

HSIPR Best Practices: Operating Costs Toolkit

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CONTENTS

1	INTRODUCTION	1
	OPERATING COST CHECKLISTS.....	1
	REVIEWERS' QUALITY CHECK QUESTIONS.....	2
	BEST PRACTICE GUIDANCE	3
2	HSIPR OPERATING COSTS CHECKLISTS.....	5
3	REVIEWER QUALITY CHECK QUESTIONS	19
	TRAIN SERVICE SPECIFICATION: REVIEWER QUALITY CHECK QUESTIONS.....	20
	1. Route and track miles (D1 and D2).....	20
	2. Annual train miles and hours (D11 and D12).....	20
	3. Implied on-train staff per train	21
	TRAINCREW COSTS : REVIEWER QUALITY CHECK QUESTIONS	22
	4. Total Number of HSRIIPR drivers (T3)	22
	5. Total number of other on-train staff (T4)	22
	6. Drivers annual salary (T5) and other on-train staff salary (T6)	23
	7. Other relevant information (T9)	23
	8. Forecast change in staff costs over time (T8)	23
	9. Total traincrew costs (T12)	23
	ENERGY COSTS : REVIEWER QUALITY CHECK QUESTIONS.....	24
	10. Energy consumption per train mile (E1)	24
	11. Cost per kwh or US gallon of diesel (E2)	24
	12. Total energy consumed per year (E4).....	24
	13. Change in unit cost of power over time (E5).....	25
	14. Total energy costs per year (E7)	25
	ROLLING STOCK COSTS : REVIEWER QUALITY CHECK QUESTIONS.....	25
	15. Number of trains in regular passenger service (A1)	25
	16. Number of trains as maintenance cover (A2).....	25
	ROLLING STOCK MAINTENANCE COSTS : REVIEWER QUALITY CHECK QUESTIONS.....	26
	17. Number of light maintenance inspections per Year (A8).....	26
	18. Time required for light maintenance inspection (A9).....	26
	19. Labor time required for light maintenance inspections (A10).....	26
	20. Number of light maintenance staff (A11).....	26
	21. Total light maintenance staff costs per year (A14).....	27
	22. Total heavy maintenance staff costs (A22)	27
	23. Other maintenance staff costs (A24).....	27
	24. Total non-staff light and heavy maintenance costs per year (A15 + A23 + A27).....	27
	25. Total cleaning staff costs (R29 + R30)	27
	STATION COSTS : REVIEWER QUALITY CHECK QUESTIONS.....	28
	26. Number of staff at terminal/major stations (S5) and other stations (S6):	28
	27. Station staff annual salary (S8):	29
	RAILROAD COSTS: REVIEWER QUALITY CHECK QUESTIONS	29
	28. Number of signaling and control Centers (R1).....	29
	29. Number of staff per signaling and control centers (R2).....	29
	30. Annual salary of signaling and control center staff (R3)	30

31.	Total annual cost of signaling and control center staff (R7).....	30
32.	Total railroad maintenance costs per year (R10)	30
	GENERAL AND ADMIN. COSTS: REVIEWER QUALITY CHECK QUESTIONS	30
33.	Headquarters staff numbers and costs (G1, G2 and G6).....	30
34.	Other general and admin. costs	30
4	BEST PRACTICE CHECKLISTS.....	31
	INTRODUCTION	31

FIGURES

Figure 1-1.	Proposed review process.....	1
-------------	------------------------------	---

TABLES

Table 2-1.	Train service specification.....	6
Table 2-2.	Traincrew costs	8
Table 2-3.	Energy costs	9
Table 2-4.	Rolling stock Costs	10
Table 2-5.	Rolling stock maintenance costs.....	11
Table 2-6.	Station costs	13
Table 2-7.	Railroad costs	14
Table 2-8.	General and administrative costs	15
Table 2-9.	Summary of contingency applied	16
Table 2-10.	Summary of operating costs	17
Table 4-1.	Route alignment & train service offer at preliminary stage	32
Table 4-2.	Quantifying traincrew costs at preliminary stage	34
Table 4-3.	Quantifying energy costs at preliminary stage	35
Table 4-4.	Quantifying station costs at preliminary stage.....	36
Table 4-5.	Quantifying rolling stock costs (including maintenance) at preliminary stage	37
Table 4-6.	Quantifying railroad costs at preliminary stage	38
Table 4-7.	Quantifying general and administrative costs at preliminary stage	39
Table 4-8.	Route alignment & train service offer for intermediate stage.....	40
Table 4-9.	Quantifying traincrew costs at intermediate stage.....	42
Table 4-10.	Quantifying energy costs at intermediate stage	43
Table 4-11.	Quantifying station costs at intermediate stage	44
Table 4-12.	Quantifying rolling stock costs (including rolling stock maintenance) at intermediate stage	45
Table 4-13.	Quantifying railroad costs at intermediate stage.....	46
Table 4-14.	Quantifying general and administrative costs at intermediate stage	47
Table 4-15.	Route alignment & train service offer for final stage	48
Table 4-16.	Quantifying traincrew costs at final stage	50
Table 4-17.	Quantifying energy costs at final stage	51
Table 4-18.	Quantifying station costs at final stage.....	52
Table 4-19.	Quantifying rolling stock costs (including maintenance) at final stage	54
Table 4-20.	Quantifying railroad costs at final stage	57
Table 4-21.	Quantifying general and administrative costs at final stage	59

Table 4-22. Route alignment and train service offer at commercial closeout.....	61
Table 4-23. Quantifying traincrew costs at commercial closeout	63
Table 4-24. Quantifying energy costs at commercial closeout	64
Table 4-25. Quantifying station costs at commercial closeout	65
Table 4-26. Quantifying rolling stock costs (including maintenance) at commercial closeout	66
Table 4-27. Quantifying railroad costs at commercial closeout.....	69
Table 4-28. Quantifying general and administrative costs at commercial closeout	71

APPENDICES

A1. Worked out example of reviewers quality check questions.....	A-1
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1 Introduction

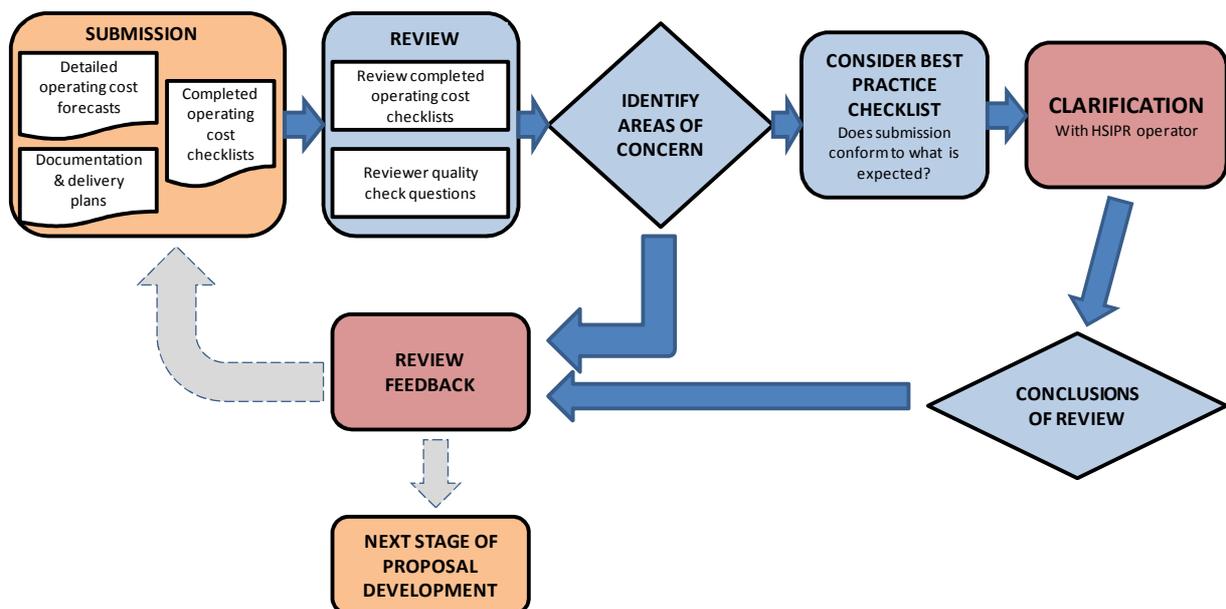
The operating costs toolkit has been prepared to assist reviewers who are considering submissions from potential operators and promoters of new HSIPR services. The organization making the submission is referred to as the “HSIPR operator” in the remainder of this document.

The toolkit comprises 3 key elements:

- **Operating cost checklists:** a series of tables, blank copies of which should be provided to HSIPR operators for completion as part of their submission (presented in Section 2 of this toolkit report);
- **Reviewers’ quality check questions:** questions to facilitate reviewers’ understanding whether the HSIPR operators’ forecasts are within reasonable tolerances (presented in Section 3 of this toolkit report); and
- **Best practice guidance:** a series of checklists which show the level of detail to which reviewers should expect the HSIPR proposal and associated operating costs forecasts to be prepared at preliminary, intermediate and final stages of the project development (presented in Section 4 of this toolkit report).

Figure 1-1 shows the proposed review process of HSIPR submissions, including how each of the elements of the toolkit will be used.

FIGURE 1-1. PROPOSED REVIEW PROCESS



The purpose of the toolkit is to assist reviewers quickly identify the strengths and weaknesses of individual operating cost estimates, in a consistent manner. The reviewer can then focus on understanding the reasons behind the weaknesses and, through the prompts in the best practice guidance, seek clarifications from the HSIPR operator in an informed manner.

Operating cost checklists

The operating cost checklists (presented in Section 2 of this toolkit) are intended for completion by HSIPR operators, and for submission to reviewers alongside the core documents and financial statements. The

completed checklists should provide a stand-alone representations of operating costs and should be consistent with the detailed operating cost forecasts in the HSIPR financial submission and should cross-reference the submitted proposal documents for supporting information, assumptions and methods of calculation.

It is recommended that the checklists presented in Section 2 of this toolkit (or a variant of them) form parts of the application requirements for potential HSIPR operators seeking funding for HSIPR service development proposals (as referred to in Federal Register documents).

In completing the operating cost checklists, HSIPR operators will gain an understanding of the type of information which reviewers will consider when considering HSIPR proposals. This is likely to improve the overall quality of submissions, particularly at preliminary stage, because the checklists will ensure that an estimate is provided for all elements which drive operating cost. From the reviewers perspective, the operating cost checklists summarize the cost forecasts in a consistent format with the key information readily available. The consistency provided then permits different HSIPR submissions to be readily compared and areas of commonality and difference identified. Ultimately, the standardized operating cost checklists will permit benchmarking matrices to developed for HSIPR projects.

The checklists have been designed for use by HSIPR operators at all stages of HSIPR proposal development (preliminary, intermediate, final and commercial closeout).

At preliminary stage, the focus of the operating cost estimate is to differentiate between a large number (6 or more) of service and route options rather than determining the likely absolute levels of operating cost with any degree of accuracy. It is therefore important for the preliminary stage estimates to be prepared consistently, using the same underpinning assumptions and spreadsheet model. At preliminary stage, the HSIPR operator will only have sufficient information to be able to partially complete some of the operating cost checklists, particularly those for train and railroad maintenance and general and administrative costs. For guidance, the items which one would expect to be completed at preliminary stage have been shaded in Table 2-1 to Table 2-9. Table 2-10 (the summary of total costs of each category) should be completed in full.

Where the HSIPR proposal is at intermediate or final stage of development all items in the operating cost checklists can be populated, however, it should be recognized that intermediate stage forecasts will not be prepared using the same rigor as those for final stage. At intermediate stage, it is likely that forecasts of train and railroad maintenance costs will still have been prepared using cost per vehicle or train mile, similar to preliminary stage. However, further background information should be provided at this stage to give confidence in the estimated sum, for example the number of depots required, an indication of staff numbers and for trains, an estimate of the number of inspections per year should be known at intermediate stage. This means Table 2-5 and Table 2-7 may not be quite fully completed but will have more cells populated than in preliminary stage. HSIPR proposals at final and commercial close out stages of development would be expected to have the supporting data to complete all Items in Table 2-5 and Table 2-7.

The operating cost checklists will be used by reviewers to efficiently gain an understanding of the costs of the proposed HSIPR operation with any gaps in the cost estimate readily identifiable. When used in tandem with the reviewers quality check questions the areas of strength and weakness in the cost estimate are quickly identified.

Reviewers' quality check questions

The reviewers' quality check questions (presented in Section 3 of this toolkit) are a series of suggested checks which will help clarify whether the operating costs forecasts submitted in the operating cost checklists are based on appropriate assumptions and are likely to be accurate within acceptable tolerances.

They are designed to enable reviewers to undertake their own quick estimates of costs which can then be compared with the forecasts presented by the HSIPR operator. This will assist the reviewer's understanding of the proposed HSIPR service and how the HSIPR operator has prepared estimates. The quality check questions use the information provided in the operating cost checklists and broad "rules of thumb" to facilitate the independent checks.

Together with the operating cost checklists the reviewers' quality questions provide transparency of proposed operating costs, thereby making the review process thorough, efficient and equitable.

Undertaking the reviewers' check questions will enable reviewers to quickly identify areas where the operating cost forecasts may be weak, incorrect or require further substantiation. The reviewers check questions are not intended to enable the reviewer to prepare "correct" forecasts of operating costs. They will only allow the reviewer to prepare indicative forecasts of the orders of magnitude of costs, using the basic HSIPR specification details provided in the checklists, supported by "rules of thumb" cost rates.

Where the reviewer finds that the cost forecasts presented in the operating cost checklists and those prepared from the reviewers' quality checks are significantly different (+/- 30%), there will often be a valid explanation for this. So the reviewer should not automatically assume that the HSIPR operator cost forecasts are incorrect. Where differences arise, these areas should be noted as requiring further clarification, firstly by reviewing the core HSIPR proposal documentation, and if not immediately clear, by requesting clarification directly from the HSIPR operator.

Where the reviewer finds that the operating cost checklists omit information, or where the information in them is weak, reference should be made to the best practice guidance to understand whether the omission or weakness is "reasonable" given the stage of development of the HSIPR proposal.

Best practice guidance

The best practice guidance (presented in Section 4 of this report) comprises three sets of tables that explain which aspects of an HSIPR proposal should be defined at each stage of HSIPR project development, and the level of detail to which operating costs should be prepared.

As part of the review process, it is expected that the reviewer will consider the operating cost forecasts (and operating cost checklists) mindful of the best practice guidance. Particular attention should be paid to those areas where information is omitted or where the reviewers' quality check calculations have highlighted a significant difference with forecasts from the HSIPR operator.

Where a significant number of forecasts of items are omitted from the operating cost checklists and the best practice guidance indicates that they should be available at that stage of development, the reviewer may decide that feedback should be given to the HSIPR operator, requiring them to re-submit proposals. Similarly, if there is a notable lack of rigor in the forecasts, and the best practice guidance indicates that this is below the standard expected, feedback may be provided at this stage.

2 HSIPR operating costs checklists

The operating cost checklist comprises a series of tables, for completion by the HSIPR operator. The completed checklists form the basis of the evaluation of the HSIPR operating costs by the reviewer.

The operating cost checklist provides reviewers with the key cost information for an HSIPR proposal at any stage of development in a consistent and easy to read format. A completed checklist on its own does not guarantee an accurate estimate, however, it does give the reviewer confidence that estimates have been prepared for all elements which drive operating cost and the risk of omissions in preliminary and intermediate stage estimates is reduced.

A total of ten tables form the operating cost checklist and include tables for each of the main categories of operating costs.

1. Specification of the railroad, train service, rolling stock and customer offer
2. Traincrew
3. Energy
4. Rolling stock (leasing/depreciation costs)
5. Rolling stock (maintenance)
6. Stations (including station staff)
7. Railroad operations and maintenance
8. General and administration
9. Costs of risks and contingencies
10. Summary of total costs by category and future year forecasts

The tables which cover each category of costs include not only estimates of costs but also the “drivers” of these costs. The summary table should present the annual total costs of each operating cost and the operating costs for a number of future years (generally at 5-year intervals and where there are step-changes in the level of train service). The total operating costs presented in this final table must be consistent with the “headline” operating costs of the HSIPR (where operating costs, like passenger revenue is a key “reference” for HSIPR proposals) and must also be consistent with the total costs of each component in the preceding tables (including the stated costs of risk and contingency stated in the penultimate table).

TABLE 2-1. TRAIN SERVICE SPECIFICATION

Item Ref	Required Item	Forecast Number (including unit of account)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
Route and Timetable			
D1	Total Route miles		
D1 _n	¹ Route miles for each service group (where "n" is the reference number of each service group)		
D2	Total track miles		
D3	Number of stations served		
D4	Times of day when service will operate for each of: a) Standard hour service b) Peak service (if applicable) c) Weekend service		
D5 _n	Service frequency (standard hour) : (for each service group _n , where relevant)		
D6 _n	Service frequency (peak periods) : (for each service group _n , where relevant)		Hours during which the peak service will operate
D7 _n	Weekend service frequency : (for each service group _n , where relevant)		
D8 _n	End-to-end trip times: (for each service group _n , where relevant)		Explanation of how this is estimated
D9	Empty stock working (ecs) miles per year ⁴		Method of calculation
D10	Empty stock working (ecs) hours per year ⁴		Method of calculation
D11	Total train miles per year (incl. ecs) ⁴		Method of calculation
D12	Total train hours per year (incl. ecs) ⁴		Method of calculation

Note: Submissions of preliminary stage HSIPR proposals (proposals in which revenue, cost and public benefit forecasts for 6-8 HSIPR options are presented) are only expected to be able to complete those items in the checklist which are shaded.

Train and Customer Offer

Item Ref	Required Item	State Defined Information	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
D13	Train specification	Length Max speed Weight Max power Seating capacity	Source of information
D14	Method of train dispatch at stations:	Driver On-train staff Station staff Other (specify)	Rationale and confirmation of adherence to safety standards and other relevant legislation
D15	Provision of differentiated product quality?	State classes of accommodation	Description of business and economy class or similar product differentiation
D16	Percentage of ticket sales made by each of	Internet Call centers, Station ticket machines, Station ticket offices, On-train ticket sales staff Other (specify)	Method of calculation

- Notes:
- 1 Where not all services operate the full length of the HSIPR, state the route miles of the main service groups
 - 2 Where different service groups operate over the HSIPR, state the frequency of each
 - 3 Where different service groups operate over the HSIPR, state the end-to-end trip times of each
 - 4 Where different train types of train lengths operate, state miles and hours for each type.

TABLE 2-2. TRAINCREW COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
T1	Number of drivers on each train		
T2	Number of other on-train staff on each train		Roles defined and key responsibilities stated
T3	Total number of drivers for HSIPR operation		Methodology and assumptions used to forecast this.
T4	Total number of other on-train staff for HSR operation		Methodology and assumptions used to forecast this.
T5	Drivers' annual salary		Rationale for the estimate of salary
T6	Annual salary of other on-train staff		Rationale for the estimate of salary
T7	Employers overheads (as a % of salary)		Explanation of components of overheads and level of overhead
T8	Change in staff costs over time		Explanation of forecast
T9	Other relevant information		Any other information used to forecast Item T12
T10	Total driver staff costs per year		Method of calculation
T11	Total on-train staff costs per year		Method of calculation
T12	Total traincrew costs		Method of calculation The cost stated here must be consistent with the summary costs forecast presented in Table 2-10.

TABLE 2-3. ENERGY COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
E1	Average energy consumption (kWh or US gallons) per train mile		Method of calculation or source of estimate (may be based on similar rolling stock and HSIPR routes or calculated through traction power modeling)
E2	Cost per kwh or US gallon		Source of estimate
E3	Total annual train miles		Expected to be identical to D11
E4	Total energy consumed per year		Method of calculation
E5	Change in unit cost of energy over time		Source and rationale for forecast
E6	Other relevant information		Any other information used to forecast Item E7 such as application of discount for regenerative braking.
E7	Total energy costs per year		Method of calculation The cost stated here must be consistent with the summary costs forecast presented in Table 2-10.

TABLE 2-4. ROLLING STOCK COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
A1	Number of trains required for standard passenger service Number of additional trains required for peak hour services (either for additional services or longer trains)		Method of calculation
A2	Number of trains as maintenance cover		Method of calculation
A3	If trains are leased, lease costs per train per year		Source of lease cost
A4	If trains are purchased, depreciation costs per train per year		Source of depreciation forecast
A5	Change in lease or depreciation costs over time		Source of this forecast change
A6	Other relevant information		Any other information used to forecast Item A7
A7	Total rolling stock ownership/lease costs		Method of calculation. This figure must be consistent with the summary costs forecast presented in Table 2-10.

TABLE 2-5. ROLLING STOCK MAINTENANCE COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
A8	Number of light maintenance inspections per train per year		Method of calculation
A9	Person hours required for light maintenance inspection		Method of calculation
A10	Resources (labor hours, materials, plant) required for inspection		Method of calculation
A11	Number of light maintenance staff		
A12	Annual salary for train maintenance staff		Rationale for the estimate of salary
A13	Change in rolling stock staff maintenance costs over time		Source and rationale for forecast
A14	Total staff light maintenance costs per year		Method of calculation
A15	Total non-staff light maintenance costs per year		Method of calculation
A16	Number of heavy maintenance inspections per train per year		Method of calculation
A17	Person hours required for heavy maintenance inspection		Method of calculation
A18	Maintenance resources (person hours, materials, plant) required for each heavy maintenance inspection		Method of calculation
A19	Number of heavy maintenance staff		Method of calculation
A20	Annual salary for train maintenance staff		Rationale for the estimate of salary
A21	Change in rolling stock staff maintenance costs over time		Source and rationale for forecast
A22	Total staff heavy maintenance costs per year		Method of calculation
A23	Total non-staff heavy maintenance costs per year		Method of calculation
A24	Other maintenance staff costs		Method of calculation
A25	Total number of maintenance staff		Method of calculation
A26	Number and size of maintenance depots		Rationale for the number, size and location of depots.
A27	Depot maintenance and utilities costs		Method of calculation
A28	Total rolling stock maintenance costs per year		
A29	Total number of cleaning staff		Method of calculation

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
A30	Total cost of cleaning staff		Method of calculation
A31	Total cost of cleaning materials		Method of calculation
A32	Total cleaning costs per year		
A33	Other relevant information		Any other information used to forecast Item A33
A34	Total rolling stock costs per year		Method of calculation. This figure must be consistent with the summary costs forecast presented in Table 2-10.

TABLE 2-6. STATION COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
S1	Number of Terminal or major stations served		
S2	Number of other stations served		
S3	Average number of platforms at terminal /major stations Specify number of island platforms and single-sided platforms		
S4	Average number of platforms at other stations Specify number of island platforms and single-sided platforms		
S5	Number of station staff at terminal / major stations		Roles defined and key responsibilities stated
S6	Number of station staff at each other station		Roles defined and key responsibilities stated
S7	Total number of station staff		Methodology and assumptions used to forecast this.
S8	Station staff annual salary		Rationale for the estimate of salary
S9	Employers overheads (as a % of salary)		Explanation of components of overheads and level of overhead
S10	Change in staff costs over time		Explanation of forecast
S11	Other relevant information		Any other information used to forecast Item S12
S12	Total station staff costs per year		Method of calculation
S13	Fixed costs e.g., utilities, building and equipment maintenance		Methodology and assumptions used to forecast this.
S14	Change in fixed costs over time		Explanation of forecast
S15	Other relevant information		Any other information used to forecast Item S16
S16	Total station costs per year		Method of calculation The cost stated here must be consistent with the summary costs forecast presented in Table 2-10.

TABLE 2-7. RAILROAD COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
R1	Number of signaling and control centers		Rationale behind this quantum
R2	Number of staff per signaling and control center		Roles defined and key responsibilities stated
R3	Annual salary of signaling and control center staff		Rationale for the estimate of salary
R4	Employers overheads (as a % of salary)		Explanation of components of overheads and level of overhead
R5	Change in signaling and control center staff costs over time		Source and rationale for forecast
R6	Other relevant information		Any other information used to forecast Item R7
R7	Total annual cost of signaling and control centers		Method of calculation
R8	Number of and type assets which will require regular inspection. For example: 400miles of way requiring weekly inspection. 50 switches which requiring monthly inspection. 400 miles of overhead catenary requiring monthly inspection.		Description of each type of inspection and frequency of inspection. method of calculation of number of inspections.
R9	Labor requirement for each type of inspection		Roles and responsibilities stated. method of calculation
R10	Annual salary of maintenance staff		Rationale for the estimate of salary
R11	Employers overheads (as a % of salary)		Explanation of components of overheads and level of overhead
R12	Change in maintenance staff costs over time		Source and rationale for forecast
R13	Total annual maintenance staff costs		Method of calculation
R14	Costs of materials for railroad maintenance per year		Method of calculation
R15	Costs of plant required for railroad maintenance per year		Method of calculation
R16	Maintenance depot costs per year, including		Method of calculation
R17	Other relevant information		Any other information used to forecast Item R18
R18	Total non-labor railroad maintenance costs per year		Method of calculation
R19	Other relevant information		Any other information used to forecast Item R20
R20	Total railroad maintenance costs per year		Method of calculation
R21	Total railroad operations and maintenance costs per year		Method of calculation The cost stated here must be consistent with the summary costs forecast presented in Table 2-10.

TABLE 2-8. GENERAL AND ADMINISTRATIVE COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
G1	Number of headquarters staff		Roles defined and key responsibilities stated
G2	Annual salary of headquarters staff (for key roles/grades)		Rationale for the estimate of salaries
G3	Employers overheads (as a % of salary)		Explanation of components of overheads and level of overhead
G4	Change in head office staff costs over time		Source and rationale for forecast
G5	Other relevant information		Any other information used to forecast Item G6
G6	Total annual cost of headquarters staff		Method of calculation
G7	Other headquarters costs including, but not limited to: IT, telecoms, utilities and office supplies		Description of cost items included Method of calculation
G8	Marketing and advertising costs		Description of cost items included method of calculation
G9	Professional services costs including, but not limited to: legal, engineering and insurance		Description of cost items included method of calculation
G10	Other ticket sales related costs including, but not limited to costs of leasing ticket machines, commissions for third party sales, call center and internet costs		Description of cost items included method of calculation
G11	Other staff related costs including, but not limited to: uniforms, expenses, bonuses		Description of cost items included method of calculation
G12	Other HSIPR delivery costs including car park management, catering and security staff, where these are sub-contracted		Description of cost items included method of calculation
G13	HSIPR training costs		Description of cost items included method of calculation
G14	Change in non-staff general and admin. costs over time		Source and rationale for forecast
G15	Other relevant information		Any other information used to forecast Item G16
G16	Total non-staff general and admin. costs		Method of calculation
G17	Other relevant information		Any other information used to forecast Item G18
G18	Total general and admin. costs		Method of calculation The cost stated here must be consistent with the summary costs forecast presented in Table 2-10.

TABLE 2-9. SUMMARY OF CONTINGENCY APPLIED

Cost category	Key risks	Value of contingency added to cost estimate
Traincrew	<ol style="list-style-type: none"> 1. 2. 3. 	
Energy	<ol style="list-style-type: none"> 1. 2. 3. 	
Rolling stock	<ol style="list-style-type: none"> 1. 2. 3. 	
Station	<ol style="list-style-type: none"> 1. 2. 3. 	
Railroad	<ol style="list-style-type: none"> 1. 2. 3. 	
General and admin.	<ol style="list-style-type: none"> 1. 2. 3. 	
Contingency overlay		If specific contingency values have not been applied to address risks in each cost category, specify the total overlay applied and the rationale for this value.
TOTAL		

TABLE 2-10. SUMMARY OF OPERATING COSTS

Required Item	Year 1 Forecast	Future Year forecast	Future Year Forecast	Future Year Forecast	Notes
Traincrew costs					Output from Table 2-2
Energy costs					Output from Table 2-3
Rolling stock costs					Output from Table 2-4 and Table 2-5
Station costs					Output from Table 2-6
Railroad costs					Output from Table 2-7
General and Admin. costs					Output from Table 2-8
Risk /contingency					Output from Table 2-9
TOTAL					

3 Reviewer quality check questions

This section provides a series of recommended questions which reviewers should consider, and undertake independent calculations for. Each question notes the “item reference” code in the operating cost checklist to which the question refers.

An example of the application of the quality check questions is provided in Appendix A, where information provided for the New Lines HSR (a proposed HSR in Great Britain between London, Birmingham, Manchester, Liverpool, Glasgow and Edinburgh which was used as a case study in the operating costs report), was used to populate the checklist, to which the reviewers quality check questions were applied.

The elements which have greatest influence on the accuracy of operating cost estimates are:

- Track miles and the unit costs of maintaining track (where these “drive” railroad maintenance costs);
- Train miles (where these “drive” energy costs and train maintenance costs); and
- Energy consumption rates and the unit costs of energy (where these “drive” energy costs).

Analysis indicates that under-estimating any one of these items by (for example) 30% may result in total operating costs being under-estimated by 10%. It follows that if the under- (or over-) estimate of one or more cost items is of greater magnitude than 30% then total operating costs will be significantly under- (or over) estimated.

Conversely, the following items are less significant in terms of their impact on operating costs:

- Train hours and staff salaries (where these “drive” traincrew and station staff costs);
- Rolling stock maintenance staff salaries, frequency of inspections, rolling stock maintenance materials costs (where these “drive” rolling stock maintenance costs); and
- General and administrative costs.

However, clearly if more than one of these items is under-forecast then the impact becomes more significant.

While a notional error of 30% magnitude has been chosen for illustration purposes, it is not unusual for forecasts of some cost drivers to be as much as 50% too high or too low, especially at early stages of project development.

Furthermore, as described in the best practices *in HSIPR operating costs Report*, the proportion of total operating costs accounted for by each of the cost categories will vary depending on the circumstances of each HSIPR project. For example, the railroad maintenance and operating cost of a 600 mile HSIPR network crossing varied terrain with an hourly train service will form a higher proportion of total operating costs than that of a 250 mile network between neighboring cities, with an intensive train service operating every 20 minutes. It is only through understanding the HSIPR proposition in some detail that it will become clear to reviewers whether unexpectedly high or low estimates are accurate reflections of the costs that will be incurred by the HSIPR proposition. It is therefore important that in addition to reviewing the checklist, the reviewer of costs should consider the wider HSIPR proposition. Working through the reviewer’s questions will undoubtedly raise issues which require clarification, either from elsewhere in the HSR proposal or from the HSIPR operator. Thus through undertaking the quality check questions, the reviewer will identify whether the HSR costs are broadly correct and will also gain a greater understanding of the HSIPR proposal.

Train service specification: reviewer quality check questions

1. *Route and track miles (D1 and D2)*

The number of HSIPR route miles (specified by each service group, where appropriate) is a key determinant of the quantum of train miles - a key driver of operating costs.

- Total route miles (D1) = straight-line distance between key stations +15% allowance; and
- Route miles for each service group (D1_n) = straight-line distance between key stations for the route on which the service group operates +15% allowance.

The number of track miles will be a key determinant of the costs of maintaining the railroad, and accordingly should have been calculated by the promoter (and presented in D2). The reviewer should undertake a high-level estimate of the track miles and confirm that these are broadly consistent (+/-20%) with those presented by the promoter.

- Total track miles (D2) = (total route miles x number of tracks in each direction) + (10% allowance).

Where the allowance covers additional tracks at stations, depots and stabling locations).

2. *Annual train miles and hours (D11 and D12)*

Annual train hours and miles are often the “driver” of a significant proportion of costs, yet they are often inaccurately forecast.

Annual train miles = annual peak train miles + annual standard hour train miles + annual weekend train miles + ecs allowance

- Annual peak train miles
 - Using the route miles and frequency for each service group (D1_n and D6_n) calculate the number of train miles in each peak hour;
 - Calculate: daily peak train miles = train miles each hour x hours when peak service will operate (D5_n reference); and
 - Calculate: annual peak train miles = daily peak train miles x annualization factor (apply an appropriate annualization - e.g. if peak only occurs on weekdays the annualization would be 260).
- Annual standard hour train miles
 - Using the route miles and frequency for each service group (D1_n and D5_n) calculate the number of train miles in each standard hour;
 - Calculate: daily standard hour train miles = train miles each hour x hours of service less peak hours (D4 minus D5 information);
 - Calculate: annual standard hour train miles = daily standard hour train miles x annualization factor (apply an appropriate annualization - e.g. 260); and
 - NB: If no weekend service frequency is specified assume that the standard hour also operates at weekends, and apply an annualization of 360.
- Annual weekend train miles
 - Using the route miles and frequency for each service group (D1_n and D7_n) calculate the number of train miles in each weekend hour; and

- Calculate: weekend train miles = train miles each hour x hours of service (D4) x appropriate annualization (52 weeks x 2 days = 104).

■ Empty Stock Allowance

- Sum the peak, standard hour and weekend train miles and add 5 - 10% for empty stock workings (choice of 5 - 10% is dependent on the proximity of the maintenance depot relative to the terminal stations).

Annual train hours = annual peak train hours + annual standard hour train hours + annual weekend train hours + ecs allowance.

Repeat the annual train miles calculation but replace D1n (route miles for each service group) with D8n (end to end trip times for each service group).

3. *Implied on-train staff per train*

It is sometimes the case that the number of staff per train is inconsistent with the responsibilities of on-train staff: train dispatch, ticket sales and passenger support/services (D14, D15 and D16).

The reviewer should independently consider the number of on-train staff (excluding drivers) likely to be required given the promoter responses to D14, D15 and D16 - and where any specific safety requirements indicate additional staff are required.

Reviewers should cross-reference the assumptions in the ridership forecasts (to ensure the quality of service assumed in the ridership forecasts is consistent with that in the cost assumptions and the operating cost checklist).

On a 650 ft train (8 cars) with 450 seats, a minimum of 1 train guard will be required. Other staff will be required:

- If on-train staff are responsible for train dispatch (D14): a further member of staff is required;
- If on-train staff are responsible for a significant (>25% of total) ticket sales (D16): a further member of staff is required. However, a guard plus one other member of staff could reasonably accommodate ticket sales and train dispatch;
- If refreshments are provided to passengers either using an at seat trolley or a buffet coach: a minimum of 2 further members of staff are required;
- If premium/business accommodation is provided (with associated at-seat refreshments): a minimum of 1 additional member of staff is required;
- If an on-board restaurant is provided: a minimum of 2 additional members of staff is required.
- **In summary up to 7 members of on-train staff (in addition to the driver(s) may be required). During periods of high demand (load factor > c60%), a further 3 members of staff may be required (ticket sales, refreshments); and**
- If on-train staff are not required to dispatch trains or provide refreshments (and <20% of tickets are sold on-board), one would expect a minimum of 1 member of on-train staff (2 during periods of high demand).

Where a 1300 ft train with c900 seats is formed by operating two 650ft trains coupled together, the on board staff numbers will generally double as there is no means of passing from one train to the other. With a single 1300ft train with c900 seats, dependent upon the responses to D14, D15 and D16 it can be expected that:

- Up to 11 members of on-train staff (in addition to the driver(s)) may be required: (guard, train dispatch / ticket sales 2, refreshments 4+2, restaurant 2), with a further 5 staff during busy periods; and
- If on-train staff are not required to dispatch trains or provide refreshments (and <20% of tickets are sold on-board), one would expect a minimum of 2 member of on-train staff (2 during periods of high demand).

Traincrew costs : reviewer quality check questions

4. Total Number of HSIPR drivers (T3)

The total number of drivers required for HSIPR service is sometimes under-estimated as drivers “productive time” is over-estimated.

While a train driver may typically work a 35 to 40 hour week (although this will vary according to what is specified in the employment terms and conditions), only a proportion of this time is spent driving trains which are in passenger service (“productive time”). A considerable proportion of a drivers time (particularly for HSR drivers) is spent preparing for start-up/close down of service, and waiting to commence the next trip.

The level of productive time varies considerably depending on the train service which is operated. For example, where there is an infrequent service (1tph or fewer) throughout the day or during the off-peak, the proportion of productive time is likely to be lower.

A high-level indication of whether the number of drivers proposed is reasonable can be ascertained as follows:

- Working week = 35 hours, 52 weeks per year, less 4 weeks holiday + 2 weeks training + 1 week sickness = 1575 working hours per year;
- It is reasonable to assume that approximately 35-40% of an HSIPR drivers’ time will be non-productive time, i.e., a driver will be productive for approximately 950 hours per year; and
- If total train hours (D12) divided by total number of train drivers (T3) implies that drivers are “productive” (driving trains in passenger service) in excess of 950 hours per year, it is likely that the number of train drivers has been under-estimated.

The reviewer must confirm whether the HSIPR operator has assumed whether the costs assume two drivers in the cab, or whether a derogation from this requirement has been assumed. Similarly, it must be confirmed whether “total train hours” includes turnaround time.

5. Total number of other on-train staff (T4)

The total number of on-train staff is defined by the number of staff per train (as discussed in reviewer question 3), the annual train hours and the number of productive hours per year per staff member.

On-train staff are generally more productive than train drivers. It is reasonable to assume that 75 - 80% of an on-train staff’s working hours are productive.

- Assuming a working week of 35 hours, 52 weeks per year, less 4 weeks holiday + 1 weeks training + 1 week sickness = 1600 working hours per year);
- It is reasonable to assume that 25% of an HSIPR on-train staff time will be non-productive time, i.e., 1200 productive hours per year; and
- Total number of on-train staff required = total train hours (D12) divided by typical staff productive hours x number of on-train staff per train.

6. *Drivers annual salary (T5) and other on-train staff salary (T6)*

Driving trains is generally a well-paid profession so driver salaries must reflect this. HSIPR train drivers will be paid a salary higher than the industry average.

- The Bureau of Labor Statistics (BLS) provides guidance on train driver salaries; and
- The reviewer should ensure that the assumed driver salary in the HSIPR proposal (T5) is consistent with the higher rates of salaries presented in this source. In doing so, it is critical to confirm that the price bases are consistent (currently the BLS salaries are presented in 2007 prices - so ignoring the price base may result in the reviewer under-estimating salaries by c10%) and that the BLS salaries exclude employers overheads.

Other on-train staff are paid less than train drivers and the reviewer should ensure that the relativity between average salaries is broadly correct.

- The BLS provides guidance on the salaries of train conductors and yardmasters, however, these roles are not consistent with the “average” HSIPR on-train staff; and
- It would be reasonable to assume that on-average, other on-train staff are paid 40% less than train drivers.

7. *Other relevant information (T9)*

The costs of trainee train drivers accounts for a notable proportion of staff costs. The proposal should include an estimate of the cost of trainee drivers, a category of staff who are usually categorized as on-train staff.

- Costs of trainee drivers = number of trainee drivers x salary and employers overheads;
- Number of trainee drivers: the turnover of HSIPR drivers in North America (where the labor market for trained drivers is fairly limited) is likely to be of the order of 5% of the total number of drivers per year. The number of trainee drivers = T3 x 5%;
- The salary of trainee drivers will depend on the terms and conditions of each HSIPR and may vary considerably (and are unlikely to be confirmed until final stage proposals). However, a reasonable assumption would be that trainee drivers salaries are 60% of those of trained drivers; and
- Uplifts to reflect employers overheads should be consistent with other on-train staff.

8. *Forecast change in staff costs over time (T8)*

On-train staff costs will change over time in response to general price rises causing wages to change (generally to increase) and also in response to changes in passenger numbers and levels of train service. If the promoter has not assumed any change in staff costs over time, it implies that on-train staff costs will be under-estimated.

9. *Total traincrew costs (T12)*

Total traincrew costs are determined by the number of drivers and other on-train staff and the salaries and employers overheads of each. Changes in staff costs over time may also influence total costs.

Total traincrew costs = total driver costs p/a (T10) + total other on-train staff costs p/a (T11).

- Total driver costs p/a = Number of drivers x (drivers annual salary + employers overheads); and
- Total other on-train staff costs p/a = Number of other on-train staff x (on-train staff annual salary + employers overheads).

Energy costs : reviewer quality check questions

10. *Energy consumption per train mile (E1)*

Energy costs account for a significant proportion of operating costs, yet are challenging to forecast accurately, and to benchmark.

Energy consumption per train mile = (power rating of train (D13) x average proportion of the maximum power drawn from the system x train hours)/train miles.

- The power rating of an HSIPR train is generally between 6 - 12MW, and should be included in the train service specification (D13);
- The average proportion of the maximum power drawn will depend on the maximum speed, the required rate of acceleration, (loaded) train weight, gradients of the route and number of station stops. The number of station stops is probably the biggest influence on the proportion of time when power is drawn; and
- Train hours and miles can either be calculated from a single trip (Distance D1n and time D8n) or from total annual distance and time (D11 and D12). Where the HSIPR services proposed provide different stopping patterns and/or routes it would be sensible to forecast energy consumption per train mile for each service group or route.

For example, in one of the case studies considered (High Speed 2), a train with maximum power 12MW, making a trip of 100 miles (including 2 station stops) in 48mins (encountering no significant gradients) was modeled as consuming electricity at a rate of 52kwh per train mile (implying that on average, 55% of the maximum power was drawn from the system (excluding regeneration)).

11. *Cost per kwh or US gallon of diesel (E2)*

Slight differences in the price of energy can have a significant effect on total HSIPR energy costs. For example, the average price of electricity per kwh for all sectors was 9.62 cents per kwh in the US in 2010 (Source: US Energy Information Administration (EIA)). However, if this was used instead of the cost to the transportation sector (where the cost was 10.42 cents per kwh), energy costs would be underestimated by 8%. Prices vary even more by state (in California the price of electricity for the transportation sector is 40% lower than for “all sectors”).

Reviewers should compare the cost per kwh of electricity or diesel with recent prices published by US EIA and confirm that they are appropriate for the sector and state.

12. *Total energy consumed per year (E4)*

Previous reviews have shown that while train service simulations have forecast the total energy consumed on a typical day (or hour), the costs have been incorrectly factored up. The reviewer should independently calculate total energy consumed:

- Annual energy costs = average energy consumption per train mile (E1) x total annual train miles (E3); and
- This calculation should be undertaken using both the checklist components presented by the promoter (E1 x D11) and the reviewers independent assessment of the consumption rate and mileage.

13. *Change in unit cost of power over time (E5)*

Given the volatility of the price of energy, it is important that the reviewer understand how increases in energy prices could affect the HSIPR proposal. The forecast change in the price of energy should be compared with a suitable source e.g., US EIA information (which provides annual and 5-yearly forecasts of energy prices for each sector).

14. *Total energy costs per year (E7)*

This quality check takes the independent check of E4 (see above) and the unit cost of energy and changes in energy costs over time.

- Annual energy costs = total energy consumed per year x cost per kwh or US gallon; and
- Changes in the unit cost of electricity or diesel should also be taken into account.

Rolling stock costs : reviewer quality check questions

15. *Number of trains in regular passenger service (A1)*

If rolling stock is leased, the number of trains used for the HSIPR service can have a significant impact on operating costs. Similarly, if maintenance costs are presented on a per train basis, it is important that the number of trains is accurate.

- A high-level check of the number of trains which would be needed to operate the HSIPR service can be forecast using the following calculation: (train frequency x diagram length in minutes)/60 mins.
 - Diagram length = (trip time from A to B) + layover + (trip time from B to A);
 - Where the HSIPR service comprises a number of different types of service, the number of trains required can be forecast for each. In practice, there may be some efficiencies from inter-working between service groups;
 - The service frequency should be that in the peak period (D6);
 - The number of services which will operate as strengthened, that is with two trains coupled together;
 - A typical layover for a service with trip time 90 mins would probably be 20 mins;
 - For example, a service with frequency 2tph, trip time 2 hours and layover 20 mins (and where all services are formed of one train): number of trains = $(2 \times (120 + 20 + 120))/60 = 9$ trains.

16. *Number of trains as maintenance cover (A2)*

If rolling stock is leased, the number of trains used for the HSIPR service can have a significant impact on operating costs.

- Trains for maintenance cover should account for 5- 10% of the total fleet. For example, if there are 30 diagrammed trains, an additional 2 or 3 trains should be provided for maintenance cover.

Irrespective of the total fleet size, a minimum of 2 trains are required for maintenance spares and if the HSIPR fleet is mixed (formed of rolling stock with different technical specifications or interior layouts), the number of spares should be estimated for each sub-fleet.

Rolling stock maintenance costs : reviewer quality check questions

Rolling stock maintenance is a first order element of operating cost generally accounting for 20% to 30% of the total. Labor and material forms most of this cost element. Preliminary stage proposals will often forecast maintenance costs by benchmarking the cost per train mile with other HSIPR operations. However, a bottom-up estimate of costs by the reviewer should enable a view to be taken as to the reasonableness of the maintenance costs.

Where benchmarking is used, the HSIPR operator may use a rate for train maintenance which equates to approximately \$7 per train mile. However, where early estimates of train maintenance costs are prepared on a bottom-up basis (in manner similar to the reviewers check questions), the equivalent cost rate may be lower - of the order of \$4 to \$5 per train mile. The difference stems from the fact that benchmarked rates are often based on sub contracted scenarios where a third party such as the train manufacturer maintains the trains and is paid a fee based on the number of trains available for service each day. With this type of contractual arrangement, overheads are incurred by both the maintainer and HSIPR operator and a premium is paid by the HSIPR operator for transferring the risk of having the trains available when required to another organization. In summary, the reviewer should not be overly concerned if their check calculation derives a smaller value than the HSIPR operator.

17. *Number of light maintenance inspections per Year (A8)*

Broadly, to benchmark light maintenance inspections will comprise:

- Cleaning and basic safety inspections after each trip;
- Daily servicing (filling water tanks, cleaning, emptying toilets) and inspection of components; and
- Trains will require a more extensive set of inspections and servicing (underframes and roofs must be checked every two days or so, and a more detailed inspection is undertaken weekly).

18. *Time required for light maintenance inspection (A9)*

- Trains will require cleaning and basic safety inspections after each trip (likely to be of the order of 15 mins per train);
- Daily servicing (filling water tanks, cleaning, emptying toilets) and inspection of components (likely to be of the order of 3 person hours per train); and
- A more extensive set of inspections and servicing every two days and weekly (likely to be of the order of 32 person hours per train).

19. *Labor time required for light maintenance inspections (A10)*

- Total labor time (resource hours p/a) required for light maintenance = Number of trains x Number of each inspections per train p/a x time required for each type of light maintenance inspection.

20. *Number of light maintenance staff (A11)*

- Number of light maintenance staff = light maintenance resource hours (A10)/annual productive hours per maintenance employee; and
- Most light maintenance takes place at night and at weekends and staff numbers must reflect appropriate rest periods.

21. Total light maintenance staff costs per year (A14)

- Staff costs = number of light maintenance staff (A11) x (average salary (A12) + employers overheads uplift); and
- The salary of maintenance staff should be assumed to be marginally lower than that of train drivers.

22. Total heavy maintenance staff costs (A22)

These costs should be checked in a similar manner to light maintenance staff costs.

- Assume that there is a rotation of the fleet such that those trains not diagrammed will be under-going heavy maintenance;
- Heavy maintenance staff costs = number of trains not diagrammed x number of maintenance staff per train x number of shifts x (annual salary + employers overheads);
- Number of trains not diagrammed = maintenance spares (A2); and
- Assume heavy maintenance requires a team of 4 to 5 maintenance staff per shift per train in heavy maintenance.

23. Other maintenance staff costs (A24)

These costs should include management staff, rostering, materials ordering staff and store control, depot drivers and any other staff required to facilitate the train maintenance.

- As a broad guide; one would expect the number of these staff to be equivalent to 30% - 40% of the staff who actually undertake the maintenance (A11 and A19); and
- Their unit costs should be assumed to be similar to other maintenance staff.

24. Total non-staff light and heavy maintenance costs per year (A15 + A23 + A27)

These costs generally comprise the maintenance and utilities costs for the depot(s) and the cost of materials for train maintenance.

Indicative costs can be estimated assuming:

- Depot utilities and maintenance costs : \$1.5m-\$3m for a depot with 4 covered roads with pits and roof access; and
- Train maintenance materials: of the order of \$1m per train per year.

25. Total cleaning staff costs (R29 + R30)

- An overnight clean will take (at most) approximately 1 person hour per passenger carriage;
- Number of cleaning hours per night = number of carriages;
- Number of staff per night shift = total hours / productive time the trains are on depot (say 5 hours), e.g., if there are 30 diagrammed sets, each with 8 carriages, total cleaning hours = $8 \times 30 = 240$ hours / 5 = 48 staff per nightshift;
- Assume a team of 5 on dayshift at each depot to undertake “heavy” cleans on maintenance trains. This will generally be a single shift;
- Assume a team of 4 at each terminal station to undertaken turnaround cleans. This will require two shifts; and
- Average cost of a cleaner will be 40-50% of a driver.

Station costs : reviewer quality check questions

The number of staff at a station will be a function of the following:

Hours of train service/opening hours of station, number of platforms, responsibilities of station staff (train dispatch, ticket sales, customer information), station layout (including concourse: platform configuration and whether there are island platforms or single sided platforms), busyness of station.

26. Number of staff at terminal/major stations (S5) and other stations (S6):

Number of staff at a station = platform staff + ticket sales staff + other staff

Terminal /major stations

- I Terminal/major stations platform staff:
 - Platform staff resource requirement = (Number of island platforms x “p” staff + number of single sided platforms x “p” staff) x hours of train service operation x 365 days; and
 - Number of platform staff required = platform staff resource requirement / platform staff productive hours p/a.
 - Number of platforms calculated from number of stations (S1) and number of island and single-sided platforms at the stations (S3);
 - If platform staff dispatch trains “p” = 2, if platform staff do not dispatch trains “p” = 1; and
 - Platform staff productive hours per person per year (pppa) = 47 weeks x 35 hours = 1650 hours.
- I Terminal/major stations ticket sales staff:
 - Ticket sales staff resource requirement = (number of ticket sales “windows” x ticket office opening hours p/d x 365 days); and
 - Number of ticket office staff required = ticket office sales staff requirement/ticket office staff productive hours p/a.
 - At terminal stations one would expect two or more ticket office sales “windows” (depending on the busyness of the station and proportion of ticket sales sold in this way (D16));
 - It would be reasonable to assume that half the ticket office “windows” would only be open during peak hours; and
 - Ticket office staff productive hours pppa = 47 weeks x 35 hours = 1650 hours.
- I Terminal/major stations other staff (customer assistance/information, concourse staff) :
 - Depending on the size and layout of the station, it would be sensible to assume 2 - 4 staff on duty to provide customer information and assistance;
 - Other staff resource requirement = (number of staff x station opening hours p/d x 365 days); and
 - Number of other staff required = (other staff requirement/other staff productive hours p/a).
 - It would be reasonable to assume that during “quieter” periods of the day, fewer staff would be required; and
 - Other staff productive hours per person pppa = 47 weeks x 35hours = 1650 hours.

Other stations

- Other stations platform staff: estimate as per terminal/major stations, however, if the frequency is 4 trains per hour (tph) or fewer (and the timings are favorable), it would be reasonable to assume that staff can “operate” more than one platform (up to a 50% saving in the number of platform staff);
- Other stations ticket sales staff: estimate as per terminal/major stations (dependent on number of ticket windows and opening hours); and
- Other stations other staff: estimate as per terminal/major stations: depending on the size and layout of the station it would be sensible to assume 1 - 2 staff on duty to provide customer information and assistance.

An alternative very high-level sense check on the number of the number of staff at terminal/other stations (S5) and other stations (S6) is:

- It is reasonable to assume that as a minimum, HSIPR stations will be staffed by at least two people throughout the times of HSIPR service operation;
- Assuming 7 day operation, 18 hours of service per day and 2 members of staff = 252 person hours per week. Assuming a 35 hour working week this equates to 7 members of staff required for each station; and
- If the average number of staff per station (total number of station staff (A7) divided by the total number of HSIPR stations (D3)) is less than 7, it is likely that the number of station staff has been under-estimated or that some stations are staffed by a third party organization (for which costs must be included elsewhere in the operating costs, and the promoter should have noted this).

27. Station staff annual salary (S8):

- The average salary of station staff is likely to be similar to that for on-train staff (c60% of that of a train driver).

Railroad costs: reviewer quality check questions

28. Number of signaling and control Centers (R1)

At least one signaling and control (S&C) center will be required to operate the HSR railroad. The number of these centers will depend on the physical size of the rail network being managed and the technology used as the interface between the signaling system and the operator. A very simple HSIPR operation comprising 250 route miles and one or two junctions could reasonably be assumed to be operated by one S&C center.

29. Number of staff per signaling and control centers (R2)

For a typical modern signaling and control center, there will be around 10 to 15 staff on duty at any one time. The signaling and control center will require to be staffed 24/7. A reduced staffing level is acceptable during the night shift as few, if any, trains are operating. Total staff numbers should reflect the need for 10-15 staff to be present when services are operating as well as covering rest periods holiday, sickness and training. Signaling and control center staff have similar levels of productivity as station staff (approximately 1200 per year).

30. Annual salary of signaling and control center staff (R3)

The average annual salary would be marginally lower than that of a train driver.

31. Total annual cost of signaling and control center staff (R7)

Number of signaling and control centers x staff per S&C center x (annual salary + employers overheads).

32. Total railroad maintenance costs per year (R10)

The maintenance costs for the HSIPR will depend on the number of track (not route) miles, number of points, structures (e.g., bridges and cuttings), telecoms and signaling equipment and electricity distribution equipment and the number and size of stations.

Based on existing HSIPR railroads, a high-level estimate of railroad maintenance costs can be prepared using a cost rate of \$100,000 - \$130,000 per single track mile, with the choice of which rate dependent on the reviewers understanding of the characteristics of the route (junctions, bridges etc.), e.g., total track miles (D2) x \$110,000.

General and admin. costs: reviewer quality check questions

33. Headquarters staff numbers and costs (G1, G2 and G6)

- It would be expected that a headquarters staff would comprise at least 20 staff - and up to 50 staff (depending on the scale of the HSIPR): G1;
- The average salary (G2) of headquarters staff (including professional staff and directors) tends to be high: it would not be unreasonable for the average salary to be 25% higher than that of train drivers; and
- Total annual staff cost = number of HQ staff x (average salary + employers overheads).

34. Other general and admin. costs

The sum of other general and admin. costs usually forms a notable proportion of total operating costs.

The reviewer should ensure that costs for all categories of the checklist have been completed, as failing to consider all the items will result in a significant under-estimate of costs.

- Where promoters have not estimate costs for each of the categories, the reviewer should estimate these, with indicative costs being in the range;
- Other HQ costs (G7): \$6m - \$6m depending on size of HQ/number of HQ staff;
- Marketing and advertising (G8): \$3m - \$15m (broadly, 2% of passenger revenue);
- Professional services (G9): \$1m - \$2m;
- Other ticket sales related costs (G10): 5 - 10% of passenger revenue (possibly higher if a significant (+40%) of sales are sold via call centers or the internet);
- Other staff related expenses (G11): 1 - 2% of total staff costs;
- Other HSIPR delivery costs (G12): \$1m - \$2m; and
- Training costs (G14): 1 - 2% of total staff costs.

4 Best practice checklists

Introduction

The best practice checklists provide reviewers with a summary of the level of detail to which HSIPR operators could reasonably be expected to prepare cost forecasts at each stage of project development (preliminary, intermediate and final).

If there are omissions or areas of incomplete information in the operating cost checklists submitted by the HSIPR operator, the reviewer should refer to the best practice checklists to check whether the omissions or gaps in information are reasonable given the level of development of the proposal.

For example, the reviewer may find that some items in the rolling stock maintenance costs checklist have not been completed. The reviewer should refer to the appropriate stage best practice checklist for rolling stock maintenance. If the HSIPR proposal is at intermediate stage, the best practice checklist confirms that a cost rate per train or train mile is acceptable providing it is validated by high-level estimates of the number of maintenance inspections and resources required to deliver them. However, if the proposal is at final stage, the best practice checklist confirms that train maintenance costs must be prepared based on a detailed maintenance plan and associated resource and cost estimates.

Where a reviewer finds that the HSIPR operator submission is significantly lacking information when compared with that identified by the best practice checklists, it is suggested that dialogue is held with the HSIPR operator to clarify the reasons for this and request submission of the required information.

However, it should be noted that the checklists are best rather than mandatory practice and it is therefore not expected that HSIPR submissions will have addressed all the points in the best practice checklists.

TABLE 4-1. ROUTE ALIGNMENT & TRAIN SERVICE OFFER AT PRELIMINARY STAGE

Driver of cost	Description
Route alignment	
Route Alignment and distances	<p>The proposal must describe the characteristics of the railroad such as maximum linespeed, minimum curvatures and maximum gradients. The proposal must describe the likely proportions of the railroad which will be newly built and those which will make use of existing railroads.</p> <p>The route and track mileage of the railroad must be specified and the proposal must explain how these distances have been estimated.</p> <p>Key geographical characteristics of the line of route must be described, including whether the railroad will have significant gradients and where the route will have to negotiate natural or man-made obstacles such as mountains, major highways or built-up areas. The scale of the obstacles to be negotiated are likely to be the key differentiators between the different route options under consideration.</p> <p>The description must describe the main conurbations which will be served by the HSL.</p> <p>The proposal must concisely describe the differentiating factors between the route alignment options under consideration.</p>
Terminating & intermediate stations	<p>The proposal must state the stations which will be served by the proposed HSIPR services, confirming which stations are new, existing or upgraded.</p> <p>A short description of each station must be provided which should describe any notable characteristics of the station (e.g., if it is an airport station).</p> <p>An initial estimate of the number of platforms at each station must be provided.</p> <p>The proposal must concisely describe the different stations being served under each HSIPR route alignment and train service option.</p>
Train service specification	
Train frequency and trip times	<p>The proposed HSIPR train service must be described in terms of the frequency, trip time (end to end and between key stations), station stops, distance and train formation.</p> <p>Where different HSIPR services are proposed (e.g., long distance and short distance or peak period services), the service specification must be described for each.</p> <p>The proposal must describe the markets served by the proposed train service and any specific features required to attract ridership such as end to end trip times or quality of on board service .</p> <p>The proposal must state the proposed hours of service.</p> <p>It should be clear that the proposed service specification, which is used for forecasting costs, is consistent with that used to prepare ridership and benefits forecasts.</p> <p>The proposal must provide a table summarizing the service characteristics of each train service option under consideration and concisely explain the rationale for the different train service.</p>
Annual train miles & train hours	<p>The proposal must state the total annual train miles and train hours and present how these have been calculated with reference to distances, trip times and the service specification previously stated. Any assumptions (e.g., annualization factors) used to estimate annual train miles and train hours must be stated and the rationale for their selection stated.</p> <p>Where the HSIPR service comprises different origins and destinations or calling points, train types or formations, train miles and hours must be stated for each.</p>
Shared routes	The proposal must state where the HSIPR services may share the railroad with existing services.
Railroad capacity	The proposal must indicate that the capacity of the railroad has been considered in preparing the train service specification.
Train service offer and delivery	
Key statutory requirements	The proposal must state what statutory requirements have been taken into account in preparing the HSIPR proposal, in particular, in relation to safety.
Proposed rolling stock	<p>The proposal must state the proposed rolling stock which will operate the HSIPR services. At preliminary stage, it is acceptable for the promoter to reference an existing type of rolling stock, where this provides the required passenger carrying capacity and delivers the performance required by the train service specification.</p> <p>The proposal must specify the type of traction power which will be used, the maximum speed, maximum power at wheel, approximate weight, any special</p>

Driver of cost	Description
	<p>requirements (e.g., need for tilt), assumed formation and train length and assumed number of seats.</p> <p>The proposal should make reference to railway standards which will need to be met by the train (e.g., safety and impaired mobility passenger facilities) and whether these have been taken into consideration in the train specification and cost forecasts.</p> <p>If different rolling stock types are proposed for the various service and route alignment options being considered, the proposal must provide a table summarizing the characteristics of each.</p>

TABLE 4-2. QUANTIFYING TRAINCREW COSTS AT PRELIMINARY STAGE

Cost element	Description
Number of staff on each train	<p>The proposal must specify the number of drivers on each train and the number of other traincrew on each train.</p> <p>The proposal should explain how this conforms with legislation (e.g., need for second drivers).</p> <p>Where the numbers of staff on each train vary between options, the proposal must concisely explain the reasons why.</p>
Description of approach used to quantify numbers of traincrew for each Role	<p>The approach used to estimate the number of traincrew must be described. A high-level approach to forecasting the number of staff in each category is acceptable, for example, traincrew may be forecast by calculating the total train hours of operation each year and dividing this by an assumed number of productive hours per staff member per year. It is not necessary at preliminary stage to undertake a rostering exercise.</p> <p>The source of any assumptions in the estimation of staff numbers (e.g., productive hours assumption) must be explained and it should take account of unproductive time (annual leave, sickness, training, and train preparation time).</p>
Salaries and overheads <ul style="list-style-type: none"> • Basic salaries stated • Overheads • Source specified • Risks identified 	<p>The proposal must specify the annual salary assumed for traincrew and confirm the source and rationale for this assumption.</p> <p>It is preferable for a different annual salary assumption to be used for train drivers as opposed to other traincrew.</p> <p>An allowance (in addition to annual salary) must be made for employers overheads including insurance and retirement contributions. The level and source of this overhead should be specified.</p> <p>At the preliminary stage, it is not expected that risks to these cost estimates would have been identified.</p>
Presentation of staff numbers and costs	<p>The proposal must state the total number of drivers required.</p> <p>The proposal must also state the number of other traincrew staff required.</p> <p>The proposal must state the total annual costs of drivers and the total annual costs of other traincrew.</p> <p>It must be clear where the employers overheads are included in the cost forecasts (e.g., these may be stated as an individual line item for all traincrew, as separate line items for drivers and other traincrew, or included in the total traincrew staff costs).</p>

TABLE 4-3. QUANTIFYING ENERGY COSTS AT PRELIMINARY STAGE

Cost element	Description
Method of calculation	The proposal must state how the costs of traction power have been forecast, including the consumption rates, the cost per unit (e.g., kwh or US gallon) of energy and the number of train miles.
Unit cost of energy	The proposal must specify the assumed cost of energy per unit (for example, the cost per US gallon of diesel or cost per kwh of electricity). The source of this unit cost and the rationale for its selection must be specified.
Energy consumption of rolling stock	<p>Energy consumption rates (e.g., electricity kwh per train mile or US gallons of diesel per train mile) for the proposed HSIPR service must be stated.</p> <p>It is acceptable to use energy consumption rates based on research into typical high-speed rolling stock and other HSR services. It is not necessary at preliminary stage to undertake power consumption modeling.</p> <p>If this is the case, the selection of the consumption rate(s) should be influenced by the relative characteristics of the proposed HSIPR service and the HSIPR services from which information from the benchmarking has been drawn. The key characteristics (which drive the consumption rates) which should be compared should include the physical characteristics of the route such as gradients, the power of the train, the number of intermediate station stops and the distance traveled.</p> <p>Where the energy consumption rates vary between options, the proposal must concisely explain the reasons why.</p>
Energy costs	It must be evident that the estimate of energy costs is consistent with the proposed train service specification.

TABLE 4-4. QUANTIFYING STATION COSTS AT PRELIMINARY STAGE

Cost element	Description
Station specification	The preliminary stage proposal must state the location and size of each station (in terms of the number of platforms at each station).
Total staff numbers specified by role	<p>The proposal must estimate the number of station staff required for the main terminus stations and the “typical” number of staff required at intermediate stations.</p> <p>It is not necessary at preliminary stage to undertake a rostering exercise but the assumptions used to extrapolate estimates of staff required per shift into full time equivalents (confirming adequate cover for holidays, training and illness) should be clearly stated .</p>
Salaries and overheads <ul style="list-style-type: none"> • Basic salaries stated • Overheads • Source specified • Risks identified 	<p>At preliminary stage, it is reasonable to assume a single salary covering all roles of station staff. The proposal must specify the annual salary assumed and confirm the source and rationale for this assumption.</p> <p>An allowance (in addition to annual salary) must be made for employers’ overheads including insurance and retirement contributions. The level and source of this overhead should be specified.</p> <p>At the preliminary stage, it is not expected that risks to these cost estimates would have been identified.</p>
Fixed costs	<p>Costs will be incurred for utilities, building maintenance, equipment maintenance (display screens, public address, ticket machines) and possibly property tax. At preliminary stage, a high-level estimate of costs is sufficient but this should be proportional to the size of each station and the source of the assumed cost must be clearly stated.</p> <p>The proposal must state what assumption has been made with respect to how costs will change over time.</p>
Presentation of station costs	<p>The preliminary level proposal must state the total number of station staff employed.</p> <p>The proposal must state the total annual station staff costs. It must be clear where employers’ overhead costs are included.</p> <p>Fixed costs of stations must be included as one or more line item in the operating cost forecasts.</p>

TABLE 4-5. QUANTIFYING ROLLING STOCK COSTS (INCLUDING MAINTENANCE) AT PRELIMINARY STAGE

Cost element	Description
Method of procuring rolling stock	The proposal must state whether HSIPR trains will be purchased through capital funding or financed by a third party and leased. Lease costs must be clearly identified on a per train or vehicle per year basis.
Rolling stock fleet required	The proposal must state the number of trains required to operate the HSIPR service. At preliminary stage, it is acceptable for the number of trains required to be calculated using a high-level estimate: for example, as a function of return trip time plus turnaround time and train frequency. Where different types of service are operated (e.g., long distance/short distance), the number of trains must be forecast for each service type. A reasonable proportion of trains (around 5-10%) must be included for use as maintenance spares.
Rolling stock ownership or leasing costs	Where trains are leased, rolling stock leasing costs must be included as one or more line items in the operating costs forecasts. The cost of purchasing or leasing each train may be based on published costs for similar, recently delivered rolling stock. If the proposal uses existing rolling stock used in Europe or Asia as the basis for their cost estimate, the proposal must consider how US technical and safety standards will be met.
Inclusion of rolling stock maintenance costs	Rolling stock maintenance costs must be included as one or more line items in the operating cost forecasts.
Maintenance plan described	At preliminary stage, it is not necessary for a maintenance plan to be described.
Approach used to estimate train maintenance costs	The proposal must describe how the costs of train maintenance are forecast. The maintenance cost rates must be clearly stated, either as a cost per train or vehicle per year or a cost per train mile. Confidence in the estimate is improved if it is benchmarked against published evidence from other HSIPR operations, with similar rolling stock, train service and route characteristics. Where the unit cost assumed for train maintenance varies between options, the proposal must concisely explain the reasons why.
Fixed costs included	Even at preliminary stage, the depot facilities required to maintain the train fleet should be estimated.
Changes in rolling stock costs over time	At preliminary stage, assumptions as to how costs will change over time should focus on changes arising from: timetable alterations affecting the number or frequency of services and longer trains required to increase passenger capacity.

TABLE 4-6. QUANTIFYING RAILROAD COSTS AT PRELIMINARY STAGE

Cost element	Description
Railroad operations and maintenance costs included in operating costs	Railroad operations and maintenance costs must be included as one or more line items in the operating cost forecasts. Where the HSR service will operate as a tenant on a railroad the costs may be presented as “railroad access costs”.
Railroad landlord or tenant?	At preliminary stage, the proposal must state whether the HSIPR operator will be a landlord and own the railroad. This is generally the case if the proposal involves construction of new railroad. Where the HSIPR operator is a tenant, the proposal must state the nature of the landlord, for example, is it public or private and is it responsible for operating train services?
Capacity of railroad	The proposal must confirm whether the HSIPR services are the only users of the railroad, and if the railroad is shared, the mix of traffic should be described (in terms of operators and passenger or freight, high speed or conventional). The proposal must state where there may be capacity constraints which may constrain the deliverability of the proposed service.
Approach to estimating railroad operations costs described	The proposal must describe how the railroad costs have been estimated and include assumptions (and their sources) for: <ul style="list-style-type: none"> • The number of signaling and control centers that are required; • The number of operations staff taking into account the hours of operation of the service and the need to include staff cover for holidays, sickness and training; and • An estimate of the annual salary and employers overheads for these staff.
Approach to estimating railroad maintenance costs described	The proposal must describe how the railroad maintenance costs (or access costs, if the HSIPR operator is a tenant) have been estimated. At preliminary stage, it is acceptable for the costs to be estimated at a high-level, for example, by applying a unit cost rate per track mile (derived from benchmarking other similar HSR railroads).

TABLE 4-7. QUANTIFYING GENERAL AND ADMINISTRATIVE COSTS AT PRELIMINARY STAGE

Cost element	Description
Inclusion of general and admin. costs	An estimate of costs of general and administrative costs must be included as one or more line items in the operating cost forecasts. In preliminary stage, it is acceptable for this element to be forecast as a percentage of total operating costs.
Staff roles and responsibilities	Assuming traincrew, maintenance, station and railroad staff have all been accounted for in the separate cost categories described above, staff in the general and administrative function will consist of headquarters staff.
Total staff numbers specified by "function"	The proposal should estimate the size of the headquarters operation.
Non staff costs	Examples of the likely non staff components of general and administrative costs must be noted in the proposal and should include IT equipment and maintenance, marketing and advertising, professional services such as legal and engineering advice and insurance. Internet and telephone ticket sales are sometimes included in general and administrative costs as are facilities management costs such as utilities, buildings maintenance and property taxes.

TABLE 4-8. ROUTE ALIGNMENT & TRAIN SERVICE OFFER FOR INTERMEDIATE STAGE

Driver of cost	Description
Route alignment	
Route alignment and distances	<p>The proposal must explain the rationale for the preferred route alignment, as a range of alternative options are expected to have been considered prior to selecting the option which is taken forward as the basis for ridership, benefits and costs forecasts.</p> <p>The proposal must describe the line of route of the proposed train service, particularly focusing on those elements of the route which are new high-speed lines or upgrades of existing railroads.</p> <p>The distances covered by the new or upgraded railroad must be specified and be presented for each of the key route sections between major stations. The proposal must explain how these distances have been estimated.</p> <p>Key geographical characteristics of the line of route must be described, including whether the railroad will have significant gradients and where the route will have to negotiate natural or man-made obstacles such as mountains, major roads or built-up areas.</p> <p>The description must describe the main conurbations which will be served by the high-speed line.</p> <p>Risks to constructing or upgrading new railroad must be briefly described, and the proposed plan for investigating and mitigating these risks must be explained.</p>
Terminating & intermediate stations	<p>The proposal must state the stations which will be served by the proposed HSIPR services, confirming which stations are new/existing/upgraded.</p> <p>A short description of each station must be provided which should describe any notable characteristics of the station (e.g., if it is an airport station).</p> <p>An initial estimate of the number of platforms at each station must be provided.</p>
Train service specification	
Train frequency and trip times	<p>The proposed HSIPR service must be described in terms of the frequency, trip time (end-to-end and between key stations), station stops, distance and train formation.</p> <p>Where different HSIPR services are proposed (e.g., long distance and short distance or peak period services), the service specification must be specified for each.</p> <p>The proposal must state whether it is expected that the same train service will operate throughout the day. Where it varies, the assumed time periods of each train service should be specified.</p> <p>The proposal must describe how the train service specification has been defined, for example, what determines the service frequency and train formation (ridership is often a key factor) and give assurances that trip times are deliverable with the proposed infrastructure, stopping pattern and rolling stock specification (especially maximum speed).</p> <p>The proposal must describe the rationale underpinning the proposed train service and must briefly mention other service options that were considered.</p> <p>It should be clear that the proposed service specification which is used for forecasting costs is consistent with that used to prepare ridership and benefits forecasts.</p>
Variations in train service	<p>The proposal must state the proposed hours of service, whether there is a defined peak period when the train service is different from the rest of the day, and what has been assumed for weekend train services.</p>
Annual train miles & train hours	<p>The proposal must state the total annual train miles and train hours and present how these have been calculated with reference to distances, trip times and the service specification previously stated. Any assumptions (e.g., annualization factors) used to estimate annual train miles and train hours must be stated and the rationale for their selection stated.</p> <p>The forecast should include train miles and hours for empty train workings (e.g., to depots), however, a high-level estimate of these is acceptable at intermediate stage.</p> <p>Where the HSIPR service will operate on a combination of new HSL and existing routes, train miles and train hours should also be estimated separately for the two railroads. Similarly, where more than one train formation or train type will be operated, train miles and hours must be stated for each.</p>
Shared routes	<p>The proposal must state where the HSIPR services will share the railroad with existing services, or where there is a high probability of another train operator entering the market.</p> <p>The impacts of sharing the railroad must be considered and any assumptions made in terms of preparing the train service specification, ridership and cost forecasts</p>

Driver of cost	Description
	must be stated.
Railroad capacity	The proposal must provide evidence that the capacity of the railroad (including stations and the impact of existing train services on the railroad) has been considered in preparing the train service specification. Any locations where there is a high-level of capacity utilization should be identified.
Train service offer and delivery	
Key statutory requirements	The proposal must state what statutory requirements have been taken into account in developing the HSIPR service, in particular in relation to safety.
Proposed rolling stock	<p>The proposal must state the proposed rolling stock which will operate the HSIPR services. At intermediate stage, it is acceptable for the promoter to reference an existing type of rolling stock, where this meets the criteria necessary to deliver the train service specification and passenger capacity of the proposed services.</p> <p>The proposal must specify the type of traction power which will be used, the maximum speed, maximum power at wheel, approximate weight, any special requirements (e.g., need for tilt), assumed formation and train length and assumed number of seats (splitting this by “class” of accommodation).</p> <p>The proposal may give an example of the train (if one currently exists).</p> <p>The proposal should make reference to railway standards which will need to be met by the train (e.g., safety and impaired mobility passenger facilities) and whether these have been taken into consideration in the train specification and cost forecasts.</p>
Customer service offer and service delivery	<p>The proposal must confirm the key customer service characteristics of the proposed HSIPR service, including whether there will be different classes of accommodation on trains (and what differentiates these), what on-train catering is proposed and how tickets will be sold.</p> <p>The proposal must confirm how trains will be dispatched from stations, including whether this will be a responsibility of on-train and/or station staff.</p>

TABLE 4-9. QUANTIFYING TRAINCREW COSTS AT INTERMEDIATE STAGE

Cost element	Description
Staff roles and responsibilities described	The proposal must state the role (e.g., managers, drivers, trainee drivers, guards, ticket examiners, customer service) and responsibilities of each member of traincrew. It should be clear from the proposal that the traincrew described meet the train service offer and delivery proposal as described in the checklist for these (for example, catering staff are included and staff are included if train dispatch is to be undertaken by traincrew).
Number of staff on each train	The proposal must specify the number of staff on each train and the roles they undertake. The proposal must clearly explain how this conforms with legislation (e.g., need for second drivers).
Description of approach used to quantify numbers of traincrew for each role	The approach used to estimate the number of traincrew must be described. A high-level approach to forecasting the number of staff in each category is acceptable, for example, traincrew may be forecast by calculating the total train hours of operation each year and dividing this by an assumed number of productive hours per staff member per year. It is not necessary at intermediate stage to undertake a detailed rostering exercise. The source of any assumptions in the estimation of staff numbers (e.g., productive hours assumption) must be explained and it should take account of unproductive time (annual leave, sickness, training, and train preparation time). The quantification of traincrew must consider the responsibilities of each member of traincrew.
Salaries and overheads <ul style="list-style-type: none"> • Basic salaries stated • Overheads • Source specified • Risks identified 	The proposal must specify the annual salary assumed for each of the staff roles and confirm the source and rationale for this assumption. It is preferable for a different annual salary assumption to be used for train drivers as opposed to other traincrew. An allowance (in addition to annual salary) must be made for employers overheads including insurance and retirement contributions. The level of this overhead should be specified and the source of this specified.
Changes in staff costs over time	The proposal must consider and make assumptions with respect to how staff costs will increase over time. This should include: <ul style="list-style-type: none"> • Whether salaries will increase over time; and • How the numbers of staff in each function will vary with any proposed change in train service level, passenger volumes or changes in train formation. The rationale behind the assumptions adopted must be explained.
Presentation of staff numbers and costs	The proposal must state the total number of drivers required. The proposal must also state the number of other traincrew staff required, and preferably these should be disaggregated by staff role. The proposal must state the total annual costs of drivers and the total annual costs of other traincrew, preferably the latter should be split by role. It must be clear where the employers overheads are included in the cost forecasts (e.g., these may be stated as an individual line item for all traincrew, as separate line items for drivers and other traincrew, or included in the total traincrew staff costs).

TABLE 4-10. QUANTIFYING ENERGY COSTS AT INTERMEDIATE STAGE

Cost element	Description
Method of calculation	The proposal must state how the costs of traction power have been forecast, including the consumption rates and the cost per unit (e.g., kwh or US gallon) of energy. This calculation should refer to the drivers of power consumption, in particular, the gradients of the route, the power of the train, the acceleration rates required, the stopping pattern, the distance and trip times.
Unit cost of energy	The proposal must specify the assumed cost of energy per unit (for example, the cost per US gallon of diesel or cost per kwh of electricity). The source of this unit cost and the rationale for its selection must be specified.
Energy consumption of rolling stock	<p>Energy consumption rates (e.g., electricity kwh per train mile or US gallons of diesel per train hour) for the proposed HSIPR service must be stated. The source of the consumption rates assumed and the rationale for their choice must be clearly described.</p> <p>At intermediate stage, it is acceptable to use energy consumption rates based on research into typical high-speed rolling stock and other HSR services. However, if this is the case, the selection of the consumption rate(s) should be influenced by the proposed rolling stock characteristics (e.g., speed, power and weight) and route alignment characteristics (stopping pattern and gradient profile).</p> <p>It is reasonable to expect promoters to base their forecasts on simple spreadsheet models which estimate (at a high-level) the power consumption rates based on the power of the train, number of station stops, gradients of the route and trip times and distances. It is not necessary at intermediate stage to undertake detailed power consumption modeling.</p>
Energy costs	It must be evident that the estimate of energy costs is consistent with the proposed train service specification (as a minimum, the estimate of train service miles or hours).
Changes over time	There is considerable uncertainty as to how energy costs will change in future. The proposal should consider the risk of energy price variations and state the assumptions as to how they will change over time.

TABLE 4-11. QUANTIFYING STATION COSTS AT INTERMEDIATE STAGE

Cost element	Description
Station specification	The proposal must describe the location and size of each station including the number of platforms and estimated footfall. The operating days and hours should be clearly stated and be consistent with the train service specification.
Staff roles and responsibilities	The proposal must state the key roles of each grade of station staff. As a minimum this will specify who is responsible for dispatching trains, selling tickets, checking tickets, providing refreshments, security and CCTV monitoring and general customer assistance. Management and supervisory requirements should be identified.
Total staff numbers specified by role	The proposal must estimate the total number of station staff to cover the specified functions. As a minimum staff numbers must be presented separately for each terminal station and an estimate for provided for a typical intermediate station. It must be evident that the estimate of the number of station staff has been calculated taking into account the number and size (in terms of platforms, layout and number of passengers) of the key stations, the roles of staff (e.g., ticket sales and train dispatch) and hours of operation of the train service. It is not necessary at intermediate stage to undertake a detailed rostering exercise, but the assumptions used to extrapolate estimates of staff required per shift into full time equivalents (confirming adequate cover for holidays, training and illness) should be clearly stated and be consistent with relevant safety and employment regulations.
Salaries and overheads <ul style="list-style-type: none"> • Basic salaries stated • Overheads • Source specified • Risks identified 	At intermediate stage, it is reasonable to assume a single salary covering all roles of station staff, with a higher rate for management or supervisory staff. The proposal must specify the annual salary assumed and confirm the source and rationale for this assumption. An allowance (in addition to annual salary) must be made for employers' overheads including insurance and retirement contributions. The level and source of this overhead should be specified.
Changes in staff costs over time	The proposal must consider and make assumptions with respect to how station staff costs will increase over time. This should include: <ul style="list-style-type: none"> • Whether salaries will increase over time • How the numbers of staff in each function will vary with any proposed change in train service level, passenger volumes or changes in train formation. The rationale behind the assumptions adopted must be explained.
Fixed costs	Costs will be incurred for utilities, building maintenance, equipment maintenance (display screens, public address, ticket machines) and possibly property tax. At intermediate stage, a high-level estimate is sufficient but this should be proportional to the size and footfall for each station and the source of the assumed cost clearly stated. The proposal must state what assumption has been made with respect to how costs will change over time.
Presentation of station costs	The intermediate stage proposal must state the total number of station staff employed, preferably split by role. The proposal must state the total annual station staff costs, preferably split by role. It must be clear where employers' overhead costs are included. Fixed costs of stations must be included as one or more line item in the operating cost forecasts.

TABLE 4-12. QUANTIFYING ROLLING STOCK COSTS (INCLUDING ROLLING STOCK MAINTENANCE) AT INTERMEDIATE STAGE

Cost element	Description
Method of procuring rolling stock	The proposal must state whether HSIPR trains will be purchased through capital funding or financed by a third party and leased. Trains purchased through capital funding may be depreciated as an operating “cost”. Lease costs must be clearly identified on a per train or vehicle per year basis and the source of this cost must be clearly stated and explained.
Rolling stock fleet required	The proposal must state the number of trains required to operate the HSIPR service and the approach used to quantify this explained. At intermediate stage, it is acceptable for a high-level diagramming exercise, rather than detailed simulation to be undertaken. A reasonable proportion of trains (around 5-10%) must be included for use as maintenance spares.
Rolling stock ownership or leasing costs	Where trains are leased, rolling stock leasing costs must be included as one or more line items in the operating costs forecasts. The cost of purchasing or leasing each train may be based on published costs for similar, recently delivered rolling stock. If the proposal uses existing rolling stock as the basis for their cost estimate, a commentary must be provided the extent to which it may need to be modified to meet US technical and safety standards and cost for these modifications included in the forecast.
Inclusion of rolling stock maintenance costs	Rolling stock maintenance costs must be included as one or more line items in the operating cost forecasts. The proposal must describe the components of maintenance costs, with reference to different levels of maintenance (servicing, light and heavy) and comprising of the labor, materials and fixed cost elements.
Maintenance plan described	A generic rather than specific maintenance plan is expected. This will identify the number of inspections required per day, week and annually and use this to estimate the location and size of depot facilities, staff, equipment and materials required. The maintenance plan must demonstrate consistency with the train service specification, particularly with respect to the annual train miles being operated and the start and finish times and locations of services.
Approach used to estimate train maintenance costs	The proposal must describe how the costs of train maintenance are forecast. The proposal must state clearly what it understands the maintenance costs to cover (in terms of labor, materials and depots) and what maintenance it assumes is covered (including whether it understands the costs to cover daily items such as water, fuel and cleaning). The maintenance cost rates must be clearly stated, either as a cost per train or vehicle per year or a cost per train mile or vehicle mile. Confidence in the estimate is improved if it is benchmarked against published evidence from other HSIPR operations, with similar rolling stock, train service and route characteristics. A sense check should be presented to demonstrate the total cost estimated is adequate to cover the staff, materials and facilities needed to provide daily servicing and the forecast number of inspections. An indication of the total staff required, the functions they will perform (maintenance, cleaning, depot driving) and average salaries should therefore be provided to support the estimate.
Fixed costs included	The fixed costs for providing the depot facilities should be estimated and presented separately or appropriate provision included in the cost estimate per train per year or per train mile. The proposal should clearly state the functions to be carried out at the depot and the equipment required including numbers of stabling sidings and inspection roads with pits elevated walkways to permit underframe and roof access to the HSIPR trains. The capacity of the depot in terms of maintenance inspections per day, week and year must be described and shown to be consistent with the trains service specification.
Changes in rolling stock costs over time	The proposal must state assumptions as to how rolling stock and maintenance costs will change over time. There is less of inflationary risk where rolling stock has been purchased outright by the HSIPR operator. Changes may arise from: timetable alterations affecting the number or frequency of services; longer trains required to increase passenger capacity; and inflationary pressure on salaries and materials.

TABLE 4-13. QUANTIFYING RAILROAD COSTS AT INTERMEDIATE STAGE

Cost element	Description
Railroad operations and maintenance costs included in operating costs	<p>Railroad operations and maintenance costs must be included as one or more line items in the operating cost forecasts. Where the HSR service will operate as a tenant on a railroad, the costs may be presented as “railroad access costs”.</p>
Railroad landlord or tenant?	<p>The proposal must state whether the HSIPR operator will be a landlord and own the railroad. This is generally the case if the proposal involves construction of new railroad.</p> <p>Where the HSIPR operator is a tenant, the proposal must state the nature of the landlord, for example, is it public or private and is it responsible for operating train services?</p> <p>Where the HSIPR operator is a tenant, the assumptions underpinning the railroad access costs must be described and access arrangements demonstrated to be consistent with the train service specification. The railroad access costs will be charged on a \$ per vehicle train mile basis, sometimes with an additional fixed cost per year and evidence should be provided that this is proportional to the costs which are likely to be incurred by the landlord to support the new services.</p>
Capacity of railroad	<p>The proposal must confirm whether the HSIPR services are the only users of the railroad.</p> <p>Where other rail services will use the railroad, the proposal must describe the mix of traffic, both in terms of operators and types of traffic, for example, passenger or freight and passenger high-speed or passenger “conventional”). Evidence should be provided that sufficient capacity exists on the railroad for all services and potential conflicts between services have been resolved.</p> <p>Where a new railroad is being constructed for the HSIPR service, the feasibility design must provide evidence that the capacity accommodates the requirements of the train service specification.</p>
Approach to estimating railroad operations costs described	<p>The proposal must describe how the railroad costs have been estimated and include assumptions (and their sources) for:</p> <ul style="list-style-type: none"> • The number of signaling and control centers that are required; • The number of staff per signaling and control center (where the number must take into account the hours of operation of the service and the need to include staff cover for holidays, sickness and training); and • An estimate of the annual salary and employers overheads for these staff.
Approach to estimating railroad maintenance costs described	<p>The proposal must describe how the railroad maintenance costs have been estimated. At intermediate stage, it is acceptable for the costs to be estimated at a high-level, for example, by quantifying the following:</p> <ul style="list-style-type: none"> • Number of single track (not route) miles to be maintained; • High-level specification of technologies used to run and regulate trains (overhead electrification in cab signaling etc.); • Number of stations to be maintained and their size (in terms of platforms); • Cost per single track mile for materials; • Number of maintenance staff required (typically estimated on the basis of a certain number of staff per 100 track miles); and • Estimate of the annual salary and employers’ overheads of railroad maintenance staff. <p>Costs incurred by other HSIPR operators can be used as a benchmark, but it is preferable that these rates are not used as the sole source of the estimate.</p>
Changes in costs over time	<p>The proposal must state what assumptions have been made in terms of how costs will change over time. Of particular importance are the assumptions regarding how staff and material costs will be affected by inflation.</p>

TABLE 4-14. QUANTIFYING GENERAL AND ADMINISTRATIVE COSTS AT INTERMEDIATE STAGE

Cost element	Description
Inclusion of general and admin. costs	An estimate of general and administrative costs must be included as one or more line items in the operating cost forecasts.
Staff roles and responsibilities	<p>Assuming traincrew, maintenance, station and railroad staff have all been accounted for in the separate cost categories described above, staff in the general and administrative function will consist of:</p> <ul style="list-style-type: none"> • Directors and senior management; • Specialist support such as technical standards, procurement and contract management; • General support such as administration, marketing, human resources, training and finance; and • Operations - control center for day to day management and separate strategic planning.
Total staff numbers specified by “function”	<p>The proposal must specify the total number of staff in the key categories described above.</p> <p>Most of these functions are Monday to Friday only but where support is provided on a 24/7 basis then assumptions behind the calculation to increase the staff per shift to an annual full time equivalent basis should be clearly presented.</p>
Salaries and overheads <ul style="list-style-type: none"> • Basic salaries stated • Overheads • Source specified • Risks identified 	<p>At intermediate stage, it is reasonable to assume a few salary bands can cover all general and administrative staff functions, with a higher rate for senior management and specialist staff and a lower rate for general support and operations staff. The proposal must specify the annual salary assumed, the roles it represents and confirm the source and rationale for this assumption.</p> <p>An allowance (in addition to annual salary) must be made for employers’ overheads including insurance and retirement contributions. The level and source of this overhead should be specified.</p>
Non staff costs	<p>Examples of the likely non staff components of general and administrative costs must be noted in the proposal and should include IT equipment and maintenance, marketing and advertising, professional services such as legal and engineering advice and insurance.</p> <p>Internet and telephone ticket sales are sometimes included in general and administrative costs as are facilities management costs such as utilities, buildings maintenance and property taxes. The facilities costs will be significant for stations and depots and it is preferable to see these discretely presented in the respective stations and train maintenance sections of the estimate to have confidence that the estimate is of the appropriate quantum.</p> <p>It is acceptable for the non staff elements of general and administrative costs to be forecast using a high-level estimate of component costs.</p>
Changes in costs over time	<p>The proposal must consider and make assumptions with respect to how staff costs will increase over time.</p> <p>This should include:</p> <ul style="list-style-type: none"> • Whether salaries will increase over time; and • How the numbers of staff in each function will vary with any proposed change in train service level, passenger volumes or changes in train formation. <p>The rationale behind the assumptions adopted must be explained.</p> <p>Inflationary assumptions which grow the non staff costs over time should be clearly explained.</p>

TABLE 4-15. ROUTE ALIGNMENT & TRAIN SERVICE OFFER FOR FINAL STAGE

Driver of cost	Description
Route alignment	
Route alignment and distances	<p>The main differences between intermediate and final stage proposals is that the HSIPR route (assuming it is new or an enhancement of an existing railroad) will have been designed to outline level of detail - this would be sufficient to be used for “design and build” procurement.</p> <p>Route distances (which underpin many operating costs) will be accurate to within 100m or so.</p> <p>The characteristics of the railroad will now be prescriptively specified, with signaling and control systems, traction power systems and curves and gradients fully defined. All of these directly impact the train timetable.</p>
Terminating & intermediate stations	<p>The proposal must confirm the stations which will be served and the layout of these stations including customer facilities (such as elevators, escalators, ticket sales points, customer lounges and information points) and platforms (including platform length, customer information points and lighting/passenger security).</p> <p>Additional station facilities such as car parking lot sizes and facilities, whether the station has been designed for automatic ticket gates and the level of retail opportunities/floor space at the station, must be identified for each station.</p>
Shared routes and stations	<p>The train service simulation modeling must include all train services on the railroad, to confirm that there is sufficient capacity on the railroad for all operators.</p>
Railroad capacity	<p>Simulation modeling will have been undertaken to demonstrate the new railroad has sufficient capacity to allow the specified timetable to operate reliably.</p>
Risks to the HSIPR alignment	<p>The proposal must describe key issues which have arisen during the development of the proposal. For example, these may be presented in the form of a risk register with a description of the risk, the potential outcome, the probability and impact of the risk materializing and how the risk has been closed out or whether it remains live.</p> <p>The proposal must refer to the risk register, identify the key risks and how these will be addressed.</p>
Timetable	
Train frequency and trip times and variations in train service	<p>The train service must now be presented in terms of a validated working timetable, underpinned by modeling using a recognized train service simulation package. This modeling must be based upon the detailed engineering specification of the railroad, the rolling stock characteristics, the proposed train service and the railroad operations plan. The working timetable will specify train passing times at regular measuring locations to the nearest 30 seconds as a minimum.</p> <p>The timetable will confirm the details of the train service from start up to close of service each day (including weekends). This will include the arrival and departure times at each station and at critical points on the railroad (e.g., junctions). The train formation for each service will be defined.</p> <p>The timetable must include all train workings including empty stock workings (for example, to and from depots and stabling sites).</p> <p>The final stage proposal must be accompanied by outputs from the train service simulation modeling, including confirmation of the input assumptions.</p>
Annual train miles & train hours	<p>The total annual train miles and train hours must be stated and the calculation presented to prove these have been outputs from the train timetable (and train service simulation).</p> <p>Empty stock workings must now be modeled to the same level of detail as the passenger timetable and an allowance must be made for unplanned empty workings.</p> <p>Where the HSIPR service will operate on a combination of new railroad and existing routes, train miles and train hours should be estimated separately for the two railroads. Similarly, where the train service is operated by more than one train formation or train type, train miles and hours must be specified for each.</p>
Proposed rolling stock	<p>The proposal must confirm the full technical specification of the rolling stock which will be operated and must provide evidence that rolling stock manufacturers are able to deliver trains to this specification and to the technical, safety and other standards set by US authorities.</p> <p>The technical specification must include the following items:</p> <ul style="list-style-type: none"> • Train and vehicle length, train weight, maximum speed, maximum power, traction type, regenerative braking ability, performance monitoring equipment (to identify potential systems failures) etc.; • Internal layout diagrams of the rolling stock, including seating plans in all classes of accommodation and passenger facilities (such as toilets, luggage areas and restaurant cars). The layouts should also identify traincrew accommodation and facilities including guards compartments, kitchens and refreshment storage points; and • Other factors which affect the passenger environment including seat width and pitch, air conditioning, power points and wi-fi points and the noise and

Driver of cost	Description
	ride quality indicators. The number of seats in each class of accommodation must be consistent with the ridership and revenue forecasting.
Risks to the HSIPR timetable	The proposal must describe issues which have arisen during the transition from intermediate to final stage. For example, these may be presented in the form of a risk register with a description of the risk, the potential outcome, the probability and impact of the risk materializing and how the risk has been closed out or whether it remains live. The final stage proposal must refer to the risk register and identify the risks and how these will be addressed.
Train service delivery and customer service offer	
Key statutory requirements	The final stage proposal will address all the known statutory requirements to which it must adhere. It must be evident from the proposal that the statutory requirements and their implications are understood, and that the proposed approach to meeting them is deliverable and will meet the requirements.
Train service delivery	The proposal must state how trains will be regulated on the railroad to provide safe operation of services. The proposal must also explain the operation of trains at stations, including how trains will be dispatched (and by whom).
Customer service offer	The final stage proposal must specify passenger offer that the HSIPR proposal will provide. This must include, but not be limited to a description of: <ul style="list-style-type: none"> • Classes of travel available and the differentiating factors between them; • The fares and tickets that will be offered, and how the tickets will be purchased; • The customer assistance that will be provided, both on-train and at stations, including for the disabled; • How service information will be provided, including when train services are disrupted; and • Whether passengers will be compensated for delayed trains.

TABLE 4-16. QUANTIFYING TRAINCREW COSTS AT FINAL STAGE

Cost element	Description
Staff roles and responsibilities described	<p>The roles of traincrew (e.g., drivers, conductors, catering staff) and their responsibilities must be stated.</p> <p>It must be clear from the descriptions which roles are critical to operate the train service (e.g., dispatch trains) and to meet statutory requirements.</p> <p>It must be clear from the descriptions whether traincrew are responsible for a) selling tickets b) checking tickets c) providing customer information d) provide refreshments, and which staff categories perform these tasks.</p>
Number of staff on each train	<p>The proposal must specify the number of staff required on each train and the role of each member of staff.</p> <p>Where the number of staff per train varies with train formation or train type (if more than one train formation or type operates) then the number of staff and the number in each role on each train must be specified.</p> <p>The number of staff on each train must take into account the requirement to operate the train service safely, and any other relevant regulatory requirements.</p>
Description of approach used to quantify numbers of traincrew	<p>Numbers of staff for each traincrew staff role must be quantified based on the proposed train timetable and a detailed staff rostering exercise.</p> <p>The rostering exercise must reflect the different responsibilities of each staff role (for example, some train drivers may be required to prepare the train at the start of the day, while some other traincrew roles will be able to join the train at the first passenger station).</p> <p>At final stage, the number of trainee drivers required must be forecast and take into account the expected time to train drivers and the availability of suitably skilled resources. The assumed turnover of trained drivers must be specified.</p> <p>It must be clear that analysis has been undertaken to confirm that the HSIPR service and the customer service offer can be delivered with the quantum of staff forecast (e.g., if the ticketing and distribution plan states that 50% of passengers will buy their ticket on-board, the number of staff on-board responsible for selling tickets must be able to fulfill this obligation at times of peak demand).</p>
Salaries and overheads <ul style="list-style-type: none"> • Basic salaries stated • Overheads • Source specified • Risks identified 	<p>The proposal must specify the annual salary assumed for each staff role.</p> <p>The source and rationale for the salary assumed is not required: it is assumed that the promoter has undertaken sufficient research to assure themselves that the salaries are appropriate. However, the salary assumptions will be expected to pass the “sense test”.</p> <p>The promoter must confirm the salary of trainee drivers and other trainee operations critical staff.</p> <p>The estimate of employers’ overhead costs must take into account all relevant component costs, and must be presented at the component levels, for each staff function. The source of the assumptions underpinning these estimates (for example, employers’ insurance contributions) must be specified and, where different to “the national norm”, must be explained.</p> <p>The terms and conditions of the main staff roles must be specified.</p> <p>At final stage, the proposal should have considered the availability of labor for each of the roles and the impact this may have on salaries. They should also have considered the potential impact of trade unions on salaries and potential risks to terms and conditions.</p>
Changes in staff costs over time	<p>The promoter must forecast, in detail, changes in staff costs as a result of changes in the train service/train formation/passenger volumes.</p> <p>Assumptions regarding changes over time in salaries and employers overheads must be refined and their rationale explained.</p>
Presentation of traincrew costs	<p>Final stage proposals must present the total number of staff employed in each role as a separate line item.</p> <p>Staff costs must also be presented as multiple line items, one for each staff role.</p> <p>Employers overhead costs must be included as separate line items for each component cost and for each role.</p>

TABLE 4-17. QUANTIFYING ENERGY COSTS AT FINAL STAGE

Cost element	Description
Method of calculation	The proposal must state how the costs of traction power have been forecast, including the consumption rates and the cost per unit (e.g., kwh or US gallon) of energy. This calculation should refer to the drivers of power consumption e.g., train hours or miles, stopping pattern, route and train characteristics.
Unit cost of energy	<p>The proposal must specify the assumed cost of energy per unit (for example, the cost per US gallon of diesel or cost per kwh of electricity). These unit costs must be based on initial negotiations with suppliers of energy, and should vary by region and time of day.</p> <p>The proposal should explain how energy will be bought, in particular, to mitigate energy price fluctuations and to exploit discounts in energy prices for bulk buyers.</p>
Energy consumption of rolling stock	<p>The quantity of energy consumed by the HSIPR operation must be based on the train service simulation (which itself is defined by the detailed specification of the railroad and the rolling stock technical specification).</p> <p>The proposal must state the quantity (kwh or US gallons) of energy consumed by the HSR service per year, both in total and split by service type (where not all trains operate between the same origin and destination station or have the same stopping pattern) and by train formation and type (if more than one is operated). The proposal should present the quantity of energy consumed on each route section, with reference to the gradients trains speed profile on that route section and the train stopping pattern.</p> <p>For electric HSIPR operation, the proposal must consider whether regenerative braking is feasible and delivers realizable benefits given the proposed railroad and the services operating it.</p> <p>If the proposal claims that regenerative braking can be implemented, it must explain how the calculation of energy cost savings was estimated.</p> <p>If the cost benefits of regenerative braking are claimed in the cost forecasts, the proposal must give a clear technical explanation of how the energy returned to the system will be used, with reference to the trains operating on the route and whether they will be able to use the energy.</p>
Changes over time	The proposal must consider the risk of energy price variations and state the assumptions as to how they will change over time.
Risks to energy costs	The proposal must acknowledge the uncertainties regarding the energy consumption of new trains on a new railroad. Given the significant proportion of HSIPR operating costs accounted for by energy costs, the proposal should propose how these risks, and their impact on operating costs will be addressed.

TABLE 4-18. QUANTIFYING STATION COSTS AT FINAL STAGE

Cost element	Description
Station specification	<p>The final stage proposal must describe the location, size and facilities of each station, consistent with the detailed engineering plans for the HSIPR, the forecast footfall and the type of passengers who are forecast to use the station.</p> <p>The proposal must describe key operational activities of the station and the how the station will operate day-to-day and when there are delays to train services.</p> <p>The proposal must state the opening hours of each station and the number of trains stopping at each station in the peak hours and during a “standard hour” and the number of passengers boarding and alighting trains in the peak hour and the standard hour (as these will determine the “capacity” of the customer facilities that will need to be provided).</p> <p>The proposal should outline the retail facilities that will be provided at the station, including their business (e.g., food and beverages, newspapers/magazines, clothing), their size, expected customer footfall and annual turnover. Potential retailers, who it is hoped will occupy the sites, may be listed.</p>
Staff roles and responsibilities	<p>The proposal must state roles of each member of station staff and, where applicable, the relative grades of these staff.</p> <p>The station staff roles that must be described in this way must include (but not be limited to): ticket sales staff, ticket checking staff, train dispatch staff, other operational critical staff, cleaning staff and CCTV monitoring and general customer assistance staff.</p> <p>The descriptions must include identification of management and supervisory staff including those with ultimate responsibility for key functions (e.g., train service, ticket sales, customer information and customer safety).</p>
Total staff numbers specified by role	<p>The proposal must estimate the total number of station staff to cover the specified roles.</p> <p>The forecast number of staff at each station must take into account:</p> <ul style="list-style-type: none"> • The number and size (in terms of platforms, layout and number of passengers) of the station; • The hours of operation of the train service; • The proposed customer offer at the station (for example, the proposed opening hours of ticket offices or the need to provide a greater level of customer support/information at some stations); and • The responsibilities of each role. <p>The number of station staff required at each station must also be underpinned by a detailed rostering exercise which will allow an efficient staffing roster to be prepared, and to ensure that safety and employment regulations are reflected and that there is sufficient cover for holidays, training and sickness. Assumptions made in the rostering exercise must be clearly stated.</p> <p>The proposal must include the outputs from the rostering exercise and these must be referred to in the quantification of staff numbers and costs.</p>
Salaries and overheads <ul style="list-style-type: none"> • Basic salaries stated • Overheads • Source specified • Risks identified 	<p>The proposal must specify the annual salary assumed for each staff role.</p> <p>The source and rationale for the salary assumed is not required: it is assumed that the promoter has undertaken sufficient research to assure themselves that the salaries are appropriate. However, the salary assumptions will be expected to pass the “sense test” and the promoter must explain reasons for any significantly high or low salaries.</p> <p>The estimate of employers’ overhead costs must take into account all relevant component costs, and must be presented at the component levels, for each staff function. The source of the assumptions underpinning these estimates (for example, employers’ insurance contributions) must be specified and, where different to “the national norm”, must be explained.</p> <p>The proposal must specify the terms and conditions of the main staff roles.</p> <p>The proposal should have considered the availability of labor for each of the roles and the impact this may have on salaries. They should also have considered the potential impact of trade unions on salaries and potential risks to terms and conditions.</p>
Changes in staff costs over time	<p>At final stage, the promoter must forecast, in detail, changes in staff costs as a result of changes in the train service/train formation/passenger volumes/station footfall.</p> <p>Assumptions regarding changes over time in salaries and employers overheads must be refined and their rationale explained.</p>
Fixed costs	<p>The cost forecasts must be evident that the costs have been forecast on a bottom-up basis. Therefore the costs of utilities, building maintenance, equipment maintenance (display screens, public address, and ticket machines) and possibly property tax must be forecast for each station, given the differing physical characteristics and customer requirements of that station. For example, the number of display screen at each station will need to be quantified.</p>

Cost element	Description
	<p>At final stage, the cost “per unit” of utilities, maintenance and property tax must be based on initial negotiations with potential suppliers of utilities or maintenance (it is unlikely that specialist station equipment could be maintained by the HSIPR operators own staff). Original documented evidence of the proposed prices of potential suppliers must be provided in the proposal.</p> <p>The proposal must also forecast changes in fixed costs over time, explaining how these have been derived and the assumptions made. It must be clear that there is no double counting or omissions between cost items (e.g., railroad maintenance costs).</p>
Presentation of station costs	<p>The final stage proposal must state the number of station staff employed at each station, split by role. The total number of staff for all stations must also be presented, split by role.</p> <p>The proposal must state the total annual station staff costs per station, split by role. The total annual staff cost for each role, across all stations, must also be specified.</p> <p>Employers overhead costs must be included as separate line items for each component cost and for each role.</p> <p>Fixed costs of stations must be included as multiple line items, one for each component cost. As a general rule, one would expect there to be at least 10 line items for fixed station costs.</p>

TABLE 4-19. QUANTIFYING ROLLING STOCK COSTS (INCLUDING MAINTENANCE) AT FINAL STAGE

Cost element	Description
Method of procuring rolling stock	<p>The proposal must state whether HSIPR trains will be purchased through capital funding or financed by a third party and leased. Trains purchased through capital funding may be depreciated as an operating “cost”. Lease costs must be clearly identified on a per train or vehicle per year basis.</p> <p>Whether the trains will be leased or purchased, at final stage, the promoter must provide evidence that expressions of interest to supply the rolling stock have been sought, and evidence of how a small number of potential suppliers has been shortlisted.</p> <p>While it is acknowledged that there are issues of commercial confidentiality for bidders to supply rolling stock (given the “competition” for the rolling stock order), the promoter must provide evidence that the rolling stock is deliverable in line with the HSIPR proposal. This may require the reviewer to sign a confidentiality agreement in advance of reviewing the proposal.</p> <p>The proposal must provide evidence of the current state of play of negotiations with the shortlisted providers of rolling stock, including the type of contract (whether it includes any element of train maintenance), timescales for delivery (design, build, test and entrance in to passenger service of the full fleet of rolling stock) and cost per train or vehicle. Information must also be provided that confirms whether options for additional orders of rolling stock (compatible with the initial fleet, both as trains and as individual cars to lengthen trains) have been addressed (for example, to operate increases in train service or passenger ridership in the medium and long term).</p>
Rolling stock fleet required	<p>The proposal must state the number of trains of each formation and type required to operate the HSR service. This must be based upon a detailed diagramming exercise underpinned by the timetable prepared from the train service simulation modeling.</p> <p>The proposal must describe, in detail, how the technical specification of the train has been defined, including the decisions made regarding trade-offs between costs, speed, track damage and customer experience.</p> <p>Where a single train type and formation is selected for all HSR services, the promoter must explain the rationale for this, and the advantages and disadvantages thereof (e.g., operating cost benefits of operating shorter trains in services with lower demand). Where a mixed fleet is selected, the promoter must also explain the rationale and advantages/disadvantages of this (for example, the impact on the price per train compared to a single fleet and the additional costs of maintaining a differentiated fleet).</p> <p>The number of spare trains required must be estimated based on whether a mixed fleet is operated, a detailed assessment of the rolling stock maintenance plan and consideration of the performance plan.</p> <p>Where a “power by the hour” rolling stock contract is being proposed, the total number of trains must be specified and the promoter must describe the basis on which they have been assured that the train service is deliverable with the total fleet size.</p>
Rolling stock ownership or leasing costs	<p>The proposal must state the cost per train if they are to be procured. This price should be based upon initial negotiations with potential suppliers. Where possible, the price must be compared with the price of other, existing rolling stock, with the differences explained.</p> <p>It is expected that the price per train quoted at final stage should be within 20% of that at commercial closeout.</p> <p>The proposal must provide evidence that risks associated with the provisions of rolling stock have been identified, their impacts assessed and ways to address these risks must be stated and in progress.</p> <p>Where the rolling stock will be leased the proposal must state the length of the proposed lease, whether the trains will be leased directly from the manufacturer or through a third party. The expected terms of the lease must be described. The lease cost per train or vehicle per year must be stated.</p>
Inclusion of rolling stock maintenance costs	<p>Rolling stock maintenance costs must be included as one or more line items in the operating cost forecasts.</p> <p>The proposal must describe the components of maintenance costs, with reference to different levels of maintenance (servicing, light and heavy) and comprising of the labor, materials and fixed cost elements.</p>
Maintenance plan described	<p>At final stage, the proposal must describe the specific maintenance plan that is proposed for the HSIPR rolling stock. This is irrespective of who will undertake the maintenance (the HSIPR operator or a third party). This must include:</p> <ul style="list-style-type: none"> • How train equipment will be monitored and pre-emptive maintenance undertaken (including the trade-offs of the cost of this with better train performance/reduction in delays); • Assumptions regarding un-planned maintenance (e.g., for vandalism) must be explained, including how these are included in the quantification of maintenance activities and resources; • Description of the scope of each type of inspection and maintenance which will be undertaken (including those undertaken prior to every train trip and

Cost element	Description
	<p>fleet overhauls/refurbishments);</p> <ul style="list-style-type: none"> • Frequency of each type of inspection and maintenance (noting where these are statutory), both on a mileage basis and on a calendar basis (translated into the latter using the proposed HSR timetable); • Where each type of inspection and maintenance will be undertaken and who will be responsible for undertaking them; • Resources (labor, materials, equipment and plant) required to undertake each type of inspection and maintenance, including the provider of these resources; • Units costs of each type of inspection and maintenance; • The number of inspections and maintenance activities required per day, week, month and year; • How the specifics of the maintenance plan, described in the above items, has been used to estimate the number and size of depots, number of maintenance staff required and significant elements of maintenance plant and equipment; and • The number of inspections and maintenance activities required. <p>The proposal must provide evidence that the location of the depots is appropriate given the timetable and the maintenance plan, in particular, in relation to the trade-offs between empty train mileage costs to access fewer depots and the efficiencies of scale of fewer depots.</p> <p>The proposal must confirm that sufficient fleet is available to operate the HSIPR service when major overhauls are planned and trains are out of service for a period of time.</p> <p>This information must be provided even if the maintenance is to be undertaken by a third party to assure both the HSIPR operator and the reviewer that the HSIPR proposition is deliverable (which, without a credible maintenance plan, doesn't provide the required confidence).</p> <p>Where a mixed train fleet is operated, the maintenance plan must explain how this will necessarily impact the maintenance resources required (different train types and possibly formations will mean a higher than average cost of maintenance than a single fleet)</p>
Approach used to estimate train maintenance costs	<p>The proposal must describe how the costs of train maintenance are forecast - this must be prepared on a bottom-up basis from the train maintenance plan described above. There should be evidence of the trade-offs which are necessarily considered when preparing a maintenance plan and the associated costs of maintenance.</p> <p>The different depot staff roles must be specified, including their responsibilities.</p> <p>The number of inspections undertaken each day, week month and year should be used to estimate the quantum of resources that are required.</p> <p>A detailed rostering exercise must be undertaken to forecast the number of each staff in each role required, this must ensure that sufficient cover is provided for training, holidays and sickness.</p> <p>Salaries must be quoted for each role. At final stage, the source and rationale for the salary assumed is not required - it is assumed that the HSIPR operator has undertaken sufficient research to assure themselves that the salaries are appropriate. However, the salary assumptions will be expected to pass the "sense test" and the promoter must explain reasons for any significantly high or low salaries.</p> <p>The estimate of employers' overhead costs must take into account all relevant component costs, and must be presented at the component levels, for each staff function. The source of the assumptions underpinning these estimates (for example, employers' insurance contributions) must be specified and where different to "the national norm", must be explained.</p> <p>The proposal must specify the terms and conditions of the main staff roles.</p> <p>The availability of skilled labor to fulfill depot staff roles should be specifically considered by the proposition at final stage, together with the impact this may have on salaries. They should also have considered the potential impact of trade unions on salaries and potential risks to terms and conditions.</p> <p>The proposal must state whether there is a step-change in maintenance costs (i.e., If maintenance costs are not directly proportional to train miles or vehicle numbers) if there is a significant change in timetable (train miles or hours) - for example, this may be the case if a new depot is required.</p> <p>As a sense check, the maintenance costs should be converted into a cost per train per year and a cost per train and vehicle mile.</p>
Fixed costs included	<p>At final stage, the fixed costs for providing the depot facilities should be estimated and presented separately.</p> <p>The proposal must clearly state the functions to be carried out at the depot and the equipment required including numbers of stabling sidings and inspection roads with pits elevated walkways to permit underframe and roof access to the HSIPR trains. The capacity of the depot in terms of maintenance inspections per day, week, month and year must be described and shown to be consistent with the maintenance plan.</p> <p>The number of each type of maintenance equipment at each depot must be stated - this must be consistent with the maintenance plan (in particular, the inspections and maintenance undertaken daily, weekly, monthly and annually. It must be clear that there is some spare capacity for unplanned maintenance.</p>

Cost element	Description
	<p>The proposal must state the proposed suppliers of equipment and materials, and provide evidence of initial negotiations with these suppliers.</p> <p>The proposal must confirm that the depots and equipment can be delivered in accordance with the timescales of the HSR proposition, and unit costs for these must be stated.</p>
Changes in rolling stock costs over time	<p>The proposal must state assumptions as to how rolling stock and maintenance costs will change over time. Where trains are leased, this must include the assumed change in costs when a new lease is signed.</p> <p>Changes may arise from - timetable alterations affecting the number or frequency of services; longer trains required to increase passenger capacity; and inflationary pressure on salaries and materials.</p> <p>For maintenance costs, the proposal must differentiate between changes in labor and materials/equipment costs over time.</p>

TABLE 4-20. QUANTIFYING RAILROAD COSTS AT FINAL STAGE

Cost element	Description
Railroad operations and maintenance costs included in operating costs	<p>Railroad operations and maintenance costs must be included as multiple line items in the operating cost forecasts.</p> <p>Where the HSIPR service will operate as a tenant on a railroad, the costs may be presented as “railroad access costs” and these must also be presented as multiple line items, in accordance with how access costs are charged.</p>
Railroad landlord or tenant?	<p>The proposal must confirm whether the HSIPR operator will be a landlord and own the railroad. This is generally the case if the proposal involves construction of new railroad.</p> <p>Where the HSIPR operator is a tenant, the proposal must state the nature of the landlord, for example, is it public or private and is it responsible for operating train services?</p> <p>Where the HSIPR operator is a tenant, proposal must submit a draft access agreement as part of the proposal. The access agreement must confirm the following:</p> <ul style="list-style-type: none"> • Sufficient capacity available for the proposed timetable to be operated; and • Times when the railroad will be unavailable for HSIPR service operation due to maintenance. <p>Where the HSIPR operator is a tenant, the assumptions underpinning the railroad access costs must be described and access arrangements demonstrated to be consistent with the HSR timetable. The railroad access costs will be charged on a \$ per vehicle or train mile basis, sometimes with an additional fixed cost per year and evidence should be provided that this is proportional to the costs which are likely to be incurred by the landlord to support the new services.</p>
Capacity of railroad	<p>The proposal must confirm whether the HSIPR services are the only users of the railroad.</p> <p>Where other rail services will use the railroad, the proposal must describe the mix of traffic, both in terms of operators and types of traffic, for example, passenger or freight and passenger high-speed or passenger “conventional”). Evidence should be provided that sufficient capacity exists on the railroad for all services and potential conflicts between services have been resolved.</p> <p>Where a new railroad is being constructed for the HSIPR service, the feasibility design must provide evidence that the capacity accommodates the requirements of the train service specification.</p>
Approach to estimating railroad operations costs described	<p>The proposal must describe how the railroad costs have been estimated and include assumptions (and their sources) for:</p> <ul style="list-style-type: none"> • The number of signaling and control centers that are required; • The number of staff per signaling and control center (roles and responsibilities must be identified and the number of staff must be quantified using a detailed rostering exercise that takes into account the hours of operation of the service and the need to include staff cover for holidays, sickness and training). Management and supervisory staff must be identified; and • Annual salaries and employers overheads for each role must be stated.
Approach to estimating railroad maintenance costs described	<p>The proposal must describe, in detail, the proposed approach to maintaining the railroad.</p> <p>The proposal must state -</p> <ul style="list-style-type: none"> • When planned maintenance will occur (and when HSR trains will not be able to operate on all or route sections of the railroad, or will have limited access to sections of the railroad); • What inspections and maintenance can be undertaken without affecting the proposed HSR timetable, and the actions that must be taken in order for this work to be undertaken safely; • State the frequency of preventative maintenance and servicing inspections of the railroad, the scope of these inspections and maintenance and the time taken for each; and • Which of the inspections and maintenance activities are labor intensive, and which are assumed to be sub-contracted (and the likely suppliers of the resources for sub-contracted work). <p>The proposal must present a maintenance program which shows the inspections taking place on each section of railroad during the year and the resources (labor, equipment and plant) required for each. The labor requirements must be disaggregated by skill type. For the purposes of the review and forecasting operating costs, annual maintenance programs must be presented covering 5-yearly periods.</p> <p>The proposal must forecast the total annual resource requirements to undertake railroad inspections and maintenance. This must include labor (by skill type), equipment and materials requirements. The resource requirements must be forecast for each of the annual programs presented. An assumption of the</p>

Cost element	Description
	<p>resources required in intervening years must be stated.</p> <p>The proposal must explain how reactive maintenance will be resourced while at the same time ensuring that the rest of the railroad is maintained to enable safe operation of HSIPR services. It must identify “on call” maintenance staff for such events.</p> <p>The proposal must state the salaries of each maintenance staff role, their terms and conditions (especially with respect to overnight working and working during national holidays) and employers’ overheads. The unit costs of materials and equipment must be provided. The proposal must state whether significant elements of equipment will be purchased or leased, and the costs of purchase or lease.</p> <p>The proposal must state the locations of maintenance depots along the route, and the rationale for how these were chosen. It must be clear that the labor resources required have been forecast taking into account the location of these depots (since travel time will impact on productive hours).</p> <p>Total annual resource costs must be forecast for each of labor, equipment, materials and depot, for every year.</p>
Changes in costs over time	<p>The proposal must state what assumptions have been made in terms of how costs will change over time. Of particular importance are the assumptions regarding how staff and material costs will be affected by inflation.</p>

TABLE 4-21. QUANTIFYING GENERAL AND ADMINISTRATIVE COSTS AT FINAL STAGE

Cost element	Description
Inclusion of general and admin. costs	Forecasts of general and administrative costs must be included as multiple line items in the operating cost forecasts and they must be forecast on a bottom-up basis.
Staff roles and responsibilities	<p>Assuming traincrew, maintenance, station and railroad staff have all been accounted for in the separate cost categories described above, staff in the general and administrative function must include:</p> <ul style="list-style-type: none"> • Directors and senior management; • Specialist support such as technical standards, procurement and contract management; • General support such as administration, marketing, human resources, training and finance; and • Operations - control center for day-to-day management and separate strategic planning. <p>Each role must be identified and the responsibilities of the role outlined.</p> <p>The costs of head office staff typically account for a significant proportion of general and admin. costs and the proposed head office team should be presented in the form of an organogram to confirm that all functions have been covered and there is no double counting. Where head office functions will be covered by a parent company, the proposal should clearly state how these costs are included in the HSIPR operating cost forecasts.</p>
Total staff numbers specified by role	<p>The proposal must specify the total number of staff in each role in the categories described above. The number of staff by role and grade must also be specified, since “other staff” costs are relatively high due to the higher than average salaries which are paid to employees in these roles.</p> <p>Most of these functions are weekdays only but where support is provided on a 24/7 basis (such as the control center), the number of staff must be estimated based on a rostering exercise to ensure that there is sufficient cover for training, holidays and sickness.</p>
Salaries and overheads <ul style="list-style-type: none"> • Basic salaries stated • Overheads • Source specified • Risks identified 	<p>The salary assumed for each role and grade must be stated. While the salaries of many roles will not be dissimilar to other organizations, the salaries of directors should be explained, as these may be significantly higher than for other organizations.</p> <p>An allowance (in addition to annual salary) must be made for employers’ overheads including insurance and retirement contributions. The level of this overhead should be specified and the source of this specified.</p> <p>The estimate of employers’ overhead costs must take into account all relevant component costs, and must be presented at the component levels, for each staff function. The source of the assumptions underpinning these estimates (for example, employers insurance contributions) must be specified and where different to “the national norm”, must be explained</p>
Non staff costs	<p>Non-staff costs will account for the majority of general and administrative costs. Robust cost forecasts can only be prepared if the promoter is clear how the HSIPR business will be supported day-to-day and to cover periodic issues.</p> <p>Cost forecasts must be prepared on a bottom-up basis, reflect initial negotiations with suppliers and include:</p> <ul style="list-style-type: none"> • IT equipment and maintenance/renewals; • Insurance; • Marketing and advertising; • Office supplies including stationary, postage and printing of HSR customer information (e.g., timetables); • Telephone services; • Professional services such as legal and engineering advice and insurance; • Commissions to third parties who sell HSR tickets (including other train operators, travel agents and airlines); • Internet and telephone ticket sales; • Utilities (water, gas, electricity) and waste disposal; • Catering, car park management and maintenance and station security staff, where these are sub-contracted;

Cost element	Description
	<ul style="list-style-type: none"> • Employees uniforms; • Employees expenses (e.g., to cover travel and subsistence for traincrew who finish their shift at a remote location); • Employees bonuses (the proposal must propose how a bonus project would work); • Air/coach costs (where train or railroad failures mean passengers need to be conveyed by an alternative means); and • Facilities management costs such as utilities, buildings maintenance and property taxes (the facilities costs for stations and depots must be discretely presented in the respective stations and train maintenance sections of the cost forecasts). <p>The proposal must include a description of each of these items, an estimate of the number of units required and the frequency of incidence (e.g., the number of computers and staff uniforms required and how frequently they will be replaced/updated) and the unit cost of each.</p> <p>The proposal must give a particularly thorough explanation of marketing and advertising costs and the costs of ticket sales, as these are often poorly scoped and they are critical to achieving the ridership forecasts and the passenger revenue.</p>
Changes in costs over time	<p>The proposal must consider and make assumptions with respect to how staff costs will increase over time.</p> <p>This must include planned variations in staff numbers for each function with any proposed change in train service level, passenger volumes or changes in train formation.</p> <p>The rationale behind the assumptions adopted must be explained.</p> <p>Inflationary assumptions which grow the non-staff costs over time should be clearly explained.</p>
Presentation of general and admin. costs	<p>Numbers of staff in “general and administrative costs” must be presented as multiple line items, one for each role.</p> <p>Total staff costs for staff included in general and admin. costs must be presented as individual line items for each role. Employers’ overheads must be specified as separate line items.</p> <p>Fixed costs must be presented as multiple line items, one for each item of cost quantified.</p>

TABLE 4-22. ROUTE ALIGNMENT AND TRAIN SERVICE OFFER AT COMMERCIAL CLOSEOUT

Driver of cost	Description
Route alignment	
Route alignment and distances	<p>The commercial closeout proposal will reflect the approved engineering design which is to be or is already under construction. Some minor alterations should be expected.</p> <p>Route distances should not change, however, gradients and curves may alter slightly. The cumulative effect of small changes may alter average line speed and traction energy consumption, and therefore have a small cost impact.</p> <p>The signaling and control systems should be consistent with those specified at final stage.</p> <p>The proposal should be underpinned by final and approved for construction engineering drawings with only small changes apparent from the final stage design. Major changes must be described in full and the reasons for the change clearly presented. A reviewer should consider the competency of the risk management process adopted by the HSIPR operator if major changes arise in the route alignment at this stage in the project.</p>
Terminating & intermediate stations	<p>The proposal will present final station designs which are approved for construction. As with the route alignment, these should be consistent with the final stage proposals. Changes to the number of platforms and facilities provided at stations must be supported by a clear rationale. Anything other than refinement of station layouts indicates a change in the HSIPR's confidence in the ridership forecasts.</p> <p>Where changes are proposed the impacts on train operations, operating costs, customer offer and ridership must be explained.</p>
Shared routes and stations	<p>At commercial closeout, the HSIPR operator must have reached agreement with other train operators and (where relevant) the railroad landlord as to how interfaces will be managed and the minimum service level supported. These agreements must be sufficiently detailed to allow contracts to be exchanged.</p> <p>The discussions to reach contractual agreements may identify opportunities for resources to be shared to save cost.</p>
Railroad capacity	<p>It is expected that there will be no changes to the overall railroad capacity from that specified in earlier stages. There may be small site-specific adjustments to mitigate against performance risks identified in the final stage.</p>
Risks to the HSR alignment	<p>The proposal must explain how issues with alignment, which are found during construction of the HSIPR railroad, will be addressed. This must include the process by which any changes are tested to verify the impact on operating costs - in a large multidisciplinary project such as construction and operation of an HSIPR service, the team constructing the railroad are not always aware of the impact a change in gradient or junction protection signal will have on the ability to meet the specified timetable.</p>
Timetable	
Train frequency and trip times and variations in train service	<p>It is expected that there will be only very minor changes to the timetable, for example, to reflect the detailed design of rolling stock (such as door widths, which would affect station dwell times) and the final route alignment (gradients and curves affecting average line speed).</p> <p>The HSIPR operator must simulate the final route alignment and rolling stock design and produce a final validated working timetable. This will specify train passing time at regular measuring locations to the nearest 30 seconds as a minimum.</p> <p>The working timetable must include all empty stock workings to the same level of detail as the passenger service timetable.</p>
Annual train miles & train hours	<p>Train hours and miles must be presented for all train formations and train types. The reasons for the changes must be explained (for example, cost savings may be possible if more services can be operated with shorter trains). If there is a significant difference from final stage, the impacts on the operating costs, customer offer and ridership must be explained.</p>
Proposed rolling stock	<p>At commercial closeout, the HSIPR operator must have an approved design and firm price agreed with a manufacturer for the supply of rolling stock.</p>
Risks to the HSR timetable	<p>There should be few, if any risks to the timetable. The proposal should describe how the risks identified at final stage were managed and the updated risk register accompany the proposal.</p> <p>Remaining risks should still be considered as "live" and management actions and responsibilities should be presented for each.</p>

Driver of cost	Description
Train service delivery and customer service offer	
Key statutory requirements	Confirmation must be given that all statutory requirements have been met. Where derogations to compliance with specific standards has been sought, appropriate confirmation from the enforcing body must be presented. A good HSIPR operator will also present its management process which ensures it will continue to comply with statutory requirements through the lifetime of the contracted service.
Train service delivery	The proposal would not be expected to include any changes to the processes by which the train service is delivered compared to the final stage. Where changes have occurred, a version of the operating costs must be presented which quantifies the impact of this change alone.
Customer service offer	Where there are changes to the customer service offer compared to the final level, the changes must be clearly described and the reasons for the change explained. The impact on ridership, passenger revenue, benefits and each component of operating costs must be presented and fully explained. Minor changes to the customer service offer often occur at commercial closeout stage in order to find cost savings as operating costs increase in response to other drivers.

TABLE 4-23. QUANTIFYING TRAINCREW COSTS AT COMMERCIAL CLOSEOUT

Cost Element	Description
Staff roles and responsibilities described	Any changes to the staff roles and responsibilities stated in the commercial closeout stage proposal must be described. Where additional responsibilities are required of a role, the proposal must provide evidence that all responsibilities are deliverable (and train operation and customer service will not be adversely affected).
Number of employees on each train	Changes to the number of on-board staff per train must be explained and a summary table provided which shows the number of traincrew employees in each role against the estimates of both the intermediate and final stage proposals.
Description of approach used to quantify numbers of traincrew	<p>Where revised rostering exercises have identified changes to the number of traincrew staff required, the proposal must state any changes in the input assumptions to the rostering exercise and assess whether there is an impact on train operation and customer service.</p> <p>Where the number of traincrew has changed, the proposal must present a table comparing the total number of staff in each role against the estimates of both the intermediate and final stage proposals, referencing the text to explain the changes.</p> <p>If the methodology to forecast the number of traincrew changes, the proposal must fully explain the reason for the change and explain the impact on the staff numbers.</p> <p>The proposal must forecast the number of trainee drivers and traincrew operations staff and the timescales of the training program which each will follow.</p> <p>The detailed rostering exercise should be sense checked to understand how contingency has been treated. A good indicator of contingency being applied on top of contingency is where daily staff numbers are rounded up, combined with assumed productivity of 60-80% and then a large deduction for training, holidays and illness over the course of a year.</p>
Salaries and overhead <ul style="list-style-type: none"> • Basic salaries stated • Overhead • Source specified • Risks identified 	<p>The process to recruit staff must be explained and evidence provided that salaries and training requirements are realistic for the areas staff will be based. Where staff salaries have changed compared to the final stage proposal, the reasons must be specified and a comparison table presented. Where staff salaries change significantly +/- 20% detailed explanations must be provided.</p> <p>It is likely that the level of employer overheads and terms and conditions of employment will have changed from the final stage proposal. A comparison table must be presented and the reasons for the changes explained.</p> <p>The rostering exercise must identify where staff will start and finish a shift away from their home location. In such cases, cost will be incurred in providing transportation or overnight accommodation and subsistence. Over the course of a year, this can amount to a considerable sum. The costs for this must be clearly presented.</p>
Changes in staff costs over time	While changes in staff costs over time are sometimes based on high-level assumptions at the final stage, at commercial closeout they must be based on detailed assessments of how resource levels will change. Evidence of this analysis must be provided.
Presentation of traincrew costs	This must be presented with consistent headings to those used at final stage and a comparison table provided to explain changes in each element.

TABLE 4-24. QUANTIFYING ENERGY COSTS AT COMMERCIAL CLOSEOUT

Cost Element	Description
Method of calculation	The method of calculation of energy costs would not expect to change from that at final stage. Where there has been a change, a detailed explanation of the reason for the change must be provided. A full description of the new method of calculation must also be provided, explaining why it is more appropriate for use.
Unit cost of energy	Where the cost of energy per unit has changed from earlier stages, the reasons must be explained. This may be a result of negotiations with suppliers of energy, in which case the terms of the supply price must be described in the proposal.
Energy consumption of rolling stock	Commercial closeout represents a point in the HSIPR proposal development when there is certainty in the design specification of the train and final (small) adjustments to the timetable will be made. The resulting changes to energy consumption must be explained, in terms of the aspects of the train specification which have affected energy consumption rates or the changes to the timetable.
Changes over time	The proposal must confirm forecasts of changes in the unit price of energy over time and evidence must be provided that these forecasts are based on a careful assessment of future energy markets. The proposal as a whole must provide evidence that the energy price risks identified in the final stage proposal have influenced the development of appropriate aspects of the proposal.

TABLE 4-25. QUANTIFYING STATION COSTS AT COMMERCIAL CLOSEOUT

Cost element	Description
Station specification	<p>Any significant change from the final stage proposals must be clearly documented and justified. The design for each station must be demonstrated to be consistent with the ridership forecasts, working timetable and quality specified for the customer experience.</p> <p>All equipment will now be fully specified and the maintenance requirements presented.</p> <p>Minor changes will be expected to reflect the refinement of operating, timetable and fares and ticketing plans.</p> <p>Where retail facilities are to be provided, final draft tenancy agreements should be provided to identify the revenue generated.</p>
Staff roles and responsibilities	<p>Any significant changes from the final stage proposals must be clearly documented and justified.</p> <p>The managerial and supervision structure will be more refined than at final stage, but changes to front line staff requirements will only be driven through major changes to the operating, timetable or retail and ticketing plans.</p> <p>The location of costs for managing call center / internet ticket sales must be defined - to avoid confusion it is best to sit within general & administrative.</p>
Total staff numbers specified by Role	<p>The calculations undertaken at final stage will be re-run to reflect final plans.</p> <p>The detailed rostering exercise should be sense checked to understand how contingency has been treated. A good indicator of contingency being applied on top of contingency is where daily staff numbers are rounded up, combined with assumed productivity of 70-90% and then a large deduction for training, holidays and illness over the course of a year.</p>
Salaries and overhead <ul style="list-style-type: none"> • Basic salaries stated • Overhead • Source specified • Risks identified 	<p>The process to recruit staff must be explained and evidence provided that salaries and training requirements are realistic for the areas staff will be based. Where staff salaries have changed compared to the final stage proposal, the reasons must be specified and a comparison table presented. Where staff salaries change significantly by +/- 20%, detailed explanations must be provided.</p> <p>It is likely that the level of employer overheads and terms and conditions of employment will have changed from the final stage proposal. A comparison table must be presented and the reasons for the changes explained.</p>
Changes in staff costs over time	<p>While changes in staff costs over time are sometimes based on high-level assumptions at the final stage, in commercial closeout stage proposals they must be based on detailed assessments of how resource levels will change to reflect growth in the HSIPR operation. Evidence of this analysis must be provided.</p>
Fixed costs	<p>Sufficient information now exists through the design process to have full disaggregated costs for maintenance. Subcontracts should be in place for maintenance of specialist equipment such as elevators, customer information systems and ticketing machines.</p> <p>The approved design will allow utility costs to be estimated with greater accuracy than at final stage.</p> <p>The proposal should contain detail on HSIPR costs incurred with respect to the immediate station area, for example, maintaining access roads and parking lots and payment of property taxes.</p>
Presentation of station costs	<p>This must be presented with consistent headings to those used at final stage and a comparison table provided to explain changes in each element. Fixed cost is the area most likely to have been underestimated at final stage and therefore change may be expected.</p>

TABLE 4-26. QUANTIFYING ROLLING STOCK COSTS (INCLUDING MAINTENANCE) AT COMMERCIAL CLOSEOUT

Cost element	Description
Method of procuring rolling stock	<p>A firm contract will be either in place or ready to execute with a manufacturer for the supply of rolling stock. This will define the specification, delivery timescales, commissioning and approval process. These should be checked to ensure consistency with the key delivery plans.</p> <p>The remedies available to the HSIPR operator in the event of delay or failure to meet the specification should be clearly explained. These should be back-to-back with any compensation the HSIPR operator will have to pay to the funder(s) in the event of late delivery or poor performance.</p> <p>The payment profile and services provided by the manufacturer should be clearly defined and consistent with requirements of the delivery plans.</p> <p>The HSIPR operators plans to accommodate future ridership growth must be presented, for example, this may be through fixed-price options to procure additional trains.</p>
Rolling stock fleet required	<p>The final requirements should be a refinement of the final stage calculation and consistent with the delivery plans. The detailed diagramming exercise should be presented.</p> <p>Any reduction in the rolling stock fleet size from final stage must be clearly explained and the mitigating actions to avoid impact on performance and service quality presented. Changes in the number of maintenance spares or trains available for strengthening peak services will impact the reliability and quality of the HSIPR offer and could reduce ridership and revenue.</p>
Rolling stock ownership or leasing costs	<p>The proposal must state the cost per train if they are to be procured. This price should be based upon a completed design and commercial agreement reached with the preferred supplier.</p> <p>Any significant change in the unit cost of each train from the final stage estimate must be documented. Cost increases may arise through difficulties in complying with national safety standards. Cost decreases generally only arise through reduction in the specification. The impacts of this on maintenance, performance and service quality must be clearly explained.</p> <p>The proposal must provide evidence as to how the risks identified at final stage have been managed. The submission must clearly confirm the selected rolling stock will clearly comply with all national standards and if any derogations to these standards are assumed, evidence must be provided that authorizing bodies are sympathetic and a plan presented for obtaining formal approval for the derogation.</p> <p>Where the rolling stock will be leased, the proposal must state the terms of the lease and whether the trains will be leased directly from the manufacturer or through a third party. If the lease is a different duration than the concession period for HSIPR operators, the proposal must state the HSIPR operator’s plan for ensuring proper rolling stock continues to be available throughout.</p>
Inclusion of rolling stock maintenance costs	<p>Rolling stock maintenance costs must be included as one or more line items in the operating cost forecasts.</p> <p>The proposal must describe the components of maintenance costs, with reference to different levels of maintenance (servicing, light and heavy) and comprising of the labor, materials and fixed cost elements. Materials will form the largest component of cost. Maintenance labor should be provided at terminal stations to undertake turnaround inspections and “running repairs”.</p>

Cost element	Description
Maintenance plan described	<p>If maintenance is to be undertaken by a third party, for example, the rolling stock manufacturer, the proposal must provide full details of the supply contract including payments, services to be provided, performance targets (such as reliability of trains expressed in number of miles per in service delay and the availability of trains - for example, 40 out of 44 trains are required for service at 06:00 every weekday and 35 at weekends.</p> <p>At commercial closeout, the maintenance plan will be now be unique to this HSIPR service, reflecting the specified rolling stock, timetable and route characteristics.</p> <p>The plan must not be generic and must include the following:</p> <ul style="list-style-type: none"> • How train equipment will be monitored and pre-emptive maintenance undertaken (including the trade-offs of the cost of this with better train performance/reduction in delays); • Assumptions regarding unplanned maintenance (e.g., for vandalism) must be explained, including how these are included in the quantification of maintenance activities and resources; • Description of the scope of each type of inspection and maintenance which will be undertaken (including those undertaken prior to every train trip and fleet overhauls/refurbishments); • Frequency of each type of inspection and maintenance (noting where these are statutory), both on a mileage basis and on a calendar basis (translated into the latter using the proposed HSR timetable); • Where each type of inspection and maintenance will be undertaken and who will be responsible for undertaking them; • Resources (labor, materials, equipment and plant) required to undertake each type of inspection and maintenance, including the provider of these resources; • Unit costs of each type of inspection and maintenance; • The number of inspections and maintenance activities required per day, week and year for the whole fleet; • How the location, size and facilities provided at each maintenance depot aligns with delivering the maintenance plan. This should include contingency plans for reacting to train breakdowns which occur away from depots or terminus stations; and • Staff numbers, skills and equipment required must be specified for each location. <p>The proposal must confirm that sufficient fleet is available to operate the HSIPR service when major overhauls are planned and trains are out of service for a period of time.</p>
Approach used to estimate train maintenance costs	<p>The proposal must describe how the costs of train maintenance are forecast, and this must be prepared on a bottom-up basis from the train maintenance plan described above.</p> <p>The different depot staff roles must be specified, including the associated responsibilities.</p> <p>The number of inspections undertaken each day, week and year should be used to estimate the quantity of resources required.</p> <p>A detailed rostering exercise must be undertaken to forecast the staffing requirements for each role; this must ensure that sufficient cover is provided for training, holidays and sickness.</p> <p>Salaries must be quoted for each role and these should have been tested with the labor market and unions. The promoter must explain reasons for salaries which are markedly different from peer groups in other industries and HSIPR operations.</p> <p>The estimate of employer overheads will be more detailed than at final stage, and should be consistent with the employment terms and conditions of staff.</p> <p>The sources of labor, the training required and plan for managing industrial relations with the unions must be explained in the proposal.</p> <p>As a sense check, the maintenance costs should be converted into an annual cost per train and a cost per train and vehicle-mile. If maintenance costs are not directly proportional to train miles or vehicle numbers, the proposal should clearly explain why.</p>

Cost element	Description
Fixed costs included	<p>The fixed costs for providing the depot facilities must be estimated on the basis of the completed rolling stock and depot design and planned workload at each location. The costs must be presented in a disaggregated manner covering utilities, property taxes, building, plant and equipment maintenance, subcontracts such as access road maintenance and waste uplifts.</p> <p>Evidence of the contracts which will be placed with suppliers must be provided to substantiate the cost estimates.</p> <p>The quantity of each type of maintenance equipment at each depot must be stated. This must be consistent with the maintenance plan (in particular the inspections and maintenance undertaken daily, monthly and annually. It must be clear that there is some spare capacity for unplanned maintenance.</p> <p>If the depot is not yet constructed, the proposal must provide details of the delivery plan and provide confidence the facility will be available when the first trains are delivered for commissioning and handover from the manufacturer. Custom plant and equipment such as train elevators and wheel lathes have very long delivery times from the point of contract award.</p>
Changes in rolling stock costs over time	<p>The proposal must state assumptions as to how rolling stock and maintenance costs will change over time. Where trains are leased or maintenance is subcontracted, this must include how inflation will affect annual payments to the supplier.</p> <p>Changes may arise from: timetable alterations affecting the number or frequency of services; longer trains required to increase passenger capacity; and inflationary pressure on salaries and materials. If maintenance is subcontracted, the change process must be clearly explained.</p> <p>If the HSIPR operator is tied to the manufacturer for the supply of materials, the process through which competitive rates will continue to be achieved in the medium-term without competition must be explained.</p> <p>For maintenance costs, the proposal must differentiate between changes in labor and materials/equipment costs over time.</p>
Presentation of rolling stock costs	<p>This must be presented with headings consistent with those used at final stage and a comparison table provided to explain changes in each element. Material and fixed costs are the areas most likely to have been underestimated at final stage and therefore changes may be expected.</p>

TABLE 4-27. QUANTIFYING RAILROAD COSTS AT COMMERCIAL CLOSEOUT

Cost element	Description
Railroad operations and maintenance costs included in operating costs	<p>Railroad operations and maintenance costs must be included as multiple line items in the operating cost forecasts, including labor, materials, subcontract and lease costs.</p> <p>Where the HSIPR service will operate as a tenant on a railroad, the costs may be presented as “railroad access costs” and these must also be presented as multiple line items, in accordance with how access costs are charged.</p>
Railroad landlord or tenant?	<p>If the HSIPR operator is a tenant to a railroad, the final access agreements must be presented to explain the services provided by the landlord and the remedies available to the HSIPR operator if these services are not provided and the costs of obtaining these services.</p> <p>Key areas of focus are:</p> <ul style="list-style-type: none"> • What rights does the landlord have to suspend the HSIPR services to undertake maintenance, how much notice do they require to give and what compensation is payable; • How will the landlord ensure sufficient capacity is retained for the HSIPR service for the duration of the concession; • What is the process by which the HSIPR can change their timetable; and • How will the landlord ensure the rights of the HSIPR operator are treated fairly and consistently in conjunction with other tenants, for example, what rights of appeal are there if proposed timetable changes are rejected by other operators?
Capacity of railroad	<p>The proposal must present the detailed working timetable and its verification by simulation. The services of other operators must be included in the simulation and the underpinning assumptions and the model outputs agreed upon with the operators (and railroad landlord if appropriate).</p> <p>The proposal must clearly demonstrate the proportion of railroad capacity unused along the route with particular focus on bottlenecks such as stations and junctions. The HSIPR operator should demonstrate in its proposal how the remaining capacity will be used, for example, to accommodate future growth or to sell access to other operators.</p>
Approach to estimating railroad operations costs described	<p>The proposal must describe how the railroad costs have been estimated and include assumptions (and their sources) for:</p> <ul style="list-style-type: none"> • The size, facilities and responsibility for each signaling and control center. The approved design must be consistent with the operations, timetable and rolling stock delivery plans; • The number of staff per signaling and control center will be verified through standard operating procedures developed from the final design. The staff skill and grades must be identified and the number quantified using a detailed rostering exercise. Management, supervisory and incident response staff must be identified; • Annual salaries and employers overheads for each role must be stated; and • The cost of maintaining the signaling and control centers and providing road vehicles for incident support staff included as fixed costs. <p>Unless there has been a radical change in the means of regulating the railroad, for example, through use of a different technology, commercial closeout costs should be expected to be consistent with those estimated at final stage. The underpinning detail will however, provide greater confidence in the estimate.</p>
Approach to estimating railroad maintenance costs described	<p>The proposal will build upon the final stage estimate for railroad maintenance costs. This key difference is the outputs from the completed design allowing a full asset register to be compiled and from this a maintenance plan specific to the asset register and final train timetable can be developed. At commercial closeout, the maintenance plan must not be generic. The proposal must state:</p> <ul style="list-style-type: none"> • The agreed times when planned maintenance can take place and the railroad will be closed or access restricted to HSIPR services; • Maintenance activities which can take place when HSIPR services are running normally; • The frequency of preventative maintenance and servicing inspections of the railroad, the scope of these inspections and maintenance and the time taken for each; and • Labor, material, plant, equipment and sub-contract resources required to deliver the maintenance plan. <p>The proposal must present a maintenance program which shows the inspections taking place on each section of railroad during the year and the resources (labor, equipment and plant) required for each. The labor requirements must be disaggregated by skill type.</p> <p>The proposal must explain how reactive maintenance will be managed and resourced while at the same time ensuring that the rest of the railroad is maintained to enable safe operation of HSR services. It must identify “on-call” maintenance staff for such events.</p> <p>The unit costs of materials and equipment must be provided along with estimates of annual usage. The proposal must state whether significant elements of</p>

Cost element	Description
	<p>equipment will be purchased or leased, and the associated purchase or lease costs.</p> <p>The location, specification and facilities provided at railroad maintenance depots will have been fully designed. These should underpin the maintenance plan. The final stage detailed rostering exercise must be refreshed to reflect the greater knowledge available on staff roles and responsibilities and forecast workload.</p> <p>Salaries must be quoted for each role and these should have been tested with the labor market and unions. The promoter must explain reasons for salaries which are markedly different from peer groups in other industries and HSIPR operations.</p> <p>The estimate of employer overhead costs will be more detailed than at final stage, and should be consistent with the employment terms and conditions of staff.</p> <p>Fixed costs such as utilities, vehicle fuel, building maintenance, property taxes and plant and equipment leasing and maintenance should all be quantified either through estimates output from the design process or subcontracts.</p> <p>The sources of labor, the training required and plan for managing industrial relations with the unions must be explained in the proposal.</p> <p>As a sense check, the maintenance costs should be converted into an annual cost per route mile. If maintenance costs are not directly proportional to route distance or varies significantly from international benchmarks, the proposal should clearly explain why.</p> <p>Total annual resource costs must be presented for the full route as well as each depot.</p>
Changes in costs over time	<p>The proposal must state what assumptions have been made in terms of how costs will change over time. Of particular importance are the assumptions regarding how staff and material costs will be affected by inflation.</p>
Presentation of railroad costs	<p>This must be presented with consistent headings to those used at final stage and a comparison table provided to explain changes in each element. Material and fixed costs are the areas most likely to have been underestimated at final stage, and therefore changes may be expected.</p>

TABLE 4-28. QUANTIFYING GENERAL AND ADMINISTRATIVE COSTS AT COMMERCIAL CLOSEOUT

Cost element	Description
Inclusion of general and administrative costs	Forecasts of general and administrative costs must be included as multiple line items in the operating cost forecasts and they must be forecast on a bottom-up basis.
Staff roles and responsibilities	<p>Assuming traincrew, maintenance, station and railroad staff have all been accounted for in the separate cost categories described earlier, staff in the general and administrative function must include:</p> <ul style="list-style-type: none"> • Directors and senior management; • Specialist support such as technical standards, procurement and contract management; • General support such as administration, marketing, human resources, training and finance; and • Operations - control center for day-to-day management and separate strategic planning. <p>Each role must be identified and the responsibilities outlined.</p> <p>The proposed head office team must be presented in the form of an organogram, to confirm that all functions have been covered and there is no double-counting. Where head office functions will be covered by a parent company, the proposal should clearly state how these costs are included in the HSIPR operating cost forecasts.</p>
Total staff numbers specified by role	<p>The proposal must specify the total number of staff in each role in the categories described above. The number of staff by role and grade must also be specified, since “other staff” costs are relatively high due to the higher than average salaries which are paid to employees in these roles.</p> <p>Most of these functions are Monday to Friday only but where support is provided on a 24/7 basis (such as the control center), the number of staff must be estimated based on a rostering exercise to ensure that there is sufficient cover for training, holidays and sickness.</p>
Salaries and overhead <ul style="list-style-type: none"> • Basic salaries stated • Overhead • Source specified • Risks identified 	<p>Salaries must be quoted for each role and at commercial closeout, these should have been tested with the labor market and unions. The promoter must explain reasons for salaries which are markedly different from peer groups in other industries and HSIPR operations.</p> <p>The estimate of employer overhead costs will be more detailed than at final stage, and should be consistent with the employment terms and conditions of staff.</p> <p>The sources of labor, the training required and plan for managing industrial relations with the unions must be explained in the proposal.</p>
Non-staff costs	<p>Non-staff costs will account for the majority of general and administrative costs. Robust cost forecasts can only be prepared if the promoter is clear how the HSIPR business will be supported day-to-day and to cover periodic issues.</p> <p>Cost forecasts must be prepared on a bottom-up basis, reflect initial negotiations with suppliers and include:</p> <ul style="list-style-type: none"> • IT equipment and maintenance/renewals; • Insurance; • Marketing and advertising; • Office supplies including stationery, postage and printing of HSR customer information (e.g., timetables); • Telephone services; • Professional services such as legal and engineering advice and insurance; • Commissions to third parties who sell HSR tickets (including other train operators, travel agents and airlines); • Internet and telephone ticket sales; • Utilities (water, gas, electricity) and waste disposal; • Catering, parking management and maintenance and station security staff, where these are subcontracted; • Employees’ uniforms;

	<ul style="list-style-type: none"> • Employees' expenses (e.g., to cover travel and subsistence for traincrew staff who finish their shift at a remote location); • Employees' bonuses (the proposal must propose how a bonus system would work); • Air/bus costs (where train or railroad failures mean passengers need to be conveyed by an alternative means); and • Facilities management costs such as utilities, building maintenance and property taxes (the facilities costs for stations and depots must be discretely presented in the respective stations and train maintenance sections of the cost forecasts). <p>The proposal must include a description of each of these items, an estimate of the number of units required and the frequency of incidence (e.g., the number of computers and staff uniforms required and how frequently they will be replaced/updated) and the unit cost of each.</p> <p>The proposal must give a particularly thorough explanation of marketing and advertising costs and the costs of ticket sales, as these are often poorly scoped and they are critical to achieving the ridership forecasts and the passenger revenue.</p>
Changes in costs over time	<p>The proposal must consider and make assumptions with respect to how staff costs will increase over time.</p> <p>This must include planned variations in staff numbers for each function with any proposed change in train service level, passenger volumes or changes in train formation.</p> <p>The rationale behind the assumptions adopted must be explained.</p> <p>Inflationary assumptions which grow the non-staff costs over time should be clearly explained.</p>
Presentation of general and administrative costs	<p>This must be presented with consistent headings to those used at final stage and a comparison table provided to explain changes in each element. Material and fixed costs are the areas most likely to have been underestimated at final stage, and therefore changes may be expected.</p>

APPENDIX

A

WORKED OUT EXAMPLE OF REVIEWERS QUALITY CHECK QUESTIONS

A1 APPENDIX 1

Introduction

This appendix uses the “New Lines” HSR case study to show how information presented in the checklist format (presented in Section 2 of this toolkit) is used by reviewers to undertake reviewers quality check questions (presented in Section 3 of this toolkit).

The “New Lines” study is one of the HSR proposals which is presented as a case study in the operating costs report. It was commissioned by Network Rail to consider options to operate HSR services in the UK, and recommended the construction of a new HSR route, with services operating between London, the Midlands, North West and Scotland.

The New Lines business case report in which the operating cost forecasts were documented was not intended to provide detailed information on cost drivers, the sources of unit cost rates nor the annual costs for each cost category. This has affected how the case study was used as an example of the checklist and reviewers quality check questions.

Populating the operating cost checklist

As shown in Appendix Table A-1 through Appendix Table A-9, the information provided in the published business case for the proposed New Lines HSR was not at the level of detail consistent with the operating costs checklist. The published documents imply that there is a considerable level of supporting analysis which was not published (and therefore could not be used for this HSIPR study). Furthermore, some of the sources of the unit cost rates used to estimate costs were confidential and therefore for the purposes of the toolkit were not available for reporting.

In order to use New Lines as an example of use of the operating cost checklist and reviewers quality check questions, it was therefore necessary to complete the checklist with the information provided, and to calculate as many of the cost items as possible given the information published (for example, costing the total annual driver costs using the published driver costs per train hour and the published train hours). Even after this information had been in-filled, only a small proportion of the checklist was complete and this affected the recommendations arising from the implementation of the reviewers quality check questions.

The significant time required to translate information published in the New Lines proposal into the checklist format confirms that the completion of the checklist should be a requirement of the HSIPR Operator rather than the reviewer. Much of the time was needed to interrogate the different sources of operating cost information provided by New Lines, translate unit cost rates and cost drivers into total costs and to understand how to interpret some of the cost information provided.

If the checklist pro-forma is available to HSIPR operators during the proposal development phase, its completion should not be onerous and will assist the HSIPR in preparing cost forecasts.

The exercise does however show the importance of the HSIPR operator documenting all the elements that determine and comprise operating costs in a single document (the checklist) rather than the information being found in two or more reports, technical notes or cost models.

APPENDIX TABLE A-1. NEW LINES HSR CASE STUDY: TRAIN SERVICE SPECIFICATION

Item Ref	Required Item	Forecast Number (incl. unit of account)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
Route and timetable			
D1 D1 _n	Total route miles ¹ Route miles for each service group (where "n" is the reference number of each service group)	773km	Page 38
D2	Total track miles	N/S	N/S. 2 track railway implies 3100 track km
D3	Number of stations served	8	Page 32
D4	Times of day when service will operate for each of: d) Standard hour service e) Peak service (if applicable) f) Weekend service		
D5 _n	Service frequency (standard hour) : (for each service group _n , where relevant)	4tph Ldn-Birm 4tph Ldn – Manc 2tph Ldn – Liv 2 tph Ldn – Glasgow 2tph Ldn – Edin 2tph Birm – Glasgow 2tph Birm - Edin	Page 29
D6 _n	Service frequency (peak periods) : (for each service group _n , where relevant)	N/S	Hours during which the peak service will operate
D7 _n	Weekend service frequency : (for each service group _n , where relevant)	N/S	
D8 _n	End-to-end trip times: (for each service group _n , where relevant)	Ldn – Birm : 46 mins Ldn – Manc: 66 mins Birm – Manc: 38 mins Ldn – Glasgow/Edinburgh	Page 26. Page 26. Page 26. Para 5.37 (trip time similar to that to Manchester today))
D9	Empty stock working (ecs) miles per year ⁴	N/S	
D10	Empty stock working (ecs) hours per year ⁴	N/S	
D11	Total train miles per year (incl. ecs) ⁴	41.33m	Page 45 (methodology N/S)

D12	Total train hours per year (incl. ecs) ⁴	360,000	Page 45 (methodology N/S)
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Train and customer offer

Item Ref	Required Item	State Defined Information	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
D13	Train specification	Length: 5car 130m and 10-car 260m and 15 car 390m Weight Max speed AGV traction & performance characteristics Max power Seating capacity: 325 seats in a 5-car	Source of information
D14	Method of train dispatch at stations:	Driver N/S Traincrew staff N/S Station staff N/S Other (specify) N/S	Rationale and confirmation of adherence to safety standards and other relevant legislation
D15	Provision of differentiated product quality?	State classes of accommodation	Description of business and economy class or similar product differentiation
D16	Percentage of ticket sales made by each of	N/S Internet Call centers Station ticket machines, Station ticket offices, Traincrew ticket sales staff Other (specify)	Method of calculation

- Notes:
- 1 Where not all services operate the full length of the HSIPR, state the route miles of the main service groups
 - 2 Where different service groups operate over the HSIPR, state the frequency of each
 - 3 Where different service groups operate over the HSIPR, state the end-to-end trip times of each
 - 4 Where different train types of train lengths operate, state miles and hours for each type.

APPENDIX TABLE A-2. NEW LINES HSR CASE STUDY : TRAINCREW COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
T1	Number of drivers on each train	N/S	
T2	Number of other traincrew staff on each train	N/S	Roles defined and key responsibilities stated. Assumes 1 guard and 1 trainee driver for every trained driver.
T3	Total number of drivers for HSIPR operation	N/S	Methodology and assumptions used to forecast this.
T4	Total number of other traincrew staff for HSR operation	N/S	Methodology and assumptions used to forecast this.
T5	Drivers annual salary	£45,000	Page 43 -44
T6	Annual salary of other traincrew staff	N/S	N/S
T7	Employers overheads (as a % of salary)	21.5%	Page 43
T8	Change in staff costs over time	N/S	Explanation of forecast
T9	Other relevant information	N/S	Any other information used to forecast Item T12
T10	Total driver staff costs per year	£25.5m p/a	Calculated from information provided. Total cost only identified in cost model, based on a cost per train mile (£0.68) and 41.3m train miles.
T11	Total traincrew staff costs per year	£16.5m p/a	£114 per train hour for driver, trainee driver and guards of which £68 is driver cost. Total cost calculated from information provided. Total cost only identified in cost model, based on a cost per train mile (£0.68) and 41.3m train miles.
T12	Total traincrew costs	£40m p/a	

APPENDIX TABLE A-3. NEW LINES HSR CASE STUDY : ENERGY COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
E1	Average energy consumption per train mile	N/S	
E2	Cost per kwh or liter of diesel	N/S	Source of estimate
E3	Total annual train miles	41.3m	
E4	Total energy consumed per year	N/S	Method of calculation
E5	Change in unit cost of energy over time	N/S	Source and rationale for forecast
E6	Other relevant information	£5.60 per train mile	Page 44. Analysis of HS1 traction costs.
E7	Total energy costs per year	£230m p/a	Only identified in cost model: based on a cost per train mile and number of train miles

APPENDIX TABLE A-4. NEW LINES HSR CASE STUDY : ROLLING STOCK COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
A1	Number of trains required for standard passenger service Number of additional trains required for peak hour services (either for additional services or longer trains)	53 10-car 20 5-car Includes maintenance spares Not specified	Page 45. Methodology N/S.
A2	Number of trains as maintenance cover	N/S (see above)	
A3	If trains are leased, lease costs per train	N/A	
A4	If trains are purchased, depreciation costs per train	N/S	
A5	Change in lease or depreciation costs over time	N/A	
A6	Other relevant information		
A7	Total Rolling Stock Ownership/Lease costs	N/A	

APPENDIX TABLE A-5. NEW LINES HSR CASE STUDY : ROLLING STOCK MAINTENANCE COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
A8	Number of light maintenance inspections per train per year		Method of calculation
A9	Person hours required for light maintenance inspection		Method of calculation
A10	Resources (person hours, materials, plant) required for inspection		Method of calculation
A11	Number of light maintenance staff		
A12	Annual salary for train maintenance staff		Rationale for the estimate of salary
A13	Change in rolling stock staff maintenance costs over time		Source and rationale for forecast
A14	Total staff light maintenance costs per year		Method of calculation
A15	Total non-staff light maintenance costs per year		Method of calculation
A16	Number of heavy maintenance inspections per train p/a		Method of calculation
A17	Person required for heavy maintenance inspection		Method of calculation
A18	Maintenance resources (person hours, materials, plant) required for each heavy maintenance inspection		Method of calculation
A19	Number of heavy maintenance staff		Method of calculation
A20	Annual salary for train maintenance staff		Rationale for the estimate of salary
A21	Change in rolling stock staff maintenance costs over time		Source and rationale for forecast
A22	Total staff heavy maintenance costs per year		Method of calculation
A23	Total non-staff heavy maintenance costs per year		Method of calculation
A24	Other maintenance staff costs		Method of calculation
A25	Total number of maintenance staff		Method of calculation
A26	Number and size of maintenance depots		Rationale for the number, size and location of depots.
A27	Depot maintenance and utilities costs		Method of calculation
A28	Total rolling stock maintenance costs per year	£63m	Based on a cost per train mile
A29	Total number of cleaning staff		Method of calculation

A30	Total cost of cleaning staff		Method of calculation
A31	Total cost of cleaning materials		Method of calculation
A32	Total cleaning costs per year	£3m	Only identified in cost model
A33	Other relevant information		Any other information used to forecast Item A33
A34	Total rolling stock costs per year	£67m	

APPENDIX TABLE A-6. NEW LINES HSR CASE STUDY : STATION COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
S1	Number of terminal or major stations served	4	Appx A1.9 major stations London, Birmingham, Manchester, Warrington
S2	Number of other stations served	4	Other stations: Warrington, Liverpool, Edinburgh, Glasgow
S3	Average number of platforms at terminal /major stations Specify number of island platforms and single-sided platforms	London has 7 platforms, others have 4 platforms: not stated whether Island or not	Appendix A1.9
S4	Average number of platforms at other stations Specify number of island platforms and single-sided platforms	All have 2 platforms: not stated if they are island or single sided	Appendix A1.9
S5	Number of station staff at terminal / major stations	N/S	
S6	Number of station staff at each other station	N/S	
S7	Total number of station staff	N/S	
S8	Station staff annual salary	£20k - £60k	Depending on role:
S9	Employers overheads (as a % of salary)	22%	To cover pensions and National Insurance
S10	Change in staff costs over time	N/S	
S11	Other relevant information	£3.6m staffing cost per 4- platform station	
S12	Total station staff costs per year	£21m	
S13	Fixed costs e.g., but not limited to: utilities, building and equipment maintenance	£474,000 per station per year	Page 44. Based on LTC and QX for a typical Intercity station.
S14	Change in fixed costs over time		
S15	Other relevant information	N/S	
S16	Total station costs per year	£25m	

APPENDIX TABLE A-7. NEW LINES HSR CASE STUDY : RAILROAD COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
R1	Number of signaling and control centers		Rationale behind this quantum
R2	Number of staff per signaling and control centre		Roles defined and key responsibilities stated
R3	Annual salary of signaling and control centre staff		Rationale for the estimate of salary
R4	Employers overheads (as a % of salary)		Description
R5	Change in signaling and control centre staff costs over time		Source and rationale for forecast
R6	Other relevant information		Any other information used to forecast Item R7
R7	Total annual cost of signaling and control centers		Method of calculation
R8	Number of and type assets which will require regular inspection. For example: 400miles of way requiring weekly inspection. 50 switches which requiring monthly inspection. 400 miles of overhead catenary requiring monthly inspection.		Description of each type of inspection and frequency of inspection. method of calculation of number of inspections.
R9	Labor requirement for each type of inspection		Roles and responsibilities stated. method of calculation
R10	Annual salary of maintenance staff		Rationale for the estimate of salary
R11	Employers overheads (as a % of salary)		Description
R12	Change in maintenance staff costs over time		Source and rationale for forecast
R13	Total annual maintenance staff costs		Method of calculation
R14	Costs of materials for railroad maintenance per year		Method of calculation
R15	Costs of plant required for railroad maintenance per year		Method of calculation
R16	Maintenance depot costs per year, including		Method of calculation
R17	Other relevant information		Any other information used to forecast Item R18
R18	Total non-labor railroad maintenance costs per year		Method of calculation

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
R19	Other relevant information	£160k per route km	Page 41. £80 per single track km for infrastructure O, M and R.
R20	Total railroad maintenance costs per year	£124m p/a	Method of calculation
R21	Total railroad operations and maintenance costs per year	£124m p/a	

APPENDIX TABLE A-8. NEW LINES HSR CASE STUDY : GENERAL AND ADMINISTRATIVE COSTS

Item Ref	Required Item	Forecast Number (incl. unit of account and price base)	Reference (page number or paragraph number) to where key related information, as defined below, is found in proposal
G1	Number of headquarters staff		Roles defined and key responsibilities stated
G2	Annual salary of headquarters staff		Rationale for the estimate of salary
G3	Employers overheads (as a % of salary)		Explanation of components of overheads and level of overhead
G4	Change in head office staff costs over time		Source and rationale for forecast
G5	Other relevant information		Any other information used to forecast Item G6
G6	Total annual cost of headquarters staff	£3.4m p/a	Bottom-up calculation, includes all HQ costs
G7	Other headquarters costs including, but not limited to: IT, telecoms, utilities and office supplies		Description of cost items included Method of calculation
G8	Marketing and advertising costs		Description of cost items included method of calculation
G9	Professional services costs including, but not limited to: legal, engineering and insurance		Description of cost items included method of calculation
G10	Other ticket sales related costs including, but not limited to costs of leasing ticket machines, commissions for third party sales, call centre and internet costs		Description of cost items included method of calculation
G11	Other staff related costs including, but not limited to: uniforms, expenses, bonuses		Description of cost items included method of calculation
G12	Other HSIPR delivery costs including car park management, catering and security staff, where these are sub-contracted		Description of cost items included method of calculation
G13	HSIPR training costs		Description of cost items included method of calculation
G14	Change in non-staff general and admin costs over time		Source and rationale for forecast
G15	Other relevant information		Any other information used to forecast Item G16
G16	Total non-staff general and admin costs	N/S	Method of calculation
G17	Other relevant information		Any other information used to forecast Item G18
G18	Total general and admin costs	£3.4m pa	

APPENDIX TABLE A-9. NEW LINES HSR CASE STUDY : SUMMARY OF CONTINGENCY APPLIED

Cost category	Key risks	Value of contingency added to cost estimate
Traincrew	<ol style="list-style-type: none"> 1. 2. 3. 	
Energy	<ol style="list-style-type: none"> 1. 2. 3. 	
Rolling stock	<ol style="list-style-type: none"> 1. 2. 3. 	
Station	<ol style="list-style-type: none"> 1. 2. 3. 	
Railroad	<ol style="list-style-type: none"> 1. 2. 3. 	
General and admin.	<ol style="list-style-type: none"> 1. 2. 3. 	
Contingency overlay	41% optimism bias is applied to all costs prior to their inclusion in the cost benefit analysis. This is in accordance with UK Treasury guidance	
TOTAL		

Reviewers quality check questions

The reviewers quality check questions were undertaken in spreadsheet format, using estimates of parameters for which information was not available from the checklist (for example, the number of traincrew staff per train). A comparison of the cost forecasts published in the New Lines study with those prepared using the reviewers quality check questions is presented in the following tables.

Ignoring the issues regarding insufficient information being provided for New Lines, the analysis indicated a series of key differences in the forecasts of cost drivers and operating costs presented or implied by the New Lines study and the quality check questions.

Forecasts of the following items are higher in the New Lines submission than the reviewers quality check estimates:

- Train hours;
- Energy costs;
- Station costs; and
- Railroad maintenance costs.

Forecasts of the following items are lower in the New Lines submission than the reviewers quality check estimates:

- Train maintenance costs; and
- General and admin. costs.

It is considered that if all supporting analysis undertaken as part of the New Lines study had been available to complete the checklist, the extent of the difference in New Lines and reviewers cost forecasts would not be as high.

It was previously noted in Section 3 of this toolkit report that the process of working through the quality check questions might highlight issues which required immediate clarification. Such an example was found in applying the quality check questions to the New Lines case study - where there was a significant difference in the total annual train miles estimated in the reviewers checks compared to that forecast in the New Lines reports. Since train miles is a “driver” of a significant proportion of costs, it was appropriate to prioritize understanding the reason for the differential as a matter of urgency. It was found to be due to a lower number of operating hours per day being assumed by the New Lines forecasts, compared to the number of hours assumed by the reviewer (an assumption which was based on typical railway hours of operation in the UK - in the absence of it being stated in the checklist).

In summary, the example of the application of the reviewers quality check questions confirms the importance of the HSIPR operator populating the checklists in full. It also shows that the reviewer can quickly identify differences in operating costs which can then be the subject of clarification questions to the HSIPR operator.

Train service specification

Total Route Miles		
	Number	Comment
Forecast in submission	480 miles	
Reviewers quality check estimate	492 miles	
Clarification questions	None	
Clarification response		
Updated reviewers QC estimate (given clarification response)		
Outstanding issues	None	
Total Track Miles		
	Number	Comment
Forecast in submission	n/s	
Reviewers quality check estimate	1055 miles	
Clarification questions	None	
Clarification response	-	
Updated reviewers QC estimate (given clarification response)	N/A	
Outstanding issues		
Total Train Miles		
	Number	Comment
Forecast in submission	41.33 million	
Reviewers QC estimate	54.8 million	Estimated from the service frequency, miles for each service group, hours of operation p/d and 360 days p/a.
Clarification questions	What is the reason for the discrepancy? What were their assumed hours of operation, peak and weekend service frequency?	
Clarification response	It was assumed that the service would operate for only 14 hours per day, which was assumed to be the commercially viable period of operation. The peak and weekend service is assumed to be the same as the standard hour	
Updated reviewers QC estimate (given clarification response)	42.60 million	
Outstanding issues	None	
Total Train Hours		
	Number	Comment
Forecast in submission	360,000 hours	
Reviewers quality check estimate	345,600 hours	
Clarification questions	None	
Clarification response	-	
Updated reviewers QC estimate (given clarification response)	268,800	34% lower than forecast in submission
Outstanding issues	What is the reason for the difference in train hours?	

Traincrew Costs

Total Number of Train Drivers		
	Number	Comment
Forecast in submission	N/S	
Reviewers QQC estimate	283	
Clarification questions	Request information on the number of train drivers and the method of calculation.	
Clarification response		
Outstanding issues		
Total Number of Other Traincrew Staff		
	Number	Comment
Forecast in submission	N/S	
Reviewers QQC estimate	336 traincrew staff 28 trainee drivers	Assumes average of 1½ traincrew staff per train, given mix of 5,10 and 15 car trains. Assume 10% trainee: trained driver ratio.
Clarification questions	Request information on how tickets will be retailed and trains dispatched for the whole HSR operation. Also request information on whether on-board refreshments will be served.	
Clarification response		
Outstanding issues		
Total Driver Costs		
	Number	Comment
Forecast in submission	£24.5m p/a	A driver cost of £68 per train hour is forecast: implying a total cost of £24.5m p/a (assuming 360,000 train hours)
Reviewers QQC estimate	£15.5m p/a	Assuming the same annual salary per driver as the submission, and the independent train hours calculation (14 hours operation p/d) this equates to £15.5m p/a.
Clarification questions	What is the reason for the disparity?	
Clarification response	Turnaround time is included in train hours. It was assumed that drivers would be productive 20 hours p/w (50%)	
Updated reviewers QC estimate (given clarification response)	No updated estimate undertaken - it is considered that the submission forecasts over-estimate driver costs	
Outstanding issues	Challenge the assumptions underpinning the driver costs which are nearly 60% higher than the reviewers QC estimate.	
Total Other Traincrew Staff Costs		
	Number	Comment
Forecast in submission	£16.5m p/a	£46 per train hour (Proposal quotes a cost of £114 per train hour including drivers, one guard and one trainee driver per 10 drivers) - equates to £16½m p/a.
Reviewers QQC estimate	£12.0m p/a	
Clarification questions	What is the reason for the disparity?	
Clarification response	N/A	

Updated reviewers QC estimate (given clarification response)	N/A
Outstanding issues	Request forecast of other traincrew staff costs p/a (consistent with estimate of staff numbers)

Energy Costs

Total Energy Costs

	Number	Comment
Forecast in submission	£231m p/a	Based on £5.60 per train mile and 41.3m train miles
Reviewers QQC estimate	£168m p/a	Assumes 12MW power output per train (New Lines state power is similar to AGV which is 6 - 12 MW power), power drawn 65% of the time and 235 miles travelled in 1.5 hours (average of service spec) = 50 kw per train mile
Clarification questions	What is the source of the £5.60 per train mile?	
Clarification response		
Updated reviewers QC estimate (given clarification response)		
Outstanding issues		

Rolling Stock Costs

Total Number of Trains

	Number	Comment
Forecast in submission	73	Proposal did not state whether this included maintenance spares
Reviewers QQC estimate	72	
Clarification questions	Does the number of trains include maintenance spares?	
Clarification response	Confirmed that the 73 sets includes spares.	
Outstanding issues	None	

Total Rolling Stock Maintenance Costs

	Number	Comment
Forecast in submission	(£63m)	The written proposal did not mention train maintenance costs however the cost model included train maintenance costs which equated to a cost per train mile of £1.50.
Reviewers QQC estimate	£96m pa	Implies a cost per train mile of £2.40.
Clarification questions	Why is there no mention of rolling stock maintenance costs in the written New Lines submission, whilst it is included in the model?	
Clarification response	Unit cost rates for maintenance costs were not stated in the written submission for reasons of commercial confidentiality.	
Updated reviewers QC estimate (given clarification response)		
Outstanding issues		

Total Rolling Stock Cleaning Costs

	Number	Comment

Forecast in submission	(£3m)	The written submission does not mention rolling stock cleaning costs however the cost model included £3m for turnaround and traincrew cleaners.
Reviewers QQC estimate	£6m	
Clarification questions		
Clarification response		
Updated reviewers QC estimate (given clarification response)		
Outstanding issues		

Station Costs

Total Station Staff Costs

	Number	Comment
Forecast in submission	(£20m)	The written submission stated that staff costs assumed £3.6m p/a for a 4 platform station. No information on numbers of stations or staff roles and responsibilities or numbers was provided. However the cost model appears to include £20m p/a for station staff costs (excl train cleaners).
Reviewers QQC estimate	£4.9m	
Clarification questions	Which stations will be staffed by HSR staff? What are the assumed roles and responsibilities of station staff? How was the estimate of £3.6m and £20m calculated? (£3.6m for a station implies c110 station staff at a single station (c 30 per shift) which seems high for a generic 4 platform station).	
Clarification response		
Updated reviewers QC estimate (given clarification response)		
Outstanding issues		

Railroad Costs

Total Railroad Operations Staff Costs

	Number	Comment
Forecast in submission	None	
Reviewers QQC estimate	£4.4m p/a	Assumes 2 S&C centers
Clarification questions	Why were the costs of operating the railroad not included in the submission?	
Clarification response		
Outstanding issues		

Total Railroad Maintenance Costs

	Number	Comment
Forecast in submission	£124m p/a	Assumes a cost of £80,000 per route km
Reviewers QQC estimate	£108m	
Clarification questions	What is the source of the £80k per route km?	
Clarification response		

Outstanding issues	
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General and Admin. Costs

Total Headquarters Staff Costs

	Number	Comment
Forecast in submission	£2m p/a	Prepared using a list of all HQ staff and their salaries.
Reviewers QQC estimate	£3.5m p/a	High level estimate.
Clarification questions	None, at this stage of project development.	
Clarification response		
Outstanding issues		

Other General and Admin Costs

	Number	Comment
Forecast in submission	N/S	
Reviewers QQC estimate	£25m p/a	
Clarification questions	Why were no costs for other general and admin costs included in the submission?	
Clarification response		
Outstanding issues		

Total Operating Costs

Total Annual Operating Costs

	New Lines	Reviewers Check
Traincrew costs	£40m	£27m
Energy costs	£230m	£168m
Rolling stock maintenance and cleaning costs	£67m	£102m
Station staff costs	£21m	£5m
Station maintenance costs	£4m	N/S
Railroad costs	£124m	£113m
General and Admin costs	£2m	£29m
Total operating costs	£488m	£444m

