



2019 periodic review of HS1 Ltd (PR19)

**Final determination – decision
document**

07 January 2020

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1. Executive summary

- 1.1. The 2019 periodic review (PR19) is the process through which HS1 Ltd concludes its Five Year Asset Management Statement (5YAMS) for the next control period (CP3), which runs from 1 April 2020 until 31 March 2025. The [Concession Agreement](#) requires HS1 Ltd to operate, maintain and renew the route.
- 1.2. As well as establishing outputs and costs, the 5YAMS determines HS1 Ltd's regulatory framework, its charging structure and the level of regulated access charges that its customers must pay.
- 1.3. Our role in the process is to scrutinise the 5YAMS and provide independent challenge. We have examined HS1 Ltd's proposals to determine whether they are consistent with the obligations set out in the Hs1 Ltd's Concession Agreement.
- 1.4. In our draft determination we explained the analysis we had undertaken in carrying out our role. We also explained that the assets are ageing and that volumes of renewals and maintenance activities are increasing in response. Since then we have reviewed the consultation responses and the further evidence provided by HS1 Ltd in its revised final 5YAMS – submitted to us on 29 November 2019. This culminated in a small number of issues that we were minded to determine, on which we undertook a further short consultation, as required by the track access contracts. We would like to thank HS1 Ltd for being open and constructive throughout the process and would also like to thank other stakeholders for engaging constructively within the time constraints imposed by the Concession Agreement and track access contracts.
- 1.5. A key aspect of this review has been how to catch-up historic underfunding for long-term renewals. High Speed 1 is a valuable public asset and we have sought to ensure the assets can be kept in good condition in the long-term at lowest possible cost. This is important to make sure that operators and, in turn, passengers and freight users get a good deal now but not at the expense of future generations.
- 1.6. Through our review we have scrutinised HS1 Ltd's plans and we have sought to ensure that the costs borne by operators are efficient. In doing this we have:
 - (a) required a frontier shift for efficiencies as a result of expected new technologies;
 - (b) tested HS1 Ltd's assumptions on risk and contingency;
 - (c) reviewed benchmarks and sought justification from HS1 Ltd where it has not aligned itself with relevant comparator organisations; and

- (d) required HS1 to deliver improvements to its internal capabilities without exceeding the funding envelope set out in its May 5YAMS.

1.7. We have now accepted the majority of HS1 Ltd's proposals, which include a significant increase in expenditure on the network and high levels of overall train performance. However, there are a few specific elements that we have not accepted:

- (a) the level of project management costs for renewals in CP3, which should be set at 10% of total renewals costs (rather than 13.5% proposed by HS1 Ltd) to be in line with comparable benchmarks;
- (b) the approach to asset life planning for CP4-10, where we consider HS1 Ltd's existing methodology may not result in the optimum long term renewals plan and therefore we have applied a 10% reduction in volumes for CP4-10;
- (c) a net addition in operating and maintenance costs presented by HS1 Ltd in November 2019 where we have not seen sufficient justification for the levels proposed and have removed them;
- (d) the risk and contingency assumption for CP4-10 which should be set at 13%;
- (e) the split between how much of the escrow fund for renewals is held in the current account compared to other accounts for CP3-10; and
- (f) the assumption of interest rates for CP4-10 which we think should be 2.5% for funds invested.

1.8. This means we have not been able to approve the revised final 5YAMS (submitted on 29 November 2019) and therefore we are determining the operations maintenance and renewals charge (OMRC) and other elements of the 5YAMS. HS1 Ltd must revise its 5YAMS by 4 February 2020 to reflect these conclusions.

1.9. In this document, we have determined that total operating and maintenance costs should be **£363.5m** over the control period (marginally higher than HS1 Ltd originally proposed in May 2019) and the annual renewals charge should be **£25.9m** (£12.3m lower than HS1 Ltd originally proposed in May 2019). This means that although the charges operators will pay in CP3 are higher than in the current control period, they will be significantly lower than those HS1 Ltd proposed in its May 5YAMS.

1.10. This results in the following charges for operators on the HS1 network:

CP3 OMRCs (February 2018 prices)	International passenger services	Domestic passenger services
£ Per train-km		
OMRCA1	£3.94	£1.58
£ per train-minute		
OMRCA2	£11.87	£2.42
OMRCB	£28.05	£30.51
OMRCC	£10.03	£10.03

CP3 OMRCs (February 2018 prices)	Freight services
£ Per train-km	
OMRCA1	£ 4.69
OMRCA2	£ 3.79

2. Introduction and background

2.1. We initiated our second periodic review of HS1 Ltd on 31 January 2018 with the publication of our [Approach to PR19](#). The scope of the review is principally determined by the Concession Agreement between HS1 Ltd and the Secretary of State for Transport and The Railways (Access, Management and Licensing of Railway Undertakings) Regulations 2016 (the Regulations). This is explained more fully in our approach document along with the context of the route, our role in regulating HS1 Ltd and the purpose of a periodic review – particularly in relation to HS1 Ltd’s General Duty and the timeline.

HS1 Ltd’s General Duty

2.2. HS1 Ltd’s General Duty requires the company “*to secure in respect of the HS1 Railway Infrastructure: its operation and maintenance; its renewal and replacement; and the planning and carrying out of any Specified Upgrades and other upgrades, in each case:*

- (a) *in accordance with Best Practice;*
- (b) *in a timely, efficient and economical manner; and*
- (c) *save in the case of the EdF Assets¹, as if HS1 Ltd were responsible for the stewardship of the HS1 Ltd Railway Infrastructure for the period of 40 years following the date that any such activities are planned or carried out, subject to:*
 - (i) *the Safety Authorisation for HS1; and*
 - (ii) *the Capability Requirements.”*

2.3. It is against this duty that we have scrutinised HS1 Ltd’s plans for CP3, as set out in its revised final 5YAMS submitted on 29 November 2019.

2.4. The approach document explains what is excluded from the scope of this review², in particular, station funding and the investment recovery charge (levied by HS1 Ltd with the purpose of recovering the long-term construction costs of the network) – which are reserved to the Secretary of State. It also explains the role of Network Rail (High Speed) Limited (NR(HS)), which operates and maintains the route on behalf of HS1 Ltd under an Operator Agreement.

¹ EdF Assets is defined in paragraph 1.1 of Schedule 10 to the Concession Agreement

² The purpose, process and scope of the periodic review is set out in Section 2 of Schedule 10 to the Concession Agreement.

Timeline

- 2.5. The timeline for this periodic review process can be broadly summarised in three stages:
- (a) a consultation and development stage, which ran from September 2017 through to February 2019, culminating in the production of a draft 5YAMS by HS1 Ltd;
 - (b) a consideration stage from February 2019 until January 2020, which includes the submission of the 5YAMS by HS1 Ltd to us and culminates in our final determination; and
 - (c) an implementation stage from February 2020 until March 2020, where HS1 Ltd submits a revised 5YAMS and ORR issues implementation notices to make the necessary contractual changes.
- 2.6. Key documents relating to the consultation and development stage can be found on HS1 Ltd's [website](#). HS1 Ltd published its draft 5YAMS on 28 February 2019 and submitted its final 5YAMS to us on 31 May 2019 (its "May 5YAMS").
- 2.7. Shortly before the draft 5YAMS was published in February 2019, Eurostar International Limited (EIL) wrote to us to express its difficulty in engaging with the periodic review process while working to mitigate the expected impacts of the United Kingdom leaving the European Union, at that time due to occur on 31 March 2019.
- 2.8. Having consulted stakeholders, we [decided](#) to add an additional step to the published timeline in order to allow EIL to respond on HS1's Ltd's draft 5YAMS at a later date³. EIL's response was received by both HS1 Ltd and ORR on 17 May 2019. HS1 Ltd then submitted an updated final 5YAMS to us on 12 July 2019, responding to the views of EIL.
- 2.9. In June 2019, we consulted on the governance arrangements for the escrow account used to hold funds for renewals. This brought into question some of the incentives for the efficient and effective management of the HS1 asset. The responses to the consultation, the views expressed to us by operators, and our own observations, plus the capability improvements we require of HS1 Ltd in CP3 through this determination have influenced our approach to monitoring and reporting which we outline in Chapter 8. We intend to consult on this, and a review of our enforcement policy for HS1 Ltd, in early 2020.
- 2.10. We published our draft determination on HS1 Ltd's plans on 30 September 2019. In response, we received [representations](#) from eight organisations including HS1 Ltd.

³ This decision was challenged by EIL by way of judicial review, which was unsuccessful.

Alongside our draft determination, we consulted on changes to the relevant provisions within HS1 Ltd's contractual documentation that would be necessary to implement the conclusions of PR19: the Passenger Access Terms, Freight Access Terms, and framework agreements for EIL and London and Southeastern Railway Limited (known as Southeastern).

- 2.11. We received HS1 Ltd's revised final 5YAMS on 29 November 2019 (its "November 5YAMS").
- 2.12. On 11 December 2019, we published a short [consultation](#) in accordance with the requirement in the track access contracts, on matters that we were minded to determine in relation to the operating, maintenance and renewals charges, and other elements of HS1 Ltd's November 5YAMS. We targeted all the organisations that responded to the draft determination and received responses from HS1 Ltd, EIL, Southeastern, DB Cargo (UK), DfT and the London Sleeper Company, on or before 20 December 2019.

PR19 final determination

- 2.13. This final determination follows the draft determination and marks completion of the consideration stage. In accordance with Schedule 10 to the Concession Agreement, it sets out whether we consider that the final 5YAMS submitted by HS1 Ltd is consistent with its General Duty, and contains an explanation of the grounds on which we have made our decision.
- 2.14. In reaching our final determination, we have taken into account the representations received in response to the consultations we have carried out, the revisions set out in the November 5YAMS, as well as any new information submitted as part of the periodic review process. We have also balanced our statutory duties, set out in section 4 of the Railways Act 1993.
- 2.15. As we have found that HS1 Ltd's 5YAMS is not fully consistent with its General Duty, in this document we determine the amounts to be applied by HS1 Ltd for the purpose of calculating the elements of track access charges to be levied in respect of operations, maintenance and renewals charges (the OMRCs). HS1 Ltd is required by the Regulations to calculate the fees to be charged for use of the HS1 infrastructure. In view of this, the tables set out in Chapter 7 of this document contain the charges to be levied on operators for CP3. These charges have been calculated by HS1 Ltd on the basis of the amounts that we have determined. Unless otherwise stated, for comparability all numbers in this document are in the February 2018 price base, provided by HS1 Ltd in its 5YAMS, and some numbers may not sum due to rounding.
- 2.16. Responses to our consultations can be found on our [website](#).

3. Health and safety

Introduction

- 3.1. Many of the functions which HS1 Ltd has as infrastructure manager are contracted out to NR(HS) through an Operator Agreement. This means that both parties have health and safety obligations, but NR(HS) is the Infrastructure Manager for the purposes of the Railways and Other Guided Transport Systems (Safety) Regulations 2006 (as amended) (ROGS).
- 3.2. Health and safety considerations are central to all of HS1 Ltd's and NR(HS)'s plans. They should enable sufficient work to be done (within a suitable Safety Management System) to maintain safety performance and risk control, make the most of all reasonably practicable opportunities for improvement, and continue to enable the two organisations to discharge their legal duties. HS1 Ltd described the framework and arrangements which have been put in place for the next control period.
- 3.3. We sought evidence that HS1 Ltd understood the importance of its role as an intelligent client, ensuring the continued safe operation of the HS1 network. We found it does this by:
 - a) assuring itself that the maintenance and renewals work NR(HS) undertakes is carried out safely;
 - b) assuring itself that maintenance and renewals activities contribute to the safety of the railway by controlling precursors to risk; and
 - c) ensuring that reasonably practicable precautions are built into approaches and new ways of working. This is ever more significant as the railway ages and requires more renewals work as a result. Key to this is how HS1 Ltd and NR(HS) will adapt or develop their approaches to maintenance and renewals during CP3.
- 3.4. Our scrutiny led to conclusions set out in the draft determination, where we highlighted areas of challenge and clarification.

HS1 Ltd's response to the draft determination

- 3.5. We are satisfied with HS1 Ltd's responses to our draft determination, detailed in Table 3.1.

Table 3.1 HS1 response to ORR draft determination on health and safety

Brief description	Action by date (if applicable)	HS1 Ltd response	ORR conclusion
NR(HS) strategy is aspirational but not measurable.	As plans are finalised for the NR(HS) strategy	HS1 Ltd agreed. It will ask NR(HS) to include measurables within the Safety, Environment Assurance Report (SEAR)	Accepted HS1 Ltd will clarify the start date as part of our usual monitoring.
Forward looking measures	Combined HS1 Ltd-tier 1 contractors' RM3 tracked over CP3	HS1 Ltd stated it had commenced implementation of RM3 across "key" tier 1 suppliers. Results of suppliers' RM3 self-assessment will be consolidated in HS1 Ltd RM3 self-assessment. HS1 Ltd was working with NR(HS) and RSSB to develop HS1-specific precursor indicator model – they will model train accident risk through precursors in asset condition and human behaviours.	Accepted. We will require updates on this activity through our usual monitoring of HS1 Ltd.
Gross disproportion test	Ongoing	HS1 will continue to work with NR(HS) to encourage industry best practice, such as gross disproportion test. HS1 should not carry out analysis by itself; the duty holder (NR(HS)) should lead analysis.	Accepted HS1 Ltd should use the test to challenge NR(HS) and check that reasonably practicable improvements are made. We will follow up during monitoring.
More fully embrace RM3	Assessments will be collated and presented to key stakeholders – early 2020. Progress will be tracked during CP3	HS1 stated that it had fully embraced RM3. Discussed by HS1 Board Safety Sub Committee in early 2019 and the Board endorsed RM3 approach being applied to all "key" tier 1 suppliers. Mitie and	Accepted. It is important that HS1 Ltd leads these conversations with its suppliers and takes the opportunity at senior levels to press for

Brief description	Action by date (if applicable)	HS1 Ltd response	ORR conclusion
		UKPNS had submitted; NR(HS) would by end of October; HS1 by end of 2019. Common improvement projects would be initiated.	improvements. We will require updates on this activity through our usual monitoring of HS1 Ltd.
Greater distinction needs to be made between activity required for legal compliance and that delivering above legal compliance.		HS1 Ltd agreed that it would ask NR(HS) to provide commentary on activities that meet basic compliance and those that go beyond.	Accepted. We will require updates on this activity through our usual monitoring of HS1 Ltd.
Actions and milestones for safety by design.		HS1 Ltd used the Construction Design & Management (CDM) Regulations 2015. Resources and milestones built into Project Gateway process. Did not anticipate interventions in CP3 that needed novel design or construction. Key point was that CP3 renewals would not introduce new safety risks.	Accepted We will follow up on this activity through our usual monitoring of HS1 Ltd.
Avoiding and eliminating risk		HS1 Ltd would ensure projects evolve through the gateway process with evidence showing how RAIB reports and other learning is incorporated into proposal. Learning would also inform future projects, approaches to monitoring and potential revisions to processes.	Accepted. We will require updates on this activity through our usual monitoring of HS1 Ltd.

Brief description	Action by date (if applicable)	HS1 Ltd response	ORR conclusion
		Projects would follow CDM regulations	

- 3.6. As intelligent client, HS1 Ltd has a crucial role to play in setting the direction for, and continuing to ensure, the safe operation of the HS1 network as the asset ages. While we recognise that the primary duty to implement best practice is with NR(HS) as the Infrastructure Manager under ROGS, HS1 Ltd has a no less important role in ensuring that:
- (a) safety is built into projects and renewals from an early stage;
 - (b) adequate resources are provided; and
 - (c) milestones are incorporated into the Project Gateway process.
- 3.7. This is not restricted to major projects or novel technology and risks, but equally to renewals and to the proposed new ways of working to deliver them.
- 3.8. HS1 Ltd should challenge NR(HS) decisions and check that appropriate, proportionate and reasonably practicable improvements are made, with proper emphasis on the hierarchy of controls. We will continue to monitor how HS1 Ltd is achieving this, and inspect NR(HS) operations against its safety management system.

Conclusions

- 3.9. From what we have seen through our regular inspections to date, and from our review of the documentation produced for CP3, we consider that HS1 Ltd and NR(HS) have demonstrated a positive commitment to achieving zero harm through the effective management of health and safety and striving for continuous improvement.
- 3.10. We have considered stakeholders' views, including those of HS1 Ltd and NR(HS), in response to our draft determination analysis and its rationale.
- 3.11. Overall, we have found a clear recognition from both HS1 Ltd and NR(HS) of their respective duties under the Concession Agreement to meet all relevant safety requirements as well as their duties under health and safety legislation. In addition, both parties have committed to a Joint Vision 2020 initiative to ensure that safety remains integral to their partnership.

- 3.12. We have found a commitment from HS1 Ltd to continuous improvement and plans to measure safety performance through leading and lagging indicators, including full implementation of the industry-wide modelling technique – Railway Management Maturity Model (RM3) – across its Tier 1 contractors, as well as precursor monitoring.
- 3.13. From our analysis we have concluded that the submitted plans are sufficient to maintain legal compliance and are therefore consistent with HS1 Ltd's General Duty with regard to its safety obligations.

4. Asset management

Introduction

- 4.1. A significant part of our review concentrated on the asset management elements of HS1 Ltd's plans, as maintaining and renewing the asset base drives the majority of the company's costs. In assessing whether HS1 Ltd's plans are consistent with its General Duty we have considered whether the plans reflect the activity of a best practice asset manager, taking into account the age and size of the network – particularly as this is a relatively new network, the data available on asset degradation is less mature than for other comparable infrastructure networks.
- 4.2. Our team of in-house specialist engineers, with support from our railway safety team, examined the plans through a combination of desktop reviews, challenge meetings and site visits.
- 4.3. We examined all the components that make up asset management in the 5YAMS, including: management capability; approach to stewardship; application of standards; whole life costing; approach to risk; and importantly operating, maintenance and renewal costings. An aspect we previously raised in our approach document was that we would look specifically at how HS1 Ltd was dealing with an asset that was ageing.
- 4.4. In doing this, we focussed on both the planned works for CP3, and the forecast of works for control periods 4-10 (CP4-10, comprising 1 April 2025 – 31 March 2060). The assumption of HS1 Ltd's expenditure in CP3 forms part of the 40-year calculation of the renewals annuity, and it also forms the baseline for our monitoring and reporting of HS1 Ltd's performance in CP3.
- 4.5. Our approach was detailed in the supplementary document to our draft determination setting out our asset management findings. In summary, while the majority of the asset management content submitted in the May 5YAMS was in line with best practice there were a number of areas that required further evidence before ORR could conclude whether they were in line with best practice. There were also the following seven aspects that we did not consider to be in line with best practice and therefore in our view were not consistent with the General Duty:
 - (a) an error in the pricing of an inverter fan;
 - (b) delivery uncertainty of some proposed CP3 renewals;
 - (c) the current estimating strategy did not fully incentivise risk mitigation;
 - (d) project management costs were higher than benchmarks;

- (e) high level of risk allocation compared to benchmarks;
- (f) lack of sensitivity analysis around critical design lives for track assets; and
- (g) lack of clarity around research and development.

4.6. This chapter explains our final conclusions drawing on previous analysis but updated to take into account stakeholder consultation responses and any further evidence provided by HS1 Ltd.

HS1 Ltd's response to the draft determination

4.7. In our draft determination, we identified deficiencies in HS1 Ltd's May 5YAMS, which we expected HS1 Ltd to address in its November 5YAMS, in order for us to be able to conclude that it was in line with best practice. HS1 Ltd's response is summarised in Table 1 of Annex B, along with our conclusion on each issue.

4.8. For the areas where we required further evidence, in the form of a series of recommendations, HS1 Ltd responded in its November 5YAMS which is summarised in Table 2 of Annex B, along with our detailed conclusion on each.

4.9. We are broadly satisfied with HS1 Ltd's response but there remain three areas where we are not. These are:

- (a) project management costs for CP3;
- (b) sensitivity analysis around critical asset lives; and
- (c) total operating and maintenance costs – where HS1 Ltd's presented changes to its internal costs since the May 5YAMS, in the November 5YAMS submission.

4.10. As a result we have determined that these elements are not best practice and are therefore inconsistent with HS1 Ltd's General Duty.

Elements of the 5YAMS inconsistent with the General Duty

4.11. This section explains those three elements of the 5YAMS' asset management content that we have reasonably determined are not consistent with HS1 Ltd's General Duty. Our minded to decisions on these matters formed part of our December 2019 consultation.

Project management office (PMO) costs for CP3

4.12. In response to our consultation on the draft determination we did not receive any specific comments from wider stakeholders on our proposed reduction of project management costs in CP3 from 15% to 10%, other than a general challenge around the need for greater efficiency and support of our analysis.

4.13. HS1 Ltd responded positively to our challenge, undertaking a further review of NR(HS)'s proposals for project functions and headcount. There were two roles that it removed and it also reduced NR(HS)'s rates, to be more in line with current market rates. This culminated in a reduction of £1.8m.

Table 4.1 Comparison of project management costs

£m	May 5YAMS	November 5YAMS
Proposed renewals (pre-efficient)	61.8	56.8
Proposed PMO costs	9.4	7.6
PMO costs as proportion of renewals costs	15.2%	13.5%

4.14. In support, HS1 Ltd provided a detailed bottom-up breakdown setting out how NR(HS) had calculated the number of project managers required by categorising CP3 renewals projects as simple or complex and resourcing them on that basis. In addition, NR(HS) provided a case for the other roles within the PMO. HS1 Ltd then estimated costs for 19 PMO staff (full-time equivalent).

4.15. In CP3 HS1 Ltd is assuming it will undertake 48 renewals jobs. Having a staffing of 19 staff gives a ratio of 2.5 projects per FTE with an average total delivery value of £2.95m per renewal⁴, per person over the five years of CP3.

4.16. HS1 Ltd has demonstrated a bottom-up resource calculation. However, we consider that peak demand for project management resource can be further reduced by adopting a programme or portfolio management approach (that is, grouping together individual smaller projects rather than treating each renewal as an isolated activity), and by re-phasing project delivery.

4.17. In the draft determination we set out a percentage range of total renewals value (8-12%), based on benchmarks, that we would expect efficient PMO costs to fall within.

⁴ When calculated against the renewals pre-efficient base cost.

And concluded that our benchmarking indicated that project management costs should be around 10% of renewals value.

- 4.18. HS1 Ltd's revised proposal still fell outside of these benchmarks and we considered that 13.5% (or a fixed cost of £7.6m) had still not been justified for a relatively standard programme of renewals, in terms of complexity and volume.
- 4.19. As a result, we were minded to determine that project management costs for CP3 should be set at 10% of the CP3 renewals portfolio which would equate to around £5.5m rather than HS1 Ltd's proposed £7.6m.
- 4.20. As a matter we were minded to determine, we consulted further on this in December 2019. Stakeholders felt it was right to require a reduction in PMO costs. HS1 Ltd did not agree with our top-down assessment and considered that we had not given sufficient weight to the additional information it had provided. In addition, the company suggested that we should have provided a repackaged plan of the CP3 renewals and accompanying resource plan. HS1 Ltd expressed a concern that setting costs at 10% of total renewals costs would impact the deliverability of the programme.
- 4.21. As part of the periodic review process it is not our role to construct a programme of renewals but rather assess whether HS1 Ltd's planning process is in accordance with best practice. In general we use a combination of top-down benchmarks and bottom-up analysis to reach our conclusions. On this matter we do not consider that HS1 Ltd has provided compelling evidence that the scale or complexity of planned renewals in CP3 is such that justifies costs in excess of the top-down benchmarks. While delivering the PMO function at 10% may be challenging for HS1 Ltd, nevertheless it is a target that we have concluded is realistic.
- 4.22. On that basis, we have determined that the PMO costs for CP3 should be forecast at 10% of the total renewals costs.

Sensitivity analysis around critical asset lives

- 4.23. In response to our draft determination, Southeastern agreed with our finding that HS1 Ltd's assumptions around asset life were overly conservative, maintenance was not as effective as it should be, and risk allowances were too high. DfT welcomed the clear evidence of our challenge in relation to HS1 Ltd's asset management plans.
- 4.24. In the draft determination and at subsequent meetings with HS1 Ltd and NR(HS), we highlighted an alternative approach to asset life planning, which would result in a reduction in the renewals volumes proposed in the May 5YAMS of around 10% over the long-term (40+ years). As a result, we concluded that HS1 Ltd's 40-year renewal

plans could be overly conservative and that best practice would be to consider a broader range of realistic scenarios, to reach a more balanced view on the optimum long-term plan.

4.25. In its response to the draft determination and its associated November 5YAMS, HS1 Ltd provided additional clarification on how it had challenged itself to develop an optimum 40-year renewal plans. These are detailed in table 4.2 below.

Table 4.2 HS1 Ltd responses on its approach to asset life planning

ORR's concern	HS1 Ltd's response
ORR's simple sensitivity analysis indicated that small changes in track asset life have a major impact on the total 40-year renewals cost, which should be explored in more detail.	HS1 Ltd clarified the sensitivity analyses it had performed using its asset decision support tool (ADST). This included scenarios with longer asset lives but ruled these out based on safety and performance impacts.
Asset lives in the Specific Asset Strategies (SASs)⁵ appeared to be minimum life based on engineering judgement, rather than plausible maximum life based on evidence.	HS1 Ltd clarified how it had challenged and assured itself that NR(HS)'s SASs were reasonable. This included examples of data behind lower track asset lives at some locations.
Renewals volumes appeared to assume that all assets would be replaced once they reached their design life, rather than based on condition data.	HS1 Ltd's clarifications included evidence of condition-based renewals for track assets. It also included a review by a consultant (Arup) which found that NR(HS) had good knowledge of the assets but noted a possible disconnect between the ADST scenarios and the 40-year renewal plans.

4.26. While we now understand more fully how HS1 Ltd reached its conclusions, we were seeking evidence of how it had taken into account a range of different calculations of asset deterioration and remaining asset life to reach an optimum plan. This is because we considered that many of NR(HS)'s design life assumptions are based on subjective judgement and the values selected are overly conservative. Given the financial impact on operators, it is important that HS1 Ltd fully justifies that it has constructed the optimum long-term plan, specifically why it has discounted assuming longer asset life.

4.27. As noted in both the draft determination and in HS1 Ltd's response, there is naturally a significant amount of uncertainty in a 40-year look ahead and no organisation could

⁵ SASs set out the strategy for managing asset on HS1 – one per asset type

be reasonably expected to predict with 100% accuracy what will occur. However, we consider that a best practice infrastructure manager would plan future renewals based on adopting an optimisation approach, balancing maintenance and renewals activity against performance risks to deliver the lowest whole-life costs. In order to do this, a greater understanding of asset degradation and the factors that influence it is needed. We consider that HS1 Ltd needs to do more in this area and we have previously highlighted those areas that we feel that it should focus on.

- 4.28. The precise volumes for each control period will be revisited in future reviews (for example, CP4 will be reviewed in 2024). As we get closer to each review, planning will be more advanced. That combined with research and development activity should provide greater certainty of renewals requirements for those decisions. However, at this point in time, HS1 Ltd's approach to long-term renewals volumes has not resulted in the optimum long-term plan because it has not identified and accepted flaws in its own modelling or satisfactorily dealt with uncertainty over 40 years.
- 4.29. Adopting an overly conservative long-term view means that volumes (and costs) are unnecessarily inflated and this undermines incentives on HS1 Ltd to drive cost efficiency and innovation. Therefore, having reviewed the responses to the draft determination we concluded that there should be a reduction in renewals direct costs for CP4-10 as a way of representing an indicative reduction in renewals volumes by around 10% over that same period.
- 4.30. As a matter we were minded to determine, we consulted on this issue in December 2019. DfT, EIL and Southeastern agreed with our view that HS1 Ltd's assumptions on asset life were overly conservative and supported our reduction in renewal volumes. HS1 Ltd did not agree with our proposed approach, arguing that we had only provided limited evidence that supported a reduction and that our approach is likely to underfund the long-term renewals based on the best evidence available today.
- 4.31. On balance we have determined that there should a reduction in renewals direct costs to represent an indicative reduction in renewals volumes by 10% over CP4-10.

Operating and maintenance costs

- 4.32. In our draft determination we explained our assessment of the following total operating and maintenance costs.

Table 4.3 CP3 operating and maintenance cost summary (May 5YAMS)

	20/21 £m	21/22 £m	22/23 £m	23/24 £m	24/25 £m	Total £m
NR(HS) operations and maintenance costs	41.9	41.8	41.0	40.8	40.0	205.5
HS1 Ltd Costs						
Subcontracted	3.7	3.7	3.8	3.8	3.8	18.7
Internal	7.9	8.2	8.6	8.5	8.0	41.2
Pass through	19.1	19.1	19.1	19.1	19.1	95.4
Freight costs	0.4	0.3	0.4	0.4	0.4	1.8
Total operating and maintenance costs	73.0	73.1	72.8	72.5	71.2	362.6
Numbers may not add up due to rounding						

4.33. In its November 5YAMS HS1 Ltd set out the following revisions:

Table 4.4 CP3 operating and maintenance cost summary (Nov 5YAMS)

	20/21 £m	21/22 £m	22/23 £m	23/24 £m	24/25 £m	Total £m
NR(HS) operations and maintenance costs	42.0	41.8	41.0	40.8	40.1	205.7
HS1 Ltd Costs						
Subcontracted	3.7	3.7	3.8	4.0	4.0	19.2
Internal	8.3	8.4	8.9	8.9	8.3	42.7
R&D	0.4	0.4	0.4	0.4	0.4	2.0
Pass through	18.9	18.9	18.9	18.9	18.9	94.3
Freight costs	0.3	0.3	0.3	0.3	0.3	1.5
Total operating and maintenance costs	73.6	73.5	73.2	73.2	71.9	365.5
Numbers may not add up due to rounding						

4.34. We highlighted that HS1 Ltd should manage its subcontract and internal costs efficiently while building the capability necessary to meet its General Duty. For pass-through costs (which include non-traction electricity, UK Power Network Services (UKPNS) operations, maintenance and renewals, traction electricity, insurance and business rates) we questioned how the costs were forecast and challenged whether elements of the UKPNS costs should be moved from HS1 Ltd internal costs to be treated as pass-through costs.

4.35. In response, HS1 Ltd explained its approach to UKPNS costs, insurance and business rates. It also stated that any additional regulatory burden would incur costs. We have accepted HS1 Ltd's explanations in response to our challenges on UKPNS, business rates and insurance.

4.36. However, in its November 5YAMS, HS1 Ltd also proposed a net £2.9m increase in subcontract and internal costs. We only became aware of the level of these additional costs late in the periodic review process and HS1 Ltd did not provide sufficient justification for inclusion of these costs or evidence to demonstrate that the costs were efficient. These adjustments were made up of the following:

- (a) NR(HS) operations and maintenance costs to increase by £0.2m.

This cost change relates to mothballing of freight-specific assets that would not be avoided if no freight traffic operated on HS1. We approve this adjustment to move the freight-specific element of the NR(HS) costs into this category (and note the equivalent reduction in freight costs).

- (b) An increase in subcontracted costs of £0.47m to reflect additional regulatory costs expected to be incurred for PR24, based on actual costs incurred in CP2.

HS1 Ltd has not provided sufficient evidence to support its proposal that ORR's costs will be greater than the initial assumption in January 2019, included in the May 5YAMS.

On this basis, we were minded to reject this proposed increase and we consulted further on this matter. Stakeholders supported our continuing challenge of HS1 Ltd's plans. HS1 Ltd provided further evidence that this increase was justified on the basis that Q1 and Q2 of the current financial year saw an increase in our costs beyond what was originally envisaged and that the increase was required as HS1 Ltd had no way of making efficiencies on the costs levied by us.

We looked into this further and found that the two quarters used as a basis by HS1 Ltd are atypical and should not be used for calculating CP3 costs. A proportion of the increase in costs over the reference period was as a result of litigation in relation to a judicial review challenge. Additionally we undertook more analytical work in reviewing the May 5YAMS than we originally envisaged. This was because we considered that HS1 Ltd had not been sufficiently rigorous in challenging its renewals delivery plan, PMO costs and risk management. In addition we identified weaknesses in HS1 Ltd's CP4-10 renewals planning.

While this resulted in costs higher than those envisaged for the specific financial year in PR14, we expect overall costs for CP2 to be below forecast.

We therefore reject this proposed increase and determine that ORR's regulatory and safety costs forecast should be £2.0m for CP3 as per our original estimate.

- (c) An increase in HS1 Ltd's internal costs from £41.2m in the May 5YAMS to £42.7m in the November 5YAMS.

In its November 5YAMS, HS1 Ltd did not provide evidence in support of the proposed cost increases, which would change our draft determination. On that basis, we were not minded to approve the proposed increase of £1.5m in HS1 Ltd's internal costs. We consulted further on these items.

As previously stated stakeholders supported our continuing challenge of HS1 Ltd's plans and budgets. HS1 Ltd was disappointed with our decision and considered ORR had not engaged HS1 Ltd on these issues following the draft determination. We do not agree. We considered the additional evidence provided by HS1 Ltd in its response.

- (i) Regulatory Staff / Structure of Charges £0.75m

HS1 Ltd stated that the DfT and ORR have increased the burden of regulation and that by insourcing activities it has reduced the overall regulatory costs. HS1 Ltd provided no specific examples of where this was the case or how the £750,000 cost had been arrived at.

Whilst we support HS1 Ltd in seeking to develop its in-house expertise, it has not provided evidence to support these additional costs. Further, as set out in our draft determination, while we did not set an efficiency target for HS1 Ltd, we required HS1 Ltd to deliver the expectations set out in the draft determination within the funding set out in its May 5YAMS, in that we required HS1 Ltd to take a more proactive approach in assuring operations, maintenance and renewals activities. We therefore reject this cost increase.

- (ii) Consultancy Costs £0.34m

HS1 Ltd stated that it has reduced its consultancy spend in CP3 by £2.5m in comparison to CP2. It said this £0.34m increase is justified by the need to rebuild the charging model and that if this increase is not agreed then it will work with operators to consider options, such as maintaining the existing charging model.

We agree that the current charging model would benefit from updating, but this has been the case for some years, and HS1 Ltd has failed to explain why between the May 5YAMS and the November 5YAMS it has become an urgent and unforeseen issue or how the amount has been arrived at.

In our draft determination, we proposed to approve £5.6m of additional consultancy costs for CP4-10 renewals planning, which although is not directly related, nevertheless already represents a considerable increase in costs for funders and we do not feel that this additional cost increase is justified. A factor in our decision is that the existing charging model can continue to be used and that HS1 Ltd has stated that it will work with operators to see how the charging model might evolve. We reject this cost increase.

(iii) Cybersecurity £0.29m

HS1 Ltd has now clarified that the item of legislation it referred to was the Network and Information Systems (NIS) Regulations 2018. HS1 Ltd told us that DfT only released the baseline requirement in July 2019 and that this has led to costs to upgrade infrastructure and software over CP3. It considered that we had arbitrarily applied a significant efficiency burden without providing any meaningful analysis or comment, despite the increased NIS requirements since the May 2019 submission.

In both its May 5YAMS and November 5YAMS HS1 Ltd stated that:

We are compliant with the Network and Information Systems Regulations 2018 (NISR) which came into force in May 2018 and place legal obligations on providers to protect critical services (including transport) by improving cybersecurity.⁶

We consider that HS1 Ltd has still not provided evidence to support the increase in costs in relation to cybersecurity. HS1 Ltd has not provided any further information as to how the amount of £0.29m was calculated or what it encompasses, and therefore we are unable to assess if this cost is justified and efficient. We therefore reject this cost increase.

(iv) Other: £0.1m for a line titled 'Other concession'.

HS1 Ltd provided no further information in relation to this proposed increase. We therefore reject this cost increase.

⁶ Page 59 of May 5YAMS and page 61 of November 5YAMS.

We determine that HS1 Ltd's internal costs for CP3 are £41.2m.

- (d) Pass-through costs have decreased by £1.1m.

In its May 5YAMS, HS1 Ltd included an estimate of the costs of the UKPNS performance regime of £1.1m⁷. It assumed that these costs would be treated as pass-through costs, instead of HS1 Ltd and the operators being in a pain/gain share arrangement. But these revised performance regime arrangements have not been agreed with operators. So, in its November 5YAMS, it removed these costs.

We therefore approve the £1.1m reduction in UKPNS costs, in light of the fact that HS1 Ltd's suggested changes to the performance regime arrangements had not been agreed with operators. This reduces the CP3 operations and maintenance costs by £1.1m compared to our draft determination and there is no change compared to the November 5YAMS.

- (e) Freight costs have decreased by £0.2m.

We accept this change which reflects the movement of mothballing costs (see item (a) above).

- (f) A new item of R&D of £2m was included in the November 5YAMS in response to our draft determination. We agree with its inclusion. The treatment of this item is discussed in greater detail in paragraphs 4.73-78 of this report.

4.37. One of the other issues that we identified in our draft determination was the categorisation of market testing costs. HS1 Ltd thinks that they should be treated as a pass-through cost while EIL stated that it expects market testing to be part of business best practice and not a pass-through cost.

4.38. After considering respondents' views, we consider that the market testing costs should be treated as pass-through costs as we do not have a reasonable assumption for these costs that we could include in operating costs.

4.39. Based on the above we have determined that the operating and maintenance costs in CP3 should be set at £363.5m rather than £365.5m (as set out in the November 5YAMS). This is a key input to the operating, maintenance and renewals charges (OMRCs) which are detailed in Chapter 7.

⁷ In our draft determination, we questioned whether the May 5YAMS had treated this change consistently.

Table 4.5 CP3 operating and maintenance cost summary

	20/21 £m	21/22 £m	22/23 £m	23/24 £m	24/25 £m	Total £m
NR(HS) operations and maintenance costs	42.0	41.8	41.0	40.8	40.1	205.7
HS1 Ltd Costs						
Subcontracted	3.7	3.7	3.8	3.8	3.8	18.7
Internal	7.9	8.2	8.6	8.5	8.0	41.2
R&D	0.4	0.4	0.4	0.4	0.4	2.0
Pass through	18.9	18.9	18.9	18.9	18.9	94.3
Freight-specific costs	0.3	0.3	0.3	0.3	0.3	1.6
Total operating and maintenance costs	73.2	73.3	73.0	72.7	71.5	363.5
Numbers may not add up due to rounding						

Elements of the 5YAMS consistent with the General Duty

4.40. This section explains elements of the 5YAMS that ORR has reasonably determined are consistent with HS1 Ltd's General Duty. It covers aspects that were identified in the draft determination that HS1 Ltd fully addressed in its revised submission of the 5YAMS and consultation responses. It also covers aspects that wider stakeholders had raised in their consultation responses.

Classification of ETCS

4.41. A significant aspect of our asset management review was to consider HS1 Ltd's proposal to reclassify the planned implementation of a new signalling system (European Train Control System (ETCS) Level 3) as a renewal rather than a specified upgrade. The specific classification affects the level of the renewals annuity charge because if it is classified as a renewal, then it is included in the renewals annuity, whereas if it is classified as a specified upgrade then it is funded outside of the charges set by this determination.

4.42. In our draft determination we set out the reasons why we consider that the replacement of ETCS should be considered a specified upgrade under the Concession Agreement, as had been determined in our 2014 periodic review of HS1 Ltd (PR14), and that the cost should not be included as a renewal.

- 4.43. In its response to our draft determination, DfT supported our view that ETCS should be treated as a specified upgrade. Separately, we understand that it will be engaging with HS1 Ltd in the near future in relation to this issue.
- 4.44. DB Cargo (UK) in its consultation response strongly supported ORR's view that the future introduction of ETCS on HS1 constitutes a specified upgrade rather than a renewal and replacement, as did EIL and Southeastern.
- 4.45. In its November 5YAMS, HS1 Ltd confirmed that ETCS is now being treated as a specified upgrade and that it will no longer be included in the calculation of the renewals annuity. HS1 Ltd confirmed it will need to be funded either by operators through an additional investment recovery charge, or by DfT.

Operations and maintenance risk

- 4.46. In its response to our draft determination, EIL set out its view that allowing a risk premium of 4.33% was neither evidenced nor justified and that there appeared to be double-counting of contingency.
- 4.47. In reaching our final determination we are mindful that the Operator Agreement allows for NR(HS) to price these contract risks separately (previously known as the risk premium). Our primary duty is therefore to ensure that HS1 Ltd has discharged its General Duty by sufficiently and robustly challenging the figure put forward by NR(HS) and that there is no double-counting of risk within NR(HS)'s base rates. In response to EIL's feedback we sought further clarification from both HS1 Ltd and NR(HS). They confirmed that:
- (a) contract risk is funding for events outside NR(HS)'s reasonable control, reflecting the likelihood and impact of risk over a five-year period;
 - (b) NR(HS)'s CP3 bottom-up budgeting process excludes any costs associated with risk that may have been incurred in previous years;
 - (c) of the contract risk calculation for CP3, 81% is related to trespass and vandalism, the remainder being legacy suppliers, lineside neighbours and adverse weather; and
 - (d) there have been no reported deficiencies in fence lines, access gates or security patrols.
- 4.48. In developing its risk assessment NR(HS) undertook a quantitative risk assessment (QRA), which is an appropriate methodology to calculate how the 4.33% had been derived. We confirmed that the QRA calculation excluded any double-counting within the base rates or any inflation allowance.

- 4.49. On the basis of the above we have concluded that the 4.33% risk provisions are justified and proportionate. In reaching our conclusion we also took into account that the resultant overall operations, maintenance and renewals contract risk percentage (7%) is in line with rail sector comparators.
- 4.50. As stated in the draft determination it is important that HS1 Ltd and its customers continue to discuss risk provisions, which could reduce risk provisions in the latter stages of CP3 and future control periods. HS1 Ltd in response to this recommendation has agreed to provide us with a plan by 30 September 2020 in relation to how it will review operations and maintenance risk ownership with its funders.

Operating and maintenance efficiencies

- 4.51. In response to the draft determination no stakeholder identified any specific areas of inefficiency, rather responses were provided in general terms about the need for greater challenge and efficiency focus.
- 4.52. EIL considered that our draft determination was less challenging on efficiency than that placed on Network Rail Infrastructure Limited or benchmarked comparators.
- 4.53. Comparing HS1 Ltd (and NR(HS)) to other infrastructure managers, such as Network Rail Infrastructure Limited, is complicated by a number of maintenance activities not previously covered within the scope of the Operator Agreement, but now being required in CP3. In the draft determination we set out how we had challenged both HS1 Ltd and NR(HS) on these increases and why we were satisfied with both the background and reasoning for their inclusion.
- 4.54. However, NR(HS) applies efficiencies before application of the 8% management fee and the 4.33% for uncontrollable risk. This is comparable to how Network Rail Infrastructure Limited presented pre/post efficient estimates for our 2018 periodic review of that company (PR18).
- 4.55. Table 4.6 sets out the comparative efficiency challenges for NR(HS) and Network Rail Infrastructure Limited, comparing exit-to-exit efficiencies. In making any comparison we are mindful that the HS1 network and the wider rail network are not directly comparable in terms of asset condition and size and that NR(HS) and Network Rail Infrastructure Limited do not classify activities in a completely similar way.

Table 4.6 Net exit-to-exit efficiency comparison

Exit-to-exit efficiency At HS1 Ltd CP2 rates	NR(HS) CP3 (2020-25) Year 5	Network Rail Infrastructure Limited CP6 (2019-24) Year 5
Maintenance	-3.5%	-7.7%
Operations	-0.8%	-2.7%
Support	-20.8%	-7.4%
Others	-17.9%	n/a
Weighted total	-6.7%	-6.4%

4.56. This comparison shows that NR(HS)'s net efficiency challenge on total operations, maintenance and support costs (6.7%) is comparable to Network Rail Infrastructure Limited's net efficiency challenge of 6.4% over a similar five-year period.

4.57. Additionally EIL believed that minimum efficiencies of 2% per year in CP3 and 1% per year thereafter were required to match the efficiencies that DfT has considered appropriate in its periodic review of station funding for CP3.

4.58. There is no evidence demonstrating a direct relationship between efficient maintenance of the stations and that of the route and as a result we do not think that efficiencies derived for station maintenance have to match those derived for maintaining the route.

4.59. DfT recognised the need for any efficiency targets to be achievable but wanted further assurance that the target we had set was sufficiently challenging. In addition, it sought further clarification of the extent to which the 18% gross operations and maintenance efficiency potential identified by HS1 Ltd's consultants Rebel Group had been met (a point also made by EIL).

4.60. Rebel Group in its report highlighted that it had looked at specific elements of NR(HS) and HS1 Ltd's areas of operations and maintenance and did not conclude that an 18% efficiency was achievable across the entire costs of operations and maintenance. HS1 Ltd and NR(HS) costs make up approximately 68% of the total operations and maintenance costs. The remainder relate to pass-through and other costs where HS1 Ltd has limited influence. In addition, Rebel did not look at renewals as part of its study.

4.61. As set out in the draft determination we consider that NR(HS)'s efficiency proposal is in line with Rebel Group's conclusions. This cost benchmark combined traditional top-down cost benchmarking with bottom-up best practice and lessons learned. The

benchmarking findings identified that a potential 18% cost reduction could be achieved across both HS1 Ltd and NR(HS)'s organisations. In our supplementary document to our draft determination setting out our asset management findings, we provided the following table (Table 2.4 of the supplementary document to our draft determination setting out our asset management findings).

Table 4.7 Summary of benchmarking outputs and responses

Benchmarking Area	Rebel Report	NR(HS) CP3
	Potential %	Saving % (vs CP2 Exit)
Reduction in operation and maintenance organisational costs	6.6%	Around 11.2% ²
Reduction in support costs	9.8%	12.7% ²
Network optimisation ¹	1.9%	N/A
¹ HS1 Ltd would need to remove these assets from the Operator Agreement. ² Inclusive of net efficiencies, recoveries and a collaborative efficiency target		

4.62. We remain of the view that further potential efficiency exists from network optimisation of the infrastructure assets. HS1 Ltd has accepted our recommendation and committed to develop a plan for engaging with stakeholders to explore if network optimisations could yield lower overall maintenance costs by 30 September 2020. HS1 Ltd will then need to work with funders and stakeholders to determine if the benefits outweigh any loss of route resilience or future service expansion opportunities.

4.63. We recognise that NR(HS)'s efficiency delivery plans are at an early stage. In response to our recommendation, HS1 Ltd has also committed to providing a plan as to how it will review incentives and monitor efficiencies in maintenance by 30 September 2020. We will hold HS1 Ltd and NR(HS) to account against that plan as part of our ongoing monitoring. In addition we will be seeking resolution on the final decision as to whether to market test the Operator Agreement in CP3. The outcome of that decision may have a significant impact on future operations and maintenance costs.

4.64. On the basis of the above we consider that the proposed operating and maintenance efficiency challenge is both appropriate and sufficiently challenging and therefore have accepted a net efficiency challenge of 6.7% for CP3, based on the evidence currently available to us.

4.65. Related, but not quantified in the same way, is that the overall package set out in the draft determination required HS1 Ltd to do more on the wider challenges we set it but within the existing funding envelope (such as being more proactive in assuring

operations, maintenance and renewals activities). Since then, HS1 Ltd has identified an increase in its internal costs which we have rejected (see para. 4.36).

4.66. HS1 Ltd did not propose any of its own efficiencies on internal costs. In our draft determination, we indicated that we were aware that there were some pressures on HS1 Ltd's internal costs, but as a result we did not include an efficiency assumption on these costs. We note that the increase in costs proposed by HS1 Ltd in its November 5YAMS would need a 3.6% exit-to-exit efficiency to fund them, which we do not think is unreasonable.

Asset condition reporting and modelling

4.67. Southeastern strongly supported our recommendation that HS1 Ltd's focus should be on condition-based renewals, supported by robust asset deterioration modelling. Additionally, the operator would like to see metrics to drive improvement in this area, as a minimum it would like to see regular reporting of asset deterioration against the forecast rate.

4.68. A key recommendation in the draft determination, which HS1 Ltd has adopted, is the reporting of projected asset condition at the end of the concession and then the end of the 40-year period. In its annual report HS1 Ltd reports against the current asset condition using high-level condition scoring, from which any change from previous years can be monitored. In addition, HS1 Ltd agreed with our recommendation that it sets out the minimum data requirements and then reports on these annually.

4.69. Once HS1 Ltd has put in place more effective reporting of asset condition, more accurate projections of future renewals can be calculated.

Renewals risk for CP3

4.70. Consultees agreed with our view that the proposed 26.25% risk overlay for CP3 renewals was inefficient and supported a reduction to 13% to bring it in to line with benchmarks.

4.71. HS1 Ltd worked with NR(HS) to finalise a revised P50 risk number for CP3 which amounts to 12.6%. P50 is a risk adjustment for the portfolio of projects, rather than for each individual project, and denotes an assumption that 50% of expenditure estimates are below the actual expenditure and 50% of expenditure estimates are higher⁸.

⁸ The underlying estimates in the November 5YAMS are produced on the basis that all the work is delivered precisely on budget. In practice, that is not going to happen. So, to calculate the average expenditure including risk and contingency, it is necessary to make a risk adjustment such as the P50 risk adjustment.

4.72. NR(HS) in its consultation response stated that this represents a lower confidence level than it previously used and if additional risks materialise then it would seek a revised authority to secure more funding.

4.73. We have approved that the risk allowance for renewals in CP3 be revised to 12.6% of the renewals base cost (see Chapter 5 for further details). Any request for further risk monies will need to be fully supported by a demonstration that effective mitigations have been put in place.

Renewals efficiencies in CP3

4.74. NR(HS) did not seek to quantify renewals efficiencies, because of a lack of comparable renewals in CP2. The omission of any renewal efficiency challenge was recognised in our draft determination and we required efficiencies as an overlay, including:

- (a) 1.8% efficiency to be applied to the total CP3 renewals cost; and
- (b) reducing project management costs from £9.4m to £4.9m, which equated to an additional 5% efficiency based on the draft determination CP3 renewals workbank.

4.75. In response to our draft determination, HS1 Ltd agreed that 1.8% should be applied to the renewals costs, and that some renewal projects should be deferred to CP4, with an associated reduction in costs by £5.5m (see paragraph 4.81). It however disagreed with the level of our proposed reduction of PMO costs.

4.76. DfT recognised the importance of efficiencies being deliverable, highlighting the need for them to be 'stretching, yet realistic'. EIL stated that in its view, 1.8% was insufficiently challenging for CP3 renewals.

4.77. An additional renewals efficiency target of 1.8% is in line with what we expected Network Rail Infrastructure Limited to achieve from more effective contracting of its supply chain, in PR18. Given that we do not wish to see a drop in renewals quality or safety standards we consider that to impose an additional renewals efficiency overlay, would not be in funders' long-term interests. However we expect HS1 Ltd to challenge renewals costs and seek to explore the benefits that might be expected to be achieved by using more innovative contracting methodologies, such as using target cost contracting (explained in the supplementary document to our draft determination setting out our asset management findings). Additionally, we have set

out a reduction in PMO costs, which when added to the 1.8% renewals cost efficiency gives an overall efficiency requirement of around 5.6%⁹.

4.78. We consider that the total renewal efficiency required is both realistic and stretching, when taking into account those efficiencies set out for operations and maintenance. As with operations and maintenance efficiencies, CP3 renewals efficiency delivery plans are at an early stage of development. We will hold HS1 Ltd and NR(HS) to account against the plan, once developed, as part of our ongoing monitoring.

4.79. On the basis of the above we have concluded that the total renewals efficiency challenge that we have set is both sufficiently challenging but realistic. Related to this we have also applied an additional 0.5% year-on-year cumulative efficiency from CP4-10 for technological frontier shift. This is explained more fully in Chapter 5.

Renewals programme and delivery for CP3

4.80. In our draft determination we highlighted an inconsistency with the pricing of one of the proposed renewals for CP3. HS1 Ltd has clarified that the correct price for this renewal (of replacement inverter fans) is £410k as shown in the May 5YAMS, and not £250k as indicated in a separate presentation. We have accepted £410k as the budgeted cost.

4.81. In its response to the draft determination deliverability challenge, HS1 Ltd has re-planned three renewals into CP4 rather than CP3, with a total value £4.97m. In addition, HS1 Ltd has re-phased three projects across CP3 and CP4. This has the impact of reducing renewals expenditure in CP3 by an additional £545k and addresses a concern we had about the justification for undertaking certain renewals in their entirety in CP3 (see Table 4.12).

4.82. HS1 Ltd, after undertaking further assurance work, is now confident that its revised £56.9m renewals programme can be delivered in CP3. We consider that HS1 Ltd's revised proposal satisfies our deliverability concerns.

4.83. HS1 Ltd's November 5YAMS submission did however contain the following two minor items:

- (a) under-sleeper pads left as a renewal¹⁰; and

⁹ Calculated saving of £2.1m in PMO costs against a CP3 renewals portfolio of £55.8m. This is a 3.8% efficiency. The 5.6% is the 3.8% plus the 1.8% discussed above.

¹⁰ In our supplementary document to our draft determination setting out our asset management findings draft determination, we set out why we believed this item should be treated as R&D.

- (b) an increase in the cost of a cross-passage door renewal since the May 5YAMS of £56k.

We are still of the view that the under-sleeper pads project is a research and development activity and that the increased cost of the cross-passage door renewal should be funded out of renewals risk. HS1 Ltd should reflect this adjustment in its revised 5YAMS.

4.84. Therefore, we have concluded that the base renewals budget for CP3 should be set at £56.8m (pre-efficient) as set out in the table below.

Table 4.8 Adjustments to CP3 renewals expenditure – May to November 5YAMS

	5YAMS submission £k Nov 2019	ORR determination £k Dec 2019
May 2019 base cost	61,800	
Less projects moved out of CP3 to CP4	-4,970	
Increase in Cross Passage Doors cost	56	
November 2019 base cost	56,886	56,886
Removed (under sleeper pads)		-30
Removed 56k for cross passage doors		-56
November 2019 base cost	56,886	56,800

4.85. Overall we note that there is a variable level of renewals over the control period (as shown in Table 6.2). We will monitor this and track delivery performance against HS1 Ltd's plan through our monitoring and reporting of the company.

4.86. Changing the level of renewals in CP3 does not have any material impact on the renewals annuity, as this adjustment is driven by re-phasing of renewals between CP2, CP3 and CP4, rather than whether the renewal is justifiable or not.

Research and development (R&D)

4.87. In the draft determination we explained why we considered that best practice asset management requires innovation and that HS1 Ltd needed to make a firm commitment to maintaining adequate levels of R&D through a reliable funding mechanism. Our concern was around the absence of a funding mechanism rather than the magnitude, hence we did not quantify a change to the total costs.

- 4.88. In response to our consultation on the draft determination we received no specific comments from operators on our requirement that HS1 Ltd commits to maintaining adequate levels of R&D in CP3 and beyond.
- 4.89. In its November 5YAMS, HS1 Ltd set out its view that the best way to fund R&D is through its own costs, rather than the renewals annuity. HS1 Ltd would release this money for R&D in accordance with an agreed process. HS1 Ltd has proposed a figure of £2m over the life of CP3 for R&D.
- 4.90. We checked that there was not already provision for R&D within the base costs and sought further clarification from HS1 Ltd on how the fund would be spent. HS1 Ltd confirmed that its CP2 5YAMS only included £1.2m for R&D in years 1-3. For the CP3 5YAMS the 'baseline' year was the forecast at 2018, so there was no R&D spend built into the CP3 forecast.
- 4.91. As a percentage of renewals costs, £2m is broadly comparable with that being undertaken by Network Rail Infrastructure Limited, so we considered that this was an appropriate amount. We did not however agree with HS1 Ltd that this should be funded as operations and maintenance expenditure. Rather we considered that R&D should be treated as capital expenditure, as a longer-term investment.
- 4.92. In setting £2m as a limit we do not preclude the addition of third party funding streams or HS1 Ltd undertaking joint R&D activities with other parties, to deliver economies of scale or to avoid duplication of effort.
- 4.93. The R&D portfolio, in best practice, should have a benefit-cost ratio (BCR) greater than 2¹¹. We do however accept that there is some uncertainty around long-term planning when it comes to R&D. We propose therefore to revisit our treatment of R&D for CP4-10 as part of our next periodic review of HS1 Ltd (PR24).
- 4.94. We consulted further on this item. Stakeholders supported both the scale of R&D funding and that it should be treated as a renewal. HS1 Ltd in its response understood our reasoning for treating it as renewals spend but explained in more detail its position that it is better to treat R&D as a non-direct cost because it is more fixed in nature and better suited to being included within HS1 Ltd's internal costs.
- 4.95. Although treating these costs as a renewal aligns with the approach used by Network Rail Infrastructure Limited, in view of HS1 Ltd's explanation of how the charging

¹¹ Network Rail Infrastructure Limited currently (Dec 2019) estimates a BCR of 2.8 over 20 years for its R&D Programme.

model allocates costs¹² we consider it reasonable for these costs to be included as operating and maintenance costs.

- 4.96. There must not be any duplication of R&D activities already accounted for as part of the CP3 preparation for CP4-10 workstreams. HS1 Ltd is required to provide further details on its plans including proposed phasing to us at the start of CP3 and we will monitor its progress against these plans through our monitoring and reporting of the company.
- 4.97. HS1 Ltd has confirmed that there will be a reconciliation of funds collected and the money spent on R&D over CP3. This will be taken into account in setting the determination funding for R&D in PR24. For example, if R&D is underspent by £0.3m in CP3, this will be deducted from the funding in PR24 for the expenditure in CP4. R&D funding that has not been spent in CP3 should not be included in any outperformance mechanism.
- 4.98. Our draft determination noted that any R&D programme requires good governance which is why we recommended that any activities should regularly review benefit realisation and challenge investments, and that this could be achieved by the establishment of an R&D review panel made up of HS1 Ltd along with funders and stakeholders.
- 4.99. Stakeholders in their consultation responses identified the importance of good governance of any R&D programme and indicated that they were prepared to play an active role.
- 4.100. HS1 Ltd in response to this recommendation has committed to forming and chairing a new Research, Development and Innovation Panel. The panel will have representation from the HS1 Ltd engineering and operations teams, NR(HS) route and stations staff (both engineering and operations), Connect Places Transport Catapult, and representatives from operators. The panel will add the requisite level of governance to the identification and delivery of innovation through a research and development portfolio process. In addition, HS1 Ltd will be working with Network Rail Infrastructure Limited and High Speed 2 (HS2) to identify where synergies exist to deliver research and development.
- 4.101. We will monitor the effectiveness of this panel as part of our ongoing monitoring of HS1 Ltd.

¹² HS1 Ltd told us on it would adjust its charging model to include R&D in the annuity calculation to allocate costs correctly. However, in response to our December 2019 consultation on matters to be determined, it said that after attempted changes it could not guarantee that its charging model correctly allocates R&D costs and as such, it wished to revert to the 'safer position' of treating this spend as an internal cost.

Development of plans for CP4-10

- 4.102. There were no specific comments made in the consultation responses to our support of HS1 Ltd expenditure of £5.6m in CP3 for preparation and planning for CP4-10 renewals.
- 4.103. HS1 Ltd has taken on board our recommendation that a market study is concluded as soon as possible as to how CP4-10 renewals will be delivered, and by whom, and that it will consider its approach to the PMO model for those control periods, agreeing a plan and programme with stakeholders by 31 December 2020. This will be contingent on the approach taken in concluding on whether it will carry out its wider market test.
- 4.104. We approve HS1 Ltd's proposals to spend up to £5.6m in CP3 on preparation and planning in advance of CP4-10 renewals, subject to the timescales set out above for consulting with stakeholders on the proposed delivery strategy. Additionally there should not be any duplication of activities funded through R&D funding or NR(HS) general renewals planning activities.
- 4.105. HS1 Ltd has confirmed that this funding will be used alongside the emerging research, development and innovation programme that will aim to drive improved efficiency and effectiveness from operations, maintenance and renewal activities.
- 4.106. The release of monies from the escrow account is dependent on HS1 Ltd bringing forward a robust business case to ORR and DfT and clarity that there is no overlap with other already-funded activities.

Delivery agents, project management and Tier 2 contractor fees for CP4-10

- 4.107. In the draft determination we concluded that project management costs for CP3 should be in the region of 8-12%, in addition to the Operator Agreement 10% mark-up on all renewal's costs, totalling 18-22%.
- 4.108. EIL in its consultation response considered that HS1 Ltd's proposed delivery integrator costs of 20% for CP4-10 were too high and that our draft determination was arbitrary. No other responses were received on this area.
- 4.109. We consider that allowing 20% for the delivery integrator is a reasonable planning allowance at this early stage, based on our determined 10% for PMO costs in CP3 and NR(HS)'s existing 10% mark-up on renewals and therefore approve this element of the November 5YAMS. However, we note that under a competitive market test it is reasonable to expect that this could be lower in CP4-10. In any case this should be

brought in for no more than NR(HS)'s costs today which have been used as the planning benchmark.

Other issues raised by stakeholders

4.110. Southeastern stated that it would like to see monitoring and reporting on HS1 Ltd's environmental objectives and key performance indicators which do not appear to be an existing requirement under the Concession Agreement or periodic review process. It highlighted the need to strengthen this area with clear metrics to ensure that HS1 Ltd is held to account along with a requirement for these updates to be shared on a regular basis with operators.

4.111. We agree that the reporting of environmental objectives against HS1 Ltd's sustainability policy statement is desirable and we will work with HS1 Ltd to seek to include performance reporting against this area in its reporting to us.

Impact of final determination on costs

4.112. The following tables set out the impact of our decisions on the relevant costs that input to the calculation of the OMRCs.

Table 4.9 Quantified cost impacts of elements inconsistent with the General Duty (compared to HS1 Ltd November 5YAMS)

Subject	Change
Asset life planning for CP4-10	10% reduction in total renewals volumes with a resultant cost reduction of 5.2% ¹³
Project management costs for CP3	PMO costs target of 10% of renewals = around £2.1m efficiency.
Risk / contingency / efficiencies for CP4-10	See Chapter 5

Table 4.10 Changes to November 5YAMS – HS1 Ltd costs

	Change £m
HS1 Ltd subcontracted costs	(0.5)
HS1 Ltd internal costs	(1.5)

¹³ The volume reduction is 10% over a period that is greater than 40 years. It is an average of 10%, but the actual adjustments vary according to the renewals work taking place in each control period, and some of those adjustments take place over a longer time frame than the concession agreement. In the period of the renewals annuity modelling the volume reduction equates to an average of a 5.2% cost reduction.

Table 4.11 CP3 operating and maintenance costs

	ORR determination £m
NR(HS) operations and maintenance costs	205.7
HS1 Ltd Costs	
Subcontracted	18.7
Internal	41.2
R&D	2.0
Pass-through	94.3
Freight costs	1.6
Total operating and maintenance costs	363.5
Numbers may not add up due to rounding	

Table 4.12 CP3 renewals costs

Item	ORR determination £m
CP3 base costs renewals (Table 4.8)	56.8
CP3 renewals brought forward to CP2 (Table 59 of November 5YAMS)	(2.9)
CP3 renewals deferred to CP4 (Deferral of M&E renewals, Table 59 of November 5YAMS)	(1.0)
CP3 Renewals portfolio during CP3, pre-efficient	52.9
NR(HS) mark-up of 10%	5.3
Sub total	58.2
Risk of 12.6%	7.3
Sub total	65.5
PMO at 10% of CP3 renewals activities (based on £52.9m + £2.9m - £1.0m)	5.5
Sub total	71.0
Renewals efficiency requirement of 1.8%	(1.3)
CP3 renewals portfolio expenditure during CP3	69.7
CP2 renewals deferred into CP3 (Table 59 of November 5YAMS)	2.7
Sub total	72.4

Item	ORR determination £m
Preparation and planning for CP4-10 to be expended in CP3	5.6
Total renewals expenditure in CP3	78.0
Numbers may not add up due to rounding	

5. Escrow account and renewals annuity

Introduction

- 5.1. The financial framework sets the rules and guidelines for a range of financial issues that determine how HS1 Ltd is funded to operate, maintain and renew the HS1 network. It is therefore key to ensuring that HS1 Ltd meets its General Duty.
- 5.2. Our approach to the financial framework is explained in detail in the supplementary document to our draft determination setting out our financial framework findings. The approach was primarily based on HS1 Ltd's May 5YAMS, but where appropriate we took account of further evidence provided by HS1 Ltd and other stakeholders during the periodic review process.
- 5.3. We have examined all aspects of the financial framework and in our draft determination we identified deficiencies that HS1 Ltd needed to address in order for us to be able to accept the November 5YAMS, including the calculation of the renewals annuity, which partly determines the charges individual train operators will pay.
- 5.4. This chapter covers the escrow account and the renewals annuity. Chapter 6 examines other financial issues.

Background

- 5.5. An important element of the financial framework is the escrow account, which was set up by HS1 Ltd in accordance with the Concession Agreement, to provide sufficient funds for renewals expenditure across a rolling 40-year period. It is based on the general principle that payments from the renewals annuity into the account equal the forecast average costs over time. This means that during periods of low renewals expenditure the balance should grow to provide funds for when renewals expenditure is higher than the average level. Funding renewals expenditure through the escrow account smooths payments¹⁴ and avoids step changes in the charges to operators.
- 5.6. The main focus of our financial assessment in the draft determination was on the proposed renewals annuity¹⁵. HS1 Ltd's Base Case forecast was that the renewals

¹⁴ The changes to charges should be as smooth as possible to avoid unnecessary variances in charges. For example, to avoid a situation where charges in the control periods change from £100 to £50 to £150. Instead an average of £100 is better and helps business planning for operators. Having the escrow account helps this as we average the charge over a 40-year period.

¹⁵ There is an investment recovery charge that is used to recover the cost of the initial capital investment and is outside the scope of PR19. HS1 Ltd also charges for the use of station services. This is regulated

annuity would be **£38.2m** per year (in February 2018 prices for CP3, including the cost of a new signalling system (ETCS)). The alternative options¹⁶ proposed by HS1 Ltd included calculating the renewals annuity for CP3 using a '20-year'¹⁷ approach that gave a charge of **£25.1m** per year, and a 40-year 'Buffer'¹⁸ approach that gave a charge of **£23.9m** per year (both excluding ETCS). In our draft determination, we recommended that a renewals annuity of **£26.1m** per year would be needed to ensure that HS1 Ltd's plans are consistent with its General Duty obligations.

- 5.7. When we calculated the renewals annuity for the draft determination, we assumed the 0.5% frontier shift adjustment was applied to both the base expenditure and the delivery integrator expenditure. However, HS1 Ltd's charging model (also used to calculate the renewals annuity) did not work in this way. Having adjusted for this, our recommendation would have been **£25.8m** per year and the efficiency overlay for frontier shift would have been £2.9m per year.
- 5.8. To calculate this renewals annuity, we made a number of adjustments to HS1 Ltd's proposals as summarised in Table 5.1. Overall, most of the adjustments in our draft determination reflected a different, usually less conservative, view of the inputs into HS1 Ltd's renewals annuity calculation.
- 5.9. However, we did not propose to adjust the renewals annuity for costs that HS1 Ltd had omitted from its forecasts in CP4-10, such as some enabling works on additional depots and sidings, and clean-up costs. This was because HS1 Ltd had not justified them and it did not have a forecast of them. However, we were also conscious that our interest rates forecast was likely to be conservative, especially after 20 years, as interest rates are historically low.

separately by the DfT and therefore does not form part of this determination, although we have considered factors raised in that review.

¹⁶ These alternative options are described in HS1 Ltd's May 5YAMS.

¹⁷ The '20-year' approach (this is also called Option 1 by HS1 Ltd) considers all costs but only over the next 20 years.

¹⁸ The 'Buffer' approach (this is also called Option 2 by HS1 Ltd) uses direct costs over the 40-year period but non-direct costs such as risk and contingency are not funded after CP6.

Table 5.1 Summary of our draft determination on renewals annuity (per year)

	Proposed adjustments £m	Renewals Annuity £m
HS1 Ltd's May 5YAMS Base Case		38.2
Reclassifying ETCS as a specified upgrade	(2.9)	
ORR input adjustments from asset management review: - risk and contingency assumption of 13% for CP3-10 (£3.4m change) - other changes, for example, re-phasing of renewals in CP3 and CP4 (£0.2m change) - for CP4-10, a 10% renewals volume reduction (5.2% cost reduction) to adjust for a too conservative approach to asset life (£1.4m change) - delivery integrator costs for CP4-10 of 20% of renewal costs rather than fixed price (£2.3m change)	(7.3)	
Frontier shift efficiency overlay for CP4-10 of 0.5% (see paragraph 5.7)	(2.6)	
Interest rate assumption of 2.5% on authorised investments	(0.9)	
Escrow balance adjustments for underfunding in CP1 and CP2 (£1.2m) and to avoid the escrow account not having enough funds in it to pay for renewals expenditure in some years of CP9 and CP10 (£0.4m)	1.6	
Impact of proposed ORR adjustments (see paragraph 5.7)		26.1

Renewals annuity method (time period and alternative approaches)

5.10. In its November 5YAMS, HS1 Ltd proposed a renewals annuity for CP3 of £28.1m. Since then, HS1 Ltd has confirmed that it had applied the frontier shift adjustment to only the base expenditure and not delivery integrator expenditure as well, in error. After adjusting for this, HS1 Ltd's proposal is **£27.8m** per year. This is based on HS1 Ltd following a 40-year approach but making changes to some of our asset

management and financial framework assumptions. Our response to these issues is set out in this final determination item by item.

- 5.11. We note that HS1 Ltd's November 5YAMS renewals annuity is higher than the £26.1m per year¹⁹ proposed in our draft determination, and higher than its alternative options from its May 5YAMS submission.
- 5.12. In responses and bilateral meetings, EIL said that a renewals annuity of £26.1m per year for CP3 was too high and that **£22.5m** per year would be better. This is EIL's 'Ratchet' approach which calculates the renewals annuity on a 15-year basis, as described in the supplementary document to our draft determination setting out our financial framework findings.
- 5.13. EIL stated that a 40-year 'look-ahead' does not mean a 40-year 'pay-ahead', hence it used a shorter period of time for its Ratchet option. HS1 Ltd was also disappointed that we said the 'Buffer' approach was unsuitable. DB Cargo (UK) expressed its disappointment that the alternative options were not deemed suitable.
- 5.14. DfT supported the 40-year approach taken in our draft determination. All other stakeholders repeated their preference for a shorter time period to be used to calculate the renewals annuity.
- 5.15. More broadly, EIL challenged the methodology that we used, saying that it did not satisfy the General Duty in relation to best practice and economic efficiency.
- 5.16. Responses from DfT, Southeastern and Kent County Council supported our proposed overall reduction in the renewals annuity from £38.2m per year.

ORR decision on renewals annuity method (time period and alternative approaches)

- 5.17. In its May 5YAMS, HS1 Ltd submitted alternative proposals for the renewals annuity of £23.9m and £25.1m to take account of the impact on operators, compared with its original proposal of £38.2m. In its November 5YAMS, HS1 Ltd did not provide new information about how its revised proposal of £28.1m takes into account the impact on operators. So, it is not clear how its £28.1m proposal aligns with its previous view in terms of the impact on operators. This is important as its revised proposal is significantly higher than its alternative options.

¹⁹ This figure also contained the same error in relation to the efficiency overlay – the figure in our draft determination should have been £25.8m per year.

- 5.18. We understand the distinction between ‘look-ahead’ and ‘pay-ahead’. As we said in our draft determination, using a 40-year calculation period (that is, the ‘pay-ahead’ time period) smooths the financial impact on operators; is consistent with the principle that users should pay for their use of the assets; and supports inter-generational equity.
- 5.19. Using a shorter period of time would mean that the renewals annuity calculation would not include expenditure related to some of the assets operators are using today, but that will not be renewed in the next 20 years. This is particularly important as the more expensive last 20 years of the 40-year forecast would be excluded from the calculation. Excluding those years from the calculation increases the chance of increases in the renewals annuity in the future and therefore is less consistent with the principle that “user pays” and less supportive of inter-generational equity.
- 5.20. EIL, both in relation to the ‘look-ahead’ / ‘pay-ahead’ issue and the CP1 and CP2 underfunding issue discussed below, has raised the issue of how our calculation should take account of the uncertainty of future costs. We recognise that future costs are uncertain but we think that our approach reasonably addresses this point. In particular, we note that the most certain cost items in the calculation are our adjustments for CP1 and CP2 underfunding (amounting to £85m²⁰) as this is a past event, and the forecast renewals expenditure for CP3 (£78m), which is for the next five years. If we recovered these costs over the next five-year control period, and did not average costs over a 40-year period, in simple terms the renewals annuity would be around £32-33m per year in CP3. This is higher than the £26.1m per year proposed in our draft determination.
- 5.21. The Concession Agreement requires HS1 Ltd to take a 40-year approach to renewals. So, in our opinion, HS1 Ltd’s ‘20-year’ approach and EIL’s ‘Ratchet’ approach are not consistent with the Concession Agreement. Using a 40-year time period better covers the life of the entire asset base and better smooths the peaks and troughs in expenditure over time than a shorter time period does. This means the financial impact on operators will also be better smoothed over time.
- 5.22. Both the HS1 Ltd ‘Buffer’ approach and the EIL ‘Ratchet’ approach ignore costs which will occur in the future, but are incurred as a result of the operation of trains now and in the past, and need to be funded. For this reason these approaches are not appropriate.

²⁰ Using a CP3 consistent methodology for CP1 and CP2, the escrow balance would have been around £130m higher at the end of CP2. But this figure would be around £85m if the delivery integrator and PMO costs are excluded (as they were in PR14).

5.23. EIL questioned whether our draft determination was consistent with HS1 Ltd acting in accordance with best practice in relation to forecasting uncertainty and inclusion of efficiency within the renewals annuity calculation. The Concession Agreement defines best practice as the exercise of that skill, diligence, prudence, foresight and practice which would be reasonably expected from a skilled and experienced infrastructure manager. It is with this standard in mind that our decisions have been taken. In our view, this requirement does not mean that we should base our determination on HS1 Ltd being unrealistically efficient. We discuss efficiency in more detail in Chapter 4 and in Annex A.

5.24. After considering respondents' views and for the reasons set out above and in our draft determination, our conclusion is that the input costs for the calculation of the renewals annuity should be considered over a 40-year period and include all costs, not just direct costs. In view of this, HS1 Ltd's '20-year' approach, its 'Buffer' approach, and EIL's 'Ratchet' approach are not consistent with the requirements of the Concession Agreement. Therefore, we approve the 40-year renewals annuity method set out in HS1 Ltd's November 5YAMS.

Asset management decisions affecting the renewals annuity

5.25. In our draft determination, we proposed a number of asset management changes to HS1 Ltd's Base Case. HS1 Ltd has included some of our proposals in its renewals annuity calculation for its November 5YAMS but not all of them. As set out in Chapter 4, where HS1 Ltd has not included the appropriate adjustment in its November 5YAMS, we have made changes to its assumptions. These changes impact on the renewals annuity compared to HS1 Ltd's November 5YAMS as follows:

- (a) a 10% renewals volume reduction, to adjust for a too conservative approach to asset life planning, which provides a 5.2% cost reduction for CP4-10. This reduces the renewals annuity by £1.5m per year compared to HS1 Ltd's November 5YAMS; and
- (b) assuming PMO costs for CP3 are £5.6m (10% of renewals costs). This reduces the renewals annuity by less than £0.1m per year compared to HS1 Ltd's November 5YAMS.

5.26. In our draft determination, we required HS1 Ltd to include funding for R&D in its November 5YAMS. We consulted stakeholders in December 2019 on the basis that the £2m R&D proposed by HS1 Ltd in its November 5YAMS, should be treated as a renewal. HS1 Ltd has stated in its response to the December 2019 consultation, that it is better to treat the R&D expenditure as a non-direct operations and maintenance

cost, because it is more fixed in nature and the allocation of these costs should not be primarily based on operators running faster heavier trains.

5.27. Although in principle we consider the R&D expenditure is more closely linked to renewals, for CP3 we think that the correct allocation of charges to operators is the key issue, especially as we do not know what types of R&D expenditure the funding will be spent on. For these reasons, we are approving its inclusion in operating and maintenance charges, and therefore it does not impact on the renewals annuity. We consider this to be a pragmatic decision given HS1 Ltd's explanation of how the current charging model allocates charges. However, we expect HS1 Ltd to consider this issue further in its structure of charges review.

CP1 and CP2 underfunding catch-up

5.28. In our draft determination, we identified that payments into the escrow account in CP1 and CP2 have been lower than the current forecast average renewals costs, so the escrow balances are lower than they need to be to fund future renewals expenditure. Our draft conclusion was that the renewals annuity should address this underfunding of the escrow account (with a contribution of £1.2m per year) by catching it up by the end of CP6 (20 years), which is around the end of the current Concession Agreement.

5.29. HS1 Ltd has indicated its support for the CP1 and CP2 underfunding catch-up adjustment and has included it in its November 5YAMS. EIL accepted that there was underfunding in CP1 and CP2, but questioned why the estimates of the renewals annuity have increased from PR14 and why operators should bear the cost. It also challenged the adjustment we proposed because there is uncertainty of the forecast costs over 40 years and there is an insufficient efficiency challenge.

ORR decision on CP1 and CP2 underfunding catch-up

5.30. We explained in the supplementary document to our draft determination setting out our financial framework findings why the forecast renewals costs have increased from the PR14 estimates, for example, due to the inclusion of delivery integrator costs. We have challenged the increases.

5.31. The escrow account was underfunded in CP1 and CP2 and this resulted in lower charges to operators. This underfunding arose because the estimates of the total costs of renewals in the past were lower than is now expected and in PR14 the increase in the renewals annuity was phased across CP2, CP3 and CP4. The adjustment to recover the underfunding means that operators will pay higher charges over the next four control periods. However, in our view this is necessary to ensure

that the escrow account contains sufficient funds for future renewals and that operators pay for the impact that their services have had on the HS1 infrastructure.

- 5.32. EIL's response did not specifically address the proposal to catch up to the appropriate escrow balance over the term of the Concession Agreement to align with the principle of "user pays" and to support inter-generational equity. We discuss the overall efficiency challenge in Chapter 4.
- 5.33. Arguably catching up over five years would be more appropriate than over 20 years. But, everything else being equal, this would add close to £16m per year to the renewals annuity, compared with our draft determination. We do not think this is appropriate given the impact on operators. So, by spreading the costs over 20 years we think that we have addressed operators' concerns regarding the impact on them.
- 5.34. After considering respondents' views and for the reasons set out above, we have decided to include an adjustment of £1.2m per year for the CP1 and CP2 underfunding catch-up. HS1 Ltd has adopted this approach in its November 5YAMS, so we are approving this issue.
- 5.35. Our decision on the CP1 and CP2 underfunding catch-up adjustment of £1.2m per year, is linked to our decision on the escrow balance adjustment of £0.4m per year. This is because, in our calculation of the escrow balance adjustment, we have taken account of the CP1 and CP2 underfunding catch-up adjustment.

Escrow balances

- 5.36. In PR14, the charging model was calibrated so that there was a zero escrow balance at the end of the 40-year planning period. When HS1 Ltd used that approach for PR19, it meant that in the May 5YAMS, there were some years in CP9 and CP10 when the balance on the escrow account would be below zero (that is, there would not be enough money in the account to fund renewals work²¹). However, HS1 Ltd could possibly finance renewals work in these years itself and be repaid through access charges. In its May 5YAMS, HS1 Ltd assumed that it would finance the deficits at its cost of capital, which added around £12m to the cost of the renewals annuity over the 40-year period.
- 5.37. By considering this issue when we are setting charges every five years, we can avoid this situation happening. And we think that we should adjust charges as soon as we are aware of the problem, to ensure that charges are as smooth as possible. So, in

²¹ The Concession Agreement prohibits withdrawals from the escrow account which would make it overdrawn.

our draft determination, we proposed a £0.4m per year adjustment to the renewals annuity.

- 5.38. HS1 Ltd now supports our view that the forecast of the escrow account should not have years where there is not sufficient money in the account to fund renewals expenditure.
- 5.39. In its response to our draft determination, EIL stated that it views the build-up of escrow balances in excess of £100m as inefficient. It also challenged the equity of today's operators paying for potential future operators' use and building a positive balance in the last two control periods. Southeastern also challenged the escrow account approach stating it should target a zero balance at the end of 2040, after which it might be appropriate to move to a steady state Regulatory Asset Base²² (RAB) amortisation approach.
- 5.40. In broad terms, there are in effect three ways of calibrating the charging model: allow the balances on the escrow account to go below zero in some years, set an escrow balance target such as £100m, or use the principle that the escrow account balances do not go below zero. We considered in our draft determination, that the latter choice is a reasonable compromise, which reflects the uncertainty of forecasting expenditure and escrow account balances for 40 years and allows sufficient flexibility for higher and lower escrow balances according to the forecast renewals.
- 5.41. For example, we recognise that the forecasts for the end of CP6 and the beginning of CP7, currently show below average expenditure leading to an escrow balance which stays above £140m for two control periods. As more accurate expenditure forecasts are produced for these control periods in the future, we will need to take a view on whether the higher escrow balances are necessary to fund upcoming control periods and prevent large renewals annuity increases in the future.
- 5.42. It is not clear why EIL has selected £100m as the reference point for its view and its comments do not address two key points:
- (a) the balance on the escrow account and the relationship with the amount of future renewals spend, to ensure there are sufficient funds in the escrow account for the current control period and at least some of the next control period. For example, for CP4, renewals expenditure is forecast to be around £117m, which is in excess of £100m. And expenditure for CP3-6 is forecast to

²² The Regulatory Asset Base approach has a value for the asset, and requires customers to pay the infrastructure manager for the use of the asset through depreciation of the asset and the associated financing costs (including borrowing costs and a rate of return on equity).

be £434m, so the renewals annuity needs to be able to meet this expected expenditure and provide a suitable positive balance for CP7; and

- (b) in order to benefit from the advantages of smoothing charges, there needs to be a mechanism such as an escrow account in place. If the amount in the account is limited, the charges will not be as smooth²³. As a comparison to the balance of £100m, if a RAB approach was used to fund the forecast £1bn of renewals over the 40-year period, instead of an escrow account, then the average RAB balance, in simple terms, could be around £500m.

5.43. In addition, we consider that EIL's response misunderstands the purpose of the renewals annuity, that is, today's operators are not paying for potential future operators' use. Instead, today's operators are paying for the impact their services have on the asset. But the work to renew the asset as a result of running today's services, is most efficiently carried out in the future.

5.44. In response to our December 2019 consultation, EIL challenged again the forecast escrow balances between CP3-10. It thought they were too high and would represent an inefficient use of capital. It also thought that the balance at the end of CP10 should be zero and did not think we should calibrate the charging model to avoid zero balances. It referred to a £60m balance at the end of CP10, saying that it should not be used to fund work deferred until after CP10.

5.45. It also compared the returns needed by EIL for investment projects (at least 7.22%) and the returns HS1 Ltd was projecting on authorised investments (1.22%) in its May 5YAMS.

ORR decision on escrow balances

5.46. The new forecast escrow balance is £65m at the end of CP10. This balance is theoretical, not a target. It is a result of the modelling assumption to avoid escrow balances being below zero²⁴. The renewals annuity is calculated on the average cost over 40 years and course-corrects²⁵ with each periodic review²⁶.

²³ For example, in a situation where the escrow balance is already £100m at the start of a control period and expenditure is forecast to be relatively low in the next five-year control period (say £10m per year), but then £20m per year for the next 35 years. Then the charges in the first control period would need to be £10m per year and they would then need to rise to £20m, assuming an escrow balance of £100m is still appropriate.

²⁴ We think that in its response to our December 2019 consultation, EIL has partly misunderstood what we said in the draft determination about the forecast escrow balance at the end of CP10. We were just pointing out that the balance could be used to pay for the work deferred from CP3-10, which would be consistent with the user pays principle. We did not target this.

²⁵ In other words, the new 40-year forecast will correct for any historical underfunding or overfunding.

²⁶ We are using the 40-year forecasts to inform the calculation of charges in CP3. Ultimately, we are setting charges in CP3, not CP4-10.

- 5.47. The underfunding (in CP1 and CP2) and the negative escrow adjustments are necessary for the next 20 years to ensure the user pays for its use of the HS1 network and just as importantly to smooth the renewals annuity²⁷, which we have assumed is at the same level for 40 years.
- 5.48. The position on escrow balances is clearer for the next 20 years than for 20-40 years' time, as we are making the adjustment for underfunding in CP1 and CP2 over 20 years, and the negative escrow balances that were forecast in the May 5YAMS, were towards the end of the 40-year period. The two adjustments need to be considered together as they are both necessary to maintain sufficient funding for renewals in the 40-year period, as a result of the services provided by operators in CP1 and CP2 or in the following 40-year period. For the first 20 years, the £1.6m per year of adjustments address the issues of CP1 and CP2 underfunding and prevents below zero escrow balances. For the last 20 years, there is also £1.6m per year needed to address the negative escrow balances issue²⁸.
- 5.49. The purpose of the escrow account is to smooth charges, provide guaranteed funding for renewals and to ensure the user pays for its use of the asset. As we set out in our draft determination, we think the modelling assumption should be consistent with having sufficient funds for the forecast renewals expenditure. So, we think that the main issue is when to adjust charges. EIL want us to wait before adjusting charges as the forecasts are uncertain, whereas HS1 Ltd agree that we should adjust charges for CP3 to better smooth them.
- 5.50. In terms of certainty (we discuss EIL's views on certainty above); we know that at the end of CP2, the escrow account would have been £85m higher if CP1 and CP2 were adequately funded, we also know that allowing the current modelling method to continue, will mean that in some years the escrow account balances would be below zero with associated costs for operators. By making adjustments in CP3 we are taking action to address these known funding challenges, and this better reflects the Concession Agreement requirements, and so is reasonable in the circumstances.
- 5.51. After considering respondents' views and for the reasons set out above, our decision is that HS1 Ltd should not forecast negative escrow balances in the calculation of the renewals annuity and an adjustment of £0.4m per year should be included. HS1 Ltd

²⁷ The way we have calculated the £0.4m adjustment is that the charging model shows that there is an adjustment needed of £1.6m per year to avoid negative escrow balances. But we have already increased the renewals annuity by £1.2m per year for underfunding in CP1 and CP2, so we just need to adjust by £0.4m per year for CP3.

²⁸ The effect of the adjustments is that the escrow balance at the end of CP3, is higher in total by £8m. This compares to the £85m of underfunding at the start of CP3 and a forecast balance on the escrow account at the end of CP10 of £65m. The majority of the balance at the end of CP10 builds up a long time after CP3 and after the end of the Concession Agreement.

has changed its modelling approach to meet this requirement. Therefore, we approve the November 5YAMS on this issue.

5.52. The issues that EIL has raised are important for how the charging model works in the future. This is because, as the escrow account becomes better funded, the balances will increase. We have adequately addressed these issues in PR19, especially as the escrow account is currently underfunded by £85m, but we will consider them further in PR24.

5.53. This will require a clearer view of expenditure across the 40-year period, the number of years the escrow balances should cover, the resulting escrow balances, the overall level of the renewals annuity and charges for each control period, and how the individual elements interact.

5.54. We discuss interest rates in Chapter 6, but EIL has raised a point in relation to the efficiency of capital and a comparison with the interest rates earned on the escrow balances, which we address here. The difficulty is that EIL is not comparing like with like. The return on authorised investments (deposits and bonds) that we are using in the renewals annuity modelling for CP4-10 is 2.5% not 1.22%. These returns are lower than an internal cost of capital, as the risks of internal investment projects are higher, for example, there can be cost shocks that would need to be funded. For that reason, investments like that are not allowed by the Concession Agreement, as the funds are to be held in relatively safe investments, to ensure there is funding available for future renewals.

Risk and contingency assumption

5.55. Assumptions for financial risk are included in expenditure to cover the possibility of costs being higher than expected. This is risk and contingency funding.

5.56. In its May 2019 5YAMS, HS1 Ltd proposed a risk and contingency estimate of 26.25% for CP3 renewals costs. However, in our draft determination, we considered that 13% was an appropriate risk and contingency estimate for CP3. We also used the 13% risk assumption for CP4-10²⁹. This was because, although the projects in those control periods may become more complex than the ones in CP3, HS1 Ltd will improve its knowledge of the asset base over time. As time passes, the projects in CP4-10 will be less uncertain than they are now and its assessment of risk will improve as it gets closer to each new control period.

²⁹ HS1 Ltd's risk and contingency assumption for CP4-10 was 30%.

- 5.57. In response to our draft determination, HS1 Ltd has worked with NR(HS) and has now proposed a revised risk and contingency assumption for renewals in CP3 and for CP4-10 of 12.6% per year³⁰.
- 5.58. As noted previously in Chapter 4, this is on a P50 basis for the portfolio of projects, rather than for each individual project. This assumes that 50% of expenditure estimates are below the actual expenditure and 50% of expenditure estimates are higher³¹.
- 5.59. EIL strongly supported our assumption of 13% for risk and contingency, and that HS1 Ltd is incentivised to improve asset knowledge.
- 5.60. After reflecting on the use of P50 rather than P80 with HS1 Ltd and NR(HS), we have concluded that using P50 is a better approach for the renewals annuity. This is because we are forecasting expenditure over 40 years to calculate an average level of expenditure, rather than providing a specific amount of money to fund a particular project with sufficient risk and contingency, so that the project does not spend more than the estimate. So, we approve HS1 Ltd's use of a P50 method for calculating risk and contingency.
- 5.61. As set out in Chapter 4, we recognise that HS1 Ltd's latest analysis provides a risk and contingency assumption for CP3 and CP4-10 of 12.6% of costs.
- 5.62. HS1 Ltd's risk analysis for CP3 (undertaken by NR(HS)) includes an assumption that total inflation will be on average 3.2%. This is 0.45%³² above its general inflation assumption (retail prices index (RPI) inflation) of 2.75%, so this is HS1 Ltd's assumption for incremental input price inflation in CP3³³. However, in our review of the CP4-10 cost inputs to the renewals annuity calculation, we could not see an assumption for incremental input price inflation. This issue could have been considered in either the risk and contingency assumption or the efficiency assumption. Based on our review we have concluded that HS1 Ltd has not taken incremental input price inflation into account for CP4-10.
- 5.63. Although it is difficult to determine an incremental input price inflation assumption, we note HS1 Ltd's assumption of 0.45% above RPI for CP3 and that Network Rail

³⁰ Using 12.6% instead of 13% for CP3-10 lowers the renewals annuity by less than £0.1m per year compared to our draft determination.

³¹ The underlying estimates in the November 5YAMS are produced on the basis that all the work is delivered precisely on budget. In practice, that is not going to happen. So, to calculate the average expenditure including risk and contingency, it is necessary to make a risk adjustment such as the P50 risk adjustment.

³² We note that using recent data from the construction price index gives similar results.

³³ This is the inflation faced by the company compared to a level of general inflation such as RPI or the Consumer Prices Index (CPI).

Infrastructure Limited's assumption for our PR18 determination was around 0.5% on average above RPI³⁴ for the five years of its Control Period 6 (1 April 2019 - 31 March 2024). We consider that these factors are appropriate evidence for PR19. However, our renewals annuity assumption is for a 40-year period, which is more uncertain.

- 5.64. For CP4-10, the effect of incremental input price inflation is not included in HS1 Ltd's calculation of the renewals annuity, so we were minded to determine that the 13% risk and contingency assumption from our draft determination should be used. This provides some leeway for incremental input price inflation and recognises that deciding on a risk and contingency assumption over a long time period is not a precise science. The impact of this is an increase in the renewals annuity of less than £0.1m per year compared to HS1 Ltd's November 5YAMS.
- 5.65. In response to our consultation in December 2019, HS1 Ltd and Southeastern supported our minded to decision regarding risk and contingency.

ORR decision on risk and contingency in the renewals annuity

- 5.66. As set out in Chapter 4, we have decided to approve the use of a 12.6% risk and contingency assumption for CP3.
- 5.67. We have taken into account respondents' views regarding risk and contingency. For the reasons set out above, we have determined that 13% per year is the most appropriate risk and contingency assumption for CP4-10.
- 5.68. It should also be noted that the periodic review process means that as new data become available, we are able to adjust funding for risk and contingency every five years. So, we agree with HS1 Ltd's suggestion that it will review actual risks in CP3, with the intention of producing a better evidence base for PR24. Our monitoring and reporting of HS1 Ltd will aid this process.

Frontier shift assumption

- 5.69. In our draft determination, we reviewed HS1 Ltd's assumptions for efficiency and productivity, and our conclusion was that they were not sufficient (that is, expenditure was too high). This was based on our view that whole economy and technology productivity (frontier shift) was not included in the May 5YAMS. We considered that

³⁴ Our [PR18 Financial Framework Supplementary document](#) explains the switch from RPI to CPI in our determination. Network Rail Infrastructure Limited's plans included an incremental input price inflation factor of around 0.5 percentage points.

an additional 0.5% per year should be assumed for CP4-10, which would reduce the renewals annuity by around £2.6m per year³⁵, compared to the November 5YAMS.

5.70. HS1 Ltd has included the 0.5% frontier shift as an “efficiency overlay” in its November 5YAMS but said that it was disappointed that we deemed the proposed productivity improvements in its plans to be insufficient.

5.71. DfT questioned whether our efficiency overlay was “stretching, yet realistic”.

5.72. EIL was disappointed at the levels of efficiency savings proposed for the frontier shift. It provided examples of higher efficiency and frontier shift assumptions for Network Rail Infrastructure Limited, DfT’s review of HS1 station funding for CP3, and other regulators to support its argument.

ORR decision on frontier shift

5.73. We have reviewed the November 5YAMS to check that costs included in the renewals annuity calculation take account of the efficiencies identified by Bechtel in its CP4-10 deliverability work for HS1 Ltd. Our conclusion is that the unit rates used by Bechtel included an element of efficiency by asset type, which then fed through to the renewals annuity. However, an estimate of the whole economy and technology productivity (frontier shift) over 40 years was not included and we consider that it should have been.

5.74. Part of the reason that EIL identified some higher frontier shift assumptions was that some of them were for operating costs or for total costs³⁶, where the frontier shift would normally be higher than for renewals, which is the type of expenditure that we are considering here. The most comparable assumption by other regulators was the 0.7% per year applied by Ofgem³⁷ for capital expenditure between 2011-12 and 2020-21.

5.75. We are applying a frontier shift over 35 years, not for the shorter periods that other regulators usually consider, which means it is reasonable to take a relatively cautious approach.

5.76. After considering respondents’ views and for the reasons set out above, we are approving the November 5YAMS for this issue, as HS1 Ltd has included a frontier shift assumption of 0.5% per year for CP4-10.

³⁵ As explained above this should have been £2.9m per year.

³⁶ Total costs are operating costs and capital costs.

³⁷ Revenue, Incentives, Innovation and Outputs - National Grid Electricity, National Grid Gas, and Gas Distribution Networks price control - [Ofgem RIIO-T1/GD1 appendix on real price effects and ongoing efficiency](#)

ORR overall renewals annuity decision

5.77. As set out above and in Chapter 4, HS1 Ltd has made some changes in its November 5YAMS to address the deficiencies identified in our draft determination. But it has not appropriately addressed all the issues we raised and therefore we are determining the renewals annuity. Our adjustments to implement this are detailed in this document and summarised in Table 5.2 below.

Table 5.2 Summary of changes to the renewals annuity (per year)

	Renewals annuity £m	Reference
ORR draft determination	26.1	
ORR 10% renewals volume reduction (5.2% cost reduction) not included by HS1 Ltd	1.5	Chapter 4 and Table 5.1
HS1 Ltd used different interest rates to our draft determination for CP3 and CP4-10	0.5	Chapter 6
Correction of frontier shift application	(0.3)	Chapter 5
HS1 Ltd November 5YAMS	27.8	
ORR 10% renewals volumes reduction (5.2% cost reduction) included by ORR	(1.5)	Chapter 4 and Table 5.1
ORR interest rate and allocation of funds assumptions	(0.4)	Chapter 5
ORR final determination	25.9	

5.78. The asset management decisions are summarised in paragraph 5.25 and are explained in Chapter 4. The changes to the interest rate assumptions are included in Chapter 6. The only change to the renewals annuity that we have determined in this chapter is that we have decided that HS1 Ltd should use a risk and contingency assumption of 13% for CP4-10. The impact of this is an increase in the renewals annuity of less than £0.1m per year compared to HS1 Ltd's November 5YAMS.

5.79. We have considered the impact of our decisions on the renewals annuity on operators in our assessment of charges (see Chapter 7). Any impact on operators needs to be balanced against HS1 Ltd's ability to recover the efficient costs of operating, maintaining and renewing its network. Based on the evidence provided to us, and taking into account the requirements of the Concession Agreement, we consider our determination achieves this balance.

5.80. Based on the above decisions and after considering respondents views, ORR's decision on the level of the renewals annuity, is that it should be £25.9m per year. This produces forecast escrow balances of £118m at the end of CP3, £140m at the end of CP6 and £65m at the end of CP10. The £25.9m per year is a £0.1m per year increase compared with the £25.8m per year in our draft determination (after the efficiency overlay adjustment correction).

6. Other financial framework issues

Introduction

6.1. This chapter covers the other financial framework issues: the cost of capital, interest rates and allocation of funds, inflation, outperformance, Ripple Lane exchange sidings and the expenditure summary.

Cost of capital

6.2. In PR19, the importance of the cost of capital for the renewals annuity calculation is reduced as we recognise that it is not efficient for the escrow account to have insufficient funds in it to pay for renewals expenditure in some years, so we do not use the cost of capital in the modelling of the renewals annuity.

6.3. However, it can still be important as it is taken into consideration in the assumptions for financing specified upgrades. In its November 5YAMS, HS1 Ltd has assumed a weighted average cost of capital (WACC) of 5.1% on a nominal vanilla basis³⁸.

6.4. In response to our draft determination, HS1 Ltd said that it did not expect the cost of capital to be relevant in CP3 because there are not negative balances in the renewals annuity calculation and it is not planning to undertake any specified upgrades in that control period. In its November 5YAMS, HS1 Ltd has said that it would expect to finance any small projects in CP3 using its operating revenue. In addition, HS1 Ltd also said it would produce a more detailed assessment of a WACC for small-scale investments for CP3 for ORR to review and endorse.

ORR decision on cost of capital

6.5. For larger projects such as ETCS, we agree with HS1 Ltd that a project-specific cost of capital should be used, not a general cost of capital. We also agree that the WACC should have limited significance for CP3.

6.6. We consider 5.1% to be a broadly reasonable estimate for CP3, given market information and that it is broadly comparable to other regulators cost of capital assumptions.

6.7. The November 5YAMS does not include any proposals for HS1 Ltd to undertake projects in CP3 which require a WACC. In the event that HS1 Ltd proposes to undertake specified upgrades or additional renewal projects during CP3, for which a

³⁸ The vanilla WACC is calculated using a pre-tax cost of debt and post-tax cost of equity, weighted by gearing.

WACC is required, HS1 Ltd will need to submit proposals, including a suitable cost of capital, to ORR, in accordance with the Concession Agreement requirements.

- 6.8. For PR24 and future reviews, with potentially more projects, we will require more detailed analysis of the cost of capital in the 5YAMS.

Interest rates and allocation of funds

- 6.9. In this section of the document, we consider for both CP3 and CP4-10, the assumptions for the average interest rates on both the current account, and on authorised investments³⁹ (deposits accounts, AAA-rated bonds or government bonds) and the allocation of funds between them. These assumptions are used to forecast the renewals annuity and escrow balances over the 40-year period in the charging model.
- 6.10. HS1 Ltd can place escrow funds in a current account or in authorised investments. In the supplementary document to our draft determination setting out our financial framework findings, we considered HS1 Ltd's interest rate assumption of 1.22% on authorised investments in CP3 to be too conservative (for example, it did not plan to invest in bonds) and said it needed to be more forward-looking. We assumed a 2.5% average interest rate for authorised investments between CP3 and CP10, which reduced the May 5YAMS proposed renewals annuity by £0.9m. However, we used HS1 Ltd's assumption of a 0.70% interest rate for the current account for CP3-10, and its assumption of the proportion of the escrow balance that would be in the current account (20%) versus the amount in authorised investments (80%).
- 6.11. In our calculations for CP3-10, we assumed that the average interest rate on authorised investments (2.5%⁴⁰) will be below the expected level of inflation (2.75%). This is historically an unusual position, but our assumption was based on market expectations⁴¹.
- 6.12. Unlike other areas of our final determination, in the financial framework, we need to assume what will happen to the concession/escrow arrangements after the current arrangements end. This is difficult as it is a decision for DfT, not ORR. For the purposes of this determination, we have assumed that the current Concession Agreement arrangements continue. But we recognise that in practice, if interest rates

³⁹ Authorised investments are made in accordance with paragraphs 5.1.1 and 5.1.2 of Appendix 1 to the Concession Agreement.

⁴⁰ In our draft determination, our view of the risk-free rate and the historical spread analysis resulted in an interest rate assumption of 2.8% for investments in AAA-rated corporate bonds for the next 20 years. However, we were aware that HS1 Ltd will not place all of the funds in bonds, as some will be on deposit and some will be in the escrow account. So, taking account of this, we assumed an average interest rate of 2.5%.

⁴¹ By assuming inflation is higher than interest rates, the cost of the renewals annuity is increased.

continue to be lower than inflation, it is possible that the arrangements would be reviewed. So, this is one reason why we do not think that it is appropriate to just use market data without considering the wider context.

- 6.13. In its response to our draft determination, HS1 Ltd considered that our draft determination average interest rate assumption of 2.5% for authorised investments was too high for CP3 and for CP4-10.
- 6.14. HS1 Ltd has not revised its CP3 assumptions for interest rates. However, it has now assumed that it would have 90% of the balance on deposit, with 10% in a current account.
- 6.15. In its November 5YAMS, for CP4-10, HS1 Ltd reviewed more recent market data on forward interest rates (based on market data on 17 September 2019) for 30 years (covering 2019-2049). Subsequently, it then proposed a new interest rate assumption for CP4-10 of 1.92% for its authorised investments. This assumption is based on an interest rate for bonds and there is no adjustment to recognise that some of the authorised investments will be held in deposits that will earn a lower return. HS1 Ltd also changed its assumption of where the money is held. It is now proposing that 90% of the escrow balance will be held in authorised investments, and 10% in the current account. These changes for CP4-10, result in an increase in the renewals annuity of £0.5m per year, compared with our draft determination.
- 6.16. In response to our draft determination, HS1 Ltd did not revise its interest rate assumption for CP3, for example, by using more recent market rates. HS1 Ltd has also said that the operators have agreed its investment strategy, which does not involve investing in bonds⁴². Therefore, we were minded to approve the November 5YAMS proposal for this issue, that is, a 0.70% interest rate assumption for the current account and 1.22% for authorised investments.
- 6.17. HS1 Ltd assumed in its November 5YAMS that in CP3 it would have 90% of the balance on deposit (an authorised investment), with 10% in a current account. But insufficient justification was provided to support this change from the May 5YAMS. So, we were minded to determine that the allocation should be 80% of the balance on deposit, with 20% in a current account, as that was the assumption in the May 5YAMS and proposed in our draft determination. We would expect HS1 Ltd to make efficient investment decisions, within the constraints of the Concession Agreement (which may be a 90% allocation to authorised investments).

⁴² We note that HS1 Ltd has consulted with operators and DfT on its CP3 investment strategy. We consider that DfT and operators have agreed the maximum authorised investments, rather than the average.

- 6.18. The effect of our changes to the CP3 assumptions, compared to our draft determination, would be a £0.1m per year increase in the renewals annuity. Compared to the November 5YAMS it would be a less than £0.1m per year increase.
- 6.19. Overall, we are not persuaded by HS1 Ltd's revised proposal for CP4-10⁴³ of an average 1.92% interest rate for authorised investments. As indicated previously, this is based on a forward curve for bonds, so does not take account of funds held in deposits. It has also not explained why it is using market data on 17 September 2019, in particular why it thought that the forward curve on that day was appropriate to be used for its calculation over a 35-year period. For example, it could have considered taking an average of the forward curve used in the May 5YAMS and the one on 17 September 2019, or explained why that day was a good estimate for the next 35 years.
- 6.20. The proposal to have 90% of the escrow balance in authorised investments is permitted by the Concession Agreement⁴⁴. However, HS1 Ltd has not provided evidence of why this is an appropriate assumption for the 35-year period for CP4-10 and how it will invest in bonds or the allocation between the types of authorised investments.
- 6.21. We considered the more up-to-date (17 September 2019) forward yield curve for interest rates for CP4 onwards provided by HS1 Ltd, but noted that yield curves are constantly changing, so using one on a particular day as the basis for a 40-year assumption, is unlikely to be appropriate.
- 6.22. Ultimately, the main issue for our interest rate assumptions, is that we are forecasting interest rates over a very long period of time, at a point when financial markets are in a historically unusual situation, for example, the interest rate forecasts are below the forecast level of general inflation. HS1 Ltd has not considered in its response, or in the November 5YAMS, how these strategic issues affected its proposal. It has also not fully considered how its investment strategy could be adjusted to obtain more appropriate returns.

⁴³ The main change in HS1 Ltd's proposal is that the November 5YAMS has an interest rate for authorised investments of 1.92% instead of 1.22%. It also assumes that 90% is in authorised investments instead of 80%.

⁴⁴ The limit on authorised investments is 90%.

6.23. For the reasons set out above and in our draft determination and after considering respondents views, we were minded to determine for CP4-10:

- (a) that for authorised investments, the average interest rate for CP4-10 should be 2.5% (unchanged from our draft determination), which would reduce the renewals annuity contained in HS1 Ltd's November 5YAMS by £0.6m per year;
- (b) for the current account, we should retain the 0.70% assumption we used in our draft determination, which is also the assumption in the November 5YAMS; and
- (c) we should also retain the assumption that 80% of the escrow account is held in authorised investments and 20% in a current account. This is because we recognised that the allocation over 40 years is uncertain, as in some control periods a 90%/10% split may be appropriate, while in other control periods, having less money in authorised investments may be better, so on average we considered that a split of 80%/20% was appropriate. This would increase the renewals annuity contained in HS1 Ltd's November 5YAMS by just under £0.2m per year.

6.24. In its response to our December 2019 consultation, HS1 Ltd stated its view that it provided sufficient justification for its assumptions on interest rates and the proportion of the escrow balance allocated to authorised investments or the current account. It also referenced the agreement with DfT that allows it to invest up to 90% of the escrow balance in authorised investments. Southeastern stated that it had no objections to our proposals for interest rate assumptions or authorised investment allocations for CP3 and CP4-10.

ORR decision on interest rates

6.25. HS1 Ltd has not provided information that improves its justification for its assumptions on interest rates, or the proportion of the escrow balance allocated to authorised investments or the current account. We understand that the Concession Agreement contains a cap of 90% in relation to the amount of money invested in authorised investments but we need to forecast the average balance not a maximum.

6.26. So, for the reasons set out above and in our draft determination and after considering respondents' views, we have maintained our decisions to approve the 1.22% interest rate for authorised investments in CP3 and determine an average 2.5% interest rate for authorised investments for CP4-10. For the current account, we have maintained our decision to approve the 0.70% interest rate assumption for CP3-10. We have also decided to determine the 80% / 20% allocation between authorised investments and the current account in CP3-10.

6.27. However, we do recognise that the Concession Agreement gives HS1 Ltd the flexibility to invest up to 90% of the escrow balance in authorised investments. The rules on this are set out in the Concession Agreement. We would expect HS1 Ltd to make efficient investment decisions, within the constraints of the Concession Agreement (which may be a 90% allocation to authorised investments).

6.28. Table 6.1 below, summarises for both CP3 and CP4-10, the average interest rate assumptions on both the current account and on authorised investments and the allocation of funds between them.

Table 6.1 Summary of average interest rates and allocation of funds

	CP3		CP4-10	
	HS1 Ltd	ORR	HS1 Ltd	ORR
Current account				
- Average interest rate	0.70%	0.70%	0.70%	0.70%
- Average allocation	10%	20%	10%	20%
Authorised investments				
- Average interest rate	1.22%	1.22%	1.92%	2.5%
- Average allocation	90%	80%	90%	80%

6.29. During CP3, we will monitor the returns HS1 Ltd makes on authorised investments and the current account. For PR24, we will further review the interest rate and other financial assumptions used to calculate the renewals annuity. We are particularly aware of the uncertainty about long-term interest rates.

Inflation

6.30. HS1 Ltd's RPI general inflation forecast in the November 5YAMS is 2.75%⁴⁵. The basis of this number is the Bank of England's 2.00% CPI forecast, plus an additional 75 basis points to bring it into line with RPI. The Bank of England's inflation report for August 2019⁴⁶ forecasts out to Quarter 3 of 2022. Based on the CPI projections that appear in Chart 5.3 of that report, we concluded in the draft determination that a 2.00% CPI inflation rate appeared to be in line with, but on the downside of, a reasonable forward-looking estimate. We also considered that a 75 basis points assumption to bring the estimate into line with RPI is broadly consistent with our historical analysis.

⁴⁵ [HS1 Ltd November 5YAMS](#), page 55.

⁴⁶ [Bank of England Monetary Policy Committee Report on Inflation, August 2019](#)

6.31. In response to our draft determination, EIL stated that the renewals annuity calculation should be based on CPI not RPI. This is because it thinks that the use of RPI in other areas of HS1 Ltd's activities is not a sufficient reason to retain it for renewals and a transition precedent was set in PR18.

ORR decision on inflation

6.32. There are some benefits from using CPI for the inflation index as it is a more robust general inflation index but we should not consider general inflation in isolation from input price inflation.

6.33. EIL noted that for Network Rail Infrastructure Limited in PR18, we changed the inflation index we use to CPI. However, that change was neutral for Network Rail Infrastructure Limited, as we also adjusted our incremental input price inflation adjustment accordingly because it had been initially calculated with reference to RPI. The only effect was to change the profile of charges, so that the Year 1 charge was higher and the expected increases each year were lower.

6.34. Our above decisions on incremental input price inflation are with reference to RPI. If we changed our inflation index to CPI, we would need to include an incremental input price inflation adjustment for CP4-10 and adjust the assumption for CP3 (also taking into account our decisions on risk and contingency), as it is unlikely that a 2.00% yearly inflation assumption would be appropriate. So, overall HS1 Ltd would be neutral to the change but charges would be higher in Year 1, when they are already increasing.

6.35. Also, making changes in some areas but not others could cause confusion. This is another difference to Network Rail Infrastructure Limited, where in PR18 we changed the inflation index for all costs at the same time. Whereas for HS1 Ltd, it is only renewals that would change, as the index used for operations and maintenance, is set as RPI by existing contractual arrangements.

6.36. For CP3, after considering respondents' views and for the reasons set out above, we are approving the use of RPI as the inflation index and that a RPI assumption of 2.75% is appropriate.

Outperformance

6.37. In 2012, HS1 Ltd renegotiated the OA with NR(HS) to include an outperformance framework for operations and maintenance, whereby operators will receive 30%, NR(HS), 50%, and HS1 Ltd, 20%, of any outperformance in the last three years of CP2 and CP3. HS1 Ltd and NR(HS) have told us that no outperformance was payable for the two applicable years so far (1 April 2017 – 31 March 2018 and 1 April

2018 – 31 March 2019). We note however that HS1 Ltd is still finalising the position with NR(HS) for 1 April 2018 – 31 March 2019.

6.38. In addition to this, the Concession Agreement contains an outperformance mechanism for sharing renewals efficiencies. Outperformance on renewals can be assigned 70% towards future renewals (that is, retained in the escrow account) and 30% to HS1 Ltd. Whether any payments arise in accordance with this mechanism, is dependent on us determining that HS1 Ltd has outperformed against plans set out in its 5YAMS (in this case the approved PR14 final 5YAMS) and the escrow account balance being at the level necessary for HS1 Ltd to comply with its General Duty in so far as it relates to renewals. As part of a periodic review, we must review these percentages.

6.39. Stakeholders did not comment on outperformance.

ORR decisions on outperformance

6.40. For renewals, HS1 Ltd did not report outperformance in its November 5YAMS and we consider the escrow account to be underfunded at the moment. As a result, there is no sharing of efficiencies in this final determination.

6.41. In isolation, we consider that the percentage shares in the renewals outperformance mechanism are broadly consistent with other similar mechanisms and can provide a reasonable way of sharing outperformance. So, we have decided to retain them for PR19.

6.42. But given the way financial risk is dealt with in the Concession Agreement, and the incentive issues we have identified in this document and in our Escrow discussion document⁴⁷, we think that in the future we will consider how the incentive works in conjunction with the other incentives on HS1 Ltd.

Ripple Lane exchange sidings

6.43. We recognise that freight customers and HS1 Ltd were in agreement that the Ripple Lane assets should be transferred to Network Rail Infrastructure Limited as it manages the facility.

6.44. We also asked Network Rail Infrastructure Limited for its view on the issue: while it has no objection in principle to such a transfer, it notes that the change would require revisiting the funding for its Control Period 6 to allow it to absorb the income loss of

⁴⁷ [Discussion document: HS1 Escrow arrangements](#), 12 July 2019.

the current maintenance contract; and the putting in place of connection contracts between HS1 Ltd and third parties.

6.45. We have been informed by DfT since our draft determination that it is considering whether the Ripple Lane assets should be transferred. In the event that a transfer of these assets happens during CP3, we would consider whether this change would trigger an interim review under Schedule 10 to the Concession Agreement.

Expenditure summary

6.46. In this section, we provide our PR19 expenditure assumptions, which are the basis for the charges set out in Chapter 7.

6.47. The starting point for charging is the expenditure incurred for operating, maintenance and renewals, shown in Table 6.2. The operating, maintenance and renewals charges (OMRCs) include payment of: HS1 Ltd costs (line 3 in Table 6.2), the total NR(HS) costs (line 11)⁴⁸, pass-through costs (line 12), freight-specific costs (line 13) and R&D costs (line 14). Line 15 is the forecast renewals costs, as explained in Chapter 4.

6.48. All freight-specific costs are included in line 13. As well as the freight-specific operations and maintenance costs, they include costs incurred for Ripple Lane and dedicated HS1 Ltd resource.

6.49. Traction electricity costs (line 17) are recovered separately through a separate charge.

6.50. Table 6.3 shows how the forecast expenditure is converted into the expenditure that is used to calculate charges for HS1 Ltd. The main adjustment is the inclusion of the renewals annuity instead of the renewals costs.

⁴⁸ An Operator Agreement uplift of 1.1% for input price inflation ('escalation' (line 9)) is added to the Annual Fixed Price contract paid to NR(HS) to arrive at the total NR(HS) cost (line 11). There is also an adjustment on line 10 to assign freight-specific operating and maintenance costs to passengers and freight operators.

Table 6.2 ORR assessed total HS1 Ltd expenditure for CP3

(£m, February 2018 prices)	2020-21	2021-22	2022-23	2023-24	2024-25	CP3 Total	Reference
HS1 Ltd							
(1) HS1 subcontract costs	3.7	3.7	3.8	3.8	3.8	18.7	Table 4.5/ORR FD
(2) HS1 internal costs	7.9	8.2	8.6	8.5	8.0	41.2	Table 4.5/ORR FD
(3) Total HS1 Ltd costs	11.6	11.9	12.4	12.3	11.8	59.9	
NR(HS)							
(4) Total operations and maintenance costs	37.0	36.9	36.2	36.0	35.4	181.5	Table 42/Nov 5YAMS
(5) Management fee	3.0	3.0	2.9	2.9	2.8	14.5	Table 42/Nov 5YAMS
(6) Contract risk premium	1.6	1.6	1.6	1.6	1.5	7.9	Table 42/Nov 5YAMS
(7) Outperformance	-	-	-	-	-	-	
(8) NR(HS) (Annual Fixed Price)	41.6	41.5	40.7	40.4	39.7	203.9	Table 42/Nov 5YAMS
(9) Escalation (1.1% uplift)	0.5	0.5	0.4	0.4	0.4	2.2	Table 43/Nov 5YAMS
(10) Freight-specific operating and maintenance costs ⁴⁹	-0.1	-0.1	-0.1	-0.1	-0.1	-0.5	Table 43/Nov 5YAMS
(11) Total NR(HS) costs	42.0	41.8	41.0	40.8	40.1	205.7	Table 4.6/ORR FD
Other costs							
(12) Pass-through	18.9	18.9	18.9	18.9	18.9	94.3	Table 4.5/ORR FD
(13) Freight-specific	0.3	0.3	0.3	0.3	0.3	1.6	Table 4.5/ORR FD
(14) R&D	0.4	0.4	0.4	0.4	0.4	2.0	Table 4.5/ORR FD
(15) Renewals	11.9	12.1	24.5	23.5	6.0	78.0	Table 4.12/ORR FD
(16) Total OM&R costs	85.1	85.4	97.5	96.2	77.5	441.5	
(17) Traction electricity	20.8	20.2	20.1	20.1	20.0	101.2	Table 51/Nov 5YAMS
(18) Total costs	105.9	105.6	117.6	116.3	97.5	542.7⁵⁰	

Source: HS1 Ltd's November 5YAMS and ORR analysis. Numbers might not add up due to rounding.

Table 6.3 CP3 expenditure funded by charges

(£m, February 2018 prices)	2020-21	2021-22	2022-23	2023-24	2024-25	CP3 Total	CP2 Total ⁵¹
Total costs (line 18 in Table 6.2)	105.9	105.6	117.6	116.3	97.5	542.7	458.3
Less: Renewals costs (line 15 in Table 6.2)	11.9	12.1	24.5	23.5	6.0	78.0	23.4
Add: Renewals annuity (Chapter 5)	25.9	25.9	25.9	25.9	25.9	129.5	62.7
Total costs funded by charges	119.9	119.4	119.0	118.7	117.4	594.2	497.6

⁴⁹ The freight-specific element is deducted from the NR(HS) costs to avoid double-counting as it is included in the other costs freight-specific total.

⁵⁰ Total operating and maintenance costs are £363.5m over CP3.

⁵¹ The numbers in this column have been uplifted from the price base used in PR14 to February 2018 prices to aid comparability.

7. Charging and incentives

HS1 Ltd's charging structure

- 7.1. A key aspect of the 5YAMS is the regulated track access charges that HS1 Ltd proposes to levy on passenger and freight operators for using its network. In general terms, infrastructure charges are usually designed to reflect the costs that they are intended to recover. In this way, charges can significantly influence the provision and use of the infrastructure. This in turn should drive efficient use of resources both in terms of existing infrastructure and the provision of new capacity, and provide incentives to reduce costs where possible.
- 7.2. In considering whether the November 5YAMS is consistent with HS1 Ltd's General Duty under the Concession Agreement, we have assessed whether the proposed charging structure is consistent with the Regulations. We also reviewed HS1 Ltd's proposals for the capacity reservation charge and the Carbon Reduction Commitment energy efficiency scheme. Finally, we considered HS1 Ltd's traffic forecasts, the proposals for the volume re-opener provisions, and the performance and possession regimes.
- 7.3. In reaching our draft determination, we sought to ensure that charges are cost-reflective and send the right signals to users to ensure the appropriate use of the HS1 network, and at the same time enable HS1 Ltd to recover its costs.
- 7.4. As part of our assessment for this final determination, we have considered the arguments put forward by HS1 Ltd and operators in response to our draft determination, and the November 5YAMS.
- 7.5. HS1 Ltd's charging framework was established in 2009, by the Secretary of State for Transport, in the Concession Agreement. HS1 Ltd is responsible for establishing the specific charging rules governing the determination of the fees to be charged in accordance with that charging framework and the Regulations. HS1 Ltd's operating, maintenance and renewals charges (OMRCs) seek to recover HS1 Ltd's operating, maintenance and renewals costs.
- 7.6. In PR14, HS1 Ltd classified categories "OMRCA1" and "OMRCA2" as direct costs, and recovered non-direct costs through "OMRCB" and "OMRCC" using the long-term cost exception. HS1 Ltd levies a separate pass-through charge for traction electricity. Passenger operators are charged all four categories of OMRC, whereas freight operators are charged only the elements of the charge related to costs incurred as a result of operating freight services (OMRCA1 and OMRCA2).

7.7. The OMRC categories include the following costs:

- a. OMRCA1: the variable costs, mainly track costs, reflecting wear and tear of additional trains on the common track;
- b. OMRCA2: the avoidable costs on a long-run incremental cost basis where the costs of infrastructure specific to a class of operator would be avoided (that is not required) in the event that a specific class of operator ceased operating services. An example, is the section of infrastructure from Ashford International to the Channel Tunnel, which is used only by international passenger operators;
- c. OMRCA3: common costs, which include head office costs and infrastructure costs that vary with the length of track but not the volume of traffic; and
- d. OMRCA4: pass-through costs. These are common costs that in the Concession Agreement are deemed to be largely beyond HS1 Ltd's control, such as insurance and business rates. For this category of cost, there is an annual wash-up process to adjust for differences between forecast and actual costs⁵².

7.8. For PR19, HS1 Ltd classified only category OMRCA1 as direct costs. It classified all other categories (including OMRCA2) as indirect costs.

Direct costs

7.9. Our draft determination identified one aspect of HS1 Ltd's current charging structure which we considered was not consistent with the relevant legislation. In its May 5YAMS, HS1 Ltd said that there was some uncertainty about whether per train-minute charges are permitted under the *Commission Implementing Regulation (EU) on the modalities for the calculation of the cost that is directly incurred as a result of operating the train service 2015/909* (the Implementing Regulation), although it concluded that it could continue to charge direct costs on that basis, as a result of a derogation set out in that legislation.

7.10. However, we considered that the Implementing Regulation should be interpreted as requiring direct costs for passenger operators to be levied on a per train-km basis⁵³ (as they are for freight operators) rather than on a per train-minute basis as HS1 Ltd currently charges. In its response to our draft determination, HS1 Ltd told us that this

⁵² Traction electricity is charged separately.

⁵³ Or on a vehicle-km or gross tonne-km of a train basis.

change does not affect the overall amount of costs recovered from existing operators.

7.11. Our interpretation of the relevant provisions in the Implementing Regulation, and our views on the applicability of the provisions set out in Article 5(2) and Article 6(1) to HS1 Ltd's charging structure are set out in our draft determination supplementary document on charging and incentives. Our draft determination concluded that HS1 Ltd had not provided sufficient evidence to support the application of either of those exceptions. We invited further representations from stakeholders on this issue.

Stakeholder responses

7.12. In its response to our draft determination, EIL disagreed with our interpretation of the Implementing Regulation, stating that it considered the way HS1 Ltd currently charges for direct costs to be consistent with Article 6 of the Implementing Regulation. It considered that our proposed approach took a very narrow view of economic incentives by focusing on short-term costs without taking account of wider requirements such as optimising high-speed rail.

7.13. Southeastern agreed with our interpretation that direct costs should be charged on a per train-km basis both in response to the legislation and in the interests of fairness and consistency. The London Sleeper Company also supported the principle of charging direct costs on a per train-km basis.

7.14. DfT said that it understood the legal argument on the issue of per train-minute charging but noted the importance of understanding the implications of the change in the final determination.

7.15. In its response to our draft determination, HS1 Ltd reiterated its view that the way in which it calculates direct costs and converts them into a charge per train-minute is consistent with Article 6 of the Implementing Regulation. Notwithstanding this, in its November 5YAMS, HS1 Ltd amended its charging model, so that it charges direct costs (OMRCA1) on a per train-km basis for all operators.

ORR decision

7.16. Whilst we appreciate there are a number of objectives set out in both the recitals to the Regulations and other provisions within the Regulations, the requirements regarding how infrastructure managers must charge for direct costs are clear.

7.17. Although in their responses, HS1 Ltd and EIL repeated arguments in relation to the exceptions set out in Article 5(1) and 6 of the Implementing Regulation, neither provided any further evidence or analysis in support of those arguments. We

therefore remain of the view that the Implementing Regulation requires an infrastructure manager to charge for direct costs on a per train-km basis.

7.18. We are satisfied that the change HS1 Ltd has made to its charging model is consistent with the requirements of the Implementing Regulation, for the reasons set out above and in our draft determination. Further, we consider that charging on this basis better reflects the relationship between calculating and charging direct costs and thus improves the transparency of the charging structure. Therefore, we are approving this aspect of the November 5YAMS.

Non-direct costs

7.19. HS1 Ltd also charges non-direct costs on a per train-minute basis. In our draft determination, we noted that (unlike direct costs) there is no requirement in the legislation that would mean that a change to charging on a per-train km basis would be necessary. Both HS1 Ltd and EIL had previously argued that this method of apportioning costs acts as an incentive to run faster trains (leading to increased capacity) and therefore aligns with the purpose of the network as set out in the Concession Agreement, that is, to provide high-speed rail transportation.

7.20. We considered that apportioning non-direct costs in this way does not appear to satisfy the economic principle that charges should be cost-reflective. This is because it results in operators who cause higher costs (that is, those that run faster trains, that cause more wear and tear) paying a lower proportion of total non-direct costs than those that run slower trains⁵⁴. The effect of increased capacity is also marginal when there is already surplus capacity, as there is currently on the HS1 network.

7.21. HS1 Ltd has said that it will review its structure of charges in CP3 and it recognised that changing how it recovers non-direct costs could have an impact on operators. We support this review and consider that the basis on which HS1 Ltd charges non-direct costs should form part of that review.

Stakeholder responses

7.22. There were limited responses to the draft determination in relation to non-direct costs. EIL's view is the same as for direct costs in that it considers charges should be set on a per-train minute basis to incentivise high-speed train operation. HS1 Ltd sought confirmation of its understanding of the Regulations in relation to non-direct costs. In our draft determination, we said that it is for HS1 Ltd and the industry to take forward the review of how non-direct costs are recovered. However, in response to

⁵⁴ A proportion of HS1 Ltd's non-direct costs are related to the impact of different types of operator, whereas other non-direct costs are common to all operators. However, it is not always straightforward to distinguish between these two types of cost.

HS1 Ltd's question in relation to the treatment of non-direct costs under the Regulations, we also made it clear that not all non-direct costs are specific to one type of operator.

ORR decision

7.23. We support HS1 Ltd's proposal to undertake a thorough review of its charging structure in CP3, which it should do in consultation with industry.

Long-term costs

7.24. In HS1 Ltd's consultation on its draft 5YAMS (published in February 2019), many stakeholders objected to HS1 Ltd's use of the long-term cost exception. We had previously considered this as part of PR14, where we found that it was permissible for HS1 Ltd to recover all of its non-direct costs under that exception. However, in light of HS1 Ltd's proposed changes to the charging structure and in view of the objections raised by stakeholders, we considered this further. In particular, operators had argued that HS1 Ltd should instead rely on the first exception to the charging principles, which allows an infrastructure manager to levy a mark-up. This would require HS1 Ltd to assess the ability of each market segment to bear a mark-up (that is, undertake a 'market can bear test').

7.25. EIL challenged whether the long-term cost exception allows HS1 Ltd to recover the on-going operating, maintenance and renewals costs. It stated its view that the long-term cost exception was limited to recovery of the capital costs of the project only.

7.26. Freight operators, in response to HS1 Ltd's consultation on its draft 5YAMS, said that HS1 Ltd should assess higher charges for freight services under the first exception requiring a 'market can bear test', before higher charges can be levied. In particular, DB Cargo (UK), contended that the long-term cost exception cannot be applicable to conventional rail freight as it has seen no evidence to suggest that the construction of the HS1 network would not have been undertaken if HS1 Ltd was not allowed to levy higher charges on the very small number of conventional speed rail freight services that operate on the line.

7.27. Our interpretation of the long-term cost provision in the Regulations, and our views on the applicability of the provisions to freight operators are set out in our draft determination supplementary document on charging and incentives. In our draft determination, we concluded that HS1 Ltd was permitted to continue to recover both the capital costs of constructing the project and its on-going operational costs under this exception. We also set out our view that once the conditions of the long-term costs exception have been met, the exception permits higher charges to be levied on

rail users in general, with no requirement for HS1 Ltd to consider charges to individual operators or undertake a 'market can bear' test for those charges.

Stakeholder responses

7.28. In respect of HS1 Ltd's reliance on the long-term costs exception within the Regulations to recover non-direct costs, DB Cargo (UK) reiterated its argument that the provisions cannot be applicable to conventional rail freight. This is because it had seen no evidence that the construction of the HS1 network would not have been completed if HS1 Ltd had not been able to levy higher charges on the small number of freight services using the network.

7.29. As such it considered that levying higher charges for freight above direct costs should be assessed under the 'market can bear test'. Further, it said that since the services operated by DB Cargo (UK) on the HS1 network are within a market segment that we have previously found cannot bear mark-ups, it should not have to pay non-direct costs.

ORR decision

7.30. We remain of the view that HS1 Ltd is able to continue to recover both the capital costs of constructing the project and its ongoing operational costs under the long-term cost exception of the Regulations. DB Cargo (UK) has not put forward any new or additional evidence to support its view that the provisions on long-term costs cannot be applicable to conventional rail freight.

7.31. As set out in our draft determination, we do not consider DB Cargo (UK)'s interpretation to be supported by the wording in the exception. Instead, our view is that once the conditions of the long-term costs exception have been met, we consider the exception permits higher charges to be levied on rail users in general, with no requirement for HS1 Ltd to consider charges to individual operators or undertake a 'market can bear test' for those charges. Therefore, we are approving this aspect of the November 5YAMS.

Other charges and incentives issues

Capacity reservation charge

7.32. In responding to concerns from operators, HS1 Ltd proposed suspending the capacity reservation charge, reflecting the fact that there is currently spare capacity on the HS1 network. This proposal responded to operators' concerns but includes scope to reactivate the charge as a result of changes to capacity during the control period.

7.33. Our draft determination proposed accepting this proposal, and the change was reflected in the proposed amendments to the draft track access contract documentation annexed to the draft determination.

7.34. Southeastern supported HS1 Ltd's proposal to suspend the capacity reservation charge in recognition of the fact that there is currently spare capacity on the network.

Carbon Reduction Commitment energy efficiency scheme

7.35. In our draft determination, we proposed to accept HS1 Ltd's proposal to continue to recover around £10,000 per year in relation to the Carbon Reduction Commitment energy efficiency scheme.

Traffic forecasts and volume re-openers

7.36. HS1 Ltd's traffic forecasts are an important consideration as they drive HS1 Ltd's revenue and influence its asset management strategy and approach. For CP3, HS1 Ltd had assumed no increase in passenger train paths as growth is expected to be accommodated by existing service levels. It also assumed no increase in freight services. Beyond CP3, it had assumed a 1% increase per year in traffic volumes.

7.37. Our draft determination proposed accepting the traffic forecasts, and the retention of the +/-4% traffic change trigger (for passenger operators) and +/-12.5% traffic change trigger (for freight operators) for the re-openers. The proposed volume re-opener provisions are triggered when traffic changes exceed these levels, including as a result of the introduction of services run by a new operator.

Performance and possessions regimes

7.38. The performance regime is part of the charges and incentives system designed to encourage all parties to minimise disruption and improve the performance of the HS1 network. Through the regime, operators and HS1 Ltd bear the financial impact of the unplanned service delays and cancellations. The regime is designed to incentivise all parties to minimise performance-disrupting incidents, and to contain their impact when they occur. The regime includes:

- (a) payment thresholds (the point at which performance is sufficiently good or bad to trigger payments from operators to HS1 Ltd, or from HS1 Ltd to operators); and
- (b) payment rates (the amount, per minute delay, that one organisation pays another where its performance is above/below threshold performance).

- 7.39. In response to our initial consultation on PR19, operators told us that they were broadly content with the way the regime was operating with no need for major changes beyond recalibration. HS1 Ltd has undertaken a recalibration exercise and the resulting rates have been agreed with train operators.
- 7.40. The possessions regime compensates operators for disruption to their services due to engineering works and acts as an incentive on HS1 Ltd to plan possessions efficiently and minimise disruption.
- 7.41. In its May 5YAMS, HS1 Ltd proposed the retention of the existing regime saying that it worked well for the relatively small number of disruptive possessions expected in CP3. Operators also agreed to retain the existing possessions regime in response to our PR19 initial consultation.
- 7.42. In our draft determination, we proposed to accept HS1 Ltd's proposals for its performance and possessions regimes.

Stakeholder responses

- 7.43. DfT welcomed the agreement reached on the performance and possessions regimes, given the importance of creating the right incentives to operate trains on time and plan possessions efficiently to minimise disruption.

Other charges and incentives issues decisions

- 7.44. We have considered responses on these issues and are satisfied that we should maintain our decisions, as set out in the draft determination. This means we approve:
- (a) HS1 Ltd suspending the capacity reservation charge;
 - (b) HS1 Ltd continuing to recover around £10,000 per year in relation to the Carbon Reduction Commitment energy efficiency scheme;
 - (c) HS1 Ltd's traffic forecasts and proposed volume re-opener provisions; and
 - (d) HS1 Ltd's performance and possessions regimes proposals.

Impact on operators

- 7.45. As part of our review, we considered the impact of HS1 Ltd's proposals on operators. To inform our assessment, we invited operators, both passenger and freight, to provide evidence of the impact that HS1 Ltd's proposed increase in charges would

have on their businesses (see the note of our PR19 stakeholder workshop of 10 June 2019, published alongside our draft determination⁵⁵).

- 7.46. As set out in our draft determination, having carefully considered the information supplied by EIL, we concluded that while any increase in costs will clearly impact on a business, it is not clear that the new charges will impact significantly on its commercial viability. This is particularly evident when the increase in charges is considered as a percentage of the total costs across EIL's whole routes, which we think is the appropriate framework for assessment.
- 7.47. Southeastern noted that it is held harmless to increases in charges through its franchise agreement. While the company did not raise specific concerns about the impact of the proposed changes in charges, it emphasised the need for HS1 Ltd to ensure its charges are as low as possible to reduce the call on funding from its passengers and/or the taxpayer.
- 7.48. In its response, EIL criticised our assessment of the impact on operators, arguing that it supplied evidence that higher charges diminished its ability to respond to external cost shocks, by reducing the proportion of EIL's controllable costs.
- 7.49. We note EIL's comments in relation to HS1 Ltd's obligation to co-operate with other infrastructure managers to enable the application of efficient charging systems and in particular to aim to guarantee the optimal competitiveness of international rail services. We sought confirmation from HS1 Ltd as to how it discharges this obligation and it has confirmed that it has in place a strategy that involves working with adjacent infrastructure managers in order to identify opportunities for collaboration.
- 7.50. Our final determination of HS1 Ltd's charges reflects our assessment of the efficient cost to HS1 Ltd of operating, maintaining and renewing its network. Our assessment has resulted in a significant decrease in the renewals annuity as initially proposed in its May 5YAMS. However, total costs are higher than in CP2, largely as a result of the increase in renewals costs, traction electricity⁵⁶ costs and pass-through costs. We consider that this increase is necessary, to ensure HS1 Ltd is compliant with its duties under the Concession Agreement.
- 7.51. While we understand the increase in charges proposed in this final determination (compared to charges in CP2) is unwelcome to operators, the impact on operators (including their ability to respond to external cost shocks) needs to be balanced against HS1 Ltd's ability to recover the efficient costs of operating, maintaining and renewing its network. We consider our determination achieves this balance. We

⁵⁵ [Minutes of PR19 first stakeholder workshop](#), 10 June 2019.

⁵⁶ Traction electricity charges are separate to the OMRCs.

consider our final determined increase in charges will not impact significantly on operators' commercial viability.

7.52. Similarly, with respect to DB Cargo (UK), we set out in our draft determination that we considered the impact of higher charges to be significantly reduced as a result of our adjustments to HS1 Ltd's proposed charges, particularly when assessing the impact across the whole routes, which we think is the appropriate framework for assessment.

7.53. We have received no further information to cause us to change our assessment of the impact on operators as set out in our draft determination.

7.54. In reaching our decisions, we have balanced our statutory duties under the Railways Act 1993⁵⁷, in particular taking into account the impact of charges on operators against a range of other outputs of the periodic review, such as the need to ensure HS1 Ltd can recover its efficient costs and meet its asset stewardship commitments under the Concession Agreement.

OMRCs for passenger operators

7.55. We consider that HS1 Ltd's OMRCs (after our adjustments) reflect a reasonable estimate of the efficient costs of passenger services operating on the HS1 network, taking into account both our assessment of the impact on passenger operators and stakeholders' responses.

7.56. Our final determination of HS1 Ltd's OMRCs for passenger operators in CP3 is set out in Table 7.1 below. Because of the change to HS1 Ltd's charging structure, which is now made up of a mix of per train-km and per train-minute rates, it is not possible to make a straightforward comparison between CP2 and CP3 OMRC rates.

7.57. However, for illustration, a comparison between CP2 and CP3 rates based on the CP2 charging structure shows total CP3 OMRCs have increased above their level in the final year of CP2, by around 19% for international passengers and by around 16% for domestic passenger services.

⁵⁷ [Railways Act 1993](#)

Table 7.1 Determination of passenger OMRCs for CP3

CP3 OMRCs (February 2018 prices)	International passenger services	Domestic passenger services
£ Per train-km		
OMRCA1	£3.94	£1.58
£ per train-minute		
OMRCA2	£11.87	£2.42
OMRCB	£28.05	£30.51
OMRCC	£10.03	£10.03

OMRCs for freight operators

7.58. We consider that HS1 Ltd's OMRCs (after our adjustments) reflect a reasonable estimate of the efficient costs of freight services operating on the HS1 network, taking into account both our assessment of the impact on freight operators and stakeholders' responses.

7.59. Our final determination of HS1 Ltd's CP3 freight OMRCs is set out in Table 7.2 below. As a result, total OMRCs for freight services have increased by around 12% above their level in the final year of CP2.

Table 7.2 Determination of freight OMRCs for CP3

CP3 OMRCs (February 2018 prices)	Freight services
£ Per train-km	
OMRCA1	£ 4.69
OMRCA2	£ 3.79

Changes to OMRC rates set out in our draft determination

7.60. The costs that we have included in the calculation of charges are set out in Chapter 6. Since our draft determination, we have made some changes to HS1 Ltd's costs based on our assessment of further submissions from HS1 Ltd. These changes are set out in detail in Chapters 4, 5 and 6. In summary, they include a reduction of £0.2m per year for the renewals annuity (£1.0m over CP3), a reduction in UKPNS costs over CP3 of £1.1m, and an increase in costs of £2m for R&D expenditure.

Since our draft determination, there has been no overall change to the total costs over the control period⁵⁸ (£594.2m).

7.61. Using these revised costs results in some relatively small changes to the rates we set out in our draft determination.

Overall OMRCs

7.62. Table 7.3 below, shows the total OMRCs to be paid by each type of operator over CP3, based on the CP3 OMRC rates set out above.

Table 7.3 HS1 Ltd's CP3 total income from charges⁵⁹

Total OMRC income (February 2018 prices)	2020-21	2021-22	2022-23	2023-24	2024-25	CP3 Total
International services	£35.2m	£35.2m	£35.2m	£35.2m	£35.2m	£175.9m
Domestic services	£63.0m	£63.0m	£63.0m	£63.0m	£63.0m	£315.1m
Freight	£0.3m	£0.3m	£0.3m	£0.3m	£0.3m	£1.5m
Total	£98.5m	£98.5m	£98.5m	£98.5m	£98.5m	£492.5m
Traction electricity charge	£20.8m	£20.2m	£20.1m	£20.1m	£20.0m	£101.2m
Total charges income	£119.3m	£118.7m	£118.6m	£118.6m	£118.5m	£593.7m

⁵⁸ This comparison is based on a renewals annuity of £26.1m per year as included in our draft determination. But as we note above the figure in our draft determination should have been £25.8m per year.

⁵⁹ HS1 Ltd's charges income for CP3 is £593.7m, which is £0.5m lower than the £594.2m shown in Table 6.3. The difference between the two numbers relates to the costs for Ripple Lane, which HS1 Ltd partially recovers through a separate Ripple Lane charge. This charge is not regulated by ORR and so has not been included in the Table 7.2.

8. ORR monitoring and reporting

- 8.1. A significant increase in HS1 Ltd's renewals volumes and costs is forecast for CP3 compared to CP2. HS1 Ltd is also forecasting another step change in volumes in CP4 (starting in 2025). We note that this will come after a forecast low period of expenditure in the last year of CP3.
- 8.2. HS1 Ltd recognises that it needs to transform its capabilities to be ready to meet this challenge. Through our review we have identified areas of asset management capability, that we expect HS1 Ltd to demonstrate in CP3 that it has strengthened, to ensure that it is meeting the requirements of its General Duty regarding efficient costs and asset sustainability.
- 8.3. Monitoring and reporting its development of these capabilities and whether it efficiently delivers its renewals and maintenance plans set out in its November 5YAMS, alongside train performance, can provide additional incentives for HS1 Ltd.
- 8.4. We have not concluded on the best approach for monitoring and reporting for CP3 and intend to consult with stakeholders in early 2020. The basis for our monitoring and reporting will be this determination. Our presumption is that we will not require HS1 Ltd to produce any information specifically for our monitoring, we will rely instead on the information that it produces to manage its business.
- 8.5. The areas where we envisage additional monitoring and reporting include:
 - (a) asset management capability;
 - (b) financial reporting improvements, including the calculation of efficiency;
 - (c) measuring outperformance;
 - (d) use of risk and contingency provisions;
 - (e) investment decisions for renewals and R&D; and
 - (f) the delivery of efficiencies set out in its 5YAMS.
- 8.6. Stakeholders have broadly welcomed the increased focus on monitoring and reporting. In particular, HS1 Ltd in its response to the draft determination, said it was willing to work with us on developing improved monitoring and reporting (it did however, in its recent response to our December 2019 consultation, state that additional work may incur additional costs). Southeastern has asked that reporting is improved on HS1 Ltd's environmental objectives and its use of traction electricity, and that monitoring and reporting encompasses the £2m on R&D. However, EIL

questioned the influence that monitoring and reporting would have and asked for greater clarity.

- 8.7. To set out our further thinking on the financial risks, incentives and governance of the escrow account arrangements, and to support our thinking on how best to monitor HS1 Ltd, in 12 July 2019 we published a [discussion paper](#) on the arrangements for renewals funding, drawing on an [independent study](#) we commissioned from Steer. That study suggested that the risks of the current funding arrangements may not lie with the parties best able to manage them and the incentives may not be appropriate.
- 8.8. Recognising that the arrangements that create the governance, allocation of risk, and incentive issues can only be amended through re-opening the Concession Agreement, we sought stakeholder views on how our role could be used to ensure funders have sufficient oversight of how their money is spent. We have not yet concluded on how best to do this yet.
- 8.9. The responses we received from stakeholders to our draft determination did touch on some of these issues, but it was also helpful to receive separate responses from DfT and EIL on them. DfT noted the need for consistency with the aims of the concession agreement and the stations element of HS1 Ltd when developing any improvements to funding. EIL questioned the efficiency of the escrow account in its current format.
- 8.10. We recognise that the arrangements that create the issues with governance, the allocation of risk and incentives, can only be amended through re-opening the Concession Agreement. So, we need to consider how our role can help HS1 Ltd meet its General Duty and address the areas identified for improvement.
- 8.11. Given the increase in funding HS1 Ltd will receive in CP3, the resultant expected delivery ramp-up, and the importance of being well prepared to efficiently deliver increased volumes in CP4, we will strengthen our monitoring and reporting. However, it is important that our monitoring and reporting is proportionate and does not place undue burden on HS1 Ltd.
- 8.12. We will consider all elements of monitoring and reporting in the round. We plan to publish our proposals, and share them with stakeholders, in early 2020.

9. Next steps

- 9.1. In accordance with paragraph 8.11 of Schedule 10 to the Concession Agreement, HS1 Ltd should submit to us, no later than 4 February 2020, a revised 5YAMS which reflects the matters we have determined in this final determination.
- 9.2. If we determine that the revised 5YAMS is then consistent with HS1 Ltd's General Duty, we shall approve that document and implement the changes to the track access documentation, in accordance with the process set out in the access terms. We consulted on those changes alongside our draft determination and received no comments from stakeholders.
- 9.3. If we determine that the revised 5YAMS is not consistent with HS1 Ltd's General Duty, we shall not approve the 5YAMS and may implement the enforcement procedure set out in Schedule 8 to the Concession Agreement.
- 9.4. If HS1 Ltd feels aggrieved by this final determination, it may challenge such determination in accordance with the provisions of Schedule 8 to the Concession Agreement.

Annex A

Efficient cost challenge

- A.1 A critical part of our role is to ensure that costs borne by operators are efficient, that is, that the assets can be kept in good condition in the long term at lowest possible cost. We need to have confidence that costs are not inflated to include excessive risk provisions or unnecessary items, but are adequate to cover risk which has been properly evidenced, work which is required in CP3 to maintain performance and safety standards, and sees the appropriate amount of money placed into the escrow account to secure funding for future renewals.
- A.2 A number of stakeholders queried the level of challenge the ORR had applied throughout the review. The structure of the final determination is such that the total challenge we have made to HS1 Ltd's cost base is not obvious. Therefore, we have pulled together what we have done in this annex for ease of reference.
- A.3 For CP3 costs, we have:
- (a) required a 1.8% overlay to renewals costs for contract efficiencies;
 - (b) determined that HS1 Ltd should reduce its PMO costs by £4.5m equivalent to a 5% efficiency on the work bank our draft determination was based upon;
 - (c) verified that the 4.33% operations and maintenance risk premium does not include any double-counting of risk and is appropriate to fund the risks it is covering;
 - (d) we sense checked the overall risk provision in our determination against the risk provision we included in our determination for Network Rail Infrastructure Limited and adjusted the provision for risk and contingency on renewals down from 26.25% to 12.6%;
 - (e) challenged the priority and classification of elements of the proposed CP3 renewals, resulting in an overall reduction in CP3 renewals from £61.8m to £56.8m;
 - (f) scrutinised NR(HS)'s costs for CP3 and checked their proposed efficiencies against the benchmarks set out by Rebel Group's study; and
 - (g) we then applied a top-down comparison to NR(HS) against its parent Network Rail Infrastructure Limited and found that the overall exit-to-exit efficiency to be slightly more challenging for NR(HS).

A.4 We also tested the renewals costs for CP4-10, which have a significant influence on the value of the renewals annuity payments operators make into the escrow account. We have, after taking to adjustments to CP3 as the base position, also required HS1 Ltd to:

- (a) apply a 0.5% per year frontier shift efficiency for developments in the whole economy and technology productivity;
- (b) limit the costs of the delivery integrator function to 20% of renewals costs rather than a fixed price; and
- (c) adjusted the provision for risk and contingency on renewals down from 30% to 13%.

A.5 In addition to these efficiencies our challenges to HS1 Ltd also brought down the cost of charges to operators by:

- (a) removing ETCS from the escrow annuity calculation;
- (b) determining a reduction in renewals volumes of 10% to adjust for HS1 Ltd being overly conservative in its approach to asset life planning, reducing costs over CP4-10 by 5.2%; and
- (c) we required HS1 Ltd to constrain its internal costs to the total set out in its May 5YAMS in delivering the requirements of our determination and rejected the additions proposed by HS1 Ltd late in the process.

Annex B

Our conclusions on asset management improvements and recommendations

These tables set out HS1 Ltd's responses to the recommendations included within our draft determination.

Table B.1 HS1 Ltd's response to asset management proposed improvements

Area of deficiency	Recommendation	HS1 Ltd response	ORR conclusion
An error in the pricing of an inverter fan	Correction - £160k reduction in total renewals costs	NR(HS) has confirmed that the cost of this project is £410,000 and not £250,000 which was a reporting error.	Accepted.
Delivery uncertainty of some proposed CP3 renewals	Re-profile some work to next control period – with £12.9m reduction in total CP3 renewals costs	Further delivery assurance work has been undertaken by HS1 Ltd. Overall this has the effect of reducing CP3 renewals by £5.5m.	Accepted. There are two minor items totalling £85k. One of these should be funded as a research item, and the other from risk. This change doesn't affect the OMRC. HS1 Ltd should reflect this minor adjustment in its revised 5YAMS, to be submitted on 4 February 2020.
Current estimating strategy does not fully incentivise risk mitigation	Consider alternative approach – with likely 1.8% reduction in renewals costs for CP3	NR(HS) has applied the 1.8% separately to the CP3 renewals portfolio.	Accepted.

Area of deficiency	Recommendation	HS1 Ltd response	ORR conclusion
Project management costs higher than benchmarks for other UK rail projects	Reduction in project management overlay (from 15% to 10%) to bring in to line with benchmarks	HS1 Ltd has revised NR(HS)'s resourcing proposed. It now believes that CP3 project management office (PMO) costs should be reduced to fixed costs of £7.6m (around 13%), from its May 5YAMS proposal of £9.4m (around 15%).	Not accepted. (see chapter 4)
Very high level of risk and contingency provision of an allocation compared to benchmarks	Reduce risk overlay based on ORR analysis for CP3 (from 26.25% to 13%) and CP4-10 (from 30% to 13%)	HS1 Ltd has worked with NR(HS) to finalise a P50 risk number for CP3 which amounts to 12.6%. It proposes using this number in its annuity calculation.	Accepted for CP3. Not accepted for CP4-10 (see chapter 5).
Lack of sensitivity analysis around critical design lives for track assets	Undertake sensitivity analysis and consider extended lives – resulting in a likely 10% reduction in renewals volumes for CP4-10	HS1 Ltd considers the approach that it has taken to asset life is robust, based on the asset information currently available supplemented with engineering knowledge and, where necessary, judgement.	Not accepted (see chapter 4).
Lack of clarity on how research and development (R&D) will be undertaken	Clarification on the process for undertaking R&D	In HS1 Ltd's view the best way to fund R&D is through its own costs – recovered through the Operating, Maintenance and Renewals Charge (OMRC). HS1 Ltd has included a figure of £2m over the life of CP3 for R&D.	Accepted.

Table B.2 HS1 Ltd’s response to asset management recommendations

Brief description of recommended improvement	Action by date	HS1 Ltd response	ORR conclusion
<p>HS1 Ltd to develop an action plan with set milestones for implementation in CP3 of the recommendations contained within AMCL’s⁶⁰ wider report.</p>	<p>Plan to be developed by 31 March 2020.</p>	<p>HS1 Ltd agreed with the timeframe proposed. It will continue to improve its asset management capability in line with other leading asset practitioners and collaborate with NR(HS) to translate the recommendations from the ISO55001 AMEM⁶¹ assessment into an asset management maturity improvement plan.</p>	<p>Sufficient evidence provided.</p> <p>HS1 Ltd to provide ORR with a plan by 31 March 2020 setting out the milestones for CP3 implementation of the recommendations contained within AMCL’s report. Delivery success against this plan will be reported in the Annual Asset Management Statement (AMAS).</p>
<p>Undertake a follow-up review of progress towards ISO55001 certification</p>	<p>By 31 March 2023.</p>	<p>HS1 Ltd has committed to undertaking a further review of its asset management capability/maturity to confirm progress against the principles of ISO55001 (asset management best practice) by end 2023 and HS1 Ltd will seek to close out any identified improvement areas in order to meet ISO55001 certification on the route by the end of CP3.</p>	<p>Sufficient evidence provided.</p> <p>A further ISO 55001 independent review is to be undertaken by Dec 2023 and achieving ISO 55001 by end of the control period.</p>

⁶⁰Asset Management Consulting Limited report on HS1 and NR(HS) asset management maturity

⁶¹ Asset Management Excellent Model

Brief description of recommended improvement	Action by date	HS1 Ltd response	ORR conclusion
<p>Future 5YAMS to document and demonstrate the assurance activities HS1 Ltd has undertaken on suppliers' contributions.</p>	<p>In advance of CP4 5YAMS submission.</p>	<p>Agree – HS1 Ltd already undertakes extensive assurance activities as evidenced throughout the PR19 process. HS1 Ltd recognises it can always improve and enhance its approach and will work with ORR to understand the documentary evidence it requires.</p>	<p>Sufficient evidence provided.</p> <p>At the next 5YAMS submission HS1 Ltd should be more explicate on the assurance activities it has undertaken. The format of this can be discussed as part of our ongoing dialogue on monitoring and reporting.</p>
<p>HS1 Ltd to update its Asset Management Policy with current status and CP3 targets/milestones</p>	<p>By 31 January 2020.</p>	<p>HS1 Ltd considered that NR(HS)'s Strategic Asset Management Plan (SAMP) is the most suitable document to contain details of the current asset management status and the improvement targets/milestones for CP3. The SAMP will be revised before 31 March 2021.</p>	<p>Sufficient evidence provided.</p> <p>We are satisfied that if the SAMP is used to meet this requirement. In accordance with best practice the asset management policy should however, be subject to regular review.</p>
<p>Asset Management Objectives (AMOs) should be subject to review at a suitable frequency</p>	<p>Plan & programme to be developed and agreed by 31 March 2020.</p>	<p>A review of the AMOs will be undertaken to enable a better understanding of the relationship between the AMO weightings and the renewals workbank.</p> <p>HS1 Ltd will use the learning from this review to feed into the production of new AMOs for use in CP4. HS1 Ltd's aspiration is to create</p>	<p>Sufficient evidence provided.</p> <p>A detailed plan and programme to be developed and agreed by 31 March 2020.</p>

Brief description of recommended improvement	Action by date	HS1 Ltd response	ORR conclusion
		differently weighted AMOs (scenarios) which will be used in the asset decision support tool to enable stakeholders to understand the trade-offs/impacts arising.	
Strategic Asset Management Plan (SAMP) should outline how the stated aims will be achieved and by when.	At next revision or no later than 31 December 2020.	The NR(HS) SAMP will be revised by 31 March 2021. Revision will include details of the current asset management status and the targets/milestones for improvement within CP3.	Sufficient evidence provided. We accept the proposed timescale for revising the SAMP by 31 March 2021.
Specific Asset Strategies (SASs) should present the expected asset condition at end of control period, handback and end of the 40-year plan.	At next revision or no later than 31 December 2020.	HS1 Ltd will work with NR(HS) to enable future versions of the Specific Asset Strategies to include the forecast condition at key future time points, for example end of the Concession and the end of the 40-year indicative plan. HS1 Ltd will work NR(HS) to provide new SASs by December 2021.	Sufficient evidence provided. We accept that December 2021 is an acceptable time frame.
Regular feedback of Asset Decision Support Tools (ADSTs) outcomes should be shared with stakeholders by HS1 Ltd.	Plan & programme to be developed and agreed by end March 2020.	HS1 Ltd will provide an update to stakeholders by June 2022 with potential options as a starting point for considering different options in CP4.	Sufficient evidence provided. HS1 to provide a plan and programme for meeting the 30 June 2022 date to be provided and agreed by 31 March 2020.

Brief description of recommended improvement	Action by date	HS1 Ltd response	ORR conclusion
Additional consideration of remote or automated monitoring should be given by HS1 Ltd.	At next revision or no later 31 December 2020.	HS1 Ltd agrees and supports the proposal from NR(HS) in its SAMP to assess the viability of remote condition monitoring in the first year of CP3 for certain assets.	Sufficient evidence provided. Although we will we seek further details of the proposed approach.
Additional consideration of efficiencies, outside normal railway practice should be undertaken by HS1 Ltd.	By 30 September 2020.	HS1 Ltd and NR(HS) will undertake a series of benchmarking sessions to review cross industry comparisons. They will make this work clearer in future documentation submitted to ORR. Further benchmarking and knowledge gathering will evolve in CP3 and HS1 Ltd will demonstrate that that has fed into its future plans.	Sufficient evidence provided. HS1 Ltd and NR(HS) to undertake a series of benchmarking sessions to review cross industry comparisons by 30 September 2020.
HS1 Ltd to set out the minimum asset data requirements and then report on data quality annually	At next revision or no later than 31 December 2020.	HS1 Ltd is working on an asset data quality standard and will report in the AMAS on progress against the approach to the future quality of asset data.	Sufficient evidence provided. HS1 Ltd to produce an asset data standard by 31 March 2021.
HS1 Ltd to review operations and maintenance risks ownership with funders.	Plan & programme to be developed and agreed by 31 March 2020.	HS1 Ltd will provide a plan to ORR in the first six months of CP3 in relation to how it will review operations and maintenance risk ownership with funders.	Sufficient evidence provided. We consider the proposed time frame acceptable.

Brief description of recommended improvement	Action by date	HS1 Ltd response	ORR conclusion
Provide a resource programme with milestones for NR(HS) resilience of key risks workstream.	At next revision or no later than 31 December 2020.	HS1 Ltd supports the NR(HS) approach to introduce NR Business Continuity by 2020 and incorporate this into its future operational strategy. HS1 Ltd expects NR(HS) to fully fund these activities within its fixed price.	Sufficient evidence provided. HS1 Ltd to ensure that NR(HS) introduces a business continuity plan by 31 December 2020
Maintenance frequencies to be revisited as more HS1-specific failure data becomes available.	During CP3.	HS1 Ltd supports NR(HS) approach where frequencies are reviewed by Professional Heads, informed by faults, inspection, desktop review and engineering assurance. As more specific data becomes available maintenance frequencies will adjust accordingly.	Sufficient evidence provided. HS1 Ltd to provide updates on progress in its AMAS.
HS1 Ltd to follow up on water ingress issues identified on site visits.	By 31 December 2019.	HS1 Ltd notes that NR(HS) is already following up on this request and supports the approach adopted.	Accepted. At time of publication of this document we understand work has been undertaken and await formal update.
HS1 Ltd to review incentives and monitors of efficiency in maintenance.	Plan & programme to be developed and agreed by 31 March 2020.	HS1 Ltd agrees to improvement, but will provide a plan to ORR in the first six months of CP3, that is, by 30 September 2020.	Sufficient evidence provided. We consider the proposed time frame acceptable.
HS1 Ltd to review incentives used to maximize asset life	Plan & programme to be developed and	HS1 does not believe that maximising asset life necessarily achieves	Sufficient evidence provided.

Brief description of recommended improvement	Action by date	HS1 Ltd response	ORR conclusion
before required renewal.	agreed by 31 March 2020.	best practice or is consistent with its AMOs. HS1 Ltd has worked with NR(HS) to develop a whole-life cost model designed to identify the best approach to managing each asset. This could include in some instances maximising asset life.	We agree that maximise may not be the best use of wording. We would suggest that 'optimise' would be a better descriptor. The goal in asset planning objective should be to optimise the lowest whole life cost balancing operational and renewal cost against performance risk whilst maintaining a safe operating environment.
HS1 Ltd to commission an independent review into the effectiveness of its Quality Assurance Board.	By 31 March 2021.	HS1 has commissioned an independent chair and expects a report on its findings in accordance with the dates set by ORR. HS1 Ltd therefore does not propose a further independent review.	Sufficient evidence provided. However, we will keep this under review and if we deem that the level of reporting is insufficient, then we will require an independent review.
HS1 Ltd to explore with stakeholders if network optimisations could yield lower overall maintenance cost and lower performance penalties.	Plan & programme to be developed and agreed by 31 March 2020.	Agree – HS1 Ltd will provide a plan to ORR in the first six months of CP3, that is, by 30 September 2020.	Sufficient evidence provided. We consider the proposed time frame to be acceptable.

Brief description of recommended improvement	Action by date	HS1 Ltd response	ORR conclusion
HS1 Ltd to provide further evidence to substantiate a number of highlighted renewals in CP3, should it still believe that they are critical.	In response to draft determination – by 30 November 2019.	HS1 Ltd consider that most projects in CP3 are justified. It expects a number of E&P projects to be removed. These adjustments will have very minor impacts on charges.	Sufficient evidence provided. Each renewal will be subject to stage gate challenge and monitoring.
HS1 Ltd to ensure flexibility and resilience to changes to renewals programme (within CP3 and to/from CP4).	Plan & programme to be developed and agreed by 31 March 2020.	HS1 Ltd has provided a revised renewals plan for CP3.	Sufficient evidence provided. We recognise that over the course of CP3 there will inevitably be revisions to the renewals programme that needs to reflect changes. These changes need to be subject to effective change control, which we will monitor through our ongoing engagement with HS1 Ltd.
HS1 Ltd to review NR(HS) PMO headcount, in light of Network Rail Infrastructure Limited benchmarking.	In response to draft determination – by 30 November 2019.	A revised organisation has been put forward with a reduction in staffing of two.	This is aligned with our overall determination that PMO costs should be around 10% of renewals costs so HS1 Ltd's revised proposal is not acceptable to the ORR. PMO costs related to planned CP3 renewals are still above our proposed benchmark.
HS1 Ltd to establish R&D panel to review benefits and investments.	Plan & programme to be developed and agreed by 31 March 2020.	Agree. HS1 Ltd will be forming and chairing a new Innovation Panel. The panel will have representation from the HS1 Engineering and	Sufficient evidence provided. HS1 Ltd to bring forward a detailed plan and programme for R&D

Brief description of recommended improvement	Action by date	HS1 Ltd response	ORR conclusion
		Operations teams, NR(HS) Route and Stations (both Engineering and Operations), Connect Places Catapult and representatives from operators.	programme and governance by 31 March 2020. HS1 Ltd to also provide details of the governance process that will be put in place.
HS1 Ltd to ensure awareness that Bechtel's CP4-10 direct costs contain a number of omissions and assumptions that will need to be quantified during CP3.	In response to draft determination – by 30 November 2019.	Agree – HS1 Ltd will discuss this further with ORR and ensure any omitted costs are included in future plans.	Accepted. As part of our ongoing dialogue we will engage with HS1 Ltd to ensure that any omitted costs are included in future plans.
HS1 Ltd should begin planning for ETCS signalling replacement as a specified upgrade.	In response to draft determination – by 30 November 2019.	HS1 Ltd agrees it will commence planning during CP3. HS1 Ltd anticipates finalising early proposals by the end of 2022 with a view to submitting a proposal to ORR in 2023. HS1 Ltd notes this will require a decision by DfT on its approach to funding in advance of any application to ORR. HS1 Ltd also notes that this project is now unfunded.	Sufficient evidence provided. Final timings will be dependent on DfT agreeing a funding approach.
HS1 Ltd to review blanket 30% risk for CP4-10.	In response to draft determination – by 30 November 2019.	HS1 Ltd has worked with NR(HS) to finalise a P50 risk number for CP3 which amounts to 12.6%. HS1 Ltd propose using this number (as updated)	While we consider that 12.6% is within our expected range for risk and P50 is considered best practice for risk planning of a portfolio of renewals for

Brief description of recommended improvement	Action by date	HS1 Ltd response	ORR conclusion
		in our renewals annuity calculation.	<p>CP4-10, HS1 Ltd has not taken into account incremental input price inflation.</p> <p>See Chapter 5 for our determination.</p>
<p>HS1 Ltd to agree business case with stakeholders for CP4-10 PMO model.</p>	<p>Plan & programme to be developed and agreed by 31 March 2020.</p>	<p>HS1 Ltd will consider its approach with stakeholders before the end of 2020, but this will be contingent on the action taken on a market study (see next item).</p>	<p>Sufficient evidence provided.</p> <p>We acknowledge that a factor in choice of delivery model will be influenced by the decision on market testing and that there is benefit in reaching a decision on the market study before that of the delivery integrator.</p>
<p>HS1 Ltd to aim to conclude market study as soon as possible, to allow time for investment in CP3 to be ready for start of CP4</p>	<p>Plan & programme to be developed and agreed by 31 March 2020.</p>	<p>NR(HS) is HS1 Ltd's contracted supplier until 2046. HS1 Ltd has the ability to market test once during the concession and is currently engaging ORR and other stakeholders to consider how it should take a decision to exercise this option. It will come to a view in the first year of CP3, that is, by 31 March 2021.</p>	<p>Sufficient evidence provided.</p> <p>Although we remain of the view that the sooner a decision is reached the better the outcomes will be.</p>



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