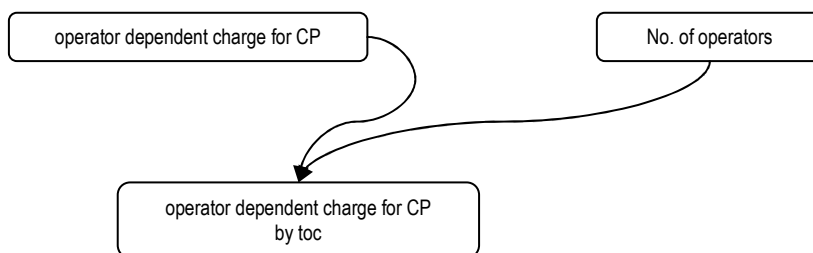
Minutes on track_{id,TOC} = $\Sigma(\text{No. of trains}_{\text{svc,y}} \times \text{minutes on track per train}_{\text{id}})_{\text{all y}}$ where svc belongs to TOC

Avoidable track charge for CP_{TOC} =
 Avoidable track charge for CP_{id} x minutes on track_{id,TOC} / $\Sigma(\text{minutes on track}_{\text{id}})_{\text{all TOCs}}$

Minutes on Common track_{TOC} = $\Sigma(\text{No of trains}_{\text{svc,y}} \times \text{Minutes per common track}_{\text{svc}})_{\text{all y}}$ where svc belongs to TOC

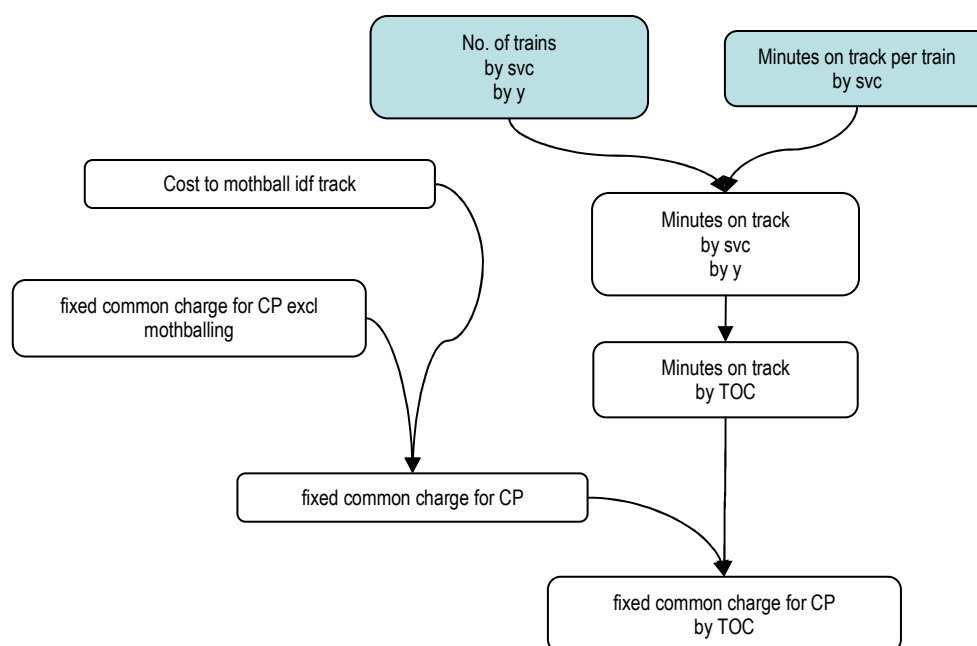
Common track charge for CP_{TOC} =
 Track dependent charge for common track x Minutes on Common track_{TOC} / $\Sigma(\text{Minutes on Common Track})_{\text{all TOCs}}$

Operator Dependent Costs



Operator dependent charge for CP_{TOC} = Operator dependent charge for CP / No. of unique Operators

Fixed Common Costs



Minutes on track_{svc,y} = No. of trains_{svc,y} x Minutes on track per train_{svc}

Minutes on track_{TOC} = Σ(Minutes on track_{svc,y})_{all y}, where svc belongs to TOC

Fixed common charge for CP = Fixed common charge excl mothballing + Cost to mothball inc track

Fixed common charge for CP_{TOC} =

$$\frac{\text{Fixed common charge for CP} \times \text{Minutes on track}_{\text{TOC}}}{\Sigma(\text{Minutes on track})_{\text{all TOCs}}}$$

Step 3 – Setting a price

The cost allocated to each train operator is divided by the total number of minutes for that operator's trains on the total HS1 track to give a price per minute. The price for each service is calculated as the standard timetabled minutes for that service multiplied by the price per minute. Note that the price can be calculated at the apportionment category level or aggregated as appropriate.

Price Setting for Renewals

The price for Renewals is calculated in an analogous way to OMC at target cost. The differences between the two are

- There are fewer categories within Renewals
- The Renewals charge is input as an annuity and there is no need to calculate this
- The cost of mothballing is not relevant to the Renewals calculations

Price Setting for Items Charged at Cost (CNSEFT)

Rates / Insurance / 11kV Power / EDFe Fees

Rates, Insurance, 11kV Power and EDFe Fees are charged to TOCs at cost incurred by HS1. These will be allocated between TOCs according to total minutes on HS1. Due to the nature of these costs the model will contain estimates of the price per train for TOCs based on estimates of the costs for the 5 years, but the actual price/cost to TOCs will be dependent on the actual cost incurred.

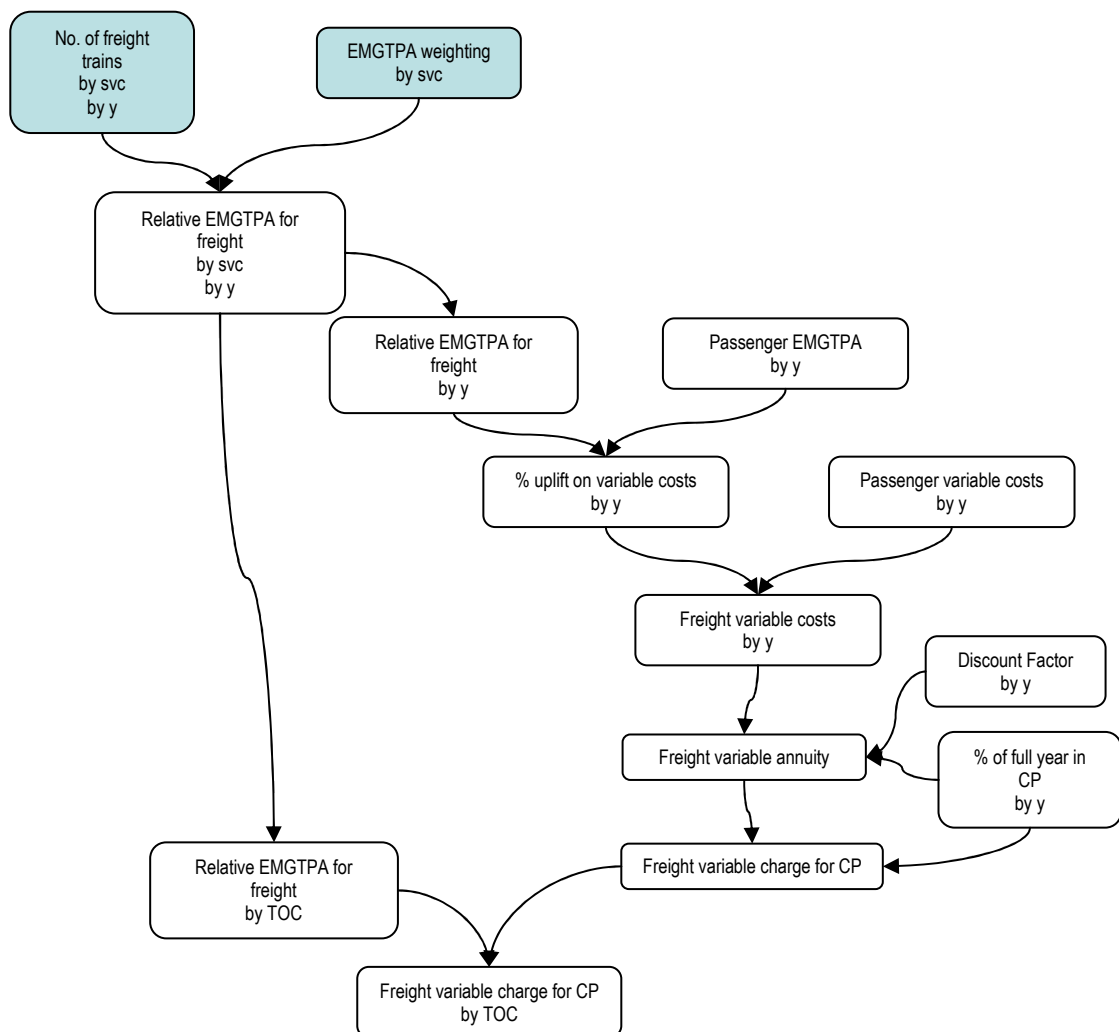
Freight

The charge calculated for freight covers Variable and Avoidable costs with no contribution to Common Costs. Where this charge is higher than the cost the market will bear the charge is capped with the shortfall being picked up by the franchised operator.

Apportioning Costs to Freight

Variable Costs

Variable costs include both OMC and Renewals costs and the charge for each is calculated in the same way with the exception that it is not necessary to calculate an annuity for Renewals costs. The Efficient Budget input to the model assumes no freight trains are using the track, therefore the variable costs associated with freight train usage are incremental to this budget.



Relative EMGTPA for freight_{svc,y} = **No freight trains**_{svc,y} X **EMGTPA weighting**_{svc}

Relative EMGTPA for freight_y = Σ(Relative EMGTPA for freight_{svc,y})_{all years}

% uplift on variable costs_y = Relative EMGTPA for freight_y / Passenger EMGTPA_y

Freight variable costs_y = Passenger variable costs_y x % uplift on variable costs_y

Freight variable annuity = Σ(Freight variable costs_y x Discount factor_y)/Σ(Discount factor_y x % of full year in CP_y)

Freight variable charge for CP = Freight variable annuity x Σ(% of full year in CP_y)_{all y}

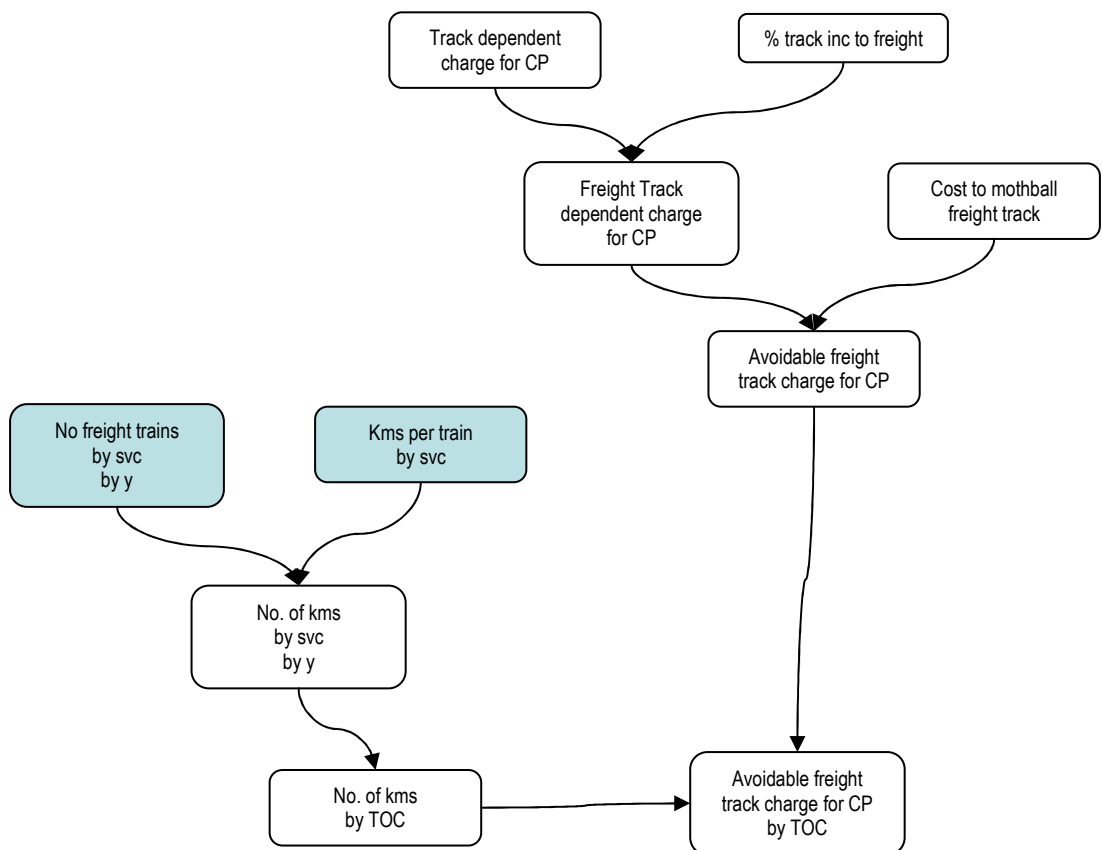
Relative EMGTPA for freight_{TOC} = Σ(Relative EMGTPA for freight_{svc,y})_{all y, where svc belongs to TOC}

Freight variable charge for CP_{TOC} =

Freight variable charge for CP x Relative EMGTPA for freight_{TOC}/Σ(Relative EMGTPA for freight)_{all TOCs}

Avoidable Track Related Costs

Avoidable track related costs include both OMC and Renewals costs and the charge for each is calculated in the same way with the exception that it is not necessary to calculate an annuity for Renewals costs, and mothballing is not relevant for Renewals costs. The Efficient Budget input to the model assumes upkeep of all track and therefore includes the Track Related costs that are incremental to freight track.



Freight Track dependent charge for CP = Track dependent charge for CP x % track inc to freight

Avoidable freight track charge for CP = Freight Track dependent charge for CP – Cost to mothball freight track

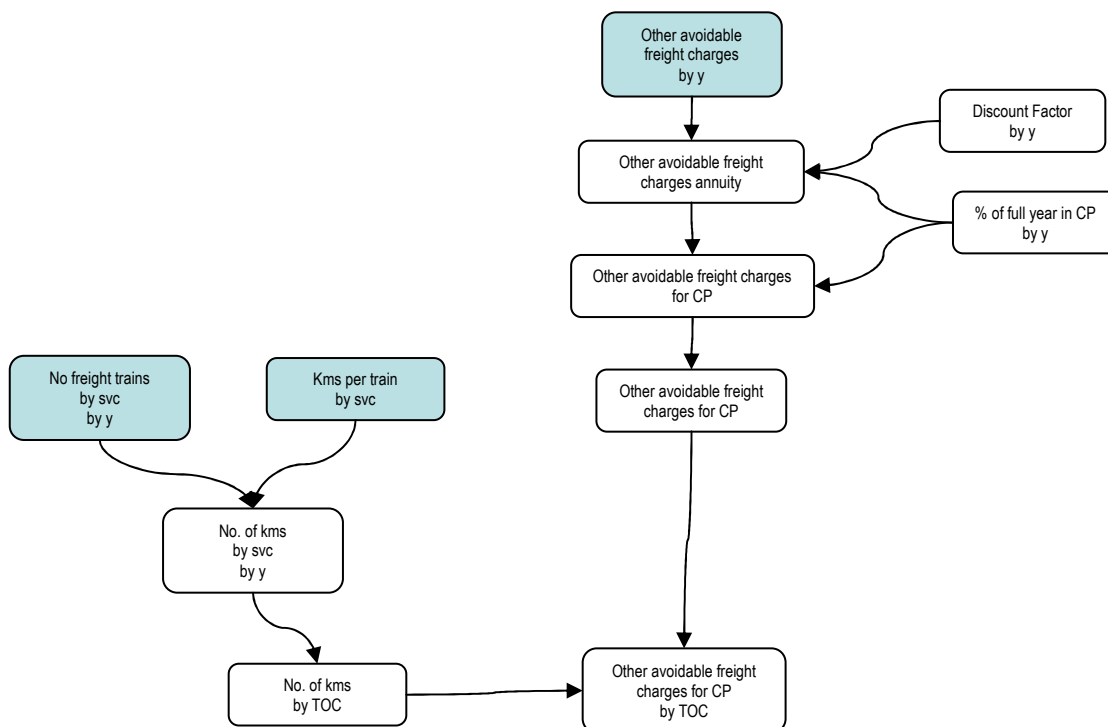
No. Kms_{svc,y} = **No freight trains**_{svc,y} X **kms per train**_{svc}

No kms_{TOC} = Σ(No kms_{svc,y})_{all y, where svc belongs to TOC}

$$\text{Avoidable freight track charge for CP}_{\text{TOC}} = \frac{\text{Avoidable track charge for CP} \times \text{No kms}_{\text{TOC}}}{\sum(\text{No Kms})_{\text{all TOCs}}}$$

Other Freight Avoidable Costs

Other Freight Specific Avoidable costs are input directly to the model by year. They are annuitised and apportioned on the basis of track kms.



$$\text{Other avoidable freight charges annuity} = \frac{\sum(\text{Other avoidable freight charges}_y \times \text{Discount factor}_y)}{\sum(\text{Discount factor}_y \times \% \text{ of full year in CP}_y)}$$

$$\text{Other avoidable freight charges for CP} = \text{Other avoidable freight charges annuity} \times \sum(\% \text{ of full year in CP}_y)_{\text{all } y}$$

$$\text{No. Kms}_{\text{svc},y} = \text{No freight trains}_{\text{svc},y} \times \text{kms per train}_{\text{svc}}$$

$$\text{No kms}_{\text{TOC}} = \sum(\text{No kms}_{\text{svc},y})_{\text{all } y}, \text{ where svc belongs to TOC}$$

$$\text{Other avoidable freight charges for CP}_{\text{TOC}} = \frac{\text{Other avoidable freight charges for CP} \times \text{No kms}_{\text{TOC}}}{\sum(\text{No Kms})_{\text{all TOCs}}}$$

Setting a Price for Freight Services

A price per km for each freight service is calculated with respect to.

1. Variable OM charges
2. Variable Renewal charges
3. Avoidable Freight specific charges
4. Avoidable Freight track OM charges
5. Avoidable Freight track Renewals charges

An input “market rate per km” is used to cap freight charges with any excess being allocated to Domestic services. The discounted rate that freight pay is allocated to the categories in the order shown above, such that the Variable costs are covered first, then the Avoidable costs.