OFFICE OF RAIL AND ROAD

ORR's annual report on HS1 Ltd's performance in 2018-2019

July 2019

Contents

Executive summary 3

Background 5

1. Train service performance and traffic volume 6

Overview 6

Train service performance 6

Traffic volume 10

2. Asset management 11

Asset performance and condition 11

Asset planning 18

Route Renewals programme 21

3. Finance and efficiency 24

Income 25

Costs 25

Route escrow account 27

Overview of HS1 statutory financial statements 28

4. Health & Safety 29

Executive summary

This report sets out ORR's assessment of HS1 Ltd's operational and financial performance during the financial year 2018-19. Previous reports are available on our website. Alongside our regular monitoring, we have moved into the scrutiny phase of HS1 Ltd's plans for the next five-year period – see our PR19 pages here.

HS1 Ltd's delivery for its users remains significantly better than the minimum standard in its concession and overall it has maintained a high level of train service reliability. Within this context we are reporting on the company's train service and asset performance against that of previous years and also against the stretching targets it set itself for the year, where it measures its impact on passengers in seconds.

For financial performance we examine only the regulated aspects. We have assessed HS1 Ltd's actual income and expenditure against that which was originally assumed at the start of the current control period.

Train service performance
The number of train services delayed by incidents attributed to HS1 Ltd worsened this year – with 478 train services being delayed compared to 245 train services last year. The main factors affecting this were down to asset faults. The average delay per train was 8.24 seconds, worse than the company's target of 5.0 seconds.

Asset management
Underlying asset reliability was generally good when compared to the average standard applied for the control period, but there were seven major asset incidents which caused significant delay. The main faults were to do with the track asset, rather than signalling or overhead catenary.

Overall condition of the assets remained good and the infrastructure's capability has remained as originally designed. The severity level of faults has decreased again this year which demonstrated a further improvement in HS1 Ltd's maintenance effectiveness.

Approximately 80% of renewals work that was scheduled for completion was delivered with the remainder due to be completed in subsequent years. The company has planned to accelerate some of the smaller CP3 projects to use up any surplus funding. We agree that this is a sensible approach.

The network is becoming older and therefore more likely to need renewing rather than just maintaining. HS1 Ltd must adapt its asset management approach accordingly.

Financial
HS1's regulated costs (£75.0m) exceeded its regulated income (£74.7m) by £0.3m. At the time of the 2014 Final Determination we had expected regulated costs for 2018-19 to be

£0.3m lower than income. Therefore, the actual out-turn represents £0.6m underperformance compared to the original plan. It received £74.7m of regulated income (£4m higher than assumed in PR14) but spent £75m operating, maintaining and renewing the infrastructure (£4.6m higher than originally assumed).

Background

HS1 Ltd has a 30-year Concession Agreement from the Secretary of State for Transport to operate and manage the HS1 network. This agreement is between those two parties only and ORR had no role in devising its terms.

HS1 Ltd is responsible for the overall management and operation of the HS1 network, and subcontracts delivery of operations, maintenance and renewals to Network Rail (High Speed) Ltd. Network Rail (High Speed) is also the safety dutyholder for the HS1 network and therefore responsible for compliance with regulatory requirements relating to the management of safety on the HS1 network.

ORR is the health and safety regulator for the HS1 network under the conventional suite of legislation. It has economic regulation responsibilities through the terms of the Concession Agreement and the Railways Infrastructure (Access and Management) Regulations 2016 ("the Regulations"), as amended in 2019.

Under the terms of the Concession Agreement, ORR's role has been defined as ensuring the long-term sustainability of the asset, while also making sure that HS1 Ltd is provided with incentives to reduce the costs of provision of infrastructure and access charges.

The Concession Agreement requires HS1 Ltd to secure the operation, maintenance, renewal, replacement, planning and carrying out of upgrades in accordance with best practice and in a timely, efficient and economical manner, to the greatest extent reasonably practicable having regard to all circumstances.

We monitor train service performance through data provided by HS1 Ltd against key performance metrics. Asset management is monitored through delivery of HS1 Ltd's Asset Management Strategy. The Asset Management Annual Statement, along with asset stewardship key performance indicators, is used to assess HS1 Ltd's performance in maintaining its assets.

1. Train service performance and traffic volume

Overview

While remaining significantly better than its minimum standard and maintaining a high level of overall reliability, HS1 Ltd's performance during 2018-19 worsened from last year, with 478 train services (0.65%) being delayed by HS1-attributable incidents. Three-fifths (60%) of these delays were attributable to track faults including broken rails, which affected 288 train services. It also missed its stretch target for the average number of seconds each train was delayed.

Train service performance

1.1 In terms of HS1 Ltd's obligations in its Concession Agreement, we monitor operational performance against minimum thresholds set out in that agreement. These state that the proportion of services delayed by HS1 Ltd in a quarter should not exceed 15% and in a year must not exceed 13%. However, the network is relatively new and both HS1 Ltd and its users expect much higher levels of performance than this. As a result, HS1 Ltd sets itself – and its subcontractor Network Rail (High Speed) – a separate, more challenging target of 5.0 average seconds delay per train.

1.2 Figure 1 shows a breakdown of performance for the year ending 31 March 2019.

Figure 1 – HS1 performance in 2018-19[1]

	Total number of trains timetabled	Total number of services delayed	Total number of services delays (attributable to HS1)	Percentage of services delayed (attributable to HS1)	Total number of services delayed (unknown incident)
Domestic (St Pancras – North Kent Line via Ebbsfleet)	26,599	2,302	163	0.61%	14
Domestic (St Pancras – Ashford)	28,840	3,552	200	0.69%	20
International	17,589	4,554	112	0.64%	5
Freight	374	73	3	0.80%	0
Total	**73,402**	**10,481**	**478**	**0.65%**	**39**

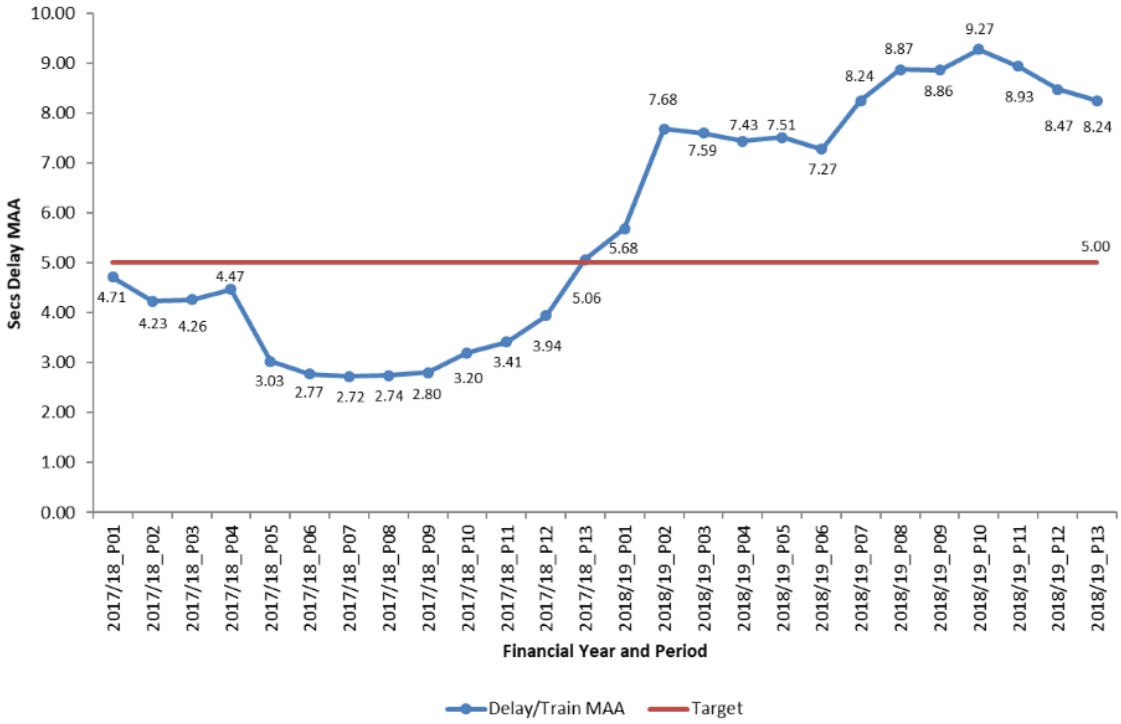
1.3 The proportion of trains delayed by HS1 Ltd-attributable incidents in 2018-19 was 0.65%. This was well within the minimum standard set out in the Concession

[1] Some of the figures included in this chapter are subject to revision due to various factors including the re-classification of some delay incidents.

Agreement of 13%. However, compared to what has been achieved in recent years (Figure 3) it represented nearly double the number of services delayed in the previous year (0.34%). This was mainly due to a decline in performance at the start of the year. In the first quarter[2], three significant track faults resulted in a combined 2,902 minutes of delay.

1.4 As can be seen in Figure 2, the average delay per train was 8.24 seconds, missing HS1 Ltd's stretch target of 5.00 seconds.

Figure 2 – Moving annual average delay per train on the HS1 network (delays attributed to HS1 Ltd), by period 2017 to 2019



Source: Network Rail (High Speed)

1.5 Figure 3 shows the number of trains delayed by an incident wholly or mainly attributable to HS1 Ltd, displayed by cause.

[2] 2018-19 Quarter 1 includes 1st April 2018 to 23rd June 2018 (Periods 1 to 3, 2018-19)

Figure 3 – Delayed trains broken down by causes for which HS1 Ltd are wholly or mainly responsible, 2013 to 2019

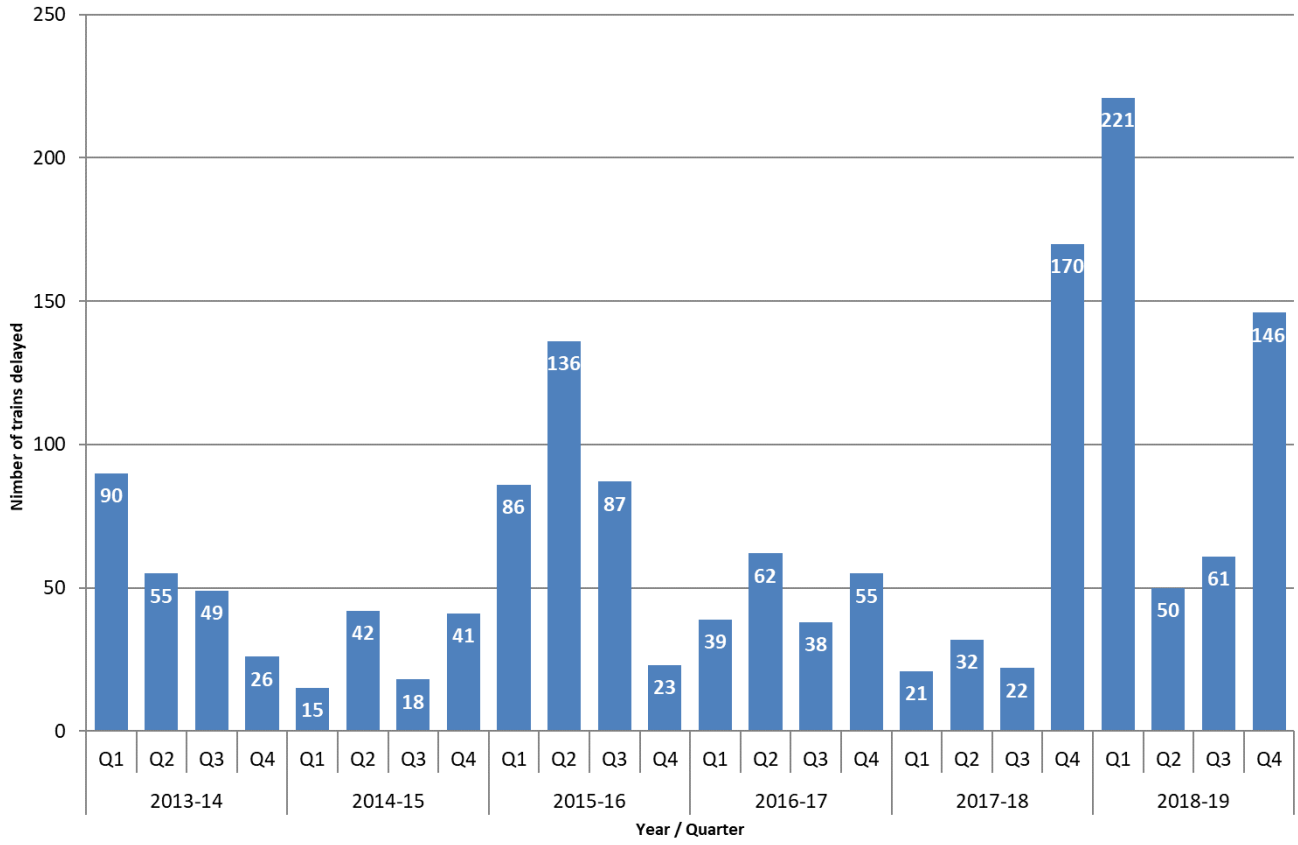
Category	Incident description	Total number of services delayed (attributable to HS1)					
		2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Track	TSRs due to condition of track	0	0	0	0	0	0
	Track faults including Broken Rails	60	0	0	0	11	288
	Reactionary delay to P-coded TSRs				1	0	0
	Track (total)	**60**	**0**	**0**	**1**	**11**	**288**
Non-track assets	Points failures	13	25	95	70	104	14
	OLE/Third Rail faults	50	5	52	2	40	43
	Signal Failures	1	0	14	9	1	0
	Track Circuit Failures	5	27	41	41	16	46
	Signalling System & Power Supply Failures	0	4	35	14	3	10
	Other Signal Equipment Failures	2	3	15	5	0	1
	Telecoms failures	0	0	1	4	3	1
	Non-track assets (total)	**71**	**64**	**253**	**145**	**167**	**115**
Network management	Problems with trackside signs including TSR boards	0	0	0	0	0	0
	Other infrastructure	0	6	3	0	5	13
	Track Patrols & related possessions	1	0	0	1	0	3
	Possession overrun & related faults	4	3	5	8	2	6
	Other possession related delay	39	0	0	8	0	0
	Network Rail Operations – signalling	36	32	36	20	26	19
	Network Rail Operations – control	1	0	18	1	4	2
	Network Rail Operations – other	6	5	11	1	14	5
	Timetable planning	0	6	6	7	11	7
	Network Rail commercial takeback/other	0	0	0	0	0	0
	Uninvestigated delay	0	0	0	0	0	0
	Network management (total)	**87**	**52**	**79**	**46**	**62**	**55**
Severe weather	Civil engineering structures, earthworks & buildings	0	0	0	1	4	17
	Wheel slip due to leaf fall	0	0	0	1	0	0
	Other weather	2	0	0	0	1	0
	Severe weather (total)	**2**	**0**	**0**	**2**	**5**	**17**
External fires	External fires	0	0	0	0	0	0
	Fires starting on Network Rail infrastructure						3
	External (total)	**0**	**0**	**0**	**0**	**0**	**3**
All	**Grand total**	**220**	**116**	**332**	**194**	**245**	**478**

Note: Please see footnote 1 regarding revisions of figures.

1.6 The majority of delay was caused by asset failures rather than operational management or severe weather. Three-fifths (60.3%) of the delays were attributable to track faults including broken rails, which affected 288 trains. The majority of the delayed trains due to track faults occurred in Quarter 1 (1 April 2018 – 23 June 2018) and Quarter 4 (9 December 2018 - 31 March 2019), which accounted for 154 and 122 delayed trains respectively.

1.7 There were however significantly fewer delays due to point failures in 2018-19 (14 trains) compared to the previous year (104 trains). This is the lowest number of delayed trains attributed to point failures since 1 April 2013.

Figure 4 - Number of trains delayed wholly or partly due to HS1 Ltd, 2013 to 2019



Note: Please see footnote 1 regarding revisions of figures.

1.8 Figure 4 shows the number of trains delayed by HS1 Ltd by quarter. Overall performance in 2018-19 deteriorated due to the worsening trend in Quarter 1. It had the highest number of delayed trains (221) ever recorded since the time series started on 1 April 2010. This was due to significant track faults. There were also two trespass incidents in 2018-19. Whilst major incidents are infrequent, they have a significant impact on average performance. Each incident has led to a comprehensive reactive action plan with lessons learned being applied at HS1.

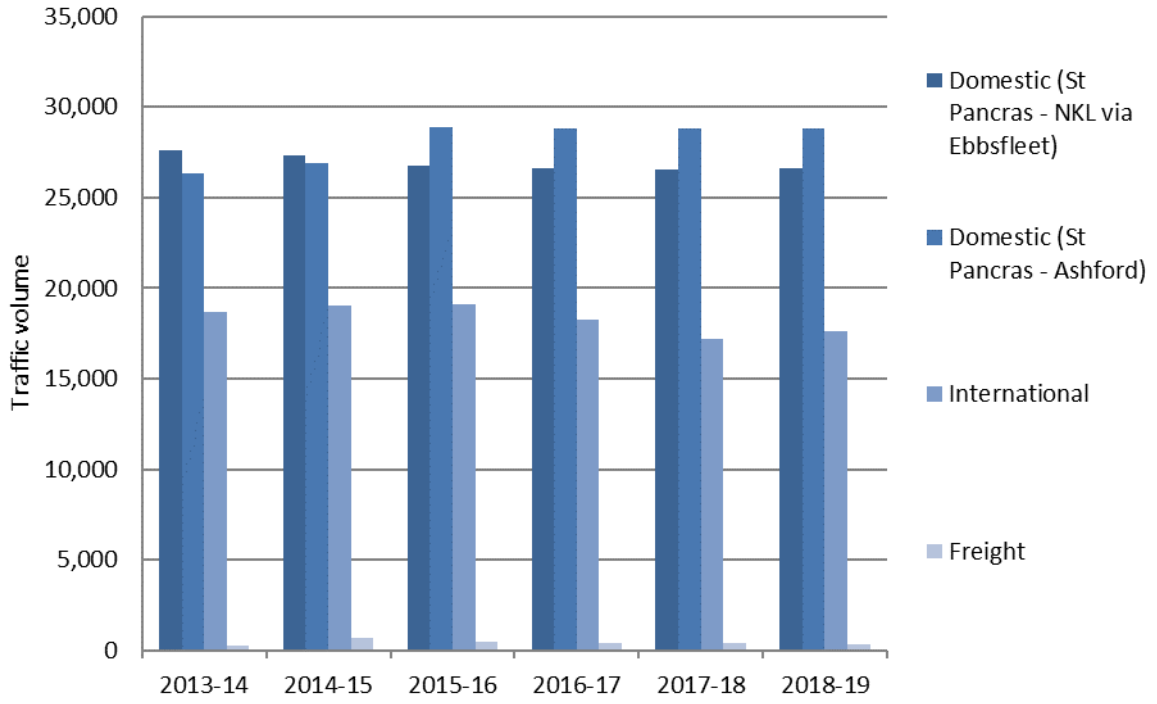
Typically, significant infrastructure incidents are caused by assets at service limit on inspection, rather than reactive from an in-service asset failure.

More detailed information on how asset performance and condition affected services is explained in Chapter 2.

Traffic volume

1.9 The total number of trains timetabled to run on the HS1 network increased since last year, to 73,402 in 2018-19. This represents an increase of 0.6% on 2017-18, after recording falls over two consecutive years. This is mostly attributed to the increase in the number of timetabled international trains (up 386) compared to 2017-18.

Figure 5 – HS1 traffic volume, 2013 to 2019



	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Domestic (St Pancras – North Kent Line via Ebbsfleet	27,591	27,333	26,759	26,645	26,538	26,599
Domestic (St Pancras – Ashford)	26,326	26,874	28,885	28,814	28,810	28,840
International	18,707	19,011	19,117	18,233	17,203	17,589
Freight	286	704	509	439	444	374
Total	**72,910**	**73,922**	**75,270**	**74,131**	**72,995**	**73,402**

Note: Please see footnote 1 regarding revisions of figures.

2. Asset management

Overview

Underlying asset reliability was generally good when compared to the average standard applied for the control period, but there were nine major incidents which caused significant delay – two of which were not asset-related and were the result of trespassers. The main faults were to do with the track asset, rather than signalling or overhead catenary. Overall condition of the assets also remained good and the infrastructure's capability remains as originally designed. The severity level of faults has decreased again this year which demonstrated a further improvement in HS1 Ltd's maintenance effectiveness.

Delivery of renewals was within the funding available, but there has been some schedule slippage from the baseline established in last year's Asset Management Annual Statement (AMAS). Around 80% of the work that was scheduled for completion in the financial year was delivered. HS1 Ltd had forecast that the cumulative cost of CP2 renewals (some of which will now extend into CP3) would be £26.5m (Feb 2014 prices), which is higher than the amount assumed at the time of the PR14 Final Determination: £20.8m (Feb 2014 prices). However, its latest forecast suggests that costs have been reduced to within the original assumption. We are monitoring this closely.

HS1 Ltd's supply chain asset management maturity has continued to develop with its energy supplier UKPNS obtaining ISO 55001 certification in December 2018. Network Rail (High Speed) Ltd gained ISO 55001 certification in March 2018.

We agree with HS1 Ltd's assessment in its AMAS that its current asset management capability is adequate for the safe and economic operation, maintenance and renewal of the HS1 asset portfolio. However, the network is becoming older and therefore more likely to need renewing rather than just maintaining. HS1 Ltd needs to adapt its asset management approach accordingly.

Asset performance and condition

Asset Performance

2.1 This section builds upon our explanation of train service performance and examines the underlying asset reliability in more detail.

2.2 Underpinning HS1Ltd's objective for an average 5.00 seconds delay per train are targets for delay per train by type of infrastructure. Figure 6 reports outturn for the asset types: Overhead Catenary System (OCS), Mechanical & Engineering (M&E), Signalling & Telecoms (S&T), Civils & Environment and Track. As can be seen there

was only one area which exceeded target – OCS - and track was furthest away from target.

Figure 6 – Moving annual average of seconds delay per train caused by infrastructure failures (Period 13, 2018-19) (Source: HS1 Ltd)

Infrastructure Failures		
Target	Actual	Var
1.76	5.39	3.63

OCS			M&E			S&T			Civils & Environment			Track		
Target	Actual	Var	Target	Actual	Var	Target	Actual	Var	Target	Actual	Var	Target	Actual	Var
0.07	0.01	-0.06	0.11	0.33	0.22	0.96	1.10	0.14	0.01	0.14	0.13	0.61	3.82	3.21

Delay minutes (13 periods)	Delay minutes (13 periods)	Delay minutes (13 periods)	Delay minutes (13 periods)	Delay minutes (13 periods)
11	365	1,234	156	4,273

Note – Values are rounded to 2 decimal places; consequently a summed actual may differ by +/-0.01 to the stated aggregated Network Rail (High Speed) Actual.

2.3 However, in looking across the whole control period so far (Figure 7), the average standard the company set itself for number of incidents and services affected have all been met with the exception of track and civils. Compared to last year this represents a slight worsening on the performance attained, when only signalling failed to meet this standard.

Figure 7 – Asset group performance against HS1 Ltd's internal CP2 targets

Asset group		CP2 Standard Ave / Period	2014-15 Actual Ave / Period	2015-16 Actual Ave / Period	2016-17 Actual Ave / Period	2017-18 Actual Ave / Period	2018-19 Actual Ave / Period
Signalling	Number of faults	18	9	12.31	12.46	10.23	4.89
	Services affected	1	4	10.77	1.46	1.54	0.77
Telecoms	Number of faults	4	0.92	1.15	0.92	0.54	0.08
	Services affected	1	0.85	1.08	0	0	0.08
M&E	Number of faults	9	5.92	4.46	2.31	1.77	0.69
	Services affected	1	5.92	4.38	0	0.08	0.15
OCS	Number of faults	2	0.38	0.31	0	0	0.46
	Services affected	1	0.08	0	0	0	0.38
Track	Number of faults	0.2	0	0	0.08	1.23	3.11
	Services affected	0.1	0	0	0	0.08	0.54
Civil	Number of faults	2	0	0	0.23	1.3	0.31
	Services affected	0	0	0	0.08	0.08	0.08

2.4 In 2018/19 there were nine significant incidents (resulting in over 200 mins delay):

- track fault at Points 2051 between Stratford International and Stratford International West on 18/05/2018 which caused 1,781 minutes delay;
- cracked rail in the Thames Tunnel on 23/05/2018 which caused 563 minutes delay;
- track fault at St Pancras International on 18/04/2018 which caused 558 minutes delay;
- loss of traction at Ashford West Junction on 18/04/2018, which caused 333 minutes delay;
- trespass event at Dagenham Dock Junction on 03/10/2018, which caused 1,017 minutes delay;
- track circuit failure at Stratford International on 19/10/2018, which caused 928 minutes delay;
- rail flaw at York Way South Junction on 13/12/2018, which caused 1,114 minutes delay;

- small tree branch in 2021 points at St Pancras on 19/03/2019, which caused 217 minutes delay; and
- trespass event at London Tunnel 1 on 29th March, which caused 855 minutes delay.

2.5 The most significant increases were in track and OCS. It is crucial that HS1 Ltd understands the changing characteristics of asset performance as they age. There needs to be greater use of asset data to predict where faults may occur and how they can be prevented and/or effectively mitigated. During the year Network Rail (High Speed) Ltd initiated an organisational change to enable it to do this and better respond to changing requirements.

2.6 New availability measures were partially implemented this year to inform PR19. These were:

- Asset Availability
  - Operational Availability: defined as the percentage of time that a specific asset group or system is available for operational use, excluding planned maintenance. For 2018-19 a network availability of 97.8% was achieved;
  - Engineering Access Statement Availability: defined as the number of nights per week that the level in the engineering access statement is achieved. Specifically, to provide a single line route for at least 160km/h running to be available between St Pancras International and the CTRL/Eurotunnel Boundary on Monday to Friday nights. HS1 Ltd now plans to report against this measure in 2019-20;
- Plan/Attainment
  - Effectiveness of the Network Rail (High Speed) Ltd works planning capability: defined as the percentage of work completed in the week. This requires NR(HS) to provide backlog figures through periodic reporting, as defined in the Operator Agreement.

Route Asset condition

2.7 The asset portfolio is in a good condition overall, with asset degradation broadly in line with expectations. Owing to renewals interventions delivered in 2017-18, a small proportion of assets saw a year-on-year improvement in asset condition. During 2018-19, the observed condition of the signalling portfolio deteriorated, with the majority of the assets moving from a state of high reliability to a functional state. Some assets were renewed, returning to condition band 1 (as new). The changes in condition can be summarised by three aspects:

- **Changes in utilisation:** recent changes in rolling stock with the introduction of new Velaro trains. It is surmised that this change in operational utilisation has resulted in a degradation of condition of some of the point machines at Stratford and Ebbsfleet. This degradation has resulted in reduced reliability of these assets.
- **Expected end of life:** The electronic control units for POE - HPSS at St Pancras International were installed in 2006 and will be reaching end-of-life during the next control period. Additionally, the signalling markers have now deteriorated and are generally in a poor condition. This deterioration is in line with expectations.
- **Renewals:** During CP2, 30% of the POE - MCEM 91 point machines have been successfully renewed and are now in a good condition. Additionally, gearboxes for all 36 POE - HPSS point machines at St. Pancras have been renewed.

2.8 The current condition profile for the core asset groups is shown in Figure 8. This also compares the current profile based on the condition scores within the Network Rail (High Speed) electronic Asset Management System (eAMS) against the condition profile established in 2013 contained within the CP2 Five Year Asset Management Statement (5YAMS).

2.9 Overall 97.62% of assets are in condition bands 1 to 3, 2.4% are in band 4, and none are the lowest band, 5.

Figure 8 – Current assessment of asset condition compared to the position at the start of the control period (in the CP2 5YAMS) (Source: HS1 Ltd)

	Condition Band	Comparison to 5YAMS	CIVILS	M&E	OCS	SIGNALLING	TELECOMS	TRACK
Percentage of assets in each condition band	1 (New)	CP2 5YAMS	0.00%	0.00%	0.00%	0.00%	0.00%	12.80%
		2017	0.16%	0.09%	0.00%	0.00%	1.64%	14.02%
		2018	0.22%	0.09%	0.00%	0.00%	1.62%	14.16%
		2019	0.22%	0.09%	0.00%	0.00%	1.48%	12.68%
	2	CP2 5YAMS	40.68%	0.00%	0.00%	96.85%	7.87%	78.49%
		2017	40.56%	0.00%	0.00%	97.28%	8.46%	76.14%
		2018	40.58%	0.03%	0.00%	97.21%	10.79%	75.97%
		2019	40.59%	0.14%	0.00%	35.62%	9.58%	78.61%
	3	CP2 5YAMS	59.30%	100.00%	100.00%	1.20%	62.62%	8.71%
		2017	59.25%	99.91%	100.00%	0.77%	58.74%	9.74%
		2018	59.17%	99.91%	100.00%	0.80%	57.72%	9.77%
		2019	59.16%	99.70%	100.00%	63.32%	61.78%	8.63%
	4	CP2 5YAMS	0.02%	0.00%	0.00%	1.95%	29.51%	0.00%
		2017	0.03%	0.00%	0.00%	1.94%	31.16%	0.10%
		2018	0.03%	0.00%	0.00%	2.00%	29.87%	0.10%
		2019	0.03%	0.00%	0.00%	2.01%	27.16%	0.09%
	5	CP2 5YAMS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		2018	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		2019	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Not Scored	CP2 5YAMS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		2018	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		2019	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Route asset capability

2.10 The maximum line speed remains at 300 km/h with no projected decreases in asset capability in the reporting year. In addition, route availability has remained at 22.5 axle loading, with a maximum gauge of 4.5m, with no projected reductions.

2.11 The theoretical maximum number of achievable train paths that the signalling system can deliver has remained at 20 trains per hour, based on three-minute signalling headways. HS1 Ltd currently operates a mid-morning weekly peak of 11 trains per hour citing limiting factors as enabling the mix of international, domestic and freight traffic; turnaround times at St Pancras; and the pattern of services being run.

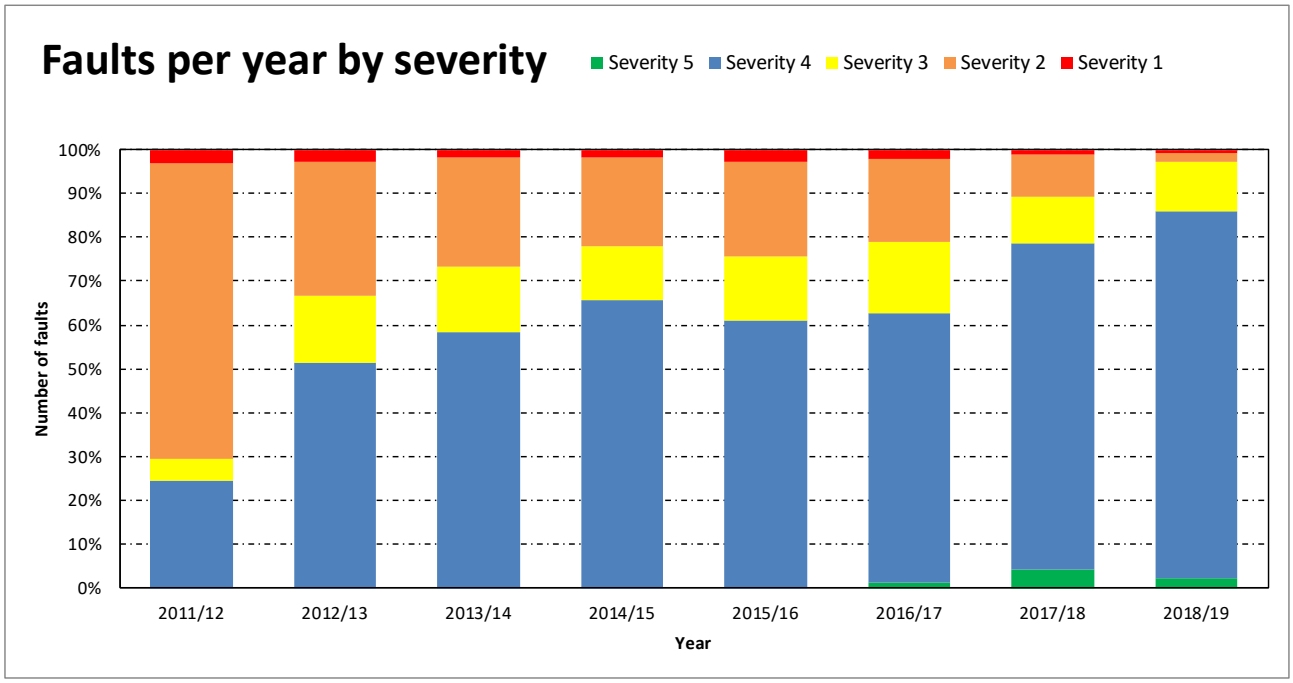
Maintenance

2.12 HS1 Ltd categorises faults in five groups of severity:

- **Severity 1** asset fault causes operational delay;
- **Severity 2** asset fault with potential to cause operational delay;
- **Severity 3/4** asset fault identified and rectified prior to potential to cause operational delay; and
- **Severity 5** asset fault identified through remote condition monitoring and rectified prior to potential to cause operational.

2.13 In 2018-19 there was a continuing trend of lower-severity faults (Figure 9) demonstrating improving effectiveness of HS1 Ltd's maintenance activity.

Figure 9 – Faults per year by severity (Source: HS1 Ltd)



2.14 One power outage occurred causing minor disruption to station services. During the recovery works it was found to have been caused by a wiring fault within one of the control panels. This fault was corrected, and all other panels have been checked for similar issues.

2.15 A good example of proactive maintenance was the replacement of a 400kV transformer bushing at Selindge feeder station. The feeder station was taken out of service for six months, during which time HS1 Ltd's supplier (UKPNS) successfully

kept traction supply uninterrupted and available. There were no delays caused in 2018-19 due to non-availability of power from UKPNS.

2.16 HS1 Ltd and Network Rail (High Speed) have instigated a shift from maintenance and renewal interventions based on fixed-time intervals, to reliability-based intervals informed by asset utilisation and asset condition. Following the rationalisation of intrusive inspections for four S&T critical asset classes, asset reliability has increased.

Asset data

2.17 Accurate asset information is fundamental to providing best-in-class infrastructure stewardship. The HS1 asset information currently collected, stored and shared has to date been sufficient for the effective operation and maintenance of the route. This needs to continue. Condition scoring provided in HS1 Ltd's AMAS document is extracted from the Network Rail (High Speed) Ltd Route Asset Register (eAMS) and includes scoring of all assets. Condition scoring determined by Network Rail (High Speed) Ltd and detailed in their Specific Asset Strategies and 5 Year Asset Management Statement is limited to 'System Level' in the Asset Hierarchy. Differences in overall condition scores shown between the 5YAMS and AMAS have been noted. These differences are driven by the different numbers of assets included in each condition report. Network Rail (High Speed) Ltd are in the process of undertaking engineering assurance reviews to reconcile condition scoring between eAMS and the Specific Asset Strategies.

2.18 Network Rail (High Speed) Ltd has committed to improving the overall approach to recording of asset condition, notably through the continued roll out of composite asset stewardship indices.

Asset planning

Asset management capability improvement

2.19 HS1 Ltd and its suppliers have been working together to develop the maturity of the HS1 Asset Management System.

2.20 The company had previously refreshed its Asset Management Policy and created a new set of Asset Management Objectives. In line with its harmonised approach to asset management, the asset management objectives are applied to both route and stations, categorised as:

Safety	Cost	Punctuality	Availability	Meeting Passengers Expectations	Comfort

2.21 The overall asset management approach has been tested through the CP3 stakeholder engagement sessions.

2.22 The required reliability of an asset group or system is orientated to deliver the asset management objectives. This means that HS1 Ltd prioritised assets that are of a higher criticality.

2.23 Network Rail (High Speed) Ltd has aligned the asset condition required in each specific asset strategy with respect to the importance of an asset group or system in delivering the asset management objectives. As with the shift to reliability-centred maintenance, HS1 Ltd reports that Network Rail (High Speed) has prioritised improvements to asset information collection for higher criticality assets.

Progress with CP2 key outputs & initiatives

2.24 HS1 Ltd has continued to work on the key initiatives and improvements it identified in its CP2 submission against the key asset areas. The status of this work is summarised in Figure 10. Overall this represent an improved position over 2018-2019.

Figure 10 – Progress against key initiatives identified in HS1 Ltd's CP2 submission (source HS1 Ltd)

Asset Group	Completed / on schedule	Behind schedule / at risk	Cancelled
Track	3	1	1
Signal Control & Commmunications	3	0	0
Electrical & Plant (E&P)	4	1	0
Civils	3	0	0

2.25 The items behind schedule or at risk are:

- **E&P – Pantograph-mounted CCTV to help with OCS inspection.** Network Rail (High Speed) is proposing the instrumentation of Eurostar trains including with cameras. This would achieve the OCS inspection requirements and supersede the pantograph-mounted CCTV initiative. The instrumentation of Eurostar trains is likely to take place in the next control period.
- **Track – Introduction of IRIS320 high speed measurement train at full line speed.** Following a feasibility study which highlighted the difficulty of getting the French measurement train through the Channel Tunnel, it has been concluded that this is not the best solution. Alternative technologies are now being explored.
- **Track - Plain line pattern-recognition software to reduce resources and improve information.** The tool will not be used in the same way as on the rest of the UK network; the most appropriate use on HS1 is being examined. HS1-specific algorithms need to be developed using HS1 fault data but there are too few faults for the tool to learn. The aspiration is to complete this in CP2 but this initiative may continue into CP3.

Preparation for CP3

2.26 In 2018-19 HS1 Ltd continued to hold a series of stakeholder CP3 engagement workshops. Key content in these workshop was looking at how HS1 Ltd is approaching asset condition and asset deterioration rates as part of the asset management activity, and how this (and other information) is being used to drive the CP3 renewal plans as well as the 40-year renewal plan.

2.27 The company commissioned Bechtel to look at the deliverability of the long-term plan of route renewals. The first phase of this work was completed in 2017-18.

2.28 In 2018-19, HS1 Ltd delivered the final phases of the route renewals deliverability study, which included the development of specific work execution methodologies (labour and plant requirements), unit rates for work, an integrated plan for CP4 and a high-level master plan for CP5 onwards.

Route Renewals programme

Project governance

2.29 HS1 Ltd has been developing its project management capability to improve management and reporting on the growing number of projects in the portfolio.

2.30 A core part of these improvements is associated with implementing revised governance and reporting arrangements for the work bank and improvements in the authorisation process involving HS1 Ltd, DfT and ORR.

2.31 HS1 Ltd had forecast that the cumulative cost of CP2 renewals (some of which will now extend into CP3) would £26.5m (Feb 2014 prices), which is higher than the amount assumed at the time of the PR14 Final Determination - £20.8m (Feb 2014 prices). However, its latest forecast states that costs have been reduced to within the original assumption. We are monitoring this closely.

Summary of 2018-19

2.32 Eight renewals projects have been completed, these were;

- **Switch Blades** – renewal of three worn half sets of switch blades at St Pancras Station (2047, 2048 & 2000). These were not in the original work bank but have been brought forwards for renewal.
- **Stratford Box Drainage Sump Pumps** – renewal of three dewatering pumping wells.
- **Stratford De-watering** - replacement of obsolete critical components of the dewatering control system.
- **Boundary Fencing** – repair and replacement of 2050m of damaged Clipex fencing.
- **Acoustic Barriers** – stabilisation and renewal of defective acoustic barriers.
- **Road Rail Vehicle control system** - replacement of an obsolete RRV obsolete control system.
- **MCEM 91 renewal** – renewal of points machines.

- **HPSS Gearbox renewal** – renewal of points high performance switch system

2.33 The delivery of the renewals projects in 2018-19 has been within budget but there has been some schedule slippage from the baseline established in last year's AMAS. Approximately 80% of the work that was scheduled for completion in 2018-19 was delivered. This was predominantly due to slippage in delivery of a number of renewal projects planned for this reporting year, into the next. Planned expenditure headroom will used to bring forward CP3 planned renewals into CP2.

Deliverables for 2019-20

2.34 The following renewals are expected to either be completed or key milestones will be achieved in 2019-20.

- **Data Transmission Network (DTN)** - The most significant piece of planned CP2 work is the upgrade/renewal of the DTN. Given the complexity of the project and strategic phased approach to migration of the new and altered circuits, the project is planned for completion towards end 2020-21.
- **Route Uninterruptible Power Supply (UPS)** – Renewal of 13 No. critical UPS equipment across the route. Like the DTN project, this schemes construction programme is planned for completion towards end 2020-21.
- **Medway Headwall** – The project entered into Early Contractor Involvement early in 2018-19 in readiness for construction in 2019-20.
- **Route Control Centre (RCC) / Electrical & Mechanical Management Information System (EMMIS)** - Phase 1 of the RCC / EMMIS was completed in 2018 with Phase 2 final commissioning into service planned for 2019-20.
- **CME / LME** - Renewal of the local and central maintenance equipment.
- **Air Conditioning (AC) / Ventilation Control System (VCS)** - The AC renewal in the Signalling Equipment Rooms and the tunnel VCS renewal contracts have commenced.
- **Radio Propagation** – Replacement of Section 1 GSMR repeaters, fire service base stations and components from decommissioned CSR repeaters to be recovered for use as maintenance spares for the TETRA/ Fire service system.

2.35 In addition there are three projects that are planned to commence in CP2 that were not in the original CP2 renewals plan:

- **Switch Blades** - Wear and fatigue cracking problems of switches, exacerbated by the introduction of the Velaro fleet (2015), is a known issue. This wear has the potential to cause major impact to services. HS1 Ltd has developed a

planned programme of S&C replacement for 38 specifically identified switches. In 2019-20, four more switches shall be renewed.

- **Temple Mills Depot** – track connection was showing increased wear owing to the introduction of the new Velaro trains so has been replaced.
- **Fibre Optic Signals** – Feasibility study into renewal of the fibre optic fed signals at St Pancras driven by equipment obsolescence.

2.36 In addition to the above described CP2 renewals, HS1 Ltd has put forward plans to develop and deliver 13 accelerated CP3 renewal projects in 2019-20. The company considers that this is possible from a financial perspective because some of the CP2 projects will not be completed before March 2020. This means that there is surplus funding in the Escrow account that could allow commencement of some of the smaller CP3 works schemes that are more pressing to get underway in the remaining eleven months. Any progress on these renewal projects will be subject to final approval by the DfT and ORR in line with the agreed renewal-governance process.

Deliverables for 2019-20

2.37 HS1 Ltd reported that its main focus for CP2 remained the successful delivery of the SCSR project which will complete detailed designs and begin delivery of communication system renewals at each station in the next year. It is also planning early stage work to begin on larger CP3 renewals; proposals for this work will be reviewed by ORR in order to advise DfT on funding from the route escrow account (see Chapter 3).

3. Finance and efficiency

Overview

In 2018-19 HS1 Ltd's regulated costs exceeded its regulated income of £74.7m by £0.3m[3]. In comparison to what was set out at the time of the final determination in 2014 (PR14) this was £0.6m worse. It received £74.7m of regulated income, £4.0m higher than assumed in PR14. It spent £75.0m operating, maintaining and renewing its rail infrastructure in the year, £4.6m higher than assumed in PR14. These variances are explained in Figure 11.

Figure 11 – Summary of HS1 Ltd's regulated income and expenditure in 2018-19

£m (2018-19 prices)	Actual	PR14	Difference better / (worse)	2017-18
Income				
OMR charge	56.0	54.7	1.3	54.7
Pass through income	18.6	16.0	2.6	17.4
Performance regime	0.1	0.0	0.1	0.1
Total income	**74.7**	**70.7**	**4.0**	**72.2**
Controlled track costs				
Network Rail (High Speed) Ltd	41.6	41.6	0.0	42.2
HS1 Ltd	11.5	10.4	(1.1)	11.9
Network Rail Infrastructure Limited	1.5	1.6	0.1	1.4
Total controlled track costs	**54.6**	**53.5**	**(1.1)**	**55.5**
Pass through costs				
Rates	8.5	5.2	(3.3)	7.2
Electrical infrastructure (traction)	5.4	5.3	(0.1)	5.3
Insurance	3.2	3.9	0.7	3.3
Power – non-traction	1.6	1.3	(0.3)	1.5
Total pass through costs	**18.7**	**15.7**	**(3.0)**	**17.4**
Freight costs				
Network Rail (High Speed) Ltd	0.3	0.3	0.0	0.3
Network Rail Infrastructure Limited	0.2	0.2	0.0	0.2
HS1 Ltd	0.1	0.1	0.0	0.1
Total freight costs	**0.6**	**0.6**	**0.0**	**0.6**
Opex-funded upgrades	**0.5**	**0.6**	**0.0**	**0.5**
Performance-related payments	**0.6**	**0.0**	**0.0**	**0.0**
Total costs	**75.0**	**70.4**	**(4.6)**	**74.2**
Net Income / (Expenditure)	**(0.3)**	**0.3**	**(0.6)**	**(2.0)**

[3] Our analysis excludes unregulated income and expenditure. Unregulated income includes the 'Investment Recovery Charge' (IRC) and income from commercial property. Unregulated expenditure includes financing costs. HS1's statutory financial statements provide more information about these items. Some figures in this section may not sum due to rounding.

Income

3.1 HS1 Ltd received £74.7m of regulated income in 2018-19, £4.0m higher than assumed in PR14. The majority of HS1 Ltd's regulated income (£56.0m) was from charges to train operators for operating, maintaining and renewing its network. The company also received pass through income (£18.6m) from train operators to recover costs that are largely uncontrollable by HS1 Ltd. These include non-traction electricity, electrical infrastructure costs, insurance and business rates.

3.2 Income was higher than assumed in PR14 largely due to higher than assumed use of the network by Southeastern's domestic passenger services, partly offset by lower than assumed use by Eurostar.

Costs

Operating, maintenance and renewals costs

3.3 HS1 Ltd incurred £75.0m of regulated costs in 2018-19, £4.6m higher than assumed in PR14. The majority of HS1's regulated costs (£41.6m) were incurred in operating, maintaining and renewing its network. This work is undertaken through a long-term, fixed price contract with Network Rail (High Speed) Limited[4]. This expenditure was the same as assumed in PR14. Figure 12 provides a breakdown of Network Rail (High Speed)'s costs.

3.4 HS1 Ltd's internal costs are shown in Figure 13. Its own staff costs were £0.5m higher than assumed in PR14 which HS1 has attributed an expanded team to manage increased renewals and maintenance.

3.5 In accordance with the Operator Agreement, HS1 Ltd is required to pay train operators if Network Rail (High Speed) outperforms our PR14 financial assumptions. Network Rail (High Speed) has stated that no outperformance payments are due for Year 4 as there is no outperformance after taking account of the way outperformance is calculated under the agreement, which is different to the way we have shown in Figure 12. HS1 Ltd is still reviewing this matter.

[4] Network Rail (High Speed) Limited is a wholly owned subsidiary of Network Rail.

Figure 12 – Network Rail (High Speed) costs 2018-19

£m, 2018-19 prices	Actual	PR14	Difference better / (worse)	2017-18
Staff costs	19.4	17.1	(2.3)	19.1
Agency costs	0.4	0.1	(0.3)	0.2
Consultancy costs	1.2	0.2	(1.0)	1.3
Corporate functions & Network Rail Infrastructure Ltd Services	5.0	4.5	(0.5)	5.1
Plant & Materials	4.6	5.8	1.2	5.2
Sub-Contractors	5.4	6.4	1.0	5.3
Research & Development	0.1	0.1	0.0	0.4
Overheads	1.5	2.9	1.4	2.6
Operating costs	**37.6**	**37.1**	(0.5)	**39.0**
Management fee	3.0	3.0	0.0	3.0
Risk premium[5]	1.7	1.9	0.2	0.0
Outperformance	(0.3)	0.0	0.3	0.5
Total Network Rail (High Speed) costs[6]	**41.9**	**41.9**	**0.0**	**42.5**

HS1 Ltd internal costs

3.6 HS1 Ltd's internal costs were £11.5m in 2018-19, £1.1m higher than assumed in PR14. Figure 13 provides a breakdown of HS1 Ltd's internal costs.

Figure 13 – HS1 Ltd's internal costs in 2018-19

£m, 2018-19 prices	Actual	PR14	Difference better / (worse)	2017-18
Staff costs	4.5	4.0	(0.5)	4.2
Technical support / Consultants	2.2	2.1	(0.1)	2.1
Office running costs	1.1	1.1	-	1.3
Regulatory costs and Safety levy	0.3	0.6	0.3	0.3
Other costs	3.4	2.6	(0.8)	3.9
Total HS1 Ltd Costs	**11.5**	**10.4**	**(1.1)**	**11.9**

[5] The risk premium category includes Schedule 8 payments relating to poor performance resulting from infrastructure faults that occurred in the year.

[6] This includes the £0.3m of Network Rail (High Speed) costs shown in freight costs in Figure 10.

Pass through costs

3.7 Some of HS1 Ltd's costs are passed straight through to train operators with equal and offsetting pass through income. These costs are largely uncontrollable by HS1 Ltd and include traction electricity costs, business rates and insurance. Pass through costs were £18.7m in 2018-19, which was £3.0m higher than assumed in PR14, largely due to increased business rates.

Freight costs

3.8 HS1 Ltd incurs costs relating to freight traffic including maintaining freight-specific infrastructure. Freight costs were £0.6m, which was in line with PR14. This is because the costs of freight assets operated and maintained by the company are largely fixed even though the number of freight trains using the network was lower than assumed in PR14.

Upgrades to the network

3.9 In addition to the day-to-day operation of its rail network, HS1 Ltd makes upgrades to ensure that its network continues to meet the needs of customers. It spent £0.5m on opex funded upgrades in 2018-19, which was £0.1m lower than assumed in PR14.

Efficiency

3.10 HS1 Ltd does not currently report on its efficiency changes over time. However, it is important that we understand how it is performing compared to the efficiency challenge that we set in our 2014 periodic review and to inform our next review of its charges. In this report, we assess the company's efficiency by comparing its own costs and those of Network Rail (High Speed) to those incurred in 2014-15, the final year of CP1. We exclude pass through costs as HS1 has less control over these.

3.11 Adjusted for inflation, Network Rail (High Speed)'s costs have decreased by 16.7% and HS1 Ltd's costs have increased by 20.0% from 2014-15. See the expenditure sections above for details.

Route escrow account

3.12 Some of HS1 Ltd's access charges are paid into an escrow account to fund current and future renewals. This fulfils a similar function to the Regulated Asset Base (RAB) in Network Rail and other infrastructure providers to spread these costs over the long term.

3.13 The balance on the route escrow account at 31 March 2019 was £78.4m of which the majority is on deposit until 31 March 2020. The escrow balance increased by £12.0m in the year due to:

- £12.6m of payments into the escrow account. This was £0.5m lower than our determination assumption largely because of lower inflation[7];
- £1.6m withdrawn to pay for renewals undertaken in the year. PR14 assumed £5.7m due to a different phasing of work; and
- £0.9m of interest earned.

Overview of HS1 Ltd's statutory financial statements

3.14 In 2018-19, turnover of £225.7m less operating costs of £137m resulted in earnings before interest, tax, depreciation and amortisation (EBITDA) of £88.7m. Profit for the financial year was £70.5m in 2018-19. As at 31 March 2019 HS1 Ltd's net assets were £319.6m.

3.15 In analysing HS1's financial position to understand the risks it is exposed to, we recognise that it is important to consider the position of the wider group of companies of which it is part. For example, debt for HS1 Ltd is raised at the group level by High Speed Rail Finance (1) Plc and High Speed Rail Finance Plc (subsidiaries of HS1's immediate parent company, Helix Acquisition Ltd). High Speed Rail Finance (1) Plc and High Speed Rail Finance Plc provide finance to HS1 Ltd, which then pays finance charges to them. Recent credit rating agency reports on High Speed Rail Finance 1 Plc, have confirmed its A- rating, confirming that it has an affordable and sustainable capital structure.

[7] Unlike in the rest of our report, where we report HS1 Ltd's financial performance in a consistent price base, we report the value of the escrow account in cash prices. This means we do not update our PR14 assumption for differences in inflation compared to our PR14 determination assumptions.

4. Health & Safety

Overview

Under the Railways and Other Guided Transport Systems (Safety) Regulations 2006, the infrastructure manager, Network Rail (High Speed), has duties to establish and maintain a safety management system as set out in the Regulations. Network Rail (High Speed) was issued with a safety authorisation in accordance with the Regulations in October 2009, which was renewed in May 2017 for five years. We have carried out inspection and assessment activity, and note HS1 Ltd and Network Rail (High Speed)'s proposed adoption of the risk maturity model (RM3).

4.1 During 2018-19 the ORR carried out the following activity:

- inspections with High Speed 1, Network Rail (High Speed) and relevant stakeholders to seek assurance on preparations for leaving the European Union and to encourage a collaborative, co-ordinated and co-operative approach;
- inspection at St Pancras International station, checking legal compliance;
- follow up on Network Rail (High Speed) response to the March 2018 incident involving a front-facing swing-nose crossing, ORR's track inspection recommendations, fire safety issues at St Pancras International Station and its recruitment of key new posts and reorganising as it strengthens its ability to manage ageing assets and renewals; and
- routine monitoring meetings with HS1 Ltd and Network Rail (High Speed) during the year.

4.2 ORR completed its assessment of Mitie Technical Facilities Management's application, and renewed its safety authorisation to operate Ashford International Station on HS1.

4.3 HS1 Ltd's and Network Rail (High Speed)'s progress with adopting the risk management maturity model (RM3) as a tool to improve the capability of health and safety management on the HS1 network has been slowed down by the wider improvements being set in action. ORR notes both organisations' attendance at recent ORR RM3 workshops and their intentions to adopt RM3, and will follow up on progress during 2019-20. Further information on RM3 can be found on the ORR website.

4.4 Further information on health and safety performance on all of Britain's railways can be found in ORR's health and safety annual report, and on the mainline railway

(which includes the HS1 network) can be found in the Rail Safety and Standards Board (RSSB) Annual Safety Performance Report.

4.5 Further information on our approach to regulating health and safety risks created and managed by businesses in the railway industry can be found in the strategic risk priorities section of the ORR website.

This publication is available at: orr.gov.uk.

Any enquiries regarding this publication should be sent to us at orr.gov.uk/contact-us.