HS1 Ltd

Five Year Asset Management Statement

Consultation

18 October 2013

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1. Foreword

HS1 has three strategic mantras: (1) protect and grow, (2) punching above our weight and (3) winning by inches. The first demonstrates our commitment to looking after the HS1 assets for the nation for the long term. The second recognises that we are a minnow in the UK and European rail context and need to work with our customers and stakeholders to deliver. The third demonstrates our commitment to continuous improvement.

Over the last five years we have delivered well – the best infrastructure punctuality performance in Europe and the UK's highest customer satisfaction levels at our stations as measured through the National Passenger Survey. Our customers have told us that they continue to expect and require the same results from HS1, both over the five years from 2015-20 and over the longer term.

Delivering such success is not easy though and it could not have been achieved without working in partnership with our stakeholders:

- Network Rail (High Speed) operates and maintains HS1 on our behalf. We have chosen them to continue as our partner until 2025, renegotiating our agreement with them to emphasise partnership working, sustaining high quality delivery at better value for our customers.
- We work with our customers and are responsive to their needs. Passenger satisfaction of 92% for Southeastern Highspeed and Eurostar's 80% market share with 9.9 million passengers show the success of this approach.

We have approached this periodic review in the same spirit of cooperation. We have engaged with stakeholders including ORR and shared information throughout the review. Those stakeholders have told us that they value our proactive and collaborative approach.

This document distils the work we have done and the comments already made. It covers:

(1) Our understanding of customer requirements for the asset for the short and long term. Their requirements are in turn informed by their customers to provide a clear line of sight from infrastructure to passenger (and, albeit to a lesser extent, freight shipper);

(2) The detailed work and resulting costs incurred by HS1 and NR(HS) to deliver these requirements over the next five year control period from 2015 to 2020; and

(3) The longer term renewal requirements (including our approach to asset stewardship) and resultant costs and annuity requirements.

This is a draft to get your views. If the draft isn't exciting, that's because, in the words of David Brailsford, performance director of the supremely successful British cycling team "*There comes a point of time where the result is expected, rather than it being exciting*". Nevertheless we know how much work needs to be done to retain that great success – David uses the term "marginal performance" where we use "winning by inches". Whatever the terminology, it is clear small differences matter when performance is already at the top. We look forward to receiving your views and comments, however large or small, and improving on this document.

Nicola Shaw

Chief Executive Officer

2. Executive Summary

This Five Year Asset Management Statement (5YAMS) sets out our plans for the period from April 2015 to March 2020 (Control Period 2) and beyond. It shows how we will deliver what our customers want from HS1, which is primarily to maintain the current excellent performance. It outlines how we will meet our long term asset obligation to hand back HS1 with equivalent capability to that at the start of the concession despite it being 30 years older. And it illustrates the progress we have made in making HS1 more affordable. The plans have been developed in collaboration with our partner Network Rail (High Speed) (NR(HS)), train operators, ORR and DfT.

HS1 has performed exceptionally well during CP1 and delivered substantial benefits to Kent commuters, travellers to and from continental Europe, and more widely to UK plc. We have learnt a huge amount since operations commenced that can support future continuous improvement.

Because of the commercial model for HS1 that delivered a £2.1 billion benefit to the taxpayer in 2010, operators pay a premium to use our infrastructure compared to other Government-owned infrastructure in Europe. We recognise that and we want to ensure we are delivering a service that we can all be proud of, which justifies the price premium, and which gets used by others as an example of what “great” looks like.

The ultimate output of this periodic review is a new set of prices for inclusion in operator contracts. We are pleased that we are able to propose reductions for international and domestic operators as shown in Table 1. These prices mean an overall saving of 9% per timetabled train minute for passenger operators compared to the initial CP1 charge.

Table 1: CP1 and CP2 OMRC (£ per train minute, February 2013 prices)[1]

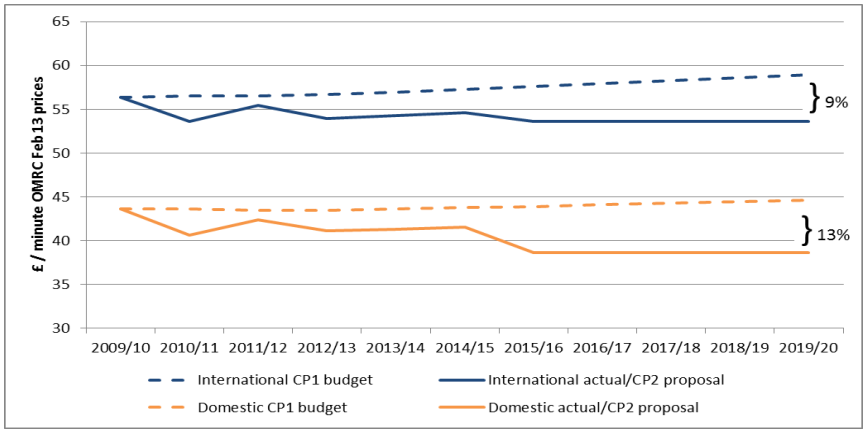
	International passenger services	Domestic passenger services
OMRC CP1 start (2009/10)	56.38	43.58
OMRC CP1 exit (2014/15)	54.61	41.52
Proposed OMRC for CP2	53.62	38.63
% reduction		
from CP1 start	-5%	-11%
from CP1 exit	-2%	-7%

The change within CP1 reflects significant savings in pass through costs from better procurement and an immediate sharing of benefits from a renegotiated operations and maintenance contract with NR(HS), which together have saved operators £5m p.a. in charges. This has more than offset the RPI+1.1% indexation rate in CP1.

In CP2 we propose further savings in operations and maintenance costs which more than offsets the increase in the renewals annuity required to put renewals on a more sustainable footing. In addition we propose to escalate charges in CP2 by RPI only, removing the real increase of 1.1% p.a. As highlighted in Figure 1, these changes have a material impact on proposed charges.

[1] Unless otherwise stated all costs and charges presented in this 5YAMS are in February 2013 prices

Figure 1: CP1 and CP2 OMRC savings (£ per minute, February 2013 prices)



Compared to a continuation of the charge set at the start of CP1, our charges in 2019/20 are expected to be 13% lower for domestic operators and 9% lower for international operators which, as described later, we believe is a major saving given the high proportion of relatively fixed costs and an ageing asset. This represents a total reduction of £11m in 2019/20 OMRC, to £81m.

The 5YAMS sets out the considerable detail underpinning these summary results, by considering the:

- **Safety** commitments we have;
- **Outputs** we plan to deliver;
- **Asset Management Strategy** that delivers these outputs in a robust and reliable way;
- **Cost plans** that have been built from the bottom up and embody significant stretch; and
- **Future renewal plans** consistent with our asset management strategy that balance asset stewardship and affordability considerations.

First and foremost we have an ongoing commitment to ensuring a **safe** railway. We are passionate about reducing harm to all those who work in the HS1 community. Our safety vision is "*to create and lead a culture in which all HS1 Ltd stakeholders can deliver world class safety performance with zero harm to their people, their contractors, their customers and their neighbours*". To date both HS1 Ltd and NR(HS) have focused, in the main, on the delivery of situational safety through the development and implementation of procedures, standards and competencies. We will build on this by focusing on behavioural and psychological activities so that there is a culture where everyone owns and takes responsibility for improving safety performance.

We are delivering the **outputs** that our customers want in a way that underpins their business models. Their needs are driven by what their customers want, providing a line of sight from HS1 outputs to passengers. Defining outputs is an example of how we have worked collaboratively and transparently with operators, reflecting the day-to-day operation of HS1. In terms of outputs for CP2, we have agreed key areas that we will track over time through bilateral sessions. This will allow a review of outturn, early identification of any challenges, and better alignment of needs over time. We will focus on minimising the number and impact of any "big" performance incidents, improving information flow in times of perturbation and learning from techniques trialled in CP1.

Our world class performance levels (consistent MAA delays of less than 8 seconds per train v UK average of c70 seconds) show we are operating and managing the asset well. **Asset management** is key going forward, as the asset ages, and we are challenging ourselves to do more with less, drawing on accumulated professional expertise and learning from others where possible. Our work is underpinned by new techniques and analysis, such as whole life cost modelling, and improved data collection. Our asset information strategy involves collecting data to inform better decisions over time.

We have developed our **cost plans** and shared these with stakeholders at a very granular level to allow challenge on an individual line basis. Our plans respond to, and largely incorporate, the recommendations from external bottom up and top down benchmarking, which for the first time has provided insightful high speed rail comparators that we can continue to develop during CP2.

Our operations and maintenance costs have reduced by £63m (13%) in CP1 against the original agreed budget, of which £44m has been delivered to customers through pass through cost reductions and immediate sharing of savings from our renegotiation of the NR(HS) contract in 2012 (which also delivered an outperformance sharing mechanism during CP2 and CP3). Our CP2 plans propose an additional 15% cost reduction on this CP1 exit as shown in Table 2.

Table 2: CP2 O&M cost savings (£ million, February 2013 prices)

	Savings v CP1 efficient budget	Change 19/20 v 14/15
NR(HS) costs	-8%	-20%
HS1 costs (contract / internal)	-8%	-7%
Pass through costs	-30%	-3%
Freight costs	+9%	-60%
Total O&M cost	**-13%**	**-15%**

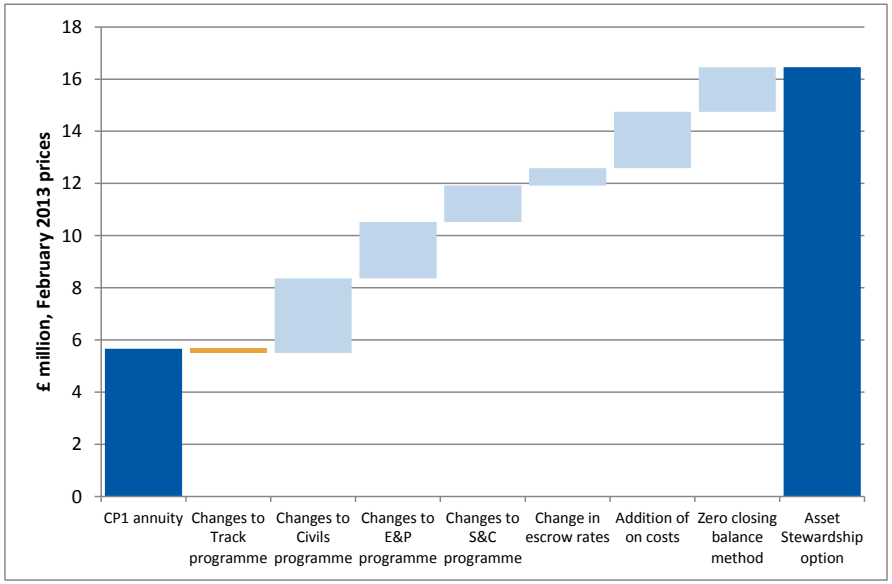
Our approach to **long term renewals** balances our long term asset stewardship obligations with affordability considerations. Although we are delivering big reductions in operations and maintenance and pass through costs, renewals requirements will increase from a low CP1 base. This is partly driven by the move to more sustainable financial assumptions.

We have concrete plans for maintenance and renewal activity volumes in CP2 which derive from our Asset Specific Policies. Unlike other regulated utilities with RAB-based regulation we have a “pay in advance” escrow system in operation to smooth out lumpy spend. This means that there is a risk of either over- or under-funding the account. The funding risks are borne by operators over time.

Before CP1, no detailed work had been done to assess the renewals requirements. In the last year we have developed more detailed plans for each asset using manufacturers’ recommendations, experience to-date and lessons learned from other operators. This gave a baseline option for the renewals annuity of approximately quadruple its CP1 level. Using our engineering judgment and early experience of the assets we have developed an alternative “asset stewardship” case which we believe supports operator affordability whilst allowing for the uncertainty of a 40 year outlook and can be revisited at each periodic review as we develop a more detailed understanding of the asset aging process. The CP2 plan and prices presented in this document assume we deliver on the asset stewardship case.

The following chart illustrates the key differences between the annuity values (February 13 prices) in CP1 (£5.7m p.a.) and the asset stewardship option (£16.5m p.a.). Compared to CP1, the asset stewardship option has higher volumes of work (particularly in civils and electrification & plant), a lower assumed rate of return which increases the contribution required from operators, and “on-costs” which were omitted from the original calculations.

Figure 2: Changes in the renewals annuity (£ million per annum, February 2013 prices)



Train volumes are expected to be relatively flat over CP2 with a re-opener proposed if a new operator commences during CP2 as this will be a "binary" change in the HS1 operation.

We will continue to work within a regulatory framework that was recently established and is working well. From discussions with stakeholders there is no appetite to change this framework fundamentally, with the new outperformance sharing mechanism offered by NR(HS) providing an opportunity for all stakeholders on HS1 to continue working through CP2 to generate new ideas that will make the railway better.

In addition we want to support the availability of HS1 for freight services and hence have worked hard to reduce the freight specific costs – reducing them by 60% compared to CP1 levels. However, given the very low volumes predicted (c 200 trains a year) this still leads to very high per train costs. Our freight operating customers are discussing funding options with the DfT and we will continue to support this discussion.

Station costs are not part of the CP2 ORR review or this consultation. However, we agreed with operators that we would provide an indicative view of station costs so that they could understand the holistic cost position – this initial view is included in Part E. We will be consulting separately on our station plans from December 2013.

All of this combines into a strong plan for CP2 that delivers real benefit before 2020 but also sets a great platform beyond 2020.

This document forms one of the key deliverables of the PR14 consultation with train operators and other interested parties that will run from 18 October 2013 to 29 November 2013. We will provide opportunities to discuss these plans with consultees during that time. Our aim is to submit a final plan to the ORR at the end of December that has been endorsed by our key stakeholders.

The remainder of this document is structured as follows:

Part A: Background

Part B: CP1 outturn

Part C: CP2 proposals. This part includes:

- our proposed outputs for CP2;
- the asset management plans which will deliver these outputs;
- the associated costs and charges; and
- proposed changes to our regulatory framework.

Part D: Conclusions

Part E: Stations review

Part F: Appendices

Part A: Background

3. Introduction

3.1. HS1

3.1.1. What is HS1?

HS1 Limited (HS1 Ltd) holds the concession through to 31 December 2040 to operate, maintain, renew and replace the 109 kilometre high speed rail line (HS1) connecting London's St Pancras International station with high speed commuter destinations throughout Kent, and international passenger destinations in Europe such as Paris and Brussels via the Channel Tunnel, as well as the international stations at St Pancras, Stratford, Ebbsfleet and Ashford.

- HS1 was designed to be compliant with both UIC GC structure gauge and relevant European Technical Specifications for Interoperability (TSIs).
- The signalling system on HS1 is TVM 430 which is also used in the Channel Tunnel, on TGV Nord and Belgian high speed lines.
- Power is supplied from the overhead catenary system at 25kV/50Hz.
- Maximum operating speeds are 300km/h on Section 1 and 225km/h on Section 2.
- 25km of the HS1 route is in tunnel and there are three significant bridges of 1km or more.

A route map of HS1 showing stations, significant tunnels and bridges and connections with other networks and facilities is shown in Figure 3.

HS1 has a number of connections to the UK domestic network: at Ebbsfleet and Ashford allowing through services from north and east Kent, with domestic lines to the north of London and a freight connection at Ripple Lane.

HS1 was built in two phases. Section 1, with a connection to London Waterloo station, was completed in 2003. Section 2, linking Section 1 with St Pancras International and the two new international stations at Stratford and Ebbsfleet, was completed in 2007.

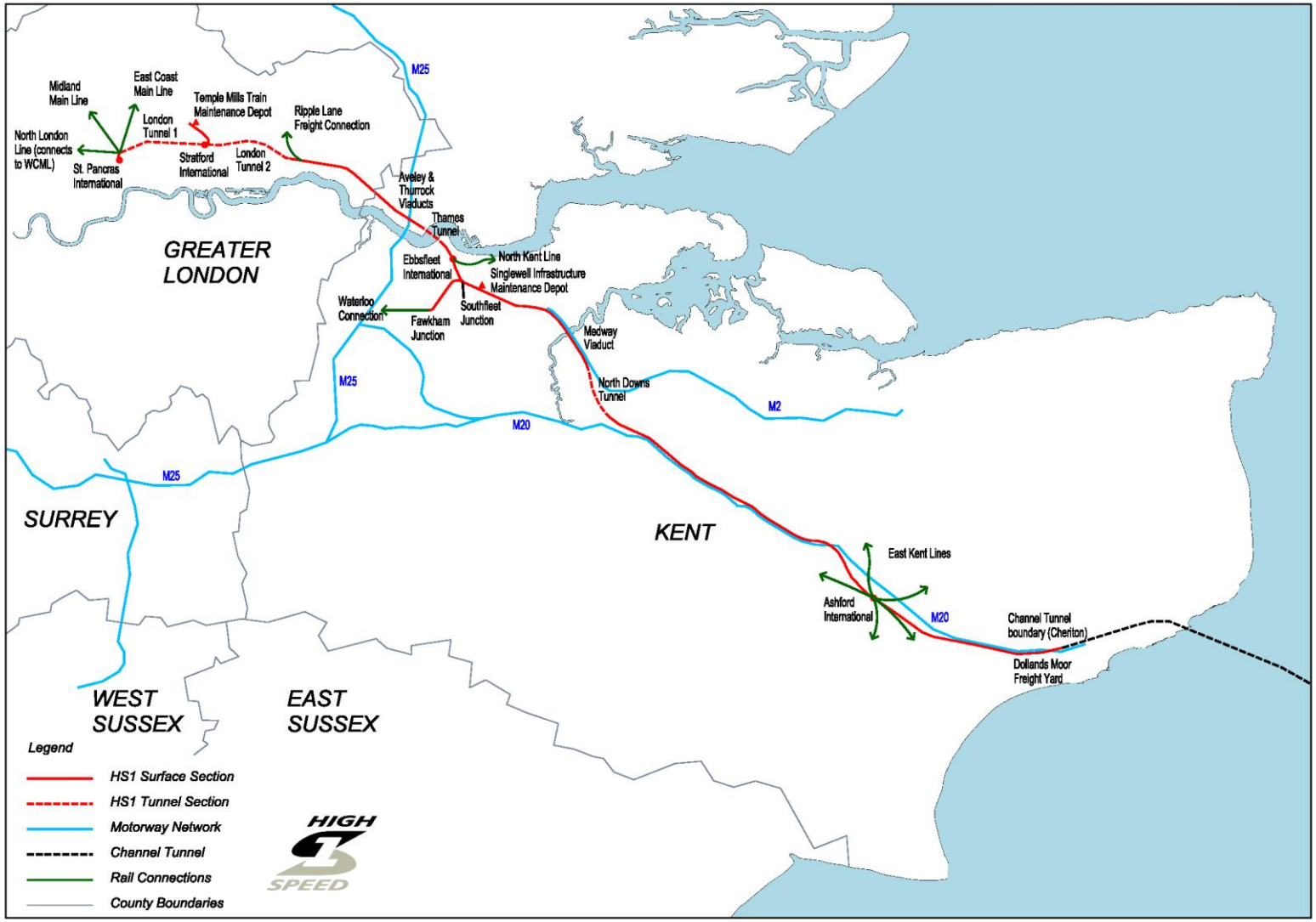
Since opening, we have worked with train operators to manage the seamless transfer of Eurostar services to HS1 and the smooth introduction of Southeastern Highspeed domestic services on the line in 2009. International freight services commenced in 2011. HS1 has spare capacity to accommodate new services, however, the morning peaks at St Pancras are beginning to become more constrained.

Commercially HS1 is governed by a Concession Agreement and various leases with the UK Government and operates primarily through an outsourced model, notably through NR(HS).

The story of HS1 has been a story of success:

- Construction was on time and on budget
- Journey time savings of 40 minutes for international passengers and up to 50 minutes for London commuters from Kent have been achieved.
- HS1 has operated at world class levels of reliability throughout its life, with a Moving Annual Average (MAA) of less than 8 seconds delay per train from infrastructure incidents. Consistent performance has been achieved despite the 300% increase in rail operations since December 2009.
- We have achieved significant cost efficiency in CP1: by the end of CP1 we expect overall cost savings of 13% compared with the budget agreed for this period. Most of the savings are passed on to train operators.
- During the 2012 Olympic and Paralympic Games, we worked with LSER and NR(HS) to provide the acclaimed "Javelin" shuttle service which operated on HS1 between St Pancras International and Stratford International, adjacent to the Olympic Park site. An additional 5,800 trains operated during the period and carried more than 1.4 million spectators to and from the Olympic Park.

Figure 3: HS1 route map



3.1.2. Corporate history

Table 3 shows key HS1 milestones.

Table 3: Key HS1 business milestones

Date	Milestone
2003	Completion of Section 1 of HS1 with a connection to London Waterloo station.
2007	Completion of Section 2 of HS1 linking Section 1 with St Pancras International. Total construction cost for Sections 1 and 2 was £6.2 billion.
2009	The UK government granted HS1 Ltd a concession to operate, manage and maintain the HS1 assets until 31 December 2040.
2010	The UK Government sold HS1 Ltd to a consortium comprising Borealis Infrastructure and Ontario Teachers' Pension Plan for £2.1 billion.
2011-2013	Major improvements delivered in HS1 including the renegotiated Operator Agreement with NR(HS) (April 2012), successful Olympic service delivery and completion of the business refinancing (February 2013).

Our ultimate shareholders are OMERS Administration Corporation (OMERS) (50% share) and the Ontario Teachers' Pension Plan Board (OTPP) (50% share).

OMERS is responsible for the pension income for almost 430,000 members, retirees and survivors, including Ontario municipal workers. OMERS has a AAA credit rating from Standard & Poor's and as at 31 December 2012 had over C$60.8 billion in net investment assets. Borealis Infrastructure (Borealis) identifies, invests in and manages infrastructure assets on behalf of OMERS. It currently manages investments of approximately C$9.8 billion in Canada, the United States and Europe.

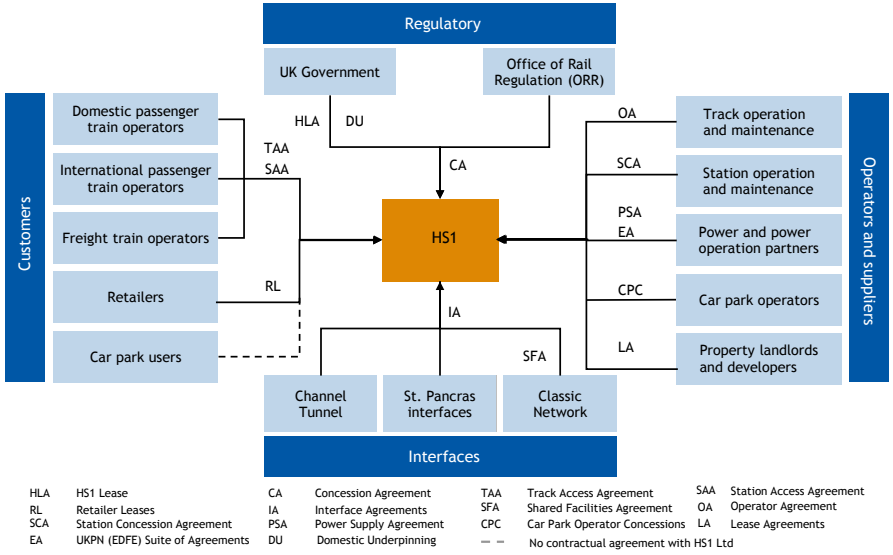
OTPP is an independent corporation responsible for investing and administering the pensions of Ontario's 303,000 current and retired school teachers. With net assets of C$129.5 billion as at 31 December 2012, it is one of the largest financial institutions in Canada. OTPP is a significant long term holder of infrastructure assets in North America, Europe and South America. As at 31 December 2012 its infrastructure investments totalled C$9.6 billion.

Both sponsors have significant experience and knowledge of investing in and managing large scale infrastructure assets based in the UK, including Associated British Ports, Scotia Gas Networks, InterGen, Bristol Airport and Birmingham International Airport.

3.1.3. Contractual framework

Figure 4 shows our contractual framework.

Figure 4: Contractual framework



The key contracts of relevance to this periodic review are discussed below.

3.1.3.1. Concession Agreement

We hold the concession from the UK government to operate, maintain, renew and replace the HS1 assets until 31 December 2040. Among other things the Concession Agreement sets out the charging framework for HS1 (Schedule 4) and specifies the asset stewardship obligations and periodic review requirements (Schedule 10).

The track assets are overseen by the ORR in accordance with the Rail Regulations and on behalf of the Secretary of State for Transport (SoS). The ORR's functions in relation to the Concession Agreement relate principally to the stewardship of HS1 (other than stations) and to the review of operations, maintenance and renewal costs and charges.

Our General Duty under the Concession Agreement is to achieve the Asset Stewardship Purpose. The Asset Stewardship Purpose is to secure the operation and maintenance, renewal and replacement, and the planning and carrying out of any upgrades of the HS1 railway infrastructure:

- In accordance with best practice;
- In a timely, efficient and economical manner; and
- Save in the case of the UKPNS assets, as if we were responsible for the stewardship of the HS1 railway infrastructure for the period of 40 years following the date that any such activities are planned or carried out.

3.1.3.2. Operator Agreement

We subcontract with NR(HS), a wholly-owned subsidiary of NRIL, to operate, maintain, renew and replace the HS1 assets on our behalf. The Operator Agreement with NR(HS) was renegotiated in 2012: the price for the remainder of CP1 was reduced by 10%, provisions were added for the sharing of future financial outperformance by NR(HS) and our break clause rights were moved from 2015 to 2025. The Operator Agreement has a fixed price for O&M for each control period: the fixed price for each of CP2 and CP3 will be determined through the periodic review process. NR(HS) is involved in, and bound by, the periodic review process.

The Operator Agreement contains separate provisions for renewal and replacement activities and specific additional services.

The renegotiated Operator Agreement includes new obligations for NR(HS) to provide:

- Operational and maintenance standards and procedures which can be used to conduct a market test at a later date; and
- Information on NR(HS)'s contractual arrangements with NRIL.

3.1.3.3. Operations and Maintenance Agreement

The interface assets between the NRIL network and HS1 are covered by the Operations and Maintenance Agreement (OMA). The OMA is an agreement between HS1 Ltd, NRIL and the Secretary of State and was agreed before the sale of HS1.

The OMA defines the interface assets and, for each interface asset, sets out the ownership, responsibility for maintenance and renewal and the cost contributions of each party for maintenance and renewal activities. Interface assets include the Waterloo connection, Dollands Moor freight chords, Ashford chords, Ripple Lane exchange sidings and Orient Way sidings.

There is a fixed price for maintenance. Renewals are treated on a case by case basis.

3.1.3.4. UKPNS suite of agreements

UK Power Networks Services (UKPNS) financed, built and now operates, maintains and renews the electricity substations and high voltage distribution network under the UKPNS suite of agreements. The suite of four agreements was signed in 2002 and expires in 2057, with no break points. There is a fixed price for operations, maintenance and renewal.

3.1.3.5. Track Access Agreements

We enter into Track Access Agreements (TAAs) with train operators, which set out the terms and conditions for access to HS1 track.

Framework Track Access Agreements (TAAs with a duration of more than one year) require ORR approval.

We currently have:

- A Framework Track Access Agreement with Eurostar International Limited (EIL), which expires on 16 August 2019;
- A Framework Track Access Agreement with London & South Eastern Railway Limited (LSER), which expires on 31 December 2014. This will be succeeded by a new FTAA with an expiry date of 31 December 2024, subject to final ORR approval processes;
- A Track Access Agreement with Deutsche Bahn Schenker (DBS); and
- A Track Access Agreement with Europorte Channel.

3.1.4. Our customers

3.1.4.1. International passenger services

Eurostar International Limited (EIL) is currently the only international passenger rail operator serving Great Britain.

Eurostar services commenced in 1994. In 2003 Eurostar started operating on Section 1 of HS1 with journey times reduced by 20 minutes. On completion of Section 2 of HS1 in 2007, Eurostar moved to St Pancras International with journey times reduced by a further 20 minutes.

Eurostar services link St Pancras International, Ebbsfleet International and Ashford International with Paris, Brussels, Lille and Calais. There is also a daily service to Disneyland Paris and seasonal services to Lyon/Provence and the Alps. The fastest trains travel between London and Paris in 2 hours 16 minutes and between London and Brussels in 2 hours 1 minute.

Eurostar passenger growth has been strong. Since 2007 there have been increases in passenger numbers every year despite the challenging economic environment: from 2007 to 2012 average passenger growth was 3.7% per annum. In 2012 Eurostar services carried 9.9 million passengers.

There is capacity for additional international passenger services and we have been in discussions with potential operators. In particular, Deutsche Bahn (DB) has announced its intention to establish direct services between London and Frankfurt (via Brussels and Cologne) and between London and Amsterdam (via Brussels and Rotterdam) using two coupled train sets splitting in Brussels.

3.1.4.2. Domestic high speed passenger services

Domestic passenger services on HS1 are operated by LSER under a franchise let by the Department for Transport (DfT).

A preview service started in June 2009, with the full high speed domestic service commencing in December 2009 (branded Southeastern Highspeed).

The domestic high speed service is predominantly a London commuter operation. Trains connect with the Network Rail domestic network to serve destinations in north Kent (via Ebbsfleet International) and east Kent (via Ashford International). At peak times, shuttle services also operate between Ebbsfleet International and St Pancras International.

HS1 resulted in journey time savings of up to 50 minutes for London commuters from Kent. Journey times to St Pancras International are 17 minutes from Ebbsfleet International and 38 minutes from Ashford International. In 2012, 10.8 million passenger journeys were made on high speed domestic services (including 1.4 million journeys on Olympic and Paralympic services). This represented growth of 40% (excluding Olympic journeys) between 2010 and 2012.

3.1.4.3. International freight services

Deutsche Bahn Schenker (DBS) currently operates a limited freight service between London and Poland. All movements on HS1 are at night, operate at 120 km/h and use Class 92 locomotives. This conventional freight traffic is currently supported by the UK government through a levy on domestic franchised train operators which covers any shortfall in the recovery of costs arising from the freight charging arrangements.

Eurotunnel's rail freight subsidiary, Europorte Channel, operated trial conventional freight trains on HS1 during 2012.

There is currently no high speed freight service on HS1. High speed freight would operate at up to 300 km/h and could run during normal service hours. In March 2012 Euro Carex operated a test high speed freight train between Lyon St Exupéry airport and St. Pancras International Station.

3.1.4.4. What our customers want

HS1 exists to provide services to our customers, and in turn to their customers – the travelling public and freight forwarders. The nature of our railway is such that we engage closely with our customers on a day-to-day basis, and we are always open to reviewing and improving the service that we provide. This periodic review provides an opportunity to test more formally what customers want. A successful review for us is one where operators endorse our plans.

The opportunity for customers to tell us what they want has been provided in a number of ways through the process:

- Engagement in a number of stakeholder workshops where we have discussed the issue of relevant outputs;
- Questions raised by the ORR consultation regarding the PR14 process; and
- Regular bilateral discussions.

Customers have told us that they broadly want to see a continuation of the excellent CP1 performance, while reducing costs. To define this more precisely, and to identify the different constituents of overall performance, we have developed a framework that splits the outputs into nine parts, and have invited operators to rate us against each one out of five. We have asked operators to identify where improvement is required, linking this to the benefits to end customers that such improvements deliver. The results of this interaction, and our proposals to address customer challenge, are set out in Section 8. Although stations do not form part of PR14, they have been included in the output framework as they are a key determinant of the passenger experience.

3.1.5. Working with industry partners

Our approach is built on leadership and enhancing relationships. We value innovation and collaboration, and think more widely than HS1. Examples of our approach are:

- We have a partnering approach in our relationship with **NR(HS)**. The revised Operator Agreement emphasises joint working and sharing of information.
- **Domestic services**: we worked with NR(HS) and LSER to deliver a seamless introduction of the full high speed domestic service following a very successful six month preview service. More recently, we facilitated additional services such as at weekends, and special services such as on Boxing Day 2012 and 2013.
- The delivery of the acclaimed Javelin service during the **2012 Olympic and Paralympic Games** was an excellent example of whole industry partnership and collaborative working.
- In working with **ORR** we look for joint solutions. We have worked with ORR to develop the format and content of this 5YAMS and were closely involved in the ORR consultation on the PR14 process, for example, we held joint stakeholder workshops.
- **International services**: we are active in RailNetEurope forums to deliver international path coordination. In 2012 we instigated a now regular meeting between EIL and all its infrastructure managers to discuss whole route performance.

3.2. Industry context

The GB rail industry is going through a major renaissance with passenger numbers having doubled since privatisation 20 years ago combined with substantial increases in freight traffic. These increases have been driven by improving quality of service and competitiveness versus other transport modes, supported by large investments in all elements of the industry.

While HS1 connects into and forms part of the GB railway network, it has largely different industry context and drivers. The classic network has a number of issues around needing to provide additional capacity to meet demand, balancing the time required for maintaining and renewing the

network with achieving a seven day railway, reducing costs, improving performance on a highly congested network, and improving coordination.

These are issues that have been explored at length via documents such as the McNulty report[1] as well as being themes for the PR13 process for NRIL.

The McNulty report highlighted opportunities for improving the way that the industry works together, addressing the fragmented structure arising from privatisation which is not always conducive to the long term goals of the railway.

Having been recently constructed we are in the strong position of being designed to cater for growth. We have also been set up in a way that effectively means we work according to the partnership model promoted by McNulty and currently being explored by NRIL and train operators via alliancing. However, we are not a static railway and our operations will become more complex as the asset ages and more operators use HS1.

We have a small number of operators who in turn are driven by the needs of their own customers, and we can work together in a focused way. We are always working to achieve incremental gains ("winning by inches") and other sections of this document set out how we intend to do so.

The fundamentals for growth over the life of the concession remain strong. The success of both passenger operators on HS1 highlights the growth potential both for commuter services and for international services competing with air to north west Europe.

New operators on HS1 are likely to be international operators. They will travel on the infrastructure of at least three infrastructure managers (HS1, Eurotunnel, RFF) and may encounter issues in planning services which traverse several networks, particularly in terms of capacity, timetabling and technical compatibility. We aim to understand and assist in resolving such issues through cooperation with other infrastructure managers: we have good working relationships with NRIL, Eurotunnel and RFF and with infrastructure managers further into Europe through RailNetEurope.

Much of the industry context for HS1 is shaped by what is happening in Europe, including:

- Major reform proposals from the European Commission, the latest being the Fourth Railway package which aims, inter alia, to drive improvements in the competitiveness and sustainability of the railway sector by increasing competition. The package of reforms includes some that are designed to improve the rules governing the sector, and others that address the structure of the industry still dominated by State-owned companies.
- Development of Member State plans for the use of their networks. Naturally enough the usage of most infrastructure is dominated by domestic traffic, and the capacity and timetabling available for international traffic is shaped by this. It is also a matter for Member States to evaluate spending on pinch points across the network.
- Differences in priority rules in terms of path allocation and timetabling.
- Evolution of charging frameworks, again influenced by domestic as well as international considerations.

We will actively engage in the debate to optimise the development of the European railway network, and work with adjacent infrastructure managers to make it easier for operators to run trains.

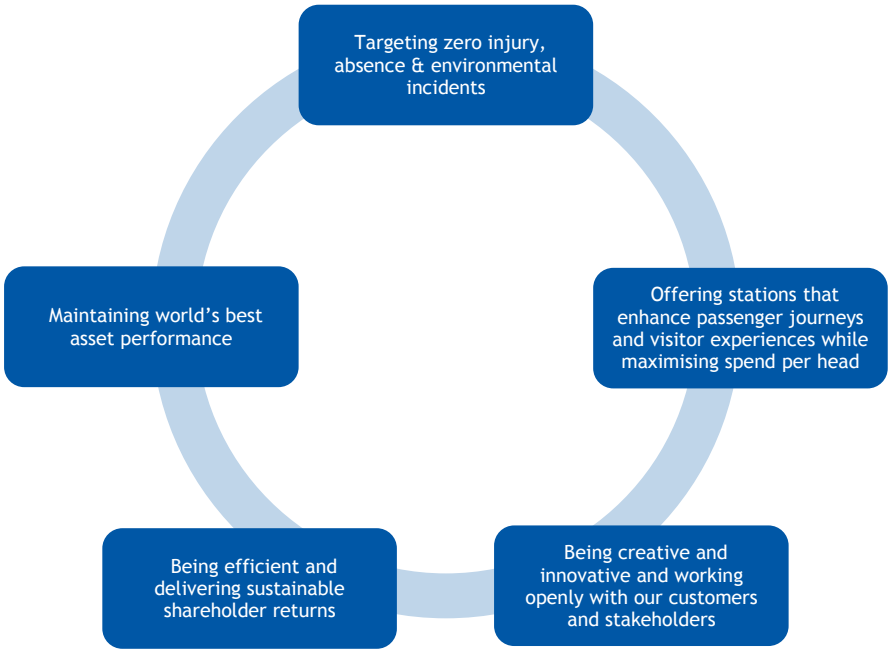
3.3. Our vision

Our vision is to become the world's leading high speed railway business.

We seek to create value over the life of the concession by being recognised as the world leader, through achieving the vision and implementing the strategies in Figure 5.

[1] Realising the Potential of GB Rail: Report of the Rail Value for Money Study, May 2011

Figure 5: Our Strategy and Vision Statement



We have a clear strategy to deliver high quality, high performance assets across all parts of the business. This is important for a number of reasons:

- It fulfils our legal and contractual obligations with respect to the operation, maintenance and renewal of the HS1 infrastructure. This includes the requirements defined in the Concession Agreement (governing the conditions for asset management and handback at the end of the concession) and statutory health and safety requirements maintained to incentivise the business to meet performance targets (defined in the Concession Agreement) that are linked to delays or cancellations.
- We recognise that passengers on HS1 pay a premium price for their travel, in part for the higher speed and greater reliability, but also for the look, feel and quality of the station environment and experience. An Ashford to St Pancras annual season ticket is currently £956 (20%) more expensive than on the classic railway but in providing choice to customers, huge savings in commuting time (around 300 hours pa) and a high quality service, LSER has been able to continue switching passengers from the classic network as well as expanding the overall numbers using the train.
- High performance delivery underpins the economic success of the business; delivering *high speed*, superior *reliability*, exceptional *safety* and robust *security*.

We are already performing at world class levels but we need to be free of major injuries on a sustainable basis, improve our response to any disruption which does occur, and do more to work with train operators and other stakeholders to enhance existing and new services whilst remaining affordable.

3.4. Steps for delivering the vision

HS1 has clearly evolved over time, from a concept to a construction project to a railway with world class performance. It will continue to evolve through CP2 and beyond, and our sense of the journey is shown in Figure 6 below.

CP1 has been about consolidating our excellent performance – sustaining it while introducing the domestic high speed service and delivering major events like the Olympics.

In CP2 we will continue to deliver excellent performance. This is never an easy feat: it requires considerable skill and dedication from the workforce. It will continue to get more challenging:

- While the HS1 infrastructure is not "old" in railway terms, it is ageing and will require more time and more expertise.
- Some assets will be reaching the end of their economic life and decisions about how we best maintain and renew them need to be made.
- We will need to do more with less, so we will have to be increasingly innovative with our work practices.

- Other pressures from potential new operators and operating patterns are likely to become apparent, putting increasing strain on the already tight possession times that we have available.

In terms of the evolution of HS1, CP2 is the time period where we need to strengthen our data collection and understanding of how the infrastructure behaves, so that we are well positioned to address the challenges of asset age and increasing usage in CP3+.

We have not purely considered CP2. We have looked forward 40+ years and looked beyond the HS1 boundary fence to ensure we are holistically delivering a long term plan that supports UK long term growth.

Figure 6: The HS1 journey

Before CP1	CP1 2010-2015	CP2 2015-2020	CP3+ 2020-2040
Start up ▪ Construction phase ▪ Start of international passenger services on HS1	**Consolidating** ▪ Start of full domestic passenger services ▪ Steady state use of HS1 with world class performance ▪ Facilitating the Olympics ▪ Start of freight service	**Developing** ▪ Continuing to deliver world class performance ▪ Opening up new European possibilities ▪ Improving asset information to enable condition -based asset management ▪ Starting renewals	**Renewing** ▪ Ageing asset ▪ More work/ disruption ▪ Challenge of maintaining performance ▪ Preparing for handback in equivalent condition

4. Periodic Review

When it set up the concession for HS1, the Government provided the ORR with a role in relation to the periodic review of costs and charges.

The Concession Agreement sets out the purpose of and the process for conducting periodic reviews. Each periodic review covers a five year control period. The 2014 Periodic Review (PR14) is our first periodic review. It covers the period from 1 April 2015 to 31 March 2020, Control Period 2 (CP2).

There was no periodic review before the start of CP1. However, ORR undertook an initial review of the structure and level of access charges which it reported on in its Regulatory Statement. In the Regulatory Statement ORR noted that "*Based on the work we have undertaken to date to assess HS1 Limited's proposed costs and charges we have no evidence to suggest they are unreasonable for the first control period*" but highlighted the need for more robust benchmarking and stated that "*there may be opportunities for further efficiency improvements beyond the first control period*". ORR also highlighted the need for more work on freight avoidable costs. These are all addressed in this 5YAMS.

4.1. Scope of PR14

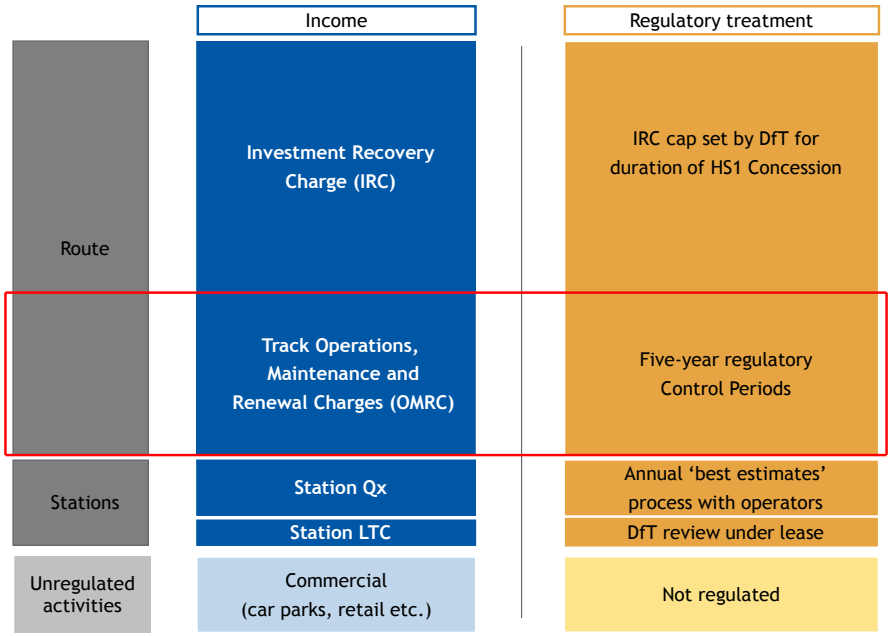
Under the terms of the Concession Agreement, the periodic review covers the efficient costs for the operation, maintenance and renewal of the HS1 route infrastructure, and how these costs are recovered via charges to train operators.

This means that the periodic review **excludes** important elements of our business:

- Investment Recovery Charge (IRC) revenue. The purpose of this charge is to part recover the construction costs of HS1 (on the basis of which £2.1 billion was received in 2010): the IRC is capped at a rate set out in the Concession Agreement and is subject to inflationary uplift. Discounts can be offered to this rate subject to compliance with the discount policy published in the HS1 Network Statement and approval of the ORR.
- Stations operation, maintenance, repair and renewal activities, which are covered by separate review procedures, none of which are regulated by ORR.
- Other unregulated commercial activities such as the letting of retail space and car parking facilities.

This is summarised in Figure 7.

Figure 7: Our income streams and their regulatory treatment



For each periodic review, we are required to propose an efficient level of cost for the operations, maintenance and renewal of the route infrastructure and the corresponding operations, maintenance and renewal charges (OMRC) for the control period. The ORR will either approve or determine the costs and level of OMRC.

Although IRC is excluded from the periodic review, there may be an Additional IRC to recover the efficient spend associated with upgrades. This Additional IRC is subject to approval by ORR through a separate process which is discussed in this 5YAMS.

As noted above, station access charges are not subject to periodic review by the ORR. Station assets are overseen by the SoS and there is a parallel review process with DfT on station long term charge. The original date for submission of the stations review to DfT was June 2014, but in order to allow customers to consider overall charges we brought this forward as much as possible (to February 2014) and have included a summary of the draft stations indicative review findings in Section 17.

As route, stations and unregulated activities have different regulatory treatments, our costs must be split between these three areas. Some of our cost categories are clearly related to one of the three areas, for example, NR(HS) charges under the Operator Agreement are all related to route. The cost categories which have been split and the way in which the split has been determined for each category have been discussed in detail with the ORR and DfT to ensure the correct allocation and no double counting of costs: they are summarised in Table 4.

Table 4: Split of costs between route, stations, unregulated activities

Cost	Route / Stations / Unregulated	Explanation
Rates	75% / 20% / 5%	Split calculated on the basis of 2012/13 rates. The rateable value for each category (route, stations, unregulated) was determined by our agents (CBRE) and the rating authority.
Insurance	77% / 21% / 2%	Split based on the judgement of our insurance brokers (Willis) in discussion with the ultimate insurance underwriters. This focussed on an actuarial assessment of where risk lies.
Power – non-traction	23% / 33% / 44%	Allocated on the basis of metered volumes.
BTP	21% / 70% / 9%	Based on discussions with BTP - best estimate of average BTP staff allocation over the year.
Staff	83% / 9% / 8%	Costs of HS1 staff significantly supporting station activity or unregulated activities are allocated to these categories. All other HS1 staff costs are allocated to route.
Technical/legal support	83% / 5% / 12%	Line by line allocation of project spend.
Other	9% / 5% / 86%	Line by line allocation of actual costs.

This 5YAMS is the principal input into the periodic review. Table 5 shows the specific Concession Agreement requirements and where each is addressed in this 5YAMS.

Table 5: Concession Agreement requirements for 5YAMS content

CA Sch10 Section 2 paragraph	Requirement	5YAMS section reference
8.1.1	A performance and infrastructure quality plan for CP2, which sets out the condition, capability and capacity of the assets	10
8.1.2	Details of any proposed changes to the possessions regime (other than the cap on liability)	13.9
8.1.3	Details of forecast demand and traffic levels (with supporting evidence) for CP2	7.1
8.1.4	A proposal with respect to the level of OMRC for CP2	12.3
8.1.5	Details of any other proposed changes to the OMRC charging provisions - OMRC, its apportionment between train operators and the freight supplement charge payable by franchised train operators	13
8.1.6	Any proposed changes to the Asset Management Strategy and details of the operations, maintenance, renewal and replacement that HS1 Ltd proposes to carry out in CP2	10
8.1.7	A detailed record of the cost of operations, maintenance, renewal and replacement for CP1 and plans for the remainder of CP1	5.6
8.1.8	Details of any additional OMRC that the ORR has determined is required by HS1 Ltd in any subsequent Control Period (pursuant to paragraph 10.4 of CA Schedule 10)	n/a
8.1.9	Details of any Specified Upgrades or other upgrades implemented in CP1	5.8
8.1.10	Details of any Specified Upgrades or other upgrades which HS1 Ltd proposes to implement in CP2 or which the Secretary of State has requested that HS1 Ltd implement	10.10
8.1.11	Details of any amount that has been withdrawn from the Escrow Account to make an Authorised Investment	5.7
8.1.12	A Cost Efficiency Plan for CP2	11
8.1.13	Details of any amount that has been withdrawn from the Escrow Account to fund any additional renewals and replacements	5.7
8.1.14 & 15	Details of any Costs Savings and any Performance Incentive Share to which HS1 Ltd believes it is entitled (with evidence) (relates to renewal and replacement	n/a
8.1.16 & 17	Details of any Additional Share to which HS1 Ltd believes it is entitled (with evidence) (relates to renewal and replacement)	n/a
8.1.18	Details of any proposed changes to the track access performance regime (other than the cap on liability)	13.8

Q1 Are there any gaps in how we have addressed the Concession Agreement requirements for the 5YAMS? If yes, please explain?

4.2. The PR14 process

The ORR consulted on the periodic review process in February 2013 and published its conclusions in June 2013. The conclusions document sets out the approach ORR will take to PR14. We were closely involved in the ORR consultation process, for example, we held a joint stakeholder workshop during the consultation.

Our approach to PR14 has been open and transparent. During the PR14 process, over the past 12+ months we have:

- Engaged with stakeholders together and individually;
- Shared information and analysis undertaken by us and our consultants;
- Been clear about the reasons underpinning our proposals, including where this relies on our expert judgement; and
- Reproduced the feedback we have had and explained how we have addressed it.

The ORR and key stakeholders have stated that they appreciate our proactive and collaborative approach for the PR14 process. The ORR conclusions document notes that "*ORR wishes to reiterate its support of the open and transparent approach adopted by HS1 Ltd during the course of PR14 so far*".

For us, a successful regulatory model for HS1 requires:

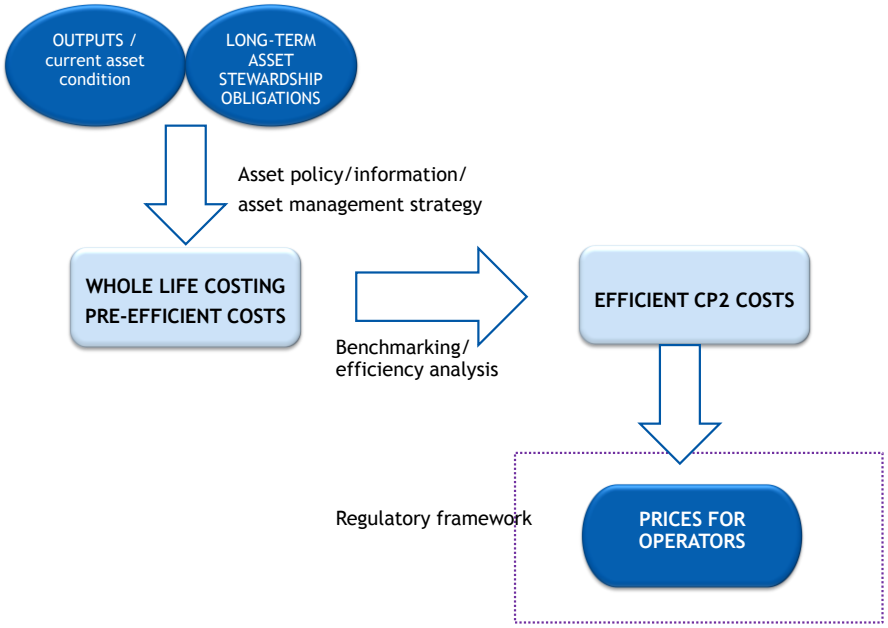
- Customer engagement with the review so that they feel able and competent to judge a fair price and quality rather than relying on the ORR;
- Working together with NR(HS) to find the right first time balance between cost and outputs and not relying on customer or ORR challenge; and
- ORR confidence that, if customers are in agreement with us on the package, it does not to make changes to demonstrate that it adds value.

All of the work we have undertaken to date, including industry stakeholder workshops and monthly bilateral meetings with the ORR and train operators, is targeted at avoiding these risks by sharing relevant information and identifying any issues and concerns early so that they can be addressed. We agree with the comments in the ORR consultation document:

"A determination which contains either no, or only minor, changes from HS1 Ltd's 5YAMS submission will demonstrate the efficiency of HS1 Ltd's approach and its overall engagement with stakeholders, including ORR, throughout the PR14 process. Such a determination will also demonstrate the robustness of the work which HS1 Ltd has undertaken, and we encourage all parties to aim for this outcome."

The process by which we have developed costs and charges for CP2 is summarised in Figure 8. It should be noted that, although the focus of PR14 is to determine the costs and charges for CP2, these have been developed in the context of a 40 year view of the HS1 assets.

Figure 8: Components of the review – how we get to prices



The principal input for PR14 is this 5YAMS. We have worked with ORR to develop the format and content of the 5YAMS.

As noted above, many of our functions are contracted out to NR(HS) under the Operator Agreement. The production of our PR14 submission has been a collaborative effort with NR(HS). NR(HS)'s Five Year Asset Management Statement, which sets out NR(HS)'s O&M costs and fixed price for CP2, is one of the key supporting documents to our 5YAMS, along with supporting information in the NR(HS)'s asset management suite of documents.

With the involvement of ORR, we commissioned consultants to undertake other supporting work on benchmarking, traffic demand, renewals and the performance regime.

The consultation period for our 5YAMS will end on 29 November 2013. We seek feedback on these plans and supporting information and will hold various workshops and bilaterals as required to discuss our proposals in more detail. The process for the consultation is outlined in Section 16.

Following this we will update the 5YAMS and submit the final version to the ORR in December 2013. By April 2014, ORR will approve the 5YAMS or advise that it is not consistent with our general asset stewardship duty. In the latter case there is an iterative process to agree the 5YAMS.

Whilst HS1 Ltd is the regulated entity, the ORR's PR14 determination will identify separately the NR(HS) O&M costs. The two components of the ORR's costs determination will be as follows:

- NR(HS) Annual Fixed Price (escalated)
- HS1 Ltd All other O&M costs plus the renewals annuity

Total costs for CP2 are shown in Table 6.

Table 6: CP2 costs (£million, February 2013 prices)

	15/16	16/17	17/18	18/19	19/20	Total
NR(HS) Annual Fixed Price +1.1% escalation	40.5	39.7	38.7	38.0	37.6	194.4
Other O&M costs	25.2	25.2	25.7	25.6	24.9	126.5
Renewals annuity	16.5	16.5	16.5	16.5	16.5	82.3
Total OMR cost	**82.1**	**81.4**	**80.8**	**80.0**	**78.9**	**403.2**

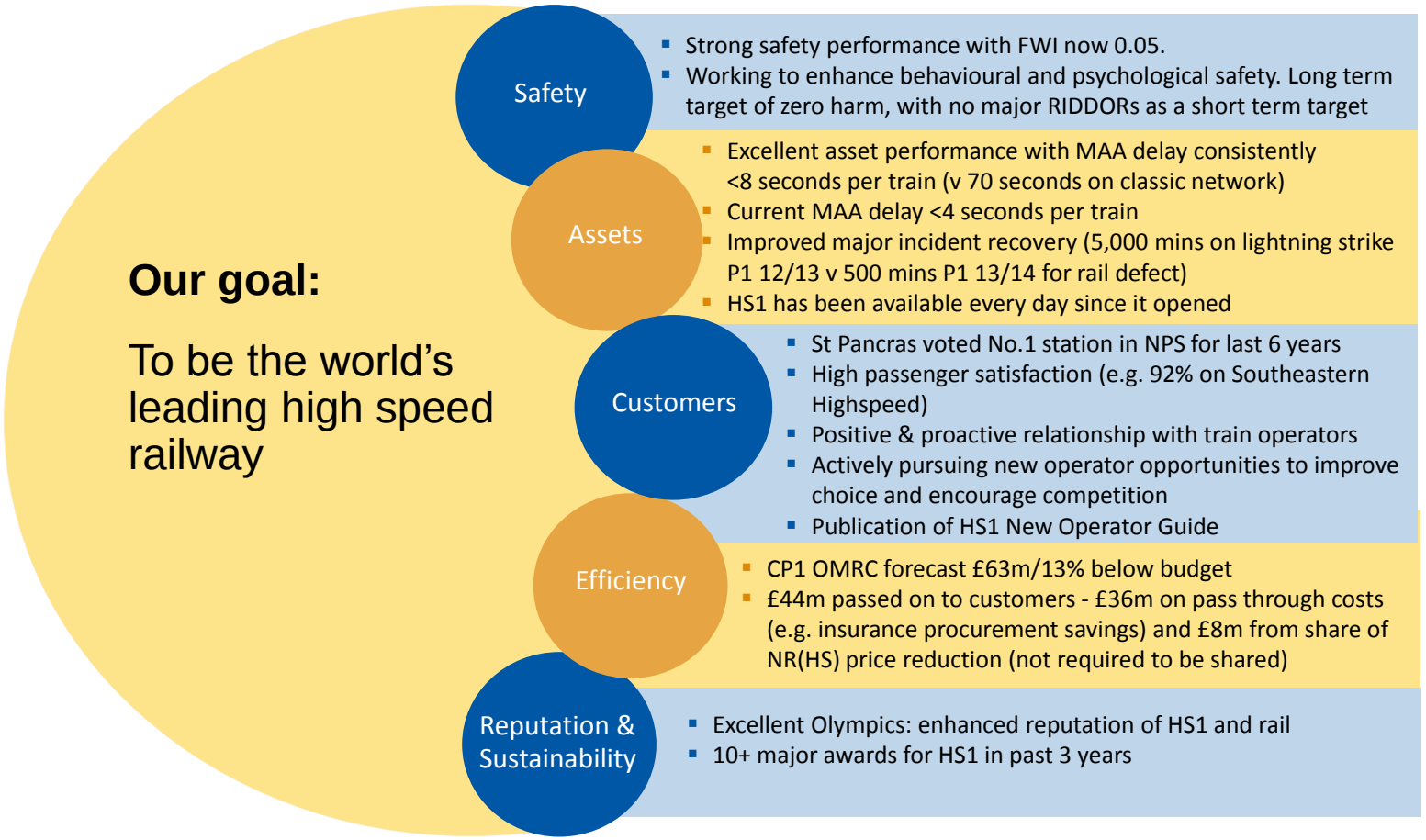
Part B: CP1

5. CP1 outturn

5.1. Overview

CP1 covers a period of 5½ years from October 2009 to March 2015. Our performance in CP1 is summarised in Figure 9 and described in more detail in the remainder of this section.

Figure 9: CP1 performance



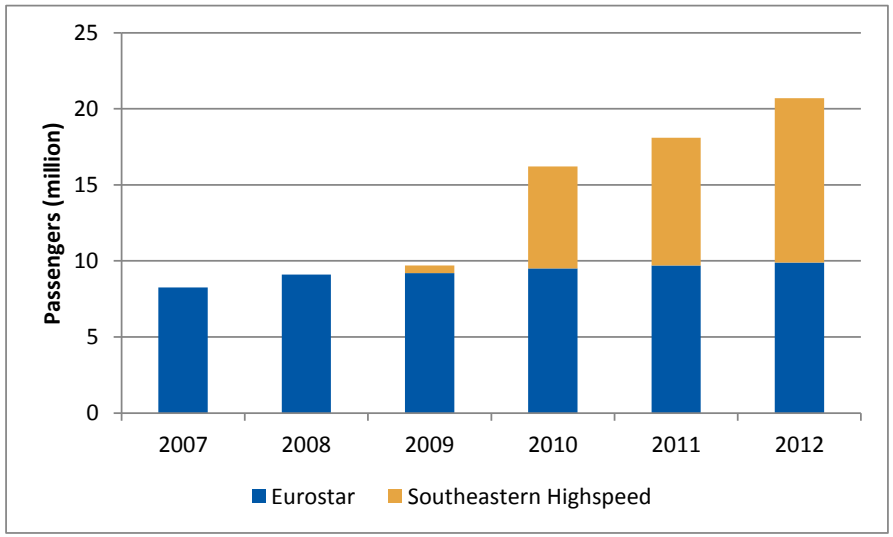
The ORR has undertaken an annual review of HS1 for each year of CP1 and made the following comments about our overall performance:

HS1 Review 2010-2011	*"We think that HS1 Limited has performed well during the year … both in terms of current performance and longer term asset management".*
ORR's Annual Report on HS1 2011-2012	*"We believe that HS1 Limited has performed well during the year and we are pleased with the progress made in a number of work areas".*
ORR's Annual Report on HS1 2012/13	*"HS1 Ltd has operated very well in the previous year, and we are pleased with the progress made – particularly with regard to the ongoing Periodic Review of HS1 Ltd."*

Passenger numbers for services operating on HS1 have grown every year since the full opening of HS1 in November 2007 as shown in Figure 10.

- Between 2007 and 2012 **Eurostar** passenger numbers grew by 20%, an average of 3.7% per annum. In 2012 Eurostar services carried 9.9 million passengers.
- Over 26 million passenger journeys were made on **Southeastern Highspeed** between the start of the service in 2009 and the end of 2012. In 2012, 10.8 million journeys were made on high speed domestic services.

Figure 10: Passenger numbers since 2007



For domestic services, passenger satisfaction is measured in the six-monthly National Passenger Survey (NPS). In the Spring 2013 NPS:

- Overall satisfaction was 92% for Southeastern Highspeed compared with a national average of 82% and a London & South East average of 81%.
- Satisfaction with punctuality/reliability was 89% for Southeastern Highspeed compared with 78% nationally and 76% for London & South East.

5.2. Initial Asset Management Statement

The Concession Agreement required us to produce and submit to the ORR an Initial Asset Management Statement (Initial AMS) covering the first control period and including:

- a performance and infrastructure quality plan which includes the condition, capability and capacity of the assets and details of any

operation, maintenance, renewal and replacement to be carried out in the first control period; and
- details of any Specified Upgrades or other upgrades that are to be carried out in the first control period.

The Initial AMS defined:

- the expected levels of performance and asset stewardship arrangements for CP1; and
- the asset populations and the renewal, maintenance, inspection and monitoring work volumes and costs for CP1 required to maintain the overall capacity and condition of HS1 according to the requirements of the Concession Agreement.

The Initial AMS aligned with the HS1 Asset Management Strategy. It demonstrated how the asset management objectives set out in the Asset Management Strategy and the requirements of the Concession Agreement would be met during CP1 and presented a first-cut high level five year work volume plan based on the planned maintenance scheduled and the experience of managing the HS1 route over the previous three years.

The Initial AMS provided a reference point for the development of our asset management approach, including the development and understanding of asset criticality, reliability and deterioration rates and their effect on asset management work volumes, costs and performance outputs of the railway. It set out the focus for asset management on the HS1 route for CP1 as:

- Ensuring the short term capacity and performance levels of service on the route are achieved; and
- Embedding robust asset management processes and procedures for the long term management and funding of the route.

No major renewal activity was planned for CP1 as the HS1 assets are still relatively young. It was anticipated that renewals in critical areas and for critical assets would commence in CP2 to ensure optimum whole life management of the route.

5.3. Safety

We have a safety vision to create and lead a culture in which all HS1 stakeholders can deliver world class safety performance with zero harm to their people, their contractors, their customers and their neighbours.

Our top level safety measure is the Fatalities and Weighted Injuries rate (FWI). In calculating the FWI, incidents on the route are weighted according to their severity and normalised per million hours worked. In 2012/13 a target of 0.05 MAA FWI was set for route and stations combined. We are currently developing a target for route-only FWI with NR(HS).

Figure 11 shows the FWI for the HS1 route for CP1 to date. Table 7 shows a breakdown for each full year of accidents by severity.

Figure 11: Fatalities and Weighted Injuries (HS1 route)

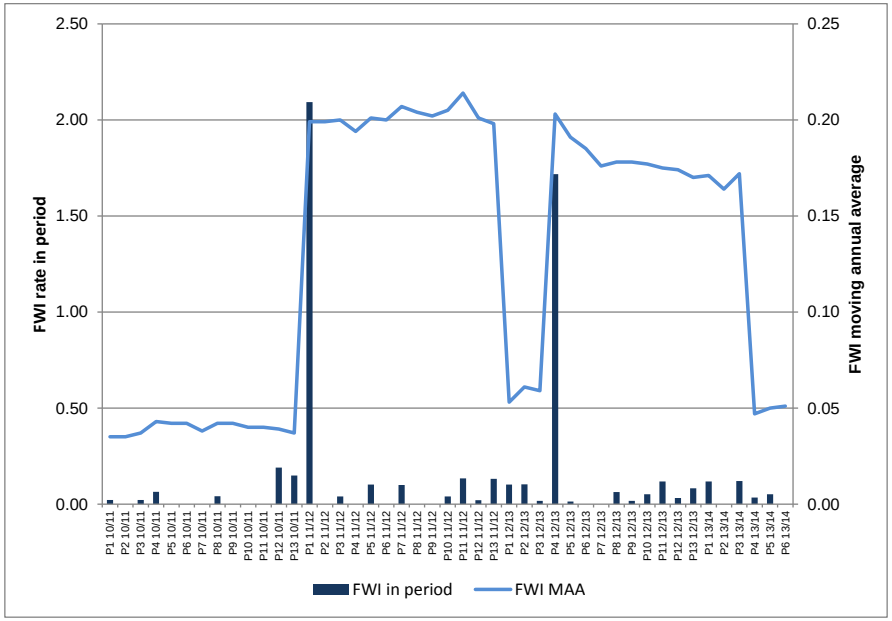


Table 7: Number of accidents by severity[1]

	Fatality	Major RIDDOR	RIDDOR lost time	Non-RIDDOR	Total	FWI for year
2010/11	0	0	2	14	16	0.037
2011/12	0	1	3	17	21	0.198
2012/13	0	1	2	28	31	0.170

Although CP1 safety outputs for the route have been good, performance has deteriorated over the first three years of CP1 with the total number of incidents of all types rising from 16 to 31. The drivers behind some of these increases were attributed to bringing maintenance staff in house and different reporting procedures.

Prior to 2011/12 there were no significant injuries to staff, contractors or the public during the operation and maintenance of HS1. 2011/12 and 2012/13 saw the first Major RIDDOR reportable incidents.

All accidents and incidents are investigated to understand root cause and precursors. For most RIDDOR events a bulletin is issued to draw attention to what happened and to try to prevent a future recurrence.

NR(HS) instituted a number of safety improvement initiatives in 2012 and 2013: these are discussed in more detail in Section 2.6.1 of the NR(HS) Five Year Asset Management Statement.

In 2013, a Safety Climate Survey was rolled out across NR(HS). Over 95% of NR(HS) employees took part. The feedback allowed NR(HS) to take a critical look at areas where improvement is required.

Using the results of survey, we are working with NR(HS) to develop a joint long term initiative to improve safety culture. This initiative covers the development of greater workforce involvement in and ownership of the improvement of safety; a safety conference involving all levels of the workforce, including contractors; benchmarking NR(HS) against comparable organisations and assessment of the effectiveness of results.

Section 9 sets out our safety strategy for the remainder of CP1 and CP2.

5.4. Operational performance

5.4.1. Delay minutes

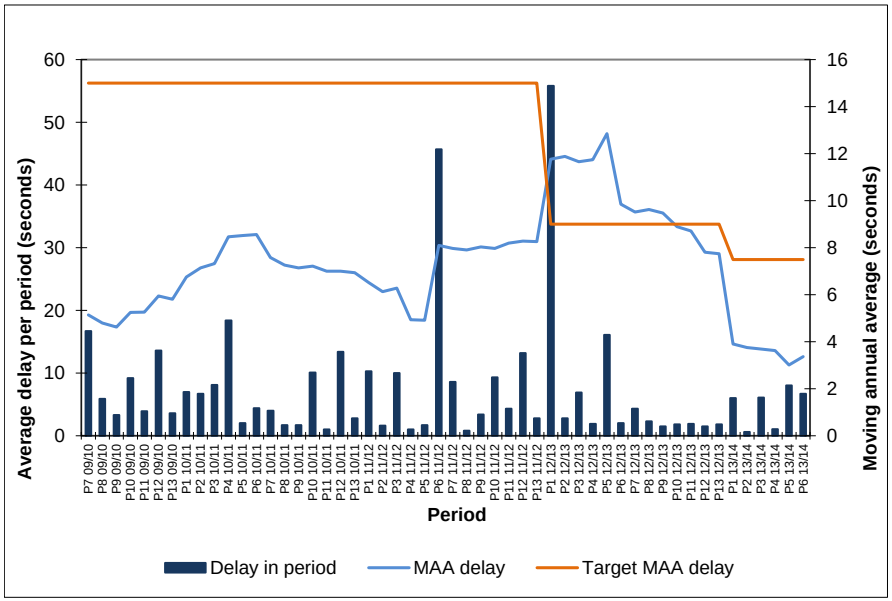
The top level service requirement for HS1 is average seconds delay per train for all incidents attributed to HS1[2]. The measure is reported on both a period and a Moving Annual Average (MAA) basis.

Targets are set on an MAA basis. The target set in the Initial Asset Management Statement was 15 seconds delay per train. We reduced the target to 9 seconds per train for 2012/13 and 7.5 seconds per train for 2013/14 to drive further improvements in performance. Figure 12 shows performance and targets for CP1 to date.

[1] RIDDOR regulations require employers to report certain serious workplace accidents, occupational diseases and specified dangerous occurrences (near misses). The reporting requirements changed in April 2012. However, in line with the rest of the railway industry, events after this date have been classified in the same way as those before, so that valid comparisons can be made.

[2] In general, only delays above a threshold of 3 minutes are attributed although there are circumstances in which sub-threshold delays are attributed

Figure 12: Average seconds delay per train attributed to HS1



HS1 has operated at world class levels of reliability throughout CP1. The actual MAA for each full year of CP1 was less than 8 seconds delay per train from incidents attributable to HS1 Ltd, compared with 70 seconds per train for the NRIL network. The latest MAA (to Period 6 2013/14) is 3.4 seconds delay per train.

Table 8: MAA delay compared with targets 2010/11 to 2012/13

Year	MAA delay	Target
2010/11	6.89s	<15s
2011/12	7.73s	<15s
2012/13	7.74s	<9s

Underlying asset reliability has been very good, with the occasional major incident having a significant impact on average performance. The biggest single incident in CP1 was a lightning strike at the end of London Tunnel 1 in April 2012 which caused 4,990 minutes of delay, 49% of total delay minutes for 2012/13.

Table 9 shows the impact of the 19 incidents which each caused more than 200 minutes of delay in 2010/11 to 2012/13. These incidents accounted for only 2.5% of total incidents but caused 62% of delay minutes.

Table 9: Impact of major incidents on delay minutes 2010/11 to 2012/13

	No of incidents	Delay minutes
All delay incidents	774	28,282
Incidents causing delay >200 minutes	19	17,585
As a % of total	2.5%	62%

We are therefore working on improving our response to major incidents as a means of reducing delays. Following the lightning strike in April 2012, operational and technical procedures were modified to reduce the impact of a major failure on train performance. In April 2013 a rail flaw at York Way caused a restriction of capacity. This could have had a similar impact to the lightning strike but, using the new procedures, the operational impact was limited to 500 delay minutes. In the subsequent review, overall management of the incident was seen as having significantly improved. We are continuing to work with NR(HS) and the train operators to implement real time procedures aimed at reducing the disruption caused by significant incidents.

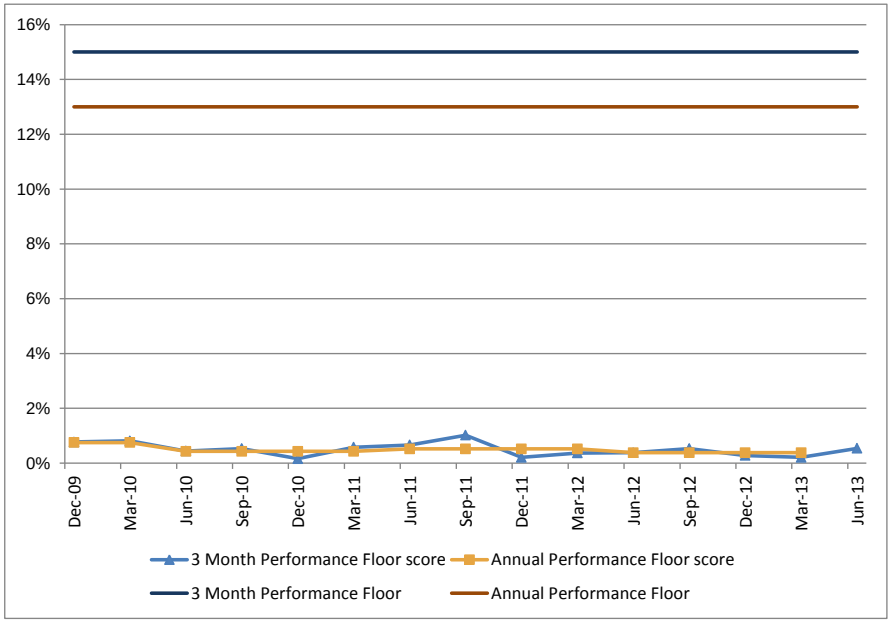
A case study on recovery from major incidents is included in Section 10.4.

5.4.2. Concession Agreement Performance Floors

Under the Concession Agreement, performance is measured against three month and annual performance floors which measure the percentage of trains delayed by five or more minutes or cancelled due mainly to incidents attributable to HS1 Ltd. The three month threshold is 15% and the annual threshold is 13%. The performance floors do not represent a target level of performance; they are triggers for enforcement procedures under the Concession Agreement.

Performance has been significantly better than the performance floors throughout CP1 as shown in Figure 13.

Figure 13: Actual performance against performance floors



5.5. Asset stewardship

Unlike safety and operational performance, it is difficult to devise a single high level measure to monitor performance against our long term asset stewardship obligations.

The key measure of how the asset is performing is average seconds delay per train (see Section 5.4.1 above).

There is also a range of asset stewardship KPIs which include fault levels and corrective work orders by asset type, plan attainment, speed restrictions and defective rails.

Asset management capability is a measure of the ability of HS1 Ltd and NR(HS) to effectively manage the HS1 assets over their lifecycle at the optimum whole life cost in a way which will deliver the required levels of service and capacity. The Initial Asset Management Statement set out a number of key deliverables in CP1 related to continuous improvement in asset management capability, as follows:

- Complete criticality analysis;
- Develop and refine Asset Specific Policies;
- Produce the first 40 year renewal plan; and
- Develop an Asset Information Strategy and Asset Information Systems.

These have all been delivered and form the basis of the plans set out in this 5YAMS.

5.6. Cost efficiencies

This section covers costs for the whole of CP1. We present actual costs for the period October 2009 to March 2013 and forecast costs for the remainder of CP1. All costs are presented in February 2013 prices.

The NR(HS) costs shown in this section represent the annual fixed price under the Operator Agreement after the train operator share of the discount is deducted, not the costs incurred by NR(HS).

5.6.1. CP1 efficient budget

The efficient budget for CP1 was set out at the start of CP1 and agreed with ORR: it included a 2% per annum efficiency saving. This was the cost base used to calculate track access charges for CP1. Table 10 shows the efficient budget for CP1 expressed in February 2013 prices.

Table 10: CP1 efficient budget (£ million, February 2013 prices)[1]

	09/10 (part)	10/11	11/12	12/13	13/14	14/15	Total
NR(HS)	27.0	54.0	53.6	53.1	52.7	52.7	293.1
HS1	6.0	11.9	11.7	11.7	11.7	11.7	64.6
Pass through	8.5	19.4	21.4	23.1	24.1	24.6	121.1
Freight-specific	0.6	1.3	1.3	1.3	1.3	1.3	7.2
Total exc. renewals	**42.1**	**86.6**	**87.9**	**89.2**	**89.7**	**90.4**	**486.0**

5.6.2. CP1 outturn costs

Table 11 shows CP1 actual costs to 2012/13 and cost forecasts for 2013/14 and 2014/15. The forecasts are based on the business plan approved by the HS1 Ltd Board. Table 12 and Figure 14 show the variance from the efficient budget.

Table 11: CP1 outturn costs (£ million, February 2013 prices)

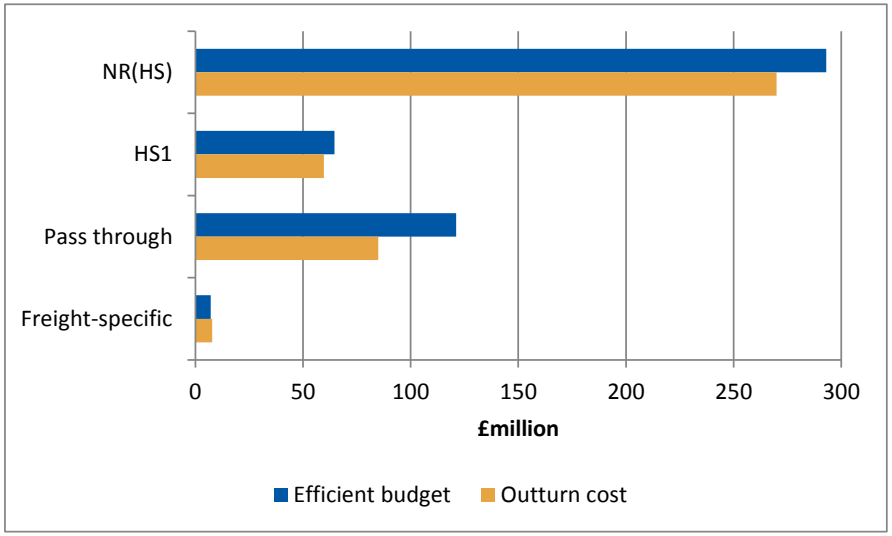
	09/10 (part) actual	10/11 actual	11/12 actual	12/13 actual	13/14 forecast	14/15 forecast	Total
NR(HS)	23.3	52.8	52.2	47.9	47.1	46.7	270.0
HS1	4.1	10.1	11.0	11.7	11.6	11.3	59.7
Pass through	9.1	17.8	14.9	14.5	14.2	14.4	84.9
Freight-specific	0.6	1.3	1.0	1.9	1.7	1.4	7.9
Total exc. renewals	**37.1**	**82.0**	**79.1**	**76.0**	**74.6**	**73.8**	**422.5**

Table 12: CP1 variance from efficient budget (£ million, February 2013 prices)

	Efficient budget	Actual/ forecast	Variance	% variance
NR(HS)	293.1	270.0	-23.1	-8%
HS1	64.6	59.7	-4.9	-8%
Pass through	121.1	84.9	-36.2	-30%
Freight-specific	7.2	7.9	0.7	+9%
Total exc. renewals	**486.0**	**422.5**	**-63.5**	**-13%**

[1] The original efficient budget included £1m per annum of BTP costs within NR(HS) costs. In the tables presented in this 5YAMS they have been reallocated to HS1 costs to allow like for like comparison between the efficient budget and actual/forecast costs.

Figure 14: CP1 cost v efficient budget (£ million, February 2013 prices)



In comparison with the efficient budget, overall cost efficiency in CP1 was 13%. The main differences between outturn and efficient budget costs were:

- NR(HS) costs came in below efficient budget from the start of CP1 and were reduced further in 2012/13 as a result of the renegotiated Operator Agreement which has a 10% discount on price in CP1. 60% of this discount (£8m) has been passed on to train operators in CP1;
- We have saved 30% on pass though costs compared with the CP1 budget mainly as a result of renegotiating insurance premiums through better procurement (£18.4m) and rates from a successful rates review in 2011 (£15.4m). All of the savings in pass through costs are passed on to train operators;
- HS1 costs are materially in line with the CP1 budget given that the HS1 Ltd organisation was sized appropriately on sale. Savings in regulatory and other costs offset higher staff and consultancy costs than expected; and
- Freight costs increased as a result of extra Class 92 signalling costs.

These are explained in more detail below.

Of the total expected saving of £63.5m compared with the CP1 budget, £44.2m is passed through to train operators. £36.2m of this is due to lower pass through costs and £8m due to the early share of renegotiated Operator Agreement savings.

5.6.3. NR(HS) O&M costs

Under the original Operator Agreement, NR(HS) quoted an annual fixed price for operations and maintenance from 2010/11 to 2014/15.

The agreement gave us the right to market test for alternative service providers and terminate the Operator Agreement in March 2015. We conducted an extensive market review of the alternatives which demonstrated that a competitive market for these services did exist. However, the quality of delivery from NR(HS) had been good and in 2012 we renegotiated the Operator Agreement with NR(HS) to provide better value for us and our customers.

The renegotiated Operator Agreement covers the remainder of CP1, CP2 and CP3. It gives a 10% discount (less £550k per annum NR(HS) risk fee) on charges for the last three years of CP1, with charges for CP2 and CP3 determined as part of the periodic review process. It also introduces 50:50 sharing of any financial outperformance by NR(HS) for the last three years of each of CP2 and CP3. We share 60% of the CP1 discount and our outperformance share with the train operators. In addition, we agreed to fund a £600k customer service investment fund over the remainder of CP1 out of our proportion of the Operator Agreement discount. We are currently agreeing the exact projects with train operators.

The revised Operator Agreement also includes qualitative improvements such as improved information share and a requirement for NR(HS) to deliver improvement plans if performance starts to deteriorate.

The following adjustments are made to the Annual Fixed Price to produce the "NR(HS) cost" line shown in our overall O&M costs:

- The freight-specific element of the NR(HS) costs has been netted off the Annual Fixed Price (and included in the separate "freight-specific costs" category); and
- The 40% of the discount which is not passed on to train operators has been added back in.

The purpose of this adjustment is to show the effective NR(HS) costs which are picked up by passenger train operators through their access charges.

Table 13 shows the adjusted NR(HS) O&M costs in CP1. There was a reduction of 12% between 2010/11 to 2014/15.

Table 13: NR(HS) O&M costs in CP1 (£ million, February 2013 prices)

	09/10 (part) actual	10/11 actual	11/12 actual	12/13 actual	13/14 forecast	14/15 forecast
NR(HS) costs	23.3	52.8	52.2	47.9	47.1	46.7

In December 2009 two major changes occurred which meant that there was some uncertainty over costs when charges were set at the start of CP1:

- NR(HS) introduced a direct maintenance organisation; and
- The full domestic service started on HS1, increasing the total number of services on the line by 300%.

In the first two years of CP1, NR(HS) gained experience of operating the new mixed domestic and international timetable and the impact of the new domestic rolling stock as well as a better understanding of maintenance costs. As a result, NR(HS) transitioned from a schedule of rates arrangement to a directly incurred, transparent cost base and was able to establish a revised baseline cost of operating the business.

NR(HS) outperformed against its cost forecasts at the start of CP1 and, from 2012/13, shared the benefit of this outperformance through the discount. To support this, NR(HS) strengthened its processes to manage costs to reflect the tighter margins it was required to work within.

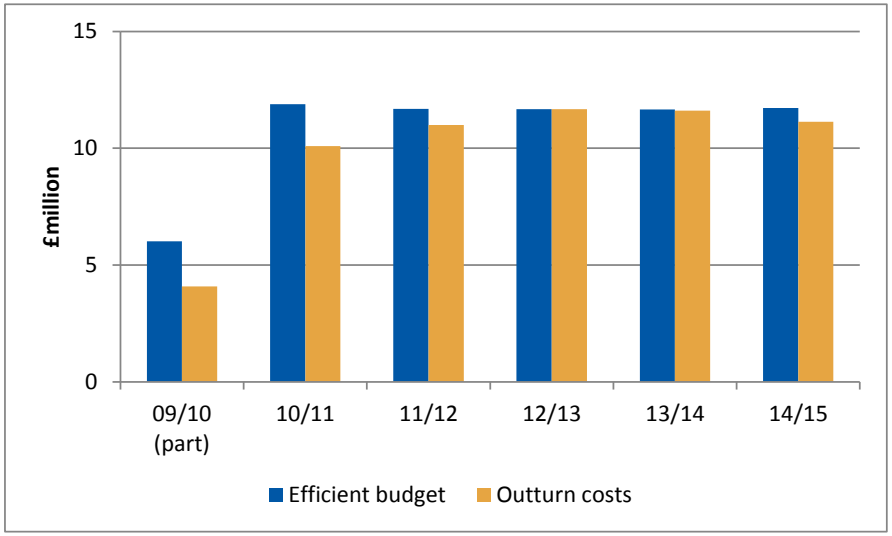
For the remainder of CP2, NR(HS) is reducing costs through increased attention on day to day spending, with a rigorous focus on achieving budgets and identifying cost saving opportunities. For both 2013/14 and 2014/15, NR(HS) is overlaying this approach with a number of planned efficiency initiatives as set out in Section 2.3 of the NR(HS) Five Year Asset Management Statement.

Detailed commentary on NR(HS)'s CP1 cost development can be found in the NR(HS) 5YAMS Section 2.

5.6.4. HS1 Costs

The total saving in HS1 costs over CP1 is expected to be £4.9m, 8% of the efficient budget. Figure 15 shows the variance from the efficient budget.

Figure 15: HS1 costs – CP1 outturn v efficient budget (£ million, February 2013 prices)



We have split HS1 costs into HS1 contract costs and HS1 internal costs. Table 14 shows a breakdown of actual and forecast HS1 costs in CP1. Key changes for each cost category are discussed in Table 15 and Table 16.

Overall the CP1 2014/15 exit cost is forecast to be 3% lower than HS1 actual costs for 2012/13.

Table 14: HS1 costs in CP1 (£million, February 2013 prices)

	09/10 (part) actual	10/11 actual	11/12 actual	12/13 actual	13/14 forecast	14/15 forecast
HS1 contract costs						
NR other	0.9	2.1	2.0	1.5	1.5	1.5
NRIL GSM-R	0.1	0.2	0.2	0.2	0.3	0.5
NGC connection fees	0.2	0.6	0.5	0.5	0.5	0.5
BTP	0.6	1.2	1.0	1.0	1.0	1.0
ORR regulatory and safety	0.4	0.5	0.3	0.5	0.5	0.4
Subtotal	**2.2**	**4.6**	**3.9**	**3.7**	**3.7**	**3.9**
HS1 internal costs						
Staff	1.3	2.4	3.0	3.7	3.7	3.7
Technical/legal support	0.1	1.0	2.5	1.8	1.8	1.6
Office running	0.5	0.8	0.7	1.4	1.3	1.0
Other	-0.1	1.3	0.9	1.0	1.0	1.0
Subtotal	**1.9**	**5.5**	**7.1**	**8.0**	**7.9**	**7.3**
Total	**4.1**	**10.1**	**11.0**	**11.7**	**11.6**	**11.3**

Table 15: Key changes in HS1 subcontract costs in CP1

Cost category	CP1 efficiency
NR other	The interface assets between the NRIL network and HS1 are covered by the Operations and Maintenance Agreement (OMA). We renegotiated the OMA price with NRIL in 2012: this gave savings of 40% (£0.8m per annum). Also included are the costs of additional services required on the route over and above services covered by the Operator Agreement of approximately £0.2m per annum. These are subject to a strict approval process by HS1 Ltd.
NRIL GSM-R	We have a contract with NRIL for the maintenance of HS1-owned GSM-R equipment and a percentage of the national NRIL spine network (based on train miles run). The system will be upgraded to train and trackside signaller communications with expected completion dates of late 2013 for domestic and late 2014 for international. The upgrade will increase maintenance costs by £170k per annum to £400k per annum. An additional £150k of licence fees is also likely to be required and has been included in the current numbers – the final negotiated position will be included in the December 2013 5YAMS submission.
NGC connection fees	These are connection charges for HS1/UKPNS power assets into the national grid. Standard charges are based on UK-wide regulated tariffs. There was minimal change in CP1.
BTP	Fixed price contract (indexed by RPI) from 2007 with re-openers for vehicles and overtime. We achieved a 10% real reduction through renegotiation early in CP1. The contract has recently been extended to March 2015 at the same rates with the focus now on quality of delivery.
ORR regulatory and safety	Regulatory fees are based on ORR costs incurred (£0.2m in 2012/13), an ORR safety levy based on proportion of UK track length (£0.13m in 2012/13) and small other regulatory and safety fees. Fees are expected to increase during 2013/14 and early 2014/15 to reflect higher ORR charges from the periodic review.

Table 16: Key changes in HS1 internal costs in CP1

Cost category	CP1 efficiency
Staff	Staff costs have increased in CP1 as we have moved to full complement (e.g. recruitment of a Customer Relationship Manager) and introduced new bonus arrangements for senior staff. 60% of staff have been appointed in the last three years so have been market tested. 10 of the most senior roles have been benchmarked. Costs have been reduced where possible e.g. the final salary pension scheme closed to new entrants immediately post HS1 sale. Team sizes have been rationalised where possible (e.g. in finance the Treasurer was an interim role during refinancing and now the role is covered by the CFO and Financial Controller).
Technical/legal support	Costs have reduced over time as issues are closed out and large procurement work completed (e.g. new Operator Agreement). Legal panel agreed in 2012 with preferential rates negotiated. Includes PR14 costs of £460k in 2013/14 and £200k in 2014/15.
Office running	Increase in 2012/13 includes cost of office move. Higher long term costs from increased rent for more appropriate office space than old HQ. £40/ft^2 annualised rent compares favourably to local rates. 2013/14 includes £450k for new IT systems (e.g. to replace the 13 year old finance system). 2014/15 onwards drops down to a more steady state of £0.4m p.a. rent/service charges, £0.4m p.a. IT costs and £0.2m p.a. other (printing, utilities, cleaning etc.).
Other	Includes HR/training costs, corporate costs (e.g. audit, rating agency) and other operational and environmental costs (e.g. rescue loco). Reduction in 2011/12 as business established then minimal change over the rest of CP1.

5.6.5. Pass through costs

We have achieved a substantial reduction in pass through costs compared with the CP1 budget mainly due to the reductions in rates and insurance. The total saving in pass through costs over CP1 is expected to be £36.2m, 30% of the efficient budget. All of these savings are passed through to the train operators. Figure 16 shows the variance from the efficient budget.

Figure 16: Pass through costs – CP1 outturn v efficient budget (£ million, February 2013 prices)

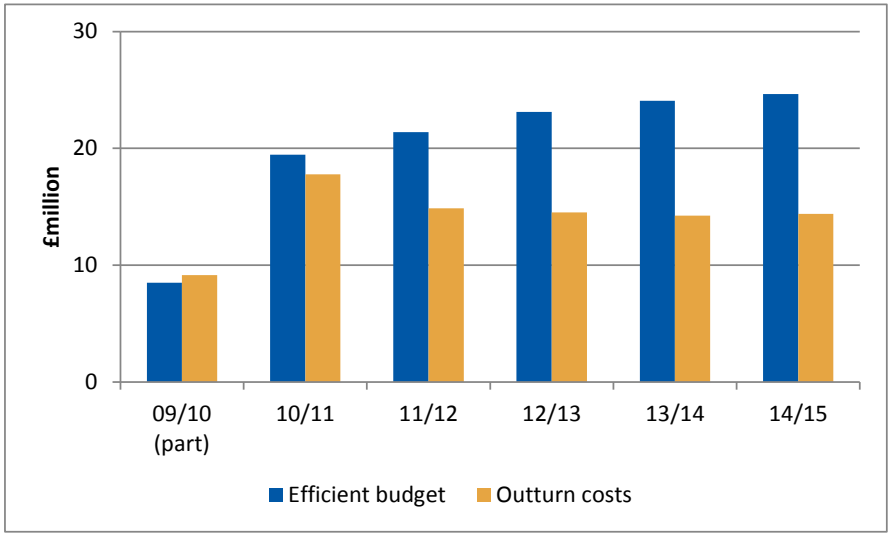


Table 17 shows a breakdown of actual and forecast pass through costs in CP1. Key changes for each cost category are discussed in Table 18.

Table 17: Pass through costs in CP1 (£million, February 2013 prices)

	09/10 (part) actual	10/11 actual	11/12 actual	12/13 actual	13/14 forecast	14/15 forecast
Rates	3.2	6.4	4.7	4.7	4.7	4.6
Insurance	2.7	5.3	4.2	3.8	3.7	3.8
UKPNS O&M and renewals	2.4	4.8	4.7	4.8	4.7	4.7
Non-traction electricity	0.8	1.3	1.3	1.3	1.2	1.2
Total	**9.1**	**17.8**	**14.9**	**14.5**	**14.2**	**14.4**

Table 18: Key changes in pass through costs in CP1

Cost category	CP1 efficiency
Rates	We obtained a 27% reduction in rateable value following a full rates review in 2011. This resulted in a £1.7m per annum reduction in route rates from 2011/12. No further rating reviews are expected before March 2015.
Insurance	The majority of insurance requirements are set out in the Concession Agreement. We bear the first £5m excess on any route claims. 2012/13 route insurance reduced by £1.5m (29%) compared with 2010/11, through improved procurement and no claims history. Brokerage services were also retendered in 2013, saving £200k in brokerage fees.
UKPNS O&M and renewals	Fixed price contract (signed 2002) with UKPNS (indexed to RPI) to 2057 (with no breaks) to provide O&M and renewals of electricity substations and connections to HS1 catenary. We have been actively engaging with UKPNS to try to protect the quality of delivery and to reduce prices/amend the contract but there have been no opportunities to date.

Cost category	CP1 efficiency
Non-traction electricity	Electricity costs for ancillary route equipment (e.g. tunnel ventilation, signalling, Singlewell infrastructure maintenance depot), based on metered volumes. Purchased via NRIL electricity supply contract. Small fluctuations in CP1 due to increasing energy prices, increased supplier charges and the new FIT. Volumes reduced from 9GWh in 2010/11 to 8GWh by 2012/13 from various efficiency initiatives.

5.6.6. Freight costs

Freight costs have increased over the CP1 efficient budget owing to the recovery of Class 92 signalling costs. The total increase in freight costs over CP1 is expected to be £0.7m, 9% of the efficient budget.

Freight costs are made up of

- Variable costs: operations, maintenance and renewal spend in addition to that required to satisfy passenger usage, as a result of freight traffic operating on shared infrastructure.
- Avoidable track-specific costs: costs relating to track dedicated to freight use. These costs cover the contract with NRIL in relation to Ripple Lane sidings, and a share of the overall efficient budget that relates to Cheriton and Dollands Moor freight chords.
- Avoidable freight specific costs: non-infrastructure costs that would be avoided if freight traffic did not operate over HS1 in the longer term. This includes staff costs, legal advice and the flat detection system.

We reviewed CP1 freight avoidable costs in 2011. The charges resulting from these new freight costs were approved by ORR to be charged from July 2012 to the end of CP1.

Table 19 shows a breakdown of actual and forecast freight costs in CP1. The main changes through CP1 are discussed in Table 20.

Table 19: Freight costs in CP1 (£million, February 2013 prices)

	09/10 (part) actual	10/11 actual	11/12 actual	12/13 actual	13/14 forecast	14/15 forecast
NRIL Ripple Lane	0.3	0.6	0.5	0.6	0.4	0.3
NR(HS)	0.2	0.6	0.2	0.8	0.8	0.5
HS1	0.1	0.2	0.2	0.5	0.5	0.5
Total	**0.6**	**1.3**	**1.0**	**1.9**	**1.7**	**1.4**

Table 20: Key changes in freight costs in CP1

Cost category	CP1 costs/efficiency
NRIL Ripple Lane	Ripple Lane exchange sidings are used exclusively for freight. Ripple Lane is operated and maintained by NRIL under a bespoke O&M contract which is currently being renegotiated. We currently pay £570k p.a. The plan assumes we can reduce this to £350k p.a. by the end of CP1.
NR(HS)	Freight variable costs, avoidable track-specific costs and other support costs as set out in our freight avoidable costs consultation. We are aiming for a £0.3m reduction by the end of CP1 on the basis of lower forecast volumes.
HS1	£0.1m of HS1 staff costs plus £0.1m of other HS1 costs specifically related to freight activity. Increased in 2012/13 as an additional £275k per annum of Class 92 signalling costs is being recovered from 2012/13 to 2014/15, as agreed with ORR and DfT.

5.6.7. Traction electricity

Table 21 shows actual traction electricity costs and forecast costs to the end of CP1.

Table 21: CP1 traction electricity costs (£ million, February 2013 prices)

	09/10 (part) actual	10/11 actual	11/12 actual	12/13 actual	13/14 forecast	14/15 forecast
Total	7.5	11.2	11.8	13.5	13.2	14.0

Electricity is purchased under the main NRIL purchase agreement with major savings and advantageous terms from bulk procurement. The unit price for baseload is locked in for one year forward, typically around October, with the agreement of train operators. We take a whole block of 5% of NRIL requirements to ensure separation.

A new electricity supply contract is to be put in place by NRIL from October 2014, in 1% blocks. This may allow us to lock in a greater percentage of our consumption and hence gain price certainty as we currently account for around 6% of NRIL consumption. Operators will be kept informed as this procurement process is completed.

Fluctuations in CP1 costs are linked to fluctuations in the wholesale market and changes brought in by government including Feed-In Tariff Levelisation. Volumes are fully metered and have stayed relatively constant during CP1 (other than during the Olympics).

We recognise this is a major cost for operators and are therefore funding the development costs of a number of schemes to reduce electricity consumption (see Section 11.8).

5.7. Renewals and the escrow account

Part of the OMRC paid by train operators is designed to fund future renewal of the HS1 railway. The total CP1 renewals charge is shown in Table 22.

Table 22: CP1 renewals charge (£ million, February 2013 prices)

	09/10 (part) actual	10/11 actual	11/12 actual	12/13 actual	13/14 forecast	14/15 forecast
Total	2.8	5.6	5.8	5.7	6.0	6.0

The funds collected from the renewals element of OMRC are paid into a separate escrow account each quarter. Any drawdowns from this account must be authorised by the SoS and can only be used to fund renewals expenditure which has been approved by the ORR.

There have been no withdrawals from the route escrow account to date and none are planned for the remainder of CP1.

Table 23 shows escrow account movements in CP1 in nominal terms. We forecast a closing balance for CP1 of £30.4 million.

Table 23: Escrow account in CP1 (£000, nominal)

	09/10 actual	10/11 actual	11/12 actual	12/13 actual	13/14 forecast	14/15 forecast
Opening balance	0	2,423	7,397	12,735	18,396	24,281
Transfers in	2,421	4,961	5,311	5,627	5,851	6,064
Withdrawals	0	0	0	0	0	0
Interest[1]	1	13	26	35	34	41
Closing balance	2,423	7,397	12,735	18,396	24,281	30,386

At the start of CP1, total funds in the escrow account by the end of CP1 were forecast to be £38.5 million, £8.1 million higher than our current forecast. The differences are reconciled in Table 24.

[1] Net of ongoing annual account fee from 2013/14, assumed interest rate to end of CP1 0.15%

Table 24: Reconciliation of original model and actual/forecast escrow account balance at the end of CP1 (£000, nominal)

	Original CP1 model	Actual/ forecast	Difference
Transfers in	30,143	30,236	+92
Withdrawals	-844	0	+844
Interest	9,191	151	-9,041
Total	38,490	30,386	-8,104

The main reason for the £8.1 million shortfall was that the interest rate assumed in the original model was 7.41% whereas the actual/forecast interest rate is an average of 0.22% over CP1. Forecast withdrawals have been deferred to CP2 whilst the slightly higher transfer in is due to higher than forecast RPI during CP1.

During early CP1, escrow funds were ring-fenced in a separate bank account. However, following the conclusion of the revised Station Access Conditions negotiations with DfT and train operators in early 2013, the renewals element of OMRC has been deposited in the HSBC Escrow Accounts which currently earn a rate of interest of 0.15%. These accounts were never set up with the intention of holding the cash for a prolonged period of time as the Concession Agreement allows for the cash to be moved into Authorised Investments to earn a greater return. We are working with DfT and ORR to document an appropriate investment strategy for surplus escrow cash that complies with the requirements of the Concession Agreement. This will allow us to invest the cash in Authorised Investments from the end of 2013 to earn a greater return.

5.8. Upgrades

There have been no Specified Upgrades in CP1 to date and none are anticipated for the remainder of CP1.

Work to upgrade the GSM-R system will be undertaken by NRIL in CP1 but payment to NRIL for the capital cost of this upgrade will take place at the start of CP2. This is discussed further in Section 10.10.

NR(HS) has carried out some renewals and upgrades in CP1 in order to strengthen the reliability of the network as well as to provide an indirect cost reduction (see Section 2.5 of the NR(HS) Five Year Asset Management Statement). None of these are considered as Specified Upgrades: all have been funded by NR(HS) within the annual fixed price or by retaining the benefits from certain Olympics-related works.

In addition HS1 Ltd has itself funded some capital schemes during CP1 that were not initially assumed e.g. £0.5m on fire suppression systems in the signalling rooms to improve the resilience of the network.

5.9. Regulatory framework

Our regulatory framework has generally worked well in CP1. Following consultation, we have made changes in the following areas:

- **HS1 Freight Access Terms**: were published in April 2011. In February 2012 we consulted on our proposed template Framework Freight Track Access Agreement for access to HS1, Catalogue Paths and amendments to the HS1 Freight Access Terms. Revised HS1 Freight Access Terms and the Framework Freight Track Access Agreement were published in June 2012.
- **HS1 Passenger Access Terms**: following consultation with the existing passenger operators and ORR, we amended the HS1 Passenger Access Terms (i) to clarify provisions contained in the existing terms; (ii) to comply with the Concession Agreement; (iii) to introduce provisions to reflect the Domestic Underpinning arrangements and (iv) to bring the periodic review and confidentiality into line with the provisions in the HS1 Freight Access Terms published in April 2011. Revised HS1 Passenger Access Terms were published in May 2012.
- **HS1 discount policy**: we consulted on and introduced a discount policy. The discount policy sets out the principles on which the policy is based, the application process for train operators and the criteria we will use to determine whether to offer a discount. The discount policy

and details of any current discounts available on HS1 are included in the HS1 Network Statement. Agreed discounts are also reflected in the framework track access agreements with the relevant operator(s).

- **Freight avoidable costs review**: following consultation and ORR's decision, we reduced the daytime freight charge from £7.13 per train-km to £6.92 per train-km for the remainder of CP1. There was no change to the discounted charge of £4.00 per train-km for freight operating at night.
- **HS1 Network Code Part D**: we proposed changes in order to align the timetabling processes in Part D of the HS1 Network Code with those in the new Part D of Network Rail Infrastructure Limited's Network Code (March 2012) as well as updating the HS1 Decision Criteria to align (to the extent possible) with NRIL's Decision Criteria. In addition, the proposed changes aimed to better align the HS1 timetabling timescales with European timetables. Following consultation, we published the revised HS1 Network Code in December 2012. Consequential changes were made to the HS1 Passenger and Freight Access Terms and Framework Track Access Agreements.
- **Performance regime**: the HS1 Passenger Access Terms required us to recalibrate the performance regime thresholds, benchmarks and payment rates on the basis of actual performance on HS1 for the year ending June 2011. We undertook the recalibration exercise but did not change the rates and thresholds as it was agreed that the existing regime provided better incentives.

In summary, CP1 to date has delivered excellent safety, customer and asset performance combined with a forecast 13% reduction in budgeted costs of which operators have/will benefit by £44m.

Part C: CP2 Proposals

6. Overview

This part of our 5YAMS covers our proposals for CP2.

Section 7 discusses the **key assumptions** we have made including traffic demand, financial assumptions and other assumptions underpinning our asset management plans.

Section 8 sets out the key **outputs** that we plan to deliver in CP2, taking into account train operator aspirations.

Section 9 sets out our **safety plans** for CP2. It includes our safety vision and objectives for CP2 and our strategy for the delivery of our safety and security objectives in CP2.

Section 10 describes our **asset management plans** to deliver customer requirements and our long term asset stewardship obligations. It sets out:

- The process by which we and NR(HS) worked together to develop our proposals. This includes the whole life cost modelling undertaken to optimise our approach over 40 years;
- Our strategy to improve the quality of our asset information to support further improvements in our asset management;
- Our proposals for maintenance and renewal activity in CP2;
- Our forecasts of renewals in the longer term. We have examined two renewals options – a “Baseline” option and a reduced cost “Asset Stewardship” option; and
- Upgrades planned during CP2.

Section 11 sets out our **proposed cost levels** for CP2 and, in the case of renewals, beyond. We discuss:

- How the costs were built up;
- Key initiatives and their impact on costs;
- Benchmarking/efficiency; and
- Comparison with CP1 exit costs.

Key points are:

- Operating and maintenance costs reduce by 15% (£11.3 million) between CP1 exit (2014/15) and CP2 exit (2019/20).
- This is on top of CP1 savings of 13% compared with the efficient budget at the start of CP1. Of the total CP1 savings of £63.5m, £44.2m is being passed on to train operators.
- Renewals costs have increased from CP1 owing to an increase in renewal volumes and changes to assumed escrow account interest rates. The renewals annuity has increased from £5.7m in CP1 to £16.5m for CP2 under the Asset Stewardship renewals option.
- Our review of freight-specific costs, in the light of lower than anticipated freight traffic, has led to a 60% cost reduction between CP1 exit and CP2 exit.

Section 12 discusses **access charges** for CP2. It describes how our access charging model allocates costs between operators to calculate per minute and per train-km charges for passenger and freight operators respectively.

- For **passenger operators**, the element of the access charge related to operations and maintenance has decreased, and the element related to renewals has increased. The overall result is a significant reduction in track access charges as shown in Table 25.

Table 25: OMRC per train per minute (February 2013 prices)

	International passenger services	Domestic passenger services
CP1 start OMRC (2009/10)	£56.38	£43.58
CP1 exit OMRC (2014/15)	£54.61	£41.52
Proposed CP2 OMRC	£53.61	£38.62
% reduction		
- from CP1 start	-5%	-11%
- from CP1 exit	-2%	-7%

- The undiscounted **freight charge** has increased to £31.05 per train-km. The main reason for this change is the forecast volume of freight trains. The very significant reduction (92%) in volumes compared with CP1 assumptions more than outweighs the 60% reduction in freight costs. We and the freight operators are in discussion with DfT about the continuation of the freight subsidy into CP2. However, our plans assume that freight costs are fully recovered in some form, to allow the continued operation of freight on HS1.

Section 13 discusses the analysis we have undertaken for several areas of our **regulatory framework**, including the performance regime. We propose largely rolling over the existing framework because it is working well, was extensively reviewed only recently in the lead up to letting the HS1 concession, and there is limited appetite for change among stakeholders. We propose a limited number of changes as follows:

- Introduction of a formal quarterly washup to spread the access charges more accurately across the year;
- Removal of the freight supplement provisions as DfT will not continue to support freight on HS1 through this mechanism; and
- Introduction of outperformance sharing provisions into the Access Terms to reflect financial outperformance sharing provisions in our Operator Agreement with NR(HS).

Section 14 discusses **risk**. It identifies both the risks inherent in the business and specific risks to delivery of our plans.

Section 15 sets out our **conclusions**.

7. Key assumptions

7.1. Traffic demand in CP2

Oliver Wyman developed forecasts of passenger demand and train paths prior to the sale of HS1 and we engaged them to review and update these forecasts for CP2. The forecasts were updated using:

- Latest GDP, population and employment data; and
- Discussions with operators, forwarders and shippers.

Forecasts were developed for four scenarios:

50:50	50% probability that the number of paths will be lower/higher. This scenario includes entry of a new international operator within CP2.
50:50 No New International Operator	This scenario excludes the entry of a new international operator in CP2 (as timing of entry is difficult to predict).
Upside	Only 20% probability that demand could be this high
Downside	Only 20% probability that demand could be this low.

7.1.1. International passenger services

Deutsche Bahn (DB) is the most credible new international operator for CP2. The entry of a third player is considered unlikely during CP2.

DB has announced its intention to establish direct services from London to Frankfurt via Brussels and Cologne and to Amsterdam via Brussels and Rotterdam (using two coupled train sets splitting in Brussels). DB has ordered ICE rolling stock for use through Channel Tunnel and in June 2013 the Channel Tunnel Intergovernmental Commission (IGC) granted Deutsche Bahn an operating certificate to run passenger services through the Channel Tunnel.

In the 50:50 scenario, DB is forecast to start a London-Brussels/ Amsterdam/Frankfurt service of 3 trains per day each way at the start of 2017 and a London-Paris service of 8 trains per day each way at the start of 2019.

The Oliver Wyman analysis shows that there is some prospect of a new international operator in CP2, but there is uncertainty around the timing of entry. Given this uncertainty, Oliver Wyman also developed a 50:50 No New International Operator scenario which considers how the number of Eurostar train paths would change over CP2 in the absence of a new international operator.

An estimate of CP2 train paths is needed in order to apportion the operating, maintenance and renewal costs between passenger train operators such that we neither over- or under-recover our costs. The best way to achieve this is to apportion the costs on the basis on the 50:50 No New International Operator scenario and to adjust the apportionment to take into account a new operator when we have more certainty over the timing and volume of the new operator's services.

We therefore propose to base the OMRC apportionment calculations on the 50:50 No New International Operator scenario and to use the reopener provisions in the HS1 Access Terms to adjust the apportionment when a new operator commences (see Section 13.3).

The 50:50 No New International Operator forecasts for Eurostar train paths are as follows:

- Additional Paris services will be added to the timetable to satisfy increasing demand. A total of 1,100 additional services per annum (compared with the current level) is forecast by 2020;
- The Brussels service currently benefits from an IRC discount which ends in December 2016 at which time Eurostar is forecast to reduce its services to Brussels by 411 per annum.
- The Disney service is forecast to remain at the current level.

- Eurostar is likely to expand its network to southern France (Lyon/ Avignon/ Aix en Provence, Bordeaux) and/or Geneva. The forecast has one return service per week from early 2015 in addition to the existing ski/south of France services.

EIL has recently announced its intention to launch direct services between London and Amsterdam in December 2016. We expect that these services will be an extension of existing Brussels services and therefore will generate no additional train paths on HS1. We will confirm this with EIL before submission of our 5YAMS to ORR in December 2013.

7.1.2. Domestic passenger services

The number of domestic services on HS1 is underpinned by Government. If the franchised operator operates less than the underpinned service level, the Secretary of State will make up the shortfall in our revenue from track and station access.

The domestic high speed service is predominantly a commuter service so demand for train paths above the underpinned level would occur at peak times. Currently some peak services are 6-car and some are 12-car. The charging structure on HS1 would favour doubling 6-car trains before adding new services.

The current demand level and market analysis show no grounds for the entry of a domestic open access operator.

The 50:50 forecast scenario therefore assumes that Southeastern accommodates peak demand growth by doubling existing 6-car services so train paths remain at the current level.

LSER is consulting on services prior to direct franchise award negotiations with DfT. We will reconfirm our domestic service level forecast with LSER before submission of our 5YAMS to ORR in December 2013.

7.1.3. Freight services

Only a small fraction of current freight flows between the UK and the Continent travel by rail. In 2012, only 2,325 freight trains operated through the Channel Tunnel. 208 (9%) of these trains used HS1, taking advantage of Continental gauge. The extra capacity of Continental gauge compared to UK gauge can be up to 50%. However, Continental gauge can be used only on HS1 with transhipment required to go beyond.

Current freight trains on HS1 use the line at night and are charged at the discounted rate of £4.00 per km.

Oliver Wyman interviewed shippers, forwarders and operators to assess the freight potential of HS1 with Continental gauge wagons and UK gauge wagons. For high speed freight potential, Oliver Wyman interviewed Carex (Carex plans to transport express freight between the London area and the main European freight airports). Their findings were:

- For Continental gauge traffic significant technical constraints outweigh HS1 advantages. Demand potential on HS1 is limited by low London-bound rail freight volumes as well as by technical and commercial considerations.
- For UK gauge, advantages on HS1 are minimal and constraints remain high. Competition from other modes remains strong.
- Analysis shows Carex will not be price competitive against road. Carex faces strong constraints and is not likely to become a reality in CP2.

In the 50:50 forecast demand scenario freight demand is expected to remain flat at current levels, providing the freight discount is renewed in CP2. This is not certain and is discussed in Section 12.3.2.

7.1.4. Conclusions

As noted above, we propose to base the OMRC apportionment calculations on the 50:50 No New International Operator scenario and to use the reopener provisions in the HS1 Access Terms to adjust the apportionment when a new operator commences (see Section 13.3). Train path forecasts for this scenario are shown in Table 26.

Table 26: CP2 train path forecast

	2015	2016	2017	2018	2019	2020
Paris	12,065	12,170	12,170	12,170	12,691	12,691
Brussels	6,235	6,235	5,824	5,824	5,824	5,824
Disney	590	590	590	590	590	590
Other	194	194	194	194	194	194
Total international	***19,084***	***19,189***	***18,778***	***18,778***	***19,299***	***19,299***
Ashford	25,941	25,941	25,941	25,941	25,941	25,941
Springhead Junction	25,684	25,684	25,684	25,684	25,684	25,684
Ebbsfleet up	996	996	996	996	996	996
Ebbsfleet down	996	996	996	996	996	996
Total domestic	***53,617***	***53,617***	***53,617***	***53,617***	***53,617***	***53,617***
Total freight	***208***	***208***	***208***	***208***	***208***	***208***
Total train paths	**72,909**	**73,014**	**72,603**	**72,603**	**73,124**	**73,124**

7.2. Financial assumptions

7.2.1. Inflation rate

We have assumed an inflation rate of 2.75% after February 2013 actuals have been included. This is comparable with the NRIL Strategic Business Plan which assumes 3.0% in 2013/14 and 2.75% thereafter.

7.2.2. Discount rate

For calculation of OMRC, a discount rate of 3.5% real has been used based on Government Green Book guidance.

For Specified Upgrades our actual funding rate of 6.6% pre-tax nominal is used.

7.2.3. Escrow account interest rates

We have assumed that 80% of funds are placed in Authorised Investments and 20% remain in the escrow account. We have assumed the following:

- For Authorised Investments the interest rate varies by year based on forecasts provided by external Treasury consultants, PMC Treasury.
  - 2015/16 1.37%
  - 2016/17 2.14%
  - 2017/18 2.89%
  - 2018/19 3.39%
  - 2019/20 3.73%
  - Thereafter the rate varies with an average of 3.73%
- For funds remaining in the escrow account the interest rate is zero.
- For negative escrow account balances the interest rate is 7.5%.

7.2.4. Opening balance of the escrow account

We have assumed an opening balance at the start of CP2 of £30.386 million (as in Section 5.7).

7.3. Asset management plan assumptions

Key assumptions made by NR(HS) are as follows:

- Traffic volumes will be no more than 4% greater than the levels forecast in the Oliver Wyman report.
- Only existing rolling stock with known rail/wheel interface behaviours and characteristics will use the network. New rolling stock may have an effect on degradation rates and introduce new cost drivers.
- No new train operators commence operating services during CP2.
- There is a requirement to continue to maintain the Waterloo connection in the same manner as now, i.e. to main line standards.
- NR(HS)'s opportunity for engineering access to the network will not reduce from CP1 levels.

Q2 Do you believe that the NR(HS) asset management plan assumptions are appropriate? Are there any additional assumptions required that we have not captured in this section?

8. Our outputs

8.1. Key outputs

Our vision to become the world's leading high speed railway business was set out in Section 3.3. We have a clear strategy to deliver high quality, high performance assets across all parts of the business.

We need to balance activities that:

- Ensure the railway is safe;
- Maintain and, where possible, improve on a high performing railway and deliver quality customer service;
- Deliver on long term asset obligations; and
- Drive efficiencies and deliver value for money.

The outputs we plan to deliver in CP2 should reflect what operators want. There have been a number of discussions around what these outputs should be and they can be summarised as being broadly a continuation of the excellent performance being delivered in CP1.

The key outputs that we plan to deliver are set out in our Asset Management Policy and summarised in Table 27 along with the focus of our activities in CP2 to enable us to deliver these outputs.

Table 27: CP2 key outputs

Output aspirations	Focus for CP2
Year on year reduction of the Fatalities and Weighted Injuries rate	Further developing safety culture, including psychological and behavioural aspects
Working practices to minimise (as far as reasonably practicable) the effects of trespass and vandalism, theft and terrorism	Gather intelligence to reduce the risk to performance. Effective policing by BTP / private security
Competent stewardship of the asset portfolio and at least maintain availability at CP1 levels	Continuous improvement in asset information and tools
Identify innovative working methods to improve long term asset performance and reduce asset costs	Whole life cost analysis, asset criticality
Maintain HS1 Ltd's component of PPM and average seconds per train at CP1 levels, while exploring cost-effective approaches to improve	Working with operators to reduce the impact of "big" incidents. This is already happening and delivering benefits but there is more we can do.
As an Infrastructure Manager, improving the end customer experience	Providing support where possible/relevant. For example ride quality, delays, customer information.

Unlike other regulated industries we do not have binding regulatory output targets with penalties for failure. However, we have developed a set of KPIs to monitor our own and NR(HS)'s performance.

8.2. Responding to what customers want

It is clearly important that we deliver services that benefit end customers. We agree with train operators that it is not appropriate for us to canvass the opinions of end customers directly. In order to demonstrate "line-of-sight" to end customers we have given EIL and LSER an opportunity to set out their aspirations in greater detail based on their own research and customer surveys. This will assist with the PR14 process by:

- Providing clear guidance to us about what our proposals should meet;
- Defining a set of objective criteria against which our proposals can be judged; and
- Addressing the ORR challenge around linking outputs to end customer aspirations.

In discussion with operators, we have developed a set of nine output measures and asked our current passenger operators to tell us where we stand using a rating out of 5, using the following scale:

- 1/5 = unacceptable, significant benefit to passengers if HS1 Ltd outturn is improved
- 2/5 = poor, considerable scope for passenger benefit remains
- 3/5 = okay, minimum acceptable level
- 4/5 = good, largely delivers customer requirements
- 5/5 = excellent, fully consistent with known customer aspirations.

Table 28 sets out the ratings we have received from LSER and EIL. Because we are interested in the holistic end-customer experience we took the opportunity to ask operators about stations and route activities. For completeness we report the comments in relation to stations but they are clearly beyond the formal scope of the PR14 review.

In our view the key messages arising from this extremely valuable exercise are the following:

- No ratings of 1 or 2 against any of the output areas.
- Out of the 18 scores received (9 output areas from 2 operators), 5 of these were 3 out of 5. Only 2 scores of 3/5 relate to route activities.
- There is more we can do to improve our response to the small number of “big” performance incidents on the railway, including both the operational response and providing information to passengers.
- Operators challenge us to improve value for money.
- Information at stations is another area where we can make changes to benefit passengers (noting this is beyond the scope of PR14 but will be addressed as part of our stations review process).
- We consider that we have programmes underway to address most of the issues raised by LSER and EIL. For the other areas – such as timetabling of special events – we will develop and deliver appropriate initiatives.
- The feedback from operators has been extremely helpful, and supplements the ongoing frequent positive dialogue between HS1 Ltd, NR(HS) and train operators.

Table 28: Operator ratings by output area

Output	EIL	LSER
Performance	4	4
Safety	4	3
End-customer experience	4	3
Competent stewardship of the asset portfolio	4	5
Stakeholder relations with adjacent IMs	4	3
Asset availability	4	5
Doing things better and cheaper	3	4
Train Planning	4	4
Stations / car parks	4	3

Table 29 sets out an overview of how we propose to respond to the challenges we have received, and the initiatives we have underway and will undertake before the end of CP2. We set out these proposals for consultation with train operators, and are keen to work with them to refine and improve them so we can deliver an agreed set of initiatives. A more comprehensive set of initiatives and proposals will be included in our final 5YAMS document submitted to ORR in December 2013. This will build on and address the responses we receive during November 2013.

Table 29: HS1 proposed initiatives

Output	Initiatives
Performance	▪ Review contingency plans for recovering from big incidents, including provision of information during ▪ Develop and track a measure of significant lateness (the starting point being the CaSL measure used by NRIL) ▪ Further work to understand the drivers of customer satisfaction and the relationship with performance ▪ Review industry information flows and incident management (during the course of an incident) structures to improve the customer's understanding of when their individual train will arrive.
Safety	▪ Learn from faults to critical station assets to establish proactive and reactive measures for critical station assets ▪ Focus on behavioural and psychological aspects to engender a deeper safety culture ▪ Simplify the reporting process on safety hazards and incidents across the whole of the HS1 asset ▪ Review the joint industry process to report and correct safety related problems at stations to improve "time to fix" metrics. ▪ Protect track fencing funding to ensure the current level of security is not compromised. ▪ Build on the industry's trespass and vandalism "hot spot" analysis and strengthen our intelligence sharing.
End-customer experience	▪ Continue to review passenger information systems and improve accuracy of information flows to passengers ▪ Continue to work with LSER to improve real-time running information (particularly in times of disruption) ▪ Wifi (route): explore feasibility studies on the viability of introducing line-side wifi ▪ Wifi (station): work with Metropolis to increase the number of nodes at St Pancras to provide 4G station coverage (due early 2014). Consider rolling out similar scheme at other HS1 stations (i.e. Stratford Int. and Ebbsfleet Int.)
Competent stewardship of the asset portfolio	▪ Build on the platform of modelling and information collection described in Section 10 to continue to refine our asset knowledge and deliver excellent performance ▪ Continue to learn from the experience of others via informal and formal benchmarking programmes ▪ Further strengthen collaboration between train operators and NR(HS) relating to train bound monitoring equipment such as Panchex.
Wider stakeholder relations	▪ Implement energy initiatives such as regenerative braking and transmission loss reduction ▪ Continue to work with the train operators via forums such as Engineering Together and Performance Group meetings to discuss interface issues ▪ Develop operational understanding to better utilise capacity at Ashford International ▪ Establish a regular forum to build on ongoing dialogue with EIL from experiences from previous schemes such as ticket office move and station signage at St Pancras
Asset availability	▪ Build on collaborative working with EIL by utilising existing forums such as Business Review Forum and Performance Group meeting. ▪ Develop flexible maintenance and possession regime to accommodate LSER's operational demand. ▪ Build on work to date on flexible process to provide ad hoc access requests from LSER for special events such as those at QEOP
Doing things better and cheaper	▪ As set out in this 5YAMS document, we have comprehensive plans across all aspects of the business to improve the way we deliver to customers while reducing the cost ▪ Review the business case for maintaining the Waterloo connection
Train Planning	▪ Continue to build on relationship between operators and operational planning via forums such as Business Planning sessions to ensure a clear, transparent and efficient timetabling process for all parties

Output	Initiatives
Stations / car parks	▪ Car parks: continue to build to dialogue between CP+ and LSER with regard to staffing, car parking prices and customer services improvement schemes. ▪ Information: work with EIL to understand how we can best align (to the extent possible) our processes to meet licence conditions/obligations ▪ Way finding: continue to build on the work with EIL on St Pancras signage scheme funded by HS1's Passenger Benefit Fund' ▪ Cleanliness: continue to work with the train operators to use the independent National Passenger Survey results to gauge customer satisfaction and identify areas requiring action plans to improve overall passenger experience ▪ Taxi provision: continue to work with EIL to address EIL's concerns on taxi queuing provisions at St. Pancras. Areas of focus will be signage around taxi rank, realigning queuing systems, better road markings and improving communications to taxi operators ▪ Continue to review signage across all stations following the implementation of the signage St Pancras station. Build on previous work with the train operators who will remain full participants in the process.

We have also engaged with freight operators about what they want from HS1. The overwhelming issue for rail freight is being competitive with road transport providers. This translates to the:

- Cost of using HS1; and
- Ability to gain access.

In relation to cost, freight operators pay on an incremental basis, only the additional costs arising from freight operation rather than a contribution to common costs. As set out in Section 11.7, we have substantially reduced our overall costs relating to freight, some of which is due to changes in forecast volumes, and the remainder due to efficiency savings we propose to make. The volume reduction has, however, led to an increase in charges per train-km, and we have been working with freight operators to explore the opportunity for ongoing Government support.

We have been able to be extremely responsive in the timetabling of freight services in order to best facilitate end-customer needs, while still meeting the programme of engineering works required to keep the railway safe and reliable. We have also undertaken a large amount of work to establish a system of freight "catalogue paths" for freight operators with long term aspirations to operate services during the period of the night. The catalogue paths system is aimed at utilising capacity whilst offering access to freight operators on a fair and non-discriminatory basis. We will continue to work with freight operators to maximise access opportunities balanced against engineering access needs.

Q3 Can you please confirm that we have properly captured the output requirements for customers?

9. Our safety plans

9.1. Safety vision

Our safety vision is "*to create and lead a culture in which all HS1 Ltd stakeholders can deliver world class safety performance with zero harm to their people, their contractors, their customers and their neighbours*".

Our strap line to deliver that vision is "*Safety is no accident – we all play our part*" which was developed by HS1 staff in 2013, and endorsed by the senior management team.

We are passionate about reducing harm to all those who work in the HS1 community.

9.2. Safety objectives for CP2

Our Chief Executive has developed and implemented the HS1 Safety Strategy which comprises the following long term safety objectives:

i. To achieve all relevant statutory health and safety requirements as a minimum, and with all risks to health and safety reduced to a level that is both tolerable and As Low As Reasonably Practicable (ALARP);
ii. To ensure, within the framework of the Operator Agreement, that NR(HS) has made sufficient provision for funding within its Operations Maintenance and Renewals (OMR) price for each Control Period to continue to improve its safety performance, so far as is reasonably practicable;
iii. To provide sufficient funding in accordance with the Station Concession Agreements and the Station Management Agreement to enable NR(HS) and MITIE, respectively, to improve their safety performance at these HS1 stations so far as is reasonably practical;
iv. To design, construct and commission any changes to the railway infrastructure and stations undertaken by HS1 Ltd so that they will be capable of safe operation (including maintenance etc.) and compliant to all statutory requirements; and
v. To enable HS1 Ltd to hand back the railway and stations to the Secretary of State at the end of the concession in accordance with the provisions of the Concession Agreement and the HS1 Lease.

9.3. Strategy for delivery of the safety vision and objectives during CP2

The strategy to deliver the vision comprises the following areas:

- Situational - what the organisation does for safety.
- Behavioural - what the people do; and
- Psychological - how the people feel.

To date both HS1 Ltd and NR(HS) have focused, in the main, on the delivery of situational safety through the development and implementation of procedures, standards and competencies. However, to make a step change in safety performance during CP2, we recognise that the focus must turn to Behavioural and Psychological activities, whilst maintaining Situational safety performance. Our objective is to support and encourage NR(HS) and its contractors to improve workforce engagement so that people understand and challenge "why we do what we do", take ownership of safety and feel empowered to confront poor behaviours and unsafe environments. This will take a considerable amount of time and effort and progress will be monitored by both organisations throughout CP2. The prime safety risk is exposure to work activities on the operational railway and at stations. HS1 Ltd staff will focus on becoming more visible in the HS1 community and will work with our partners to deliver our safety vision. To achieve this we will undertake joint safety tours, sponsor and attend safety conferences and workshops, challenge and jointly review poor safety behaviours, and reward good safety behaviour.

Progress made by NR(HS) will be monitored through safety performance indicators, one of which will be to reduce the Fatalities and Weighted Injuries index (FWI) on a year by year basis.

Our contractors and directly employed staff will continue to be trained in modern safety techniques in order to ensure delivery of our safety vision.

9.4. Our security obligations

Our security strategy is to provide infrastructure that can be operated safely and efficiently. Security risks to railway users and systems, and to those affected by the railway are controlled to as low as is reasonably practicable taking into account the following factors:

- Likelihood of risk occurring;
- Costs and benefits;
- Funding and resources; and
- Views of relevant stakeholders.

At stations, security complies with mandatory standards (National Rail Security Programme) set by the DfT Maritime & Land Transport Security Division (MLTS). In addition, security within the Restricted Zones at stations and the Temple Mills International Depot complies with the requirements of the Channel Tunnel Security Order 1994.

Because the security threat varies over time, security arrangements are always subject to review and clearly are a factor that is taken into account by the HS1 Infrastructure Asset Management Strategy.

9.5. Delivery of safety and security during CP2

9.5.1. Introduction

NR(HS) holds the Safety Authorisation and has prime responsibility in law for the safe operation of HS1 railway infrastructure. No agreement by any party with HS1 Ltd will prejudice or limit the right of NR(HS) to take such action as it believes necessary to comply with its obligations under its Safety Authorisation.

The NR(HS) Safety Authorisation document (authorised by the ORR) describes its Safety Management System (SMS) and references the processes and procedures by which safety will be delivered. The outputs from NR(HS)'s SMS will deliver the majority of measures to provide assurance of the effectiveness of the delivery of the safety and security aspects of the Infrastructure Asset Management Strategy.

It is important to us that there should be continuous improvement in the safety performance of our system, so far as is reasonably practicable, and this is also one of the requirements of the European Safety Directive. NR(HS) produces an Annual Safety Plan in which it sets out how it intends to improve safety. In accordance with our safety objectives, we review the Safety Plan to satisfy ourselves that sufficient provision has been made by NR(HS) to enable its delivery.

NR(HS) is also responsible for maintaining the security of the railway in conjunction with the BTP and security contractors.

9.5.2. Audit and assurance

Audit and assurance are important tools to measure the performance of the Infrastructure Asset Management Strategy against the specifications described in NR(HS)'s SMS.

It is inappropriate to carry out audits more frequently than annually for any particular element as the cost and resources used would outweigh the benefits obtained. Therefore we use assurance to provide regular feedback on the safety performance of the SMS. This is done using the 4-weekly Safety, Environment Assurance Report (SEAR) in which NR(HS) collates various outputs of the SMS. The SEAR is sent to us, as well as reviewed internally by the NR(HS) senior management team. It is also reviewed at a Director level meeting between HS1 Ltd and NR(HS).

The ROGS require NR(HS) to carry out internal audit of compliance to its Safety Authorisation. NR(HS) undertakes an audit of topics selected using risk based criteria based on the recommendations of the Rail Safety and Standards Board (RSSB). NR(HS)'s annual audit programme is consulted with HS1 Ltd at the start of each year. NR(HS) advises us of key audit findings in the SEAR, and when necessary these are reviewed with relevant HS1 Ltd personnel.

Section 9.5.4 describes the indicators we currently plan to use although it should be noted that these may be subject to change during CP2. These indicators will be contained in the SEAR and monitored to provide assurance that the safety of the Infrastructure Asset Management Strategy is being delivered.

9.5.3. Risk management / ALARP

NR(HS)'s Safety Authorisation describes how safety performance will be managed through control of safety risk to as low as is reasonably practicable (ALARP) using its SMS. The ROGS implement the European Safety Directive in respect of risk levels to be achieved by requiring that the SMS must take account of the Common Safety Targets (CSTs) developed by the European Commission.

The CSTs apply at the Member State level. The ORR has issued guidance that authorisation of an organisation's SMS in accordance with the ROGS will be "taken as a guarantee that the operator contributes to achieving the CSTs".

The CSTs are evolving under the European Commission. The ORR will ensure that the SMSs of infrastructure managers and train operators are altered as required to deliver the CSTs.

9.5.4. Measuring safety performance on HS1

9.5.4.1. Common Safety Indicators

To demonstrate progress towards achievement of the CSTs there is a harmonised set of safety indicators against which Member States report. These are called Common Safety Indicators (CSIs) and to date these cover approximately 250 data sets. The ROGS require each infrastructure manager to report against these. We will use certain of the CSIs to provide assurance of the effectiveness of the delivery of safety of the Infrastructure Asset Management Strategy. NR(HS) will produce these by extraction of the relevant data from the Safety Management Information System (SMIS).

The CSIs we will use to measure safety performance will include:

- Indicators relating to accidents:
  - Fatalities and Weighted Injuries; and
  - RIDDOR reportable accidents;
- Indicators relating to incidents (near misses); and
- Indicators related to trespass.

9.5.4.2. Other indicators of safety performance

The CSIs are all reactive indicators of safety failures. Within the framework of the Infrastructure Asset Management Strategy, these will be supplemented by the following which will all be reported in the SEAR:

- Breaches of HS1 boundaries affecting the infrastructure (a security indicator);
- Summary of British Transport Police and security patrol activities (a security indicator); and
- Numbers and types of infrastructure faults and failures.

We believe it is important that the asset strategy is proactive and to support this approach we have developed a suite of leading indicators comprising:

- Measures of workforce competency;
  - numbers of trained Personal Track Safety holders; and
  - for each function, the total numbers of competencies held compared to the total number required;
- Number of Safety Tours compared to plan;
- Number of protection of works checks carried out compared to plan;
- Number of Planned General Inspections compared to plan;
- Emergency planning - number of exercises carried out compared to plan;
- Number of Corrective Action Requests overdue; and
- Number of safety briefings carried out compared to plan.

Thresholds will be agreed for each indicator and we will regularly review these indicators and instigate appropriate investigation of action where thresholds are exceeded.

Q4 Do you have any comments on the appropriateness of our safety policy and approach in CP2?

10. Our asset management plans

10.1. Introduction and overview

10.1.1. The challenge

The key to providing excellent ongoing service to our customers is looking after HS1 in the best possible way. This section describes how we have worked with NR(HS) to optimise our asset interventions. The result is proposals for maintenance and renewals activity in CP2 and forecasts of renewals in the longer term.

We aim for continuous improvement in how we look after the asset, so we also set out how we are working to collect better information that will drive refinement of our practices, building on the many initiatives we have already undertaken.

As well as delivering customer requirements, we have a number of underpinning asset stewardship obligations set out in the Concession Agreement. It requires us to secure the operation, maintenance, renewal, replacement and upgrade of the HS1 railway infrastructure:

- In accordance with best practice;
- In a timely, efficient and economical manner; and
- Save in the case of the UKPNS assets, as if we were responsible for the stewardship of the HS1 railway infrastructure for the period of 40 years following the date that any such activities are planned or carried out.

It also requires us to:

- Establish, maintain, develop and implement an Asset Management Strategy in respect of operations, maintenance and renewal and, to the extent appropriate, Specified Upgrades and other upgrades;
- Maintain appropriate, accurate and up to date information about the assets comprising the HS1 railway infrastructure, including information as to their condition, capability and capacity; and
- Produce, update and keep updated an Asset Register at all times listing the assets comprising the HS1 railway infrastructure and their condition, including when they are due to be renewed or replaced.

The following sections demonstrate how we have done this in CP1 and highlight how we will improve going forward. As well as our strategy and approach, we set out how our asset information is continuously evolving to underpin the best possible decisions and, in particular, how we expect to improve on this in CP2.

10.1.2. Our asset management approach

Asset management is a tool that allows us to optimise what we do to the railway infrastructure. We have to make choices between maintenance and renewals, between types of maintenance activity, and between options for the timing of interventions.

Table 30 summarises the key components of overall asset management decisions, as well as how we have approached these in PR14. In addition to the number of assets and their current condition, a major driver is simply how long the asset lasts – embodied in degradation rates. Identifying and recording this decline over time is not straightforward as degradation can be caused by a range of factors such as traffic volumes and climatic conditions, and understanding the failure mode – the point at which the asset ceases to perform - is also not an exact science. The other key factor is the criticality of the asset. While it is somewhat oversimplifying, the more critical an asset, the earlier it should be replaced so as to avoid performance risk.

Table 30: Key components of asset management decisions

Key drivers of decision / components of analysis	Approach / source of information	Issues / challenges
What assets are covered	Asset register	▪ Level of granularity data availability
Current asset condition	Asset register	▪ Identifying a common framework that relates to degradation rates etc.
Degradation rates	Combination of degradation information, manufacturer recommendations, and empirical data from HS1 operation	▪ Significant judgement involved given lack of steady-state data (only since November 2009) ▪ Main impact on renewals
Asset criticality	Impact of failure on operations and location, using internal information and industry indices	▪ Modelling likely delays of different incidents with different asset classes at different times of day
Possessions planning	Volumes from asset specific policies with current volumes and possession availability. Assumed no change to operational times	▪ Reconciling work volumes to engineering (white) period available ▪ NR(HS) proposal is to continue with the current possessions regime. HS1 notes the requirement for flexibility for midweek double line blocks to meet future customer aspirations
Options / sensitivity assessment	Using the whole-life costing model	▪ Understanding trade-offs between performance and safety risks and cost, as well as sensitivity of model outputs to key input assumptions (e.g. discount rates)

We plan to move to advanced asset management techniques embodying condition-based activity where appropriate and involving sophisticated engineering judgement. We want to continue to deliver world class performance but also continue to be affordable. Safety is clearly something that will not be compromised.

A lot of information, analysis and modelling has been brought together to inform judgements about what asset interventions we should make:

- We have used available data and experience to date to improve practices in CP1 and further improvements will be implemented in CP2 and beyond;
- Whole life cost (WLC) modelling has been undertaken to compare trade-offs between different interventions over time: this has highlighted that there are no obvious opportunities (with the information available to us at this stage in the asset life) to deliver better stewardship by a change in approach;
- We have undertaken business case analysis to justify discrete areas of expenditure/activity; and
- We have used engineering judgement to stretch the approach to future renewals, providing a degree of optionality to be discussed with train operators and to be verified through validation studies.

What we want to be able to do is:

- Know the failure mode of each asset:
- Predict when failures will happen by tracking condition and degradation over time/usage;
- Understand the criticality of any asset failure – what will happen and how it is driven by the type of asset and location; and
- Implement the optimal strategy of preventative repair.

The product of all of this analysis is described in the asset management suite, comprising:

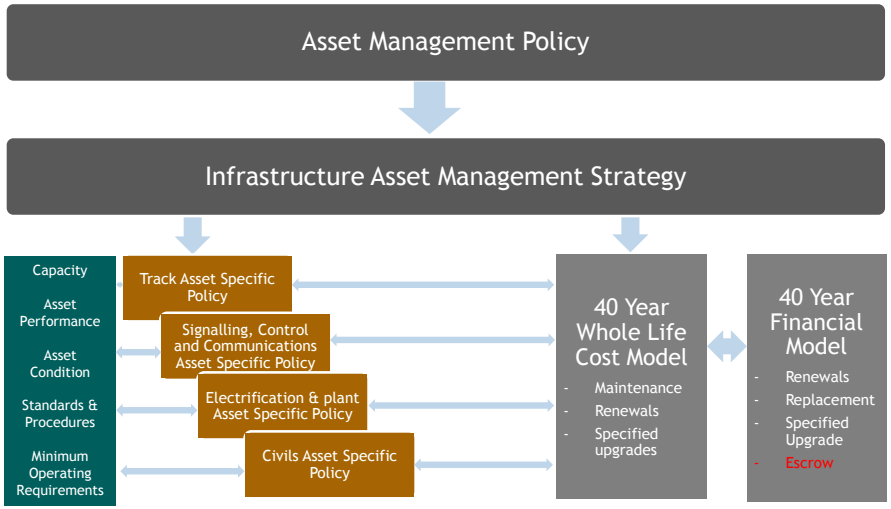
- Outputs defined in our Asset Management Policy in which we set out our vision and specified the key outputs that we require NR(HS) to deliver for CP2. These were summarised in Table 27 in Section 8. The

Asset Management Policy provides the framework within which NR(HS) has developed its asset management suite of documents.

- The NR(HS) Infrastructure Asset Management Strategy defines the overall approach to asset management and the specific objectives to be achieved. It defines the organisation and high level arrangements by which NR(HS) manages HS1 assets to deliver the asset management obligations in the Concession Agreement.
- It is underpinned by a set of Asset Specific Policies (ASPs) which define the drivers for renewal and the renewal and maintenance criteria for all key asset types. The ASPs have been developed using a 40 year whole life cost model.
- Underpinning the decision making and enabling improvements going forward is the Asset Information Strategy which sets out what information we need to collect and how we are going to use it to make better decisions.

The components of the asset management suite and the relationship between them are summarised in Figure 17.

Figure 17: Route Asset Management Suite



10.1.3. Coverage of this section

The remainder of this section:

- Outlines the process we have used in generating our plans;
- Highlights key activities and analysis such as the WLC modelling;
- Details the changes in practices in each asset area from now into the future;
- Summarises our asset information strategy which will inform improved decision making going forward;
- Sets out the CP2 maintenance and renewal volumes proposed as a result of these plans;
- Outlines our approach to developing estimates of renewals volumes into the future; and
- Sets out proposed Specified Upgrades for CP2.

The cost of doing this work is set out in detail in Section 11.

10.2. The process

The main steps in the process of developing the asset management suite of documents have been:

- Significant work was undertaken by NR(HS) and their consultants AMCL to develop a whole life cost model with the desired functionality. Model capability was tested early;
- Policy options were analysed for each asset group to inform decisions about the whole life approach to management of the assets; and
- There was ongoing peer review with ORR, HS1 Ltd and HS1 Ltd's consultants Halcrow throughout the process.

In addition to the documents noted above, NR(HS) has developed the NR(HS) Five Year Asset Management Statement. This document sets out the expected levels of performance and asset stewardship arrangements for CP2 and the renewal, maintenance, inspection, monitoring work volumes and costs for the CP2.

10.3. Key parts of the analysis

10.3.1. Whole life cost modelling

In 2011, NR(HS) produced a first draft of the ASPs based on existing processes and standards. These documents are continuously being challenged and updated in the light of experience and testing of ideas. As part of the PR14 process, NR(HS) developed a whole life cost model which enabled it to explore a range of renewal and maintenance scenarios and to identify for each asset group the scenario with the lowest whole life cost. These asset group scenarios were combined into a system whole life cost model for the HS1 route.

The model was developed with NR(HS)'s Professional Head for each asset group and replicated the behaviours and interventions of an asset or a portfolio of assets. It brought together failure rates, service and safety risk, planned and reactive maintenance costs and renewal costs.

Many of the assets are relatively young and so insufficient data was available to develop long term degradation curves and failure rates. In such cases, assumptions were made on the basis of engineering judgement and manufacturers' guidance. Where possible, NR(HS) validated these assumptions through discussions with other high speed rail infrastructure managers such as SNCF.

The results from the whole life cost modelling were used to inform the revision of the existing ASPs. Another key output from the WLC model was the asset renewal volumes for the development of the 40 year renewal plan.

The model tested four different scenarios, described in Table 31.

Table 31: Whole life cost modelling scenarios

Scenario	Description
Baseline	The current maintenance/intervention regime supporting the Asset Specific Policies
Low Cost – High Risk	Reducing cost and considering the impact on WLC and specifically the impact on safety and service risk
Low Risk – High Cost	Minimising the safety and service risk by increased inspection and maintenance, refurbishment and early renewal of assets
Life extension	Push out renewals of assets beyond expected service life predictions whilst considering the impact on safety and service risk

Broadly the WLC work has confirmed that there is no obvious scope to improve asset intervention without importing performance risk or additional costs, given what we currently know about asset degradation.

10.3.2. Asset Specific Policies

There are ASPs covering the following broad asset groups:

- Track;
- Signalling, Control and Communications;
- Electrification and Plant (covering OCS, ventilation and rail plant); and
- Civils and Lineside Buildings.

Each of the ASPs has been developed using a whole life cost model approach to explore different policy options and determine the optimum whole life approach to managing the assets. Each ASP sets out:

- The types and volumes of assets on the route;
- The status of these assets in terms of their current performance, historic performance and criticality;
- The whole life cost model and the associated options considered for managing the assets and the impact each option would have on the current and future levels of service;

- The chosen approach to managing the assets, including the planning of work volumes to deliver the business objectives and levels of service for the lowest whole life cost;
- The information requirements and development plans to support current and future decision making; and
- A summary of the defined policy for each asset type, its justification and plans for future development.

Key findings are discussed in the remainder of this Section 10.

The ASPs will be made available to ORR for its review. They will not be issued to train operators but we will work with NR(HS) to respond to train operator queries.

10.3.3. Asset condition

To support the monitoring of the assets, NR(HS) has implemented an asset condition scoring system which gives each asset or system a condition score between 1 and 5 (1 = good/new condition, 5 = poor condition). The asset condition scoring criteria are shown in Table 32.

Table 32: Asset condition scoring criteria

Score	Description
1	The asset is in a condition commensurate with a new asset.
2	The asset has been installed for more than five years and has a high level of reliability. Maintenance visits result in minor adjustments and occasional component replacements.
3	The asset is carrying out its stated function and is performing to an acceptable level of performance. In service faults are infrequent and requires occasional component replacement.
4	The asset is operating in a degraded mode or is suffering repeat faults and frequent component replacement. The system could be nearing the end of its supportable life or becoming obsolete with only remaining spares holding to maintain it in operation.
5	The asset cannot perform its given function and has been removed from operation. Renewal is required if it is to be re-introduced into operation.

Asset condition scores are captured in the EAMs system. Both quantitative and qualitative inputs are used to score the assets. NR(HS) will continue to refine the condition scoring methodology and associated data with the emphasis on quantitative supporting evidence.

Condition scores at July 2013 are shown in Table 33. The condition of the assets is generally good and in line with expectations for a route of modern construction and assets in the early phases of their life cycle. All assets categorised as 4 or 5 are included in the CP2 Renewals programme.

Table 33: Asset condition scores as at July 2013

Asset	Percentage of assets in each condition band					
	1	2	3	4	5	Not scored
Track	12.80%	78.49%	8.71%	0.00%	0.00%	0.00%
Signalling	0.00%	96.85%	1.20%	1.95%	0.00%	0.00%
Civils	0.00%	40.68%	59.30%	0.02%	0.00%	0.00%
OCS	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
M&E	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Telecoms	0.00%	7.87%	62.62%	29.51%	0.00%	0.00%

10.3.4. Possessions strategy

The Engineering Access Statement sets out the possessions available to carry out inspections, maintenance, repair, renewal and enhancement activities on HS1. The process for reviewing and revising the Engineering Access Statement is set out in Part D of the HS1 Network Code: this process is designed to deliver a balance between infrastructure availability and engineering access.

Although CP2 will see the introduction of some larger works programmes which will require some additional/longer blocks, such as track ballast cleaning and renewal, the need for additional disruptive blocks is not

considered significant. They are, however, likely to lead to some compensation payments to train operators under Section 4 of the HS1 Passenger Access Terms and HS1 Freight Access Terms.

The current standard possession opportunities are as follows:

- Monday to Friday nights: work is carried out on a single line under possession. On occasions, to support ad hoc short notice repairs or specific campaigns such as tamping and certain types of grinding, double line possessions are taken subject to rearranging empty coaching stock movements. To date, this approach has not disrupted freight services.
- Saturday and Sunday nights: double line blocks to permit major overhead line maintenance and other long duration works requiring a double line possession such as grinding of crossovers and points. Saturday night is the longest possession opportunity of the week given the later start of services on Sunday morning.

Campaigns such as the ongoing OCS insulator replacement programme could not be achieved without this approach, and very expensive hired on-track machinery can be used efficiently on consecutive nights thus avoiding wasteful downtime awaiting the next possession opportunity.

NR(HS) has assumed the same level of possessions opportunities for CP2.

10.3.5. Asset criticality

The criticality of an asset is a key driver of the optimal intervention strategy. There are different aspects of criticality required to sustain a safe and reliable railway. The Minimum Operating Requirements (MORs) represent the highest level of criticality for operating the line in terms of safety. These are set out in the Level 1 standard ref CO2/OS49/1002 and, in the extreme, if certain criteria set out within these requirements cannot be met then the HS1 line cannot operate. There are also critical assets that are required for optimum route availability (such as key turnouts and Switches and Crossings (S&C)) and procedures are in place to ensure that the maintenance effort is targeted appropriately. This availability criticality is driven by both the type of asset and the location of the asset.

A two phase approach has been taken to measuring the criticality of the assets on HS1. An initial criticality analysis was undertaken in October 2010 based on the information available at the time and was used to identify the fourteen assets chosen for the ASPs in 2011.

A second phase of criticality analysis was undertaken in 2012/13 building upon the work carried out during the development of the 2013 ASPs. This developed a more quantified measure of asset criticality and utilised leading (potential consequence) and lagging (historical data with the inclusion of cost information) indicators balanced by engineering judgement.

Each asset is given a score between 1 and 5 (with 5 being the most critical) against each of the following criteria which are dimensions of possible impact on the operational railway:

- Service (delay minutes per year);
- Safety (Fatality Weighted Index FWI);
- Planned maintenance (Direct Norm Hours);
- Reactive maintenance (CWO Direct Norm Hours); and
- Renewal/refurbishment costs (£m).

These scores feed into each of the individual ASPs. Going forward NR(HS) will improve its quantitative “total cost of ownership” approach as more data becomes available allowing the asset types to be ranked by their annualised total cost of ownership. This will allow focus on the assets/locations that contribute the largest annualised cost.

10.4. Performance management

HS1 has operated at world class levels of reliability throughout CP1. However, the occasional major incident has had a significant impact on average performance. NR(HS) has continued throughout CP1 to work with industry partners to find more effective ways of managing perturbation, particularly for significant incidents, regardless of the cause. This has already resulted in improvements in CP1.

Case Study: Recovery from major incidents

Underlying asset reliability has been very good but the occasional major incident has had a significant impact on average performance. We and NR(HS) are therefore working with train operators to improve our joint response to major incidents as a means of reducing delays. The key elements of this process are set out below.

Performance Improvement Plans

We have adopted Joint Performance Improvement Plans (JPIPs) which provide a commitment by all parties to deliver agreed targets through the delivery of specific initiatives which are jointly monitored and challenged.

Performance Groups

NR(HS) leads a number of forums where NR(HS) and the train operators analyse and review performance trends, working together to identify, track and deliver initiatives. These include the HS1 Performance Management Group, the JPIP Review Group and other operator-specific groups.

Incident Reviews

This is a key component of the management of significant delay. There is a structured Significant Performance Incident Review (SPIR) with HS1 Ltd, NR(HS) and train operators of all incidents where delay exceeds 200 minutes. The key purpose is not to assign blame but to identify root causes and aggravating factors including service recovery, leading to agreed recommendations for delivery by the parties. Delivery of the recommendations is monitored by the performance groups. Examples of recommendations as a result of incident reviews are:

- Gold command structure created and briefed to all parties, communication between ACC and stations tested at joint workshops;
- Workshop with EIL and LSER to review the command structure, re-evaluation of the communication strategy and decision making between ACC, KICC, and Southeastern Production Managers. Joint contingency plans created and implemented during subsequent disruption to services;
- Table top exercise with stakeholders to test contingency plans;
- All Class 395s have a GSM-R handset for communicating within HS1 tunnels;
- Commitment from Eurotunnel that existing KRUPP rescue loco will be positioned on UK side for use during disruption; and
- LSER redefined policy timeframe so passengers are rescued and trains are fixed in parallel: this was incorporated into the HS1 contingency plan.

OPSRAM+

The 12 weekly OPSRAM+ meeting between NR(HS), train operators and HS1 Ltd determines the overall emergency planning strategy as well as reviewing existing operational risk mitigation and safety performance. The OPSRAM+ group will determine the emergency exercise plan for the Emergency Planning sub-group to carry out in collaboration with emergency stakeholders and train operators in line with industry incidents and safety performance. This work builds on the success of the emergency planning exercises undertaken for the Olympics. In 2013 the emergency exercises plan included 19 drills, table top exercises and live exercises covering, for example, trespass incidents and winter weather preparedness.

Our approach has already resulted in improvements in CP1. Following the lightning strike in April 2012 (4,990 minutes delay), operational and technical procedures were modified to reduce the impact of a major failure on train performance. In April 2013 a rail flaw at York Way caused a restriction of capacity. This could have had a similar impact to the lightning strike but, using the new procedures, the operational impact was limited to 500 delay minutes. In the subsequent review, overall management of the incident was seen as having significantly improved.

In September 2013, during a possession, an MPV went through points 2252 near Crismill and damaged them. The incident caused 1,144 minutes delay to both EIL and LSER services. Recommendations from the SPIR are:

- NR(HS) to review the ARM role and ensure all existing ARMs are briefed on the requirement to provide robust estimates from site;
- NR(HS) to review the process to facilitate the inspection of the track without having to systematically resort to an SGP;
- NR(HS) to evaluate the feasibility of overcoming the interlocking system when flank protection stops the route being proven on the adjacent route;
- NR(HS) to brief Ops on the importance of specifying milestones to the plan;
- LSER to review some of their internal processes for communications at stations;
- LSER to brief their TSM on not terminating trains at Stratford International; and
- LSER to brief their staff on using the international platforms at Stratford International for stabling in degraded scenarios vice Temple Mills.

As well as improved operational response, we are working with operators to improve the information flow to customers, so that there is timely and consistent messaging from the response team dealing with the incident through to on-board announcements. This involves a number of parties across our organisations working together.

During CP2, we will continue with this process, recognising that the lessons learned in CP1 will further strengthen our performance management capability.

NR(HS) is considering working towards ISO Business Continuity accreditation which reinforces the requirement for robust overarching contingency plans as well as adequate business continuity processes.

10.4.1. The relationship between performance and cost

As discussed at a number of public stakeholder events, we want to give operators some sense of the relationship and trade-offs between cost and performance.

This is inherently difficult as:

- Many factors affect performance, and isolating the impact of any individual factor would require significant data over time. For example it would require not only how we currently undertake maintenance, but the counter-factual of what happens if we do 20% less (say) of an activity;
- Relationships are likely to be non-linear, so extrapolating from point estimates or specific incidents is difficult; and
- Given the nature of railway assets there can be a lag between changes in activity and the performance impact.

Despite these difficulties we have gained an insight into the relationship in the following ways:

- Whole-life cost modelling as described in Section 10.3.1 above. This shows that – even in delivering a given asset policy – the 'high risk low cost' option increases performance and safety risk;
- Professional judgement suggests that the results of the whole life cost modelling can be extrapolated, with lower cost leading to increasing risks. It is likely that these increases will be non-linear (i.e. a 10% reduction in maintenance effort will lead to a significantly greater than 10% increase in performance / safety risk) and will increase the probability of large incidents more than changing the on-time performance of each train;
- Review of non safety-critical activities that might be considered 'discrete' and confirmation that there is a robust business case for retaining them (again reinforcing the conclusion that a reduction in costs would substantially increase performance risk); and
- A challenging approach to considering longer-term renewals based on anticipating future improvements in technologies and practices, with the caveat that this needs to be verified by further work going forward. This is set out in Section 10.9 below.

We will continue to refine this analysis going forward, and the work underway to implement the asset information strategy will again be key to our understanding.

NR(HS) has already used the emerging knowledge to refine and improve maintenance activity that have already been implemented in CP1, will be implemented in CP2, and will be reviewed for CP3 and beyond. These are set out in the next Section 10.5;

10.5. Key initiatives and improvements

Our approach to asset management has been evolving over time as we gain experience, collect data, learn from comparator organisations and challenge existing practices to do things better.

Table 34 summarises key changes and initiatives including some that have already been implemented during CP1 and changes we are planning to make in CP2 and beyond.

Table 34: Key changes and initiatives

Assets	CP1	CP2	CP3+
Track	▪ Change in track standards to refine inspection frequencies ▪ Through alignment design to aid tamping ▪ Lineside dynamic inspections to improve information and reduce resource costs ▪ Short wavelength tamping to improve track quality and effectiveness of repairs ▪ Change in rail	▪ Introduce IRIS320 high speed measurement train at full line speed ▪ Establish 'strategic route sections' across HS1 to allow more targeted work – for example grinding ▪ Plain line pattern recognition software to reduce resource and improve information ▪ Improved rail defect management approaches	▪ Evaluate different technological approaches to ballast cleaning (e.g. use of high-output machines) ▪ Zero-base tamping – understand the business case ▪ Improved understanding of rail line in slab track tunnels – challenge experience from elsewhere that suggests shorter asset life

Assets	CP1	CP2	CP3+
	profile for better Class 395 ride quality and reduced rail contact fatigue incidence	▪ Install under-sleeper pads in two locations to rectify track geometry faults and optimise ballast life	
SC&C	▪ Reviewed and confirmed some inspection frequencies e.g. facing point lock checks where criticality requires frequent inspections ▪ Condition scoring implemented and captured within asset management systems ▪ Replaced friction clutches with magnetic clutches in points operating equipment to decrease maintenance costs ▪ Introduced point rollers to improve reliability ▪ Introduced remote track circuit monitoring	▪ Review all remaining inspection frequencies ▪ Investigate opportunities to roll out remote condition monitoring across all asset classes ▪ Incorporate a more risk-based approach within the modelling framework, including improved information and models around the impact of varying inspection/ maintenance frequencies	▪ Use of suppliers who can provide computer systems with fewer component variations and so deliver a decrease in renewals due to an increase in asset life / lower rate of obsolescence ▪ Improved understanding of obsolescence, particularly in relation to ITC which has a system life of 25 years
E&P	▪ Improved process to replace tunnel jet fans requiring lower resource and smaller amounts of access ▪ Replaced glass insulators with	▪ Review inspection frequencies to target more critical assets (i.e. where there is higher wear / more critical location) ▪ Pantograph mounted CCTV to	▪ Consider whether all M&E equipment in tunnels is required ▪ Verify further increases to life of contact wire

Assets	CP1	CP2	CP3+
	polymeric types in areas with high risk of vandalism (improved performance) ▪ Replacement of steady arm end fittings with SNCF type to address issues with the compression joint between the arm and end fitting.	help with OCS inspection ▪ Review of OCS inspection methodology in conjunction with SNCF ▪ Review proposals to undertake isolations more quickly without any change in safety ▪ Life extension of contact wire from 15-20 years to 25-30 years based on observed minimal degradation	
Civils	▪ Initiated condition monitoring exercise ▪ Change to tunnels inspection frequency after benchmarking with other IMs and considering design of HS1 tunnels ▪ Additional drainage to reduce the effect of water ingress ▪ Change in approach to tunnel condition rating to give a more accurate picture of degree of degradation	▪ Risk-based inspection of lineside buildings to challenge standards. Existing standards are based on NRIL so designed for older buildings. Reinforced with improved condition monitoring ▪ Collect more detailed component information to enable bottom up whole life cost modelling ▪ Verify move to decreased inspection frequencies for earthworks	▪ Evaluate / verify maintenance rather than renewal of bridge bearings ▪ Implement results of risk-based inspections ▪ Move to condition-based fix and repair regime for boundary fencing ▪ Change in technology for replacement of the fencing that makes it longer lasting

10.6. Asset information strategy

Coupled with advanced modelling techniques and engineering judgement, good decisions require good information. Good asset information should have a clear use and should only be collected if it is required to support asset management decision making.

NRHS has developed a set of asset knowledge standards covering the following elements which together provide appropriate asset information:

- Asset definition standards that set out a common definition for asset attributes and hierarchy;
- Asset utilisation standards that contain common definitions for capturing the utilisation of assets;
- Condition standards that define condition grades for all key asset types and define requirements for condition assessment;
- Defect definition standards that contain standard definitions of asset defects;
- Failure definition standards that contain standard definitions of asset failures, including failure modes and root cause of failure; and
- Performance management standards that contain standard definitions of how to capture the consequences of failure.

We are working hard to improve the quantity and quality of asset information we hold. NR(HS) and HS1 Ltd are together engaged in two main initiatives:

- Refining the list of exactly what condition data we collect for each asset and how we intend to use that information to drive better decisions; and
- Improving the asset management systems that will be required to capture the available information in a consistent form that is easy to interrogate and manipulate. This will be a system that works across all of our assets – route, stations, and unregulated assets such as car parks.

These activities will happen in parallel and are in some senses iterative. We expect to have the list of data we want to collect no later than Spring 2014 with the revised systems in operation by the commencement of CP2 in April 2015.

We are aware of the proposals NRIL is developing for asset management measures of the robustness and sustainability of each asset type. We will explore whether similar measures would be appropriate for HS1 assets. In particular, the initiatives outlined above will generate further insight around the link between what we do now and the condition of the asset in future years. This will support the move toward risk-based maintenance effort.

10.7. Maintenance volumes in CP2

Maintenance volumes for CP2 are a product of the ASPs. Further information is available in the NR(HS) 5YAMS, with a summary of volumes set out below by asset area.

10.7.1. Track

The track assets are key for both cost and operational performance. They comprise plain line, switches and crossings, ballast and trackbeds.

The track standards have evolved with growing knowledge of the high speed system. In CP1, the standards were rewritten to align with the modular concept adopted by NRIL, and to facilitate more proactive maintenance so as to predict (and hence prevent) failure.

The ASP builds on that by anticipating the introduction of strategic route sections (SRS) along the route in order to determine specific maintenance, inspection and renewals policies that provide more efficient ways of working tailored to the different usage and criticality of the track in different locations. Other developments in CP2 include:

- Rail grinding (including 48 stone grinding through long tunnels) – targeted grinding leading to reduction in associated costs in some SRS areas;
- Under-sleeper pads – reducing degradation and prolonging the life of the ballast; and
- Development of video inspection capability – to ultimately reduce costs associated with manual inspection.

Maintenance costs and volumes during CP2 are shown in Table 35.

Table 35: CP2 track maintenance volumes and costs (February 2013 prices)

	2015/16	2016/17	2017/18	2018/19	2019/20
Volume (units)	7,573	7,388	7,581	7,446	7,599
Cost (£m)	2.3	2.3	2.2	2.2	2.2

10.7.2. Signalling, Control & Communication Systems

These systems are safety and performance critical. They are electronic and computer based and hence one of the main challenges is to address obsolescence issues. As the systems are typically within environmentally controlled conditions then weather is not generally a cause of degradation. The WLC modelling supports retaining the current approach – due to obsolescence issues life extension options import significant risk.

Improvement initiatives in CP1 made a significant contribution to the high performance of the route. They included the implementation of magnetic clutches within the points actuators, points rollers, remote track circuit monitoring, CRR card design and change/replacement of grey variant DTN cards.

To maintain the HS1 performance and safety requirements, the maintenance regimes for these assets remain largely unchanged, in line with standards and manufacturers' recommendations. NR(HS) will be testing this during CP2 as well as:

- Remote condition monitoring opportunities, this will provide performance improvements from early detection of failures; and
- More intelligent selection of replacement items looking for components with improved reliability and increased service life, resulting in lower whole life costs.

Maintenance volumes and costs vary little during CP2 as shown in Table 36.

Table 36: CP2 SC&C maintenance volumes and costs (February 2013 prices)

	2015/16	2016/17	2017/18	2018/19	2019/20
Volume (units)	10,692	10,637	10,674	10,871	10,703
Cost (£m)	5.8	5.8	5.7	5.7	5.7

10.7.3. Electrification and Plant

Many of the electrification and plant assets are relatively early in their expected lives, but maintenance is still important given the performance implications of failure. Many of the challenges are about the work necessary to take possessions to do work – such as the isolation process – rather than the work itself.

Within CP1 a number of improvements were made, including:

- Determining a process for exchanging tunnel jet fans - this significantly improves productivity and reduces man-power and access required for the task;
- Replacement or refurbishment of all voltage transformers on Section 1 of HS1. All voltage transformers on Section 1 are now "as new", therefore a significant prospective life extension has been realised; and
- Replacement of glass insulators for polymeric type in all areas identified to be at high risk of vandalism. This has resulted in reduced risk of disruption to train services as a result of consequential short-circuit of the OCS.

In CP2 a detailed review of the SNCF OCS inspection methodology is planned to identify any transferable benefits. The low age of the asset means that maintenance volumes and costs are relatively constant as shown in Table 37 with CP1 activities comparable to CP2.

Table 37: CP2 E&P maintenance volumes and costs (February 2013 prices)

	2015/16	2016/17	2017/18	2018/19	2019/20
Volume (units)	3,309	3,134	3,211	3,184	3,350
Cost (£m)	5.6	5.7	5.8	5.7	5.5

10.7.4. Civil Engineering and Lineside Buildings

The civils and lineside building ASP covers some of the longer-lived railway assets such as tunnels and bridges. The scope includes earthworks, drainage and fencing assets. As we are early in the life of these assets the challenge is to devise accurate condition metrics that can then be used to track degradation.

During CP1 the development of a suitable standard for a condition marking index for HS1 tunnels commenced. In CP2 this work will be further developed and implemented to provide quantitative examination data for all civil engineering assets including lineside buildings. This will enable degradation rates and trends to be analysed enabling further validation of interventions in the whole life cost model and the ASPs.

The structures examination contract will be brought in house prior to the end of CP1. This will lead to increased levels of in house capability/ competency and an increased knowledge of degradation/failure modes for civil engineering and lineside building assets.

A review of high speed rail examination inspection techniques has commenced including the use of new technology to undertake better quality and faster inspections of bored tunnels. The results of this work will be implemented during CP2 resulting in efficiency savings for the examination of complex structures.

In CP1 the civil engineering asset knowledge systems have been improved and additional detail on asset components gained. In CP2, this work will be further developed to include the use of cloud based, hand held devices to record and share information resulting in streamlined working procedures and improved asset information.

Table 38 provides a summary of maintenance volumes and costs for CP2. This assumes unit price efficiencies to allow greater volumes to be delivered at a lower unit rate.

Table 38: CP2 Civils maintenance volumes and costs (February 2013 prices)

	2015/16	2016/17	2017/18	2018/19	2019/20
Volume (units)	861	737	766	735	804
Cost (£m)	1.7	1.6	1.6	1.5	1.5

Q5 What other factors should we consider in developing our asset management plans?

10.8. Renewals in CP2

Renewals plans for CP2 are summarised below. More detail is available in Section 4.5 of the NR(HS) Five Year Asset Management Statement.

A small volume of renewals is planned across most asset disciplines during CP2. These are focused on preventing obsolescence, reducing failure risks and correcting known localised infrastructure problems.

10.8.1. Track

The track assets are long life assets and are still relatively young so there is no significant renewal activity in CP2. Two track locations have been generating regular track geometry faults and have therefore been programmed for ballast cleaning and renewal activities in CP2. Each of the sections is approximately 800m in length. Under-sleeper pads will be installed at these locations to optimise the life of the ballast. In addition, one wheel impact detector will be renewed.

10.8.2. Signalling, Control & Communication Systems

The signalling, control and communications assets have a wide range of life expectancies. Some of the more complex systems are made up of an interdependent set of components with differing asset lives. The renewals programme is predominantly driven by the obsolescence of electronic and computer based systems. However, some longer life systems require renewal to maintain reliability which cannot be delivered through maintenance alone. The key renewals in CP2 are:

- The Data Transmission Network (DTN) which is due to become obsolete;
- Other non-DTN parts of the communications systems (CCTV, radio propagation and PABX);
- Electro-mechanical relay systems (part of the ITCS) need regular renewal due to the high safety performance required and the wear of moving parts;
- Train detection renewals to manage performance. Train detection is one of the biggest drivers of signalling system performance and safety;
- Points operating equipment (POE) renewals targeting the elements of POE that have a shorter lifespan than the rigid mechanical elements (e.g. VCC detectors and brake units for HPSS). Such selective targeting is essential to maintain performance levels; and
- Works to control systems (RCCS, EMMIS and VCS).

10.8.3. Electrification and Plant

Owing to the relatively low age of the assets, no major electrification and plant renewals are programmed. A number of small, relatively low cost items will require replacement due to life expiry and obsolescence as follows:

- Uninterruptible Power Supply;
- Stratford Box dewatering system control system;
- Drainage sump pumps control system; and
- Signalling room air conditioning.

10.8.4. Civil engineering and lineside buildings

The majority of these assets have long service lives and are still relatively young so there is no significant programme of renewals in CP2. With the exception of fencing renewal, activities in CP2 are as a result of early failures of certain components:

- Boundary fence renewal programme commences to ensure assets are renewed before they reach the end of their service life;
- Some viaduct expansion joints are degrading earlier than anticipated and need renewing. An investigation of the root cause is ongoing;
- Choats Manor Way bridge needs component renewal due to structural defects; and
- Medway River headwall due to failure of drainage valve and associated drainage pipelines.

10.9. Renewals for CP3+

10.9.1. Overview and purpose

Railway renewal spend is classically “lumpy”. For reasons of inter-generational fairness and operator certainty, it is important to smooth the funding of such spend. We use an escrow arrangement (as explained in Section 5.7), as opposed to the Regulatory Asset Base approach with most regulated utilities.

The amounts required for the escrow are calculated on a rolling 40 year basis and are reviewed and updated each control period. This is inherently challenging: consider how much has changed since 1973 that would not have been predicted at the time.

As there is a “pay before you go” system for train operators, it is important that we have a good basis for our forecasts. There are risks of both over- and under-funding.

10.9.2. Options analysis

The funding risks are borne by train operators over time. As considerable judgement is involved, we have developed two renewals options, embodying two different philosophies of approach, in order to aid

discussions and train operator choice. We term the options the “Baseline” and the “Asset Stewardship” approaches.

It should be noted that this is about how much we put away for the future. There is no impact on our specific proposals for CP2 which have been outlined earlier in this Section 10.

The Baseline option continues to plan on the basis of current practice and knowledge as set out in the current ASPs. While there are a number of initiatives and studies underway to change current practices, the approach adopted in the Baseline is that we will wait until the results are known before updating the forecasts. There is therefore a relatively high degree of certainty around the funding identified via the Baseline approach, though there may be a risk of over-funding. It should be noted that this approach may still be under-funded if, for example, there are future cost shocks or unexpected changes to requirements that are not accurately forecast.

The Asset Stewardship approach applies some engineering judgement based on the anticipated results of initiatives underway. It changes forecast practices now and will seek to verify this in coming years. This option is more uncertain, particularly on an individual line by line basis. The philosophy is that overall we can reasonably anticipate the direction of change, but we may not accurately predict this in each individual case. This approach results in a smaller amount of money being taken from the operators and placed into escrow. It is therefore an option that is more likely to lead to under-funding. The main differences from the Baseline option are:

- Anticipating changes in approach in relation to certain asset classes, moving to a condition-based approach to renewals (where appropriate) rather than a blanket renewal on life expiry, e.g. boundary fencing;
- Using engineering judgement to extend asset life assumptions, with the caveat that these need to be verified in the next five to ten years, e.g. overhead contact wire;
- Anticipating future changes in technology that could lower unit cost rates (though not necessarily volumes), e.g. ballast cleaning where use of a high-output machine may be viable. Again, this is subject to the caveat of awaiting the study outputs; and
- A broad “technology improvement” overlay reflecting as yet unknown improvements to the way we do things going forward. This is equivalent to the “frontier shift” assumed in top down benchmarking analysis and we have drawn on the analysis undertaken for NRIL.

While there are potential performance risks arising from these changes, we have not amended our forecasts in areas where this might import a safety risk.

The following sections provide an indication of the key areas we have adjusted in the asset stewardship case, in terms of volumes and unit rates across the four asset areas.

10.9.2.1. Electrification and plant

For electrification and plant we consider that moves toward condition-based monitoring will allow additional volume savings, with the caveat that the condition and failure modes of some assets are difficult to detect.

Table 39: Renewals assumptions: Electrification and plant

Area	Baseline approach	Asset Stewardship approach
Contact wire	▪ Moved from asset life of 15 years to 25 years because of observation of minimal wear rates ▪ Implementation spread over 10 years because of logistical considerations such as access requirements ▪ Further work to define degradation rates and point of failure	▪ Further extend life by 5 years, to be verified by work in coming years ▪ More work to understand the properties of the specialised profile and design of the HS1 contact wire ▪ Caveat of life extension is potential performance risk, exponential increase in risk of failure with reduced size of wire due to tensile stress. Clear performance (but not safety) implications of dewirement ▪ SAVES APPROX £10m
Supporting structures (cantilevers)	▪ Full replacement in last 7 years of 40 year period driven by manufacturer's recommendations ▪ Failure mode caused by degradation, driven by corrosion and fatigue, exacerbated by loading cycle as trains pass	▪ Move to condition-driven spot replacement, removing the full renewal programme ▪ Collection of further data around degradation measurement and failure modes ▪ As with contact wire, caveat is performance risk, will need continual review over time ▪ SAVES APPROX £65m
Tensioning equipment	▪ Age based replacement programme as wear due to weather and temperature (expansion / contraction) rather than directly driven by volume of trains ▪ Limited read of asset lives from NRIL or other comparators because a different system of pulleys / weights	▪ Assume life can be extended by 10 years through combination of different assets in different locations (e.g. tunnels have lesser temperature variation) and development of more detailed condition measures. Condition measures are difficult to develop as degradation is caused by weather, manifesting itself, for example, as rust. ▪ Monitor options for technology change over time, for example hydraulic all-encased options that are currently in prototype form ▪ SAVES APPROX £16m

10.9.2.2. Civil engineering and lineside buildings

Within the civil engineering and lineside buildings portfolio we have drawn on evidence from other sectors to challenge some of the manufacturers' recommendations, for example, the life of bridge bearings. As with the other plans, this needs to be verified in the coming years.

Table 40: Renewals assumptions: Civil engineering and lineside buildings

Area	Baseline approach	Asset Stewardship approach
Line-side acoustic barriers	▪ 30 year asset life for two types of structures (wood or metal) with foam filling ▪ Age-related replacement with failure of structures and reducing insulating properties of foam inserts ▪ Performance impacts of failure due to close proximity to operational lines	▪ Life extension considered but not possible – 30 years is lengthy for wooden structures given performance implications ▪ Other treatment options (e.g. painting) not economic because of substantial access costs versus costs of material ▪ Consider implementing different technology on replacement
Security fencing	▪ Key to have robust line of defence to mitigate access to the operational railway – for safety and performance reasons ▪ Design risk driven – for example differences in highly populated areas ▪ 25 year average life used, with allowance of some beyond 25 years due to assumption of condition based replacement	▪ Limited opportunity for reduction in volumes through say a fix on failure approach given safety critical function ▪ Also performance risk dimension ▪ Opportunities for investment in technology and reduction in unit rates ▪ Also review of safety assessments to see if assets can be more targeted by location ▪ SAVES APPROX £5m
Boundary fencing	▪ Based on a 20 year asset life, with renewal work spread either side of that to make it logistically possible to undertake the volume of works	▪ Move to fix on failure approach because not safety critical ▪ Mitigate any performance risk by improved condition monitoring and assessment ▪ SAVES APPROX £43m
Bridge bearings	▪ 1700 pot bearings across the network ▪ Mixed review about life – some instances of early failure and some of extended lives ▪ Take precautionary approach and replace on manufacturer's recommendations	▪ Take approach that since no evidence of failure across HS1 that will not need to be renewed ▪ Caveat that should evidence develop in coming years then this assumption may need to be challenged ▪ SAVES APPROX £15m
Bridge waterproofing	▪ Range of assumptions used, from 25 years based on manufacturers' recommendations to 75 years ▪ Waterproofing to protect the concrete deck – all on under-bridges ▪ Costs reflect access and technical challenges of completing this job in isolation	▪ No evidence of deterioration and other protective measures to disperse water ▪ Move to replacement on 75 years, linking to track renewals to minimise the costs of doing the work ▪ SAVES APPROX £35m

10.9.2.3. Track

For track assets, the Baseline plans already incorporate significant life extension based on implementing a more sophisticated approach to the maintenance of assets, for example targeted grinding campaigns. We consider there is an opportunity to reduce the unit rates of reballasting by moving away from the current approach.

Table 41: Renewals assumptions: Track

Area	Baseline approach	Asset Stewardship approach
Rail replacement	▪ Pushed life of 25 years based on manufacturer's recommendations to 35-40 years ▪ Driven by more sophisticated grinding programme to be informed by better condition monitoring ▪ Allows replacement to be due to usage and grinding rather than being driven exclusively by grinding as is currently the case ▪ Supported by programme of initiatives about condition monitoring	▪ Reduced grinding considered, but has adverse impact on noise / ride quality and rolling-stock maintenance costs ▪ Further life extension not possible given safety critical nature of the asset and the high-speed operation
Reballasting	▪ Existing length of life ▪ Assuming existing approach to reballasting activity ▪ Same unit cost rate applied at all locations across the network	▪ Reductions in unit costs by high-volume technology options ▪ Exception is around St Pancras where this technology is not appropriate ▪ SAVES APPROX £50m

10.9.2.4. Signalling, Control and Communications

The main changes in signalling, control and communications relate to the assumption of implementing an ERTMS Level 3 system in 2031. It is difficult to predict the precise impact of this as Level 3 does not yet exist, but the asset stewardship approach assumes considerable savings based on there being less ground based system equipment to renew.

Table 42: Renewals assumptions: Signalling, control and communications

Area	Baseline approach	Asset Stewardship approach
Train detection renewals	▪ Based on existing obsolescence driven programme of existing TVM430 equipment given no known costs of ERTMS Level 3 which is not yet in existence	▪ Assume that ERTMS Level 3 will be implemented, with reduced asset on site and therefore reduced renewal costs following the upgrade ▪ Verify this over time by monitoring experience of NRIL and others in Europe as they move toward the new system ▪ Caveat that if assumed savings do not materialise then there will be a need to increase escrow contributions, all other things being equal ▪ SAVES APPROX £16m

10.10. Upgrades

Under the Concession Agreement, we may implement a Specified Upgrade or other upgrade to HS1, and may recover the costs through an Additional Investment Recovery Charge (Additional IRC).

The Concession Agreement defines a Specified Upgrade as a major upgrade of the signalling system, control systems or trackform including any upgrades in connection with the implementation of a TSI requirement. There is no definition of an upgrade in the Concession Agreement.

In determining whether to classify specific works as Specified Upgrade, upgrade or renewal we have considered the scope of works and the reason why they are being undertaken. For example:

- If a control system needs intervention because it is obsolete this would be classed as a renewal or replacement;

- If the same control system needs intervention as a result of a TSI requirement this would be Specified Upgrade;
- If we added new assets to the HS1 infrastructure for any other reason than a TSI requirement, this is classed as an upgrade.

This section outlines the likely upgrades required, the costs of which are outlined in Section 11.11.

10.10.1. Specified Upgrades

The only Specified Upgrade planned for CP2 is an upgrade of the existing GSM-R system. GSM-R is the train radio system mandated by European TSIs aimed at achieving interoperability. It is already in use in the UK and other European Countries. NRIL has rolled out GSM-R along the HS1 route as part of the Kent GSM-R programme. Eurotunnel is currently rolling out GSM-R across its infrastructure. Eurotunnel/RFF roll out and track to train switch on is due to be completed by mid-2015.

Currently GSM-R on HS1 is used only as a maintenance radio system and Cab Secure Radio (CSR) is used for driver to signaller communications (except in tunnels[1]). We plan to upgrade GSM-R to signaller/driver communications and to implement mobile roaming for international trains. This is classified as a Specified Upgrade as it is a TSI requirement and is a major change to an existing control system.

The key changes required are:

- Modifications to GSM-R trackside equipment and lineside signage;
- Changes to control room based man-machine interfaces/trainborne equipment (GB/France international boundary handover);
- Removal of redundant CSR assets;
- Changes to operational procedures and staff training; and
- Approvals.

[1] All Class 395s have a GSM-R handset for communicating within HS1 tunnels

The rolling stock in use on HS1 is either already fitted with GSM-R or fitment is covered by NRIL's GSM-R programme although further work may be required on international trains and testing will be required for safety approvals on HS1.

We plan to upgrade the system in two phases:

- Work Package 1 (WP1) is an upgrade of the existing system to permit signaller to train communications. The indicative completion date for this workstream is August 2014.
- Work Package 2 (WP2) is an upgrade to permit international roaming. The indicative completion date for this phase is August 2015.

For each Specified Upgrade, ORR approval is needed for the efficient cost, the time period over which Additional IRC can be recovered and the rate of return to cover financing costs. The Concession Agreement sets out the information to be provided to ORR and the process for ORR approval. The information requirements include:

- Details of the upgrade and evidence that it is in accordance with our General Duty;
- Details of the costs of carrying out the upgrade and evidence that they will be efficiently incurred;
- Details of the proposed amount of the Additional IRC; and
- An implementation plan for the upgrade.

We are preparing a detailed information pack for the GSM-R upgrade to be sent to ORR and DfT by the end of October 2013. This will be shared with train operators via the Network Change Notice (NCN) process by the end of 2013.

The other key specified upgrade in the longer term will be the transition to ERTMS Level 3 which is expected during CP5.

10.10.2. Other upgrades

In addition we are considering the upgrades shown in Table 43. These have been classified as upgrades rather than Specified Upgrades as they:

- Do not fall into the definition of renewals or replacements as the systems are new; and
- Do not fall into the definition of a Specified Upgrade as they are not driven by a TSI requirement.

These upgrades are at an early stage of development and would need to be agreed with train operators before moving to the implementation phase. Any expenditure on these upgrades will be conditional on the agreement of the business case and funding stream.

Table 43: Other upgrades in CP2

Asset	Description	Estimated completion date
Acoustic monitoring system	Monitoring bearing and asset degradation caused by vehicles. New system proposed for fitment at St Pancras throat.	2016
Panchex	New CCTV system to monitor pantograph lift and carbon condition proposed to be installed at one up and one down location.	2016
Mobile telecoms	Upgrade mobile wireless services and commercial data transmission services on HS1 infrastructure to improve customer experience.	2015
Regenerative braking	Modifications to the UKPNS assets to allow vehicles with regenerative capacity to export power to the grid or between vehicles.	2016
Transmission loss upgrades	Modifications to equipment and procedures reduce the level of transmission loss on the network. Study to evaluate: ▪ options to modify UKPNS equipment along the route to reduce transmission losses ▪ the case for switching off some backup systems.	During CP2

Q6 Are there any other upgrades that we should be considering for CP2?

11. Proposed cost levels

11.1. Introduction

This section sets out our forecasts of expenditure for CP2 and, in the case of renewals, beyond. We discuss:

- How costs were built up;
- Key initiatives and their impact on costs;
- Benchmarking/efficiency story; and
- Comparison with CP1 exit costs.

Figure 18 shows total operating and maintenance costs from the start of CP1 to the end of CP2. O&M costs are forecast to reduce by 10% between 2010/11 and 2014/15 and by a further 15% between 2014/15 and 2019/20.

Figure 18: CP1 and CP2 O&M costs (£ million, February 2013 prices)

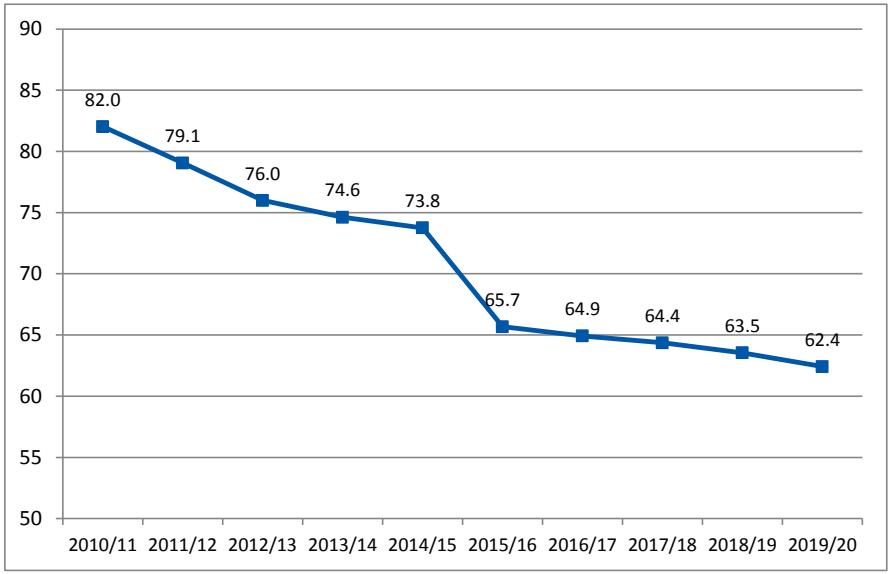


Table 44 summarises CP2 O&M costs: these are discussed further in Sections 11.2 to 11.7. Traction electricity is not included in this table: it does not form part of the OMRC but is charged separately to operators as incurred (see Section 11.8).

Table 44: CP2 O&M cost summary (£million, February 2013 prices)

	15/16	16/17	17/18	18/19	19/20	Total	Change 19/20 v 14/15
NR(HS) costs	40.3	39.6	38.6	37.8	37.4	193.7	-20%
HS1 costs							
- contract	3.9	3.9	4.0	4.0	3.9	19.7	0%
- internal	6.6	6.7	7.1	7.1	6.6	34.2	-10%
Pass through costs	14.3	14.2	14.1	14.0	13.9	70.4	-3%
Freight costs	0.6	0.6	0.6	0.6	0.6	2.8	-60%
Total O&M cost	**65.7**	**64.9**	**64.4**	**63.5**	**62.4**	**320.9**	**-15%**

The 20% saving in NR(HS) costs between 2014/15 and 2019/20 is based on the 15% saving quoted in the NR(HS) Five Year Asset Management Statement plus the full pass through of the 4% remaining Operator Agreement saving from CP1 to train operators and adjustments for the Operator Agreement 1.1% real increase and the freight-specific element of the NR(HS) costs (see Section 11.4.6).

Renewals are not included in this table as the renewals charge depends not on the actual costs incurred in CP2 but on a 40 year view of costs (see Section 11.10).

11.2. CP1 exit

All of the CP2 efficiency figures in this section have been calculated by comparing the cost for the final year of CP2 (2019/20) with the cost for the final year of CP1 (2014/15). All costs are expressed in February 2013 prices. Forecast costs for 2014/15 are shown in Table 45.

The NR(HS) cost in 2014/15 is based on the effective cost of the new CP1 Operator Agreement to customers (i.e. including the train operator share of the discount). This exit cost of £46.7m compares to the CP1 NR(HS) efficient budget of £52.7m, an 11% saving in the CP1 exit rate on these costs alone.

Table 45: 2014/15 costs (£ million, February 2013 prices)

	14/15
NR(HS) costs	46.7
HS1 costs - contract - internal	 3.9 7.3
Pass through	14.4
Freight-specific	1.4
Total O&M costs	**73.8**
Traction electricity	14.0
Renewals charge	6.0

11.3. Identifying efficient costs for CP2

While continuing to deliver an excellent service and maintaining long term asset integrity, we are clearly looking to deliver value for money. This is in everyone's interest as it improves the competitive position of rail and encourages new services and train operators on to the route.

For NR(HS) operating and maintenance costs we commissioned bottom up and top down benchmarking studies to feed into the proposed efficiency profile for CP2. We engaged with ORR and other stakeholders during the development and execution of our benchmarking programme.

Other CP2 costs have been examined line by line. Where appropriate, costs have been benchmarked. In other cases, we have provided evidence of the efficiency of our procurement strategy to justify our proposed cost levels.

A high level breakdown of cost categories and the benchmarking/efficiency approach taken for each is shown in Table 46.

Table 46: Efficiency approach by category of cost

Cost category	Examples	Approach
NR(HS)	Spend across asset categories	Bottom up and top down benchmarking analysis
HS1 contract	NRIL, BTP, ORR etc.	Examples of recent renegotiations etc.
HS1 internal	Staff, accommodation, office running costs	Some bottom up comparisons where possible
Pass through	Insurance, rates, UKPNS, non-traction power	Description of how HS1 procurement strategy is efficient
Freight-specific	NRIL (Ripple Lane), HS1 costs, NR(HS) costs	Bottom up detail on plan
Renewals	-	External unit cost assessment
Traction electricity	-	Description of how HS1 procurement strategy is efficient

11.4. NR(HS) O&M costs

NR(HS) O&M costs for CP2 will be set out as an Annual Fixed Price in the Operator Agreement. The Annual Fixed Price:

- Provides NR(HS) with a reasonable and proportionate financial reward for undertaking the services – through the management fee element of the price;
- Provides a proportionate cover for known and unknown risks to costs – through the risk premium element of the price; and
- Maintains an incentive for NR(HS) to continue to seek opportunities for cost reduction throughout CP2 – through the outperformance sharing provisions in the Operator Agreement.

In addition, if these incentives are effective and NR(HS) does achieve cost reductions during CP2 the outperformance will be shared in years 3, 4 and 5 with train operators and HS1 Ltd.

The Annual Fixed Price quoted in the NR(HS) Five Year Asset Management Statement excludes the escalation set out within the revised Operator Agreement. However, as can be seen in the following pages, NR(HS) has passed through to train operators most of the headline O&M reduction from year 1 of CP2 which is clearly to the train operators' benefit.

11.4.1. NR(HS) cost efficiency plans

Section 5 of the NR(HS) Five Year Asset Management Statement describes how NR(HS) has developed its Annual Fixed Price for CP2. The NR(HS) cost efficiency plan is a result of an internal "root and branch" review of NR(HS)'s costs supplemented by the findings of independent benchmarking exercises and learning from the NRIL PR13 submission.

A summary of the efficiency initiatives and associated cost savings is shown in Table 47. The table also includes the additional costs associated with research and development for CP2/CP3.

Table 47: CP2 net cost savings (£000 February 2013 prices)

Initiative theme	15/16	16/17	17/18	18/19	19/20	CP2 total
Improved scheduling of work / productivity	155	165	303	318	332	**1,272**
Standardisation of processes and procedures	325	341	48	332	274	**1,321**
Establishment efficiencies	250	516	674	790	909	**3,138**
Savings on support resources	139	141	141	141	141	**704**
Third party works - allocation of staff to non O&M works	-23	54	93	96	100	**318**
Suppliers - aligning objectives and incentives	1,593	1,647	1,986	2,086	2,186	**9,499**
Future undefined initiatives	0	0	290	317	547	**1,153**
Total cost savings	**2,439**	**2,864**	**3,535**	**4,080**	**4,489**	**17,405**
Research and development for CP2/CP3	-633	-407	-228	-111	-229	**-1,608**
Total	**1,806**	**2,457**	**3,307**	**3,969**	**4,260**	**15,797**

The NR(HS) cost efficiency plan includes future undefined efficiencies. Whilst the individual schemes are not yet fully defined activities, it is anticipated that opportunities will arise from;

- Staff re-deployment and related efficiencies;

- Organisational changes;
- New technologies;
- CP2 benefits arising from investment, innovation and research (see below);
- Further NRIL supply chain efficiencies;
- Long term initiatives identified by the benchmarking exercises:
- Review of tunnel inspection methodologies; and
- Movement towards reduction of base-tamping pre and post OCS adjustment.

NR(HS) is required to include in its cost efficiency plan its programme for investment and innovation or research and development which would lead to efficiencies in CP3. There are a number of opportunities included in NR(HS)'s plans as shown in the following list. Costs have been added to years 1 to 3 of the CP2 budget to deliver these. Some of these may deliver benefits during CP2 and implementation costs have been added to years 4 and 5 of CP2. NR(HS) will collaborate with operators to refine this list, and make sure that the programme of work delivers the biggest possible benefit.

- An assessment (and potential roll out) of tunnel earthing equipment;
- Introduction of further remote condition monitoring;
- A feasibility study (and potential roll out) of terminal mode isolations to increase the efficiency of taking isolations;
- A review of long tunnel ventilation equipment to consider if there are opportunities to remove equipment without compromising safety;
- A review of maintenance standards including selective adoption of risk based maintenance;
- Use of Plain Line Pattern Recognition equipment;
- A general review of track geometry/alignment methodologies;
- Assessment of benefits arising from achieving Publicly Available Specification (PAS) 55 certification (and potential roll out);
- Review with SNCF its new OCS inspection methodology;
- Condition marking index for tunnel examination (development of CP1 initiative); and
- Use of CCTV and other remote technologies to reduce manual inspections.

Several of these opportunities are investigating initiatives in the NRIL Strategic Business Plan for CP5 to identify whether they are transferable to HS1. Further details are available in Section 5.2.2 of the NR(HS) Five Year Asset Management Statement. Others are addressing recommendations from the PR14 benchmarking studies which are discussed in Section 11.4.4.

11.4.2. Management fee and risk premium

The Annual Fixed Price includes a management fee and a risk premium. In CP1 these were 10% and 7.5% respectively of the core O&M cost and were levied on outturn costs.

For PR14, NR(HS) appointed the consultancy Oxera to analyse comparators and risks carried to determine appropriate levels for CP2.

11.4.2.1. Management fee

For the management fee, directly comparable data is very limited and Oxera therefore considered a combination of regulatory precedents, comparable companies and comparable contracts:

- Regulatory precedents: for the most directly comparable companies the average profit margin was in the range 5-10% of revenue;
- Profit margins: construction companies appear to share the closest characteristics with NR(HS) with a relevant range of 6-10% of revenue;
- Comparable contracts: there are a number of indirect comparators with profit margins in or around the range of 5-10% of revenue.

Oxera's review therefore pointed to a range of 5–10% of revenue for the management fee which translates into a range of 6–11% expressed as a percentage of NR(HS) costs.

For CP2, NR(HS) has proposed that the management fee should remain at 10% of the core O&M costs, which is towards the top end of the range proposed by Oxera. In its examination of comparable companies Oxera also considered property developers with an average operating margin of 16.3%. Whilst NR(HS) accepts that the risk it carries is less than property

developers it believes that this difference is relatively small, which suggests its own fee should be towards the top end of the 6 – 11% range.

NR(HS) proposes that the management fee should be expressed as a fixed amount within the Annual Fixed Price. This would protect HS1 Ltd from the effects of a cost overrun and allow all parties to enjoy the full benefits of any outperformance NR(HS) can achieve from 2017/18 onwards. This means that the outperformance sharing arrangement is calculated net of the fee.

11.4.2.2. Risk premium

The risk premium is used to cover downside risk which is not covered in the management fee which means that only asymmetric risks are considered.

Oxera considered that data from actual events over CP1 would have significant weaknesses as a basis for estimating a risk premium for CP2 as follows:

- It is ex post and so not directly comparable with a forecast risk premium;
- It represents only a very limited time series against which to test significant 'one-off' risks;
- The risks of operating the HS1 network are likely to increase over CP2, as the network assets age.

As a result, the main analysis was to carry out an independent review of the data provided by NR(HS), by checking the data against the evidence available from actual events, including delay payments, and by executing a sensitivity test. This analysis resulted in an estimated risk premium of 5.2%. In addition, a sensitivity analysis was carried out, which gave a resulting risk premium in the range of +/- 1.75% around the **expected** premium, based on analysis of infrastructure costs, which reflect the largest portion of risks. Oxera concluded that the appropriate risk premium for the services of NR(HS) is likely to be approximately 5%.

NR(HS) has proposed that the risk premium for CP2 is reduced to 5%. As with the management fee, NR(HS) proposes that this should be expressed as a fixed amount within the Annual Fixed Price.

Further details are available in Section 5.1.2 of the NR(HS) Five Year Asset Management Statement.

11.4.3. CP2 headcount

Table 48 shows the forecast overall NR(HS) headcount from CP1 exit to the end of CP2.

Table 48: Forecast headcount

	2014/15	2015/16	2016/17 to 2019/20
Total staff	292.5	281	277

The in-sourcing of maintenance activities in late 2009 led to a high number of vacancies as a result of some staff accepting alternative positions elsewhere, which resulted in an increased reliance on subcontractors. In CP1, NR(HS) has steadily closed the vacancy gap as well as introducing new posts (such as in-house structures inspectors) to reduce the use of expensive subcontracted staff.

For CP2, NR(HS) has developed specific plans to reduce the CP1 exit headcount by 5%. In addition, NR(HS) is targeting an additional 2% headcount reduction through a process of selective and targeted recruitment into vacancies based on the needs of the business, as well as exploiting new technologies and other innovations within the future undefined efficiencies discussed above.

Q7 Do you have any comments on the appropriateness of NR(HS)'s CP2 cost plans?

11.4.4. Benchmarking

To test whether NR(HS)'s cost base is efficient, we commissioned two benchmarking studies. A bottom up analysis was undertaken by Interfleet and a top down study by LeighFisher. The purpose of the benchmarking is to feed into the proposed efficiency profile for CP2, supplementing:

- Asset management analysis including life cycle costing;
- Outturn information around efficiency initiatives in CP1; and
- Specific efficiency initiatives for CP2.

11.4.4.1. Bottom up benchmarking

Interfleet was commissioned to review appropriate team sizes for key functions on HS1 in CP2. Overall the Interfleet suggestions were within four headcount of NR(HS)'s own efficient planned headcount, with the only significant difference in views being on the number of signalling resources required, especially during an incident.

For each area of NR(HS) operational and maintenance activities, Interfleet reviewed the standards, the number and type of assets and available track access. The reviews involved a number of bottom up studies, supported by analyses of best practice and, where equivalent data could be obtained, top down comparisons.

Interfleet's general conclusions were:

- NR(HS) fulfils its obligations diligently and professionally;
- In most asset areas, NR(HS) has a programme of initiatives to improve delivery and these are supported by Interfleet;
- At present, HS1 is delivering very high reliability with very limited access for maintenance; and
- The limited route length of HS1, its unique infrastructure and the consequent need for specialist resources creates many diseconomies.

Interfleet identified a number of areas where there are opportunities to improve efficiency. These relate to the adoption of a risk-based approach (including reviews of the functionality of existing infrastructure) and changes in work practices. Interfleet's recommendations are shown in Table 49 along with how NR(HS) is addressing them.

Table 49: Bottom up benchmarking cost efficiency recommendations

Recommendation	NR(HS) response
Track	
Adoption of a risk-based approach to challenge the periodicities of inspection and relaxing the frequency of inspections on sections of the route where risk is lower	The benefits and risks of this approach will be assessed through the CP2 innovation and investment programme.
Adopting the Unattended Geometry Monitoring System (UGMS) to monitor changes in ride	Included in the CP2 innovation and investment programme
Outsourcing certain management activities or exploiting synergy with other organisations to reduce management overheads.	At present, NR(HS) believes it has reached an optimum balance between maintaining a level of discrete high speed expertise and delegation to agencies such as NRIL and other third party contractors. This will be reviewed throughout CP2 and actioned when opportunities arise.
Signalling & Telecommunications	
Investigate the possibility of savings by combining the North Thames response teams working out of Stratford International	NR(HS) believes that such teams are best deployed at different locations to reduce the risk of traffic and other factors delaying an effective response to operational incidents.
Review the structure and grading of the S&T teams who are providing the 24/7 cover, although the staff retention policy is understood	NR(HS) believes its 24/7 S&T structure and grading is appropriate and reflects the need for an effective staff retention policy for these specialist posts.

Recommendation	NR(HS) response
Investigate the possibility of further integrating the signalling and mechanical and electrical teams, which already share management, planning, etc.	Whilst NR (HS) believes that integration to date has been successful, it believes that further steps must be carefully risk assessed against performance and safety metrics. This will be assessed during CP2.
Electrification	
Detailed planning of OCS maintenance in terms of identified hotspots and where incidents are likely to occur, thus determining a critical path and mitigation against failure	NR(HS) will review how current hotspot prioritisation can be further developed.
Detailed predictions for contact wire wear and replacement	NR(HS) believes that real benefits will arise only when NR(HS) has more long term HS1-specific degradation data.
Correlation of the OCS and the track positions and implementation of "through alignment design" principles for track alignment work	During CP1, NR(HS) adopted a "through alignment design" programme which will deliver benefits during CP2. NR(HS) will undertake further research into the general area of improved techniques relating to track geometry as part of the CP2 innovation and investment programme.
Operations	
It is suggested that manpower could be reduced by some 18% by reducing signaller resources, which seem overgenerous by industry standards.	NR(HS) has already committed to undertake a review of signallers' workloads at Ashford Control Centre and will implement the findings as appropriate and agreed.

Interfleet has further recommendations in relation to tunnel ventilation equipment. In order to reduce ongoing system running costs, consideration should be given to reducing the amount of this equipment. We will address the following recommendations in CP2:

- Review the "scenario" parameters imposed upon the design against the knowledge gained from the operation of the route to establish whether practical safe reductions can be applied.
- Benchmark against systems with comparable equipment provision.

11.4.4.2. Top down benchmarking

LeighFisher was commissioned to undertake a top down benchmarking study. The study established a framework that can be updated and used in the future.

The study benchmarked HS1 against the following high speed rail comparators:

- France (5 lines)
- Italy (2 lines)
- Netherlands (1 line)
- South Korea (1 line)
- Taiwan - provided qualitative input only.

Costs were normalised for the inherent cost drivers (network layout, market/client requirements and demand profile) as these are beyond the power of the infrastructure manager to optimise. The cost comparisons were made on the basis of "equivalent track km", a measure which aims to capture differences in the complexity of the railways and the type of assets. Normalisation factors were used to convert route length into "equivalent track km" taking into account:

- Number of tracks
- Track speed
- Substructure type
- Number of switches
- Type of track
- Total tonnage
- Substations
- Tunnel installations

After adjustment for inherent cost factors and excluding the management organisation, LeighFisher concluded that HS1 has a 39% higher cost level than the average when calculating on a per line basis, or 14% higher than average on a per country basis. This is not the same as the possible cost improvements that can be made during CP2 as this comparison has not

been normalised for a number of factors (such as scale and performance regime requirements) and there is also a dimension around how quickly savings can be made.

LeighFisher undertook detailed analysis around what might improvements might be achievable and made a series of recommendations to reduce costs and estimated that implementation of these recommendations may result in a cost reduction relative to the NR(HS) budget at the start of CP2 of 10% with a further reduction during CP2 of 12%. This compares with a reduction of 20% in NR(HS) costs over CP2. Table 50 sets out the LeighFisher recommendations and how NR(HS) is proposing to address them.

Table 50: Top down benchmarking cost efficiency recommendations

Recommendation	NR(HS) response
Short term improvements: start of CP2	
Reduce the number of staff and staff cost for the rapid response teams through changing deployment	NR(HS) has reviewed the number of rapid response staff required to facilitate a fast and efficient response to traffic-affecting incidents in light of the findings. It considers that the benchmarking analysis over-estimates the potential for reduction given this group of staff also undertake inspection and other works when they are not required to respond to an incident.
Reduce the number of staff at the traffic control centres possibly also by further integration of activities with NRIL	This is being addressed via a review of signallers' workloads at Ashford Control Centre. The possibility of further integration with NRIL is continually reviewed, as there is a balance between potential cost-savings and maintaining a level of discrete high speed expertise.
Reduce the number of staff working on catenary by introducing absolute tamping	NR(HS) will undertake research into the general area of improved techniques relating to track geometry as part of the CP2 innovation and investment programme. This will include evaluating the business case for introducing absolute tamping, and will build on the analysis within the benchmarking report.
Reduce the size of the management organisation	This will be considered on a case by case basis in support of achieving target headcount savings.
Medium term improvements: during CP2	
Introduce alternative inspection techniques	NR(HS) is currently working with a train operator to install pantograph level CCTV cameras for OCS inspection. Track level video inspection is also being considered. In addition, funding is being sought in the CP2 innovation and investment programme for more general changes to maintenance and inspection methodologies.
Optimise staff utilisation of day teams	NR(HS) believes that most of daytime staff costs are fixed and that there is little opportunity to save costs through their alternative deployment.
Optimise the process for taking possession of the track	This will be taken forward through the CP2 innovation and investment programme. A particular area of focus will be the possession isolation methods.
Optimise maintenance strategies towards condition based maintenance	This will be taken forward through the CP2 innovation and investment programme.

11.4.5. Annual Fixed Price for CP2

The NR(HS) cost efficiency plans result in the proposed Annual Fixed Price shown in Table 51. This table also shows the breakdown by cost category of the O&M costs which underpin the price. The Annual Fixed Price shown in this table will be uplifted at the start of CP2 to February 2015 prices for inclusion in the Operator Agreement.

Table 51: Breakdown of NR(HS) O&M costs – CP2 forecast (£million, February 2013 prices)

Cost category	15/16	16/17	17/18	18/19	19/20	Change 19/20 v 14/15
Staff costs	15.9	15.5	15.2	15.1	14.9	-7%
Agency costs	0.1	0.1	0.1	0.1	0.1	-3%
Consultancy costs	0.2	0.2	0.2	0.2	0.3	+32%
Corporate functions	3.9	3.8	3.5	3.4	3.3	-34%
Other corporate costs	0.5	0.6	0.6	0.5	0.5	-33%
Plant & vehicle fleet	3.6	3.8	3.9	3.8	3.6	-4%
Materials	1.3	1.3	1.3	1.3	1.3	-10%
Subcontractors	5.8	5.8	5.8	5.7	5.8	-4%
Utilities	0.0	0.0	0.0	0.0	0.0	-31%
Other	2.8	2.8	2.8	2.8	2.8	-7%
Undefined future efficiencies	0.0	0.0	-0.3	-0.3	-0.5	n/a
Investment for CP3	0.6	0.4	0.2	0.0	0.1	n/a
Subtotal	**34.8**	**34.1**	**33.3**	**32.7**	**32.3**	**-12%**
Management fee (10%)	3.5	3.4	3.3	3.3	3.2	-12%
Risk premium (5%)	1.7	1.7	1.7	1.6	1.6	-41%
Outperformance	-	-	-	-	-	-100%

Cost category	15/16	16/17	17/18	18/19	19/20	Change 19/20 v 14/15
Annual Fixed Price	**40.0**	**39.3**	**38.3**	**37.6**	**37.1**	**-15%**

This price represents an overall efficiency saving of 15% between 2014/15 and 2019/20. This is made up of a 12% reduction in the core O&M cost and a 33% reduction in management fee, risk premium and outperformance, as shown in Table 52. Any outperformance against the Annual Fixed Price in 2017/18, 2018/19 and 2019/20 (net of management fee) will be shared with HS1 Ltd and the train operators (the full methodology for calculation of the outperformance sharing arrangements is set out in Section 13.11).

Table 52: CP2 efficiency

	2014/15 £m	2019/20 £m	Saving £m	% saving
Core O&M cost	36.6	32.3	4.3	12%
Management fee, risk premium, outperformance	7.2	4.8	2.3	33%
Annual Fixed Price	**43.8**	**37.1**	**6.6**	**15%**

Table 53 provides a brief explanation of the main NR(HS) cost savings in CP2.

Table 53: Main savings in NR(HS) costs in CP2

Cost category	Saving 19/20 v 14/15	Explanation of saving
Staff	7%	The saving of £1.2m in staff costs reflects the headcount-related schemes in the NR(HS) cost efficiency plan.

Cost category	Saving 19/20 v 14/15	Explanation of saving
Corporate functions/other corporate costs	34%	The significant cost reduction (£2.0m) is derived from NRIL's robust cost control in this area, delivered as part of its CP5 commitments.
Subcontractors	4%	Saving of £0.3m achieved through a robust approach with suppliers. Key changes are with the minor works and structures inspections contracts but also in terms of better payment conditions leading to a discount with the smaller suppliers.
Future undefined efficiencies	n/a	See Section 11.4.1 above
Management fee	12%	Calculated as a percentage of the core O&M costs. The reduction of £0.4m in the fee is as a consequence of the reduction in core O&M cost.
Risk premium	41%	Calculated as a percentage of the core O&M costs. The reduction of £1.1m is a consequence of (i) the reduction of the risk premium from 7.5% to 5% and (ii) the reduction in core O&M cost.

Q8 Please comment on the benchmarking work performed - and its application in the CP2 plans and usefulness in driving efficiency from CP3 onwards?

11.4.6. Adjusted Annual Fixed price

Two adjustments are needed to the Annual Fixed Price to produce the "NR(HS) cost" line shown in our overall O&M costs and used in calculating the charges to train operators:

- The Operator Agreement includes a 1.1% real increase which has been added to the Annual Fixed Price; and
- The freight-specific element of the NR(HS) costs has been netted off the Annual Fixed Price (and included in the separate "freight-specific costs" category).

This calculation is shown in Table 54.

Table 54: Adjustments to the Annual Fixed Price (£million, February 2013 prices)

	15/16	16/17	17/18	18/19	19/20	Total
Annual Fixed Price	40.0	39.3	38.3	37.6	37.1	192.3
+ escalation	+0.4	+0.4	+0.4	+0.4	+0.4	+2.1
- freight-specific costs	-0.1	-0.1	-0.1	-0.1	-0.1	-0.7
NR(HS) costs	40.3	39.6	38.6	37.8	37.4	193.7

11.5. HS1 costs

We have split HS1 costs into HS1 contract costs and HS1 internal costs. The breakdown of CP2 costs for both of these categories is shown in Table 55.

Table 55: Breakdown of HS1 costs – CP2 forecast (£million, February 2013 prices)

	15/16	16/17	17/18	18/19	19/20	Total	Change 19/20 v 14/15
HS1 contract costs							
NR other	1.5	1.5	1.5	1.5	1.5	7.3	0%
NRIL GSM-R	0.5	0.5	0.5	0.5	0.5	2.7	0%
NGC connection fees	0.5	0.5	0.5	0.5	0.5	2.5	0%
BTP	1.0	1.0	1.0	1.0	1.0	5.0	0%
ORR regulatory & safety	0.4	0.4	0.5	0.5	0.4	2.2	0%
Subtotal	**3.9**	**3.9**	**4.0**	**4.0**	**3.9**	**19.7**	**0%**
HS1 internal costs							
Staff	3.5	3.5	3.5	3.5	3.5	17.6	-5%
Technical/legal support	1.4	1.3	1.8	1.8	1.3	7.6	-20%
Office running	1.0	1.1	1.0	1.0	1.0	5.1	-3%
Other	0.8	0.8	0.8	0.8	0.8	4.0	-19%
Subtotal	**6.6**	**6.7**	**7.1**	**7.1**	**6.6**	**34.2**	**-10%**
Total	**10.5**	**10.6**	**11.2**	**11.2**	**10.5**	**54.0**	**-7%**

We forecast overall CP2 efficiency of 7% in HS1 costs, made up of a 0% change in subcontract costs and a 10% reduction in internal costs. This reduction is based on a 2014/15 forecast which itself is 5% below the initial CP1 budget giving a combined saving of 12% across the 10 years.

The remainder of this section sets out the rationale behind the CP2 forecasts for each category of cost.

11.5.1. HS1 contract costs

HS1 contract costs are primarily single choice supplier long term arrangements. We have already made some savings during CP1 (especially on the NRIL interface costs) however the potential for future savings is very limited given the single source long term nature of the contracts. Given this position, no real savings can be expected in CP2 and the focus is on delivering value from each of the contracts.

Table 56: HS1 contract cost efficiency in CP2

Cost category	CP2 efficiency	Comments/efficiency proof
NR other	0%	1. Costs incurred in relation to the interface assets between the NRIL network and HS1. These assets are covered by the Operations and Maintenance Agreement (OMA). There is no choice of supplier. Renegotiation reduced OMA costs by £0.8m p.a. (40%) in CP1. The costs under the OMA are indexed by RPI. 2. Costs of additional services required on the route over and above services covered by the Operator Agreement with NR(HS). CP2 includes £250k p.a. to cover costs related to operating assets commissioned since the introduction of the Operator Agreement and relevant NR(HS) costs that are route related but excluded from the scope of the Operator Agreement. We challenge these costs as part of the Additional Services process.

Cost category	CP2 efficiency	Comments/efficiency proof
NRIL GSM-R	0%	We have a contract with NRIL for the maintenance of HS1-owned GSM-R equipment and a percentage of the national NRIL spine network (based on train miles run). The system will be upgraded to train and trackside signaller communications in CP1. NR is the sole licence holder of GSM-R in the UK. We could use the French alternative but this would be very high risk given interfaces with the NRIL network. We have negotiated down significantly the cost of GSM-R to be charged by NRIL but the upgrade will increase maintenance costs to £400k pa at the end of CP1, indexed by RPI. An additional £150k of licence fees is also likely to be required and has been included in the current numbers – the final negotiated position will be included in the December 2013 5YAMS submission. We have assumed no further real price changes in GSM-R costs in CP2.
NGC connection fees	0%	These are connection charges for HS1/UKPNS assets into the National Grid. We have to physically connect to the National Grid and there is no choice of provider. Prices and escalation are set in line with UK-wide standard charges agreed by the electricity regulator Ofgem. There is no realistic scope for us to influence the charges. We have assumed that the charge increases with RPI during CP2.
BTP	0%	Fixed price contract (indexed by RPI) with re-openers for vehicles and overtime. A 10% saving was delivered early in CP1. During 2013 we have challenged the BTP costs and delivery again. We have secured additional quality improvements but were unable to secure any further reductions in the cost. We have assumed costs increase with RPI in CP2 in line with the contract.
ORR regulatory & safety	0%	We have challenged the ORR costs. We have assumed £380k in 2015/16 increasing with RPI plus an additional £135k for PR19 costs in each of 2017/18 and 2018/19.

11.5.2. HS1 internal costs

We have more control over HS1 internal costs and therefore more scope to take action to reduce costs. We have included CP2 stretch targets for these cost categories. We forecast an overall reduction of 10% in HS1 internal costs by the end of CP2.

Table 57: HS1 internal cost efficiency in CP2

	CP2 efficiency	Comments/efficiency proof
Staff	-5%	Total of 25 staff by 2015/16 - reduction of 2 on current level. The saving in numbers will offset a small real increase in remuneration (RPI + 0.25% pa). Staff levels were sized to fit on sale and with these additional reductions in staff levels are tight with most roles now covering multiple responsibilities. Succession is a big risk given the knowledge within a small team. 60% of staff by pay have been appointed in the last three years so pay rates have been market tested. 10 of the most senior roles have been benchmarked.

	CP2 efficiency	Comments/efficiency proof
Technical/legal support	-20%	Given the small HS1 Ltd team we need recourse to external support – technical, procurement, projects (e.g. electricity study), legal and other consultancy. All consultancy costs are subject to strict procurement processes with 3+ bidders for work. OJEU requirements for work above £350k. Costs have been built bottom up and include a £200k per annum stretch for CP2. Total cost of £1.3m per annum forecast in CP2 (c50% reduction on 2011/12 actual costs) with an additional £1.0m of PR19 consultancy costs spread across 2017/18 and 2018/19.
Office running	-3%	The main costs of rent and IT are relatively fixed. The only non-core spend included is £150k for IT system upgrade in 2016/17. 1. Rent (£0.4m p.a.): has increased over early CP1 but for a more appropriate building. 1 Euston Square was the only practical choice close to St Pancras when lease on previous office ended. Annualised rent of £40/ft^2 compares favourably to rents in the area and less than rent for the remainder of 1 Euston Square (£45/ft^2). 5 year break/rent review and potential need to move to accommodate HS2 could result in increased rental costs given growing demand for the St Pancras/Kings Cross area – however we have assumed no change in costs. 2. Office running costs (£0.2m p.a.): where practical, services are competitively tendered. 3. IT/telecoms (£0.4m p.a.): Hosting Managed Service Contract will be competitively tendered in 2014, increasing resilience and improving recovery time. This may result in a cost increase but no cost increase has been included in the CP2 forecast.
Other	-19%	Examples of procurement efficiency for significant cost items are: - audit (recently tendered/lowest price) - rating agencies (standard charge) - HR (outsourced and market tested) The CP2 forecast includes £300k p.a. stretch off bottom up detailed plans through assumed efficiency savings. This represents a 20% saving on the actual current run rate.

Q9 Do you have any comments on the appropriateness of HS1's CP2 cost plans?

11.6. Pass through costs

For CP1, the categories included in pass through costs are rates, insurance, UKPNS costs and non-traction electricity costs. For CP2, we do not propose to change these categories (see Section 13.5). Forecast pass through costs for CP2 are shown in Table 58.

Table 58: Breakdown of pass through costs – CP2 forecast (£million, February 2013 prices)

	15/16	16/17	17/18	18/19	19/20	Total	Change 19/20 v 14/15
Rates	4.6	4.6	4.6	4.6	4.6	23.2	0%
Insurance	3.7	3.6	3.5	3.4	3.3	17.6	-13%
UKPNS O&M and renewals	4.7	4.7	4.7	4.7	4.7	23.6	0%
Non-traction electricity	1.2	1.2	1.2	1.2	1.2	6.0	0%
Total	**14.3**	**14.2**	**14.1**	**14.0**	**13.9**	**70.4**	**-3%**

Significant reductions (30% below efficient budget) have already been achieved in CP1 and we will continue to push down costs wherever possible. We will review pass through costs and potential options for reducing them with train operators. Any savings will be fully passed through to customers. However, given the scale of savings already delivered and future opportunities we do not forecast further substantial reductions in CP2.

Table 59 sets out the rationale behind the CP2 forecasts for each category of cost.

Table 59: Pass through cost efficiency in CP2

	CP2 efficiency	Comments/efficiency proof
Rates	0%	A large reduction was achieved from the review in CP1. We will consider a further rating review with our rating advisor. However, there is a risk that costs could increase significantly so we would agree with affected train operators whether to go ahead with this. We have assumed that rates will increase with RPI in CP2.
Insurance	-13%	Cover is as required by the Concession Agreement. A large reduction was achieved in CP1. The refinancing due diligence noted that our insurance premiums were “good value for money”. Brokerage fees reduced to zero (from 2013/14) from retendering. For CP2 we have assumed that we can continue to deliver annual real reductions in insurance premiums from increasing competition between insurers and risk management.
UKPNS O&M and renewals	0%	Fixed price contract with UKPNS (indexed to RPI) to 2057 to provide O&M and renewals of electricity substations and connections to HS1 catenary. No price re-opener and very few options to terminate on performance / other factors. We have no choice of supplier: the contract and infrastructure are embedded into HS1. Real savings can be achieved only if we can find a way to break/re-open the contract which we have been unable to do so far (although through this we have delivered improved UKPNS performance). No efficiency savings have been assumed for CP2.

	CP2 efficiency	Comments/efficiency proof
Non-traction electricity	0%	Electricity costs for ancillary route equipment, based on metered volumes. Purchased via NRIL bulk deal with EDF. NRIL is one of the biggest power procurers in the UK so has huge bulk buying power – buys as close to wholesale power cost as any other user. Volumes assumed constant for CP2. No major change in use of assets is expected by 2020. However, see Section 11.8 for projects underway to reduce electricity consumption. Price escalation is assumed at RPI.

Q10 Do you have any comments on the appropriateness of pass through costs in CP2? Have we properly captured the options to reduce pass through costs in the remainder of CP1 and CP2? Would you consider a rates review within the next 12 months?

11.7. Freight costs

Forecast costs for CP2 are shown in Table 60. We forecast overall CP2 efficiency of 60%. This is driven by two main factors:

- Ongoing work to renegotiate the contract at Ripple Lane where maintenance and operations is undertaken by NRIL; and
- A significant reduction in forecast volumes.

Table 60: Breakdown of freight costs – CP2 forecast (£million, February 2013 prices)

	15/16	16/17	17/18	18/19	19/20	Total	Change 19/20 v 14/15
NRIL Ripple Lane	0.3	0.3	0.3	0.3	0.3	1.7	-3%
NR(HS)	0.1	0.1	0.1	0.1	0.1	0.7	-74%
HS1	0.1	0.1	0.1	0.1	0.1	0.5	-83%
Total	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**2.8**	**-60%**

Table 61 sets out the rationale behind the CP2 forecasts.

Table 61: Freight cost efficiency in CP2

	CP2 efficiency	Comments/efficiency proof
NRIL costs (Ripple Lane)	-3%	Ripple Lane exchange sidings are used exclusively for freight. Ripple Lane is operated and maintained by NRIL under a bespoke O&M contract. This is currently being renegotiated and our plans include a large cost reduction in CP1. Costs then increase with RPI in CP2.
NR(HS) costs	-74%	Allocation from total NR(HS) costs of those costs which are specific to freight operations. For CP2 this is £64k p.a. variable cost plus £84k p.a. avoidable cost. This significant reduction is as a consequence of the reduction in the forecast number of trains from 2,530 to 208. Costs then increase by RPI.

	CP2 efficiency	Comments/efficiency proof
HS1 costs	-83%	Allocation from total HS1 costs of those costs which are specific to freight operations. Reduction compared with CP1 exit as Class 92 cost recovery completed and HS1 costs directly related to freight operations are reduced to £0.1m (£50k of HS1 staff plus £50k of other HS1 costs) at the start of CP2. Costs then increase with RPI in CP2.

Q11 Please provide comments on the robustness of our freight cost forecasts. Are there any factors that we have not considered?

11.8. Traction electricity costs

Traction electricity does not form part of our OMRC charges to train operators. Operators are charged separately for traction electricity on the basis of usage.

Forecast traction electricity costs for CP2 are shown in Table 62. This forecast is indicative only: train operators will pay for traction electricity on the basis of actual prices and train numbers/formations.

Table 62: Traction electricity costs – CP2 forecast (£million, February 2013 prices)

	15/16	16/17	17/18	18/19	19/20	Total	Change 19/20 v 14/15
Total	14.0	13.9	13.9	14.1	14.1	69.9	+1%

Electricity is purchased via a NRIL bulk deal with EDF. NRIL is one of the biggest power procurers in the UK so has significant bulk buying power: it buys as close to wholesale power cost as any other user. A new electricity supply contract is to be put in place by NRIL from October 2014. All volumes are metered.

Historically, the baseload energy unit price has been locked around October for one year forward with train operator agreement. In September 2013, because the electricity contract ends in September 2014, the baseload energy unit rate was locked for 6 months only. We could lock in more than one year ahead if train operators wanted more certainty although there may be a price premium to pay for this confidence.

CP2 costs are based on an RPI increase in electricity prices and the forecast increase in train paths discussed in Section 7.1.

Electricity costs are a key concern for us and our train operators. In addition to minimising unit costs through efficient procurement, we are working to reduce electricity consumption volumes which will have both cost and environmental benefits.

Case study: Electricity consumption

We are currently consulting on our draft energy policy. This policy sets out improve our overall energy efficiency, in collaboration with NR(HS) and train operators, in order to reduce both our total carbon footprint and our energy costs.

Until recently we have concentrated on improving energy efficiency at stations where we are currently engaged in a series of projects. In terms of the route, our plans are at an earlier stage. Our current programme comprises the following key elements which will be developed and refined with NR(HS), UKPNS and train operators. We discuss them with train operators in individual meetings and through our Engineering Together quarterly update meeting.

We are providing funding of £400k to explore these projects during CP1. Further costs will then need to be incurred by train operators to deliver these schemes some of which are highlighted in the upgrades Section 11.11.2.

The potential benefits of these schemes have not been included in our traction electricity cost forecasts.

Regenerative braking

A study is underway with UKPNS and NR(HS).

Phase 1 of the study examined whether regenerative braking would have an impact on UKPNS infrastructure. It found that with regenerative braking on the combination of the LSER fleet and the Eurostar Class 374s, modifications will be needed to the Sellindge feeder station balancer system.

Phase 2 of the study currently underway is to understand costs, identify tests and develop a plan for producing the ITT.

We will present the findings of the infrastructure review and traction electricity modelling to determine if the train operators are willing to fund Phase 3 and Phase 4 Implementation.

Phase 3 will produce the ITT for the work. It will consider technical and approvals impacts on UKPNS, HS1, NRIL and train operators and will look at implementation timescales.

Phase 4 is the implementation of the upgrade to the UKPNS infrastructure and the Class 395 and 374 fleets.

Traction transmission losses

This study is designed to review the electrical losses within the UKPNS traction power supply system, in order to understand better the size of the losses and the key relevant infrastructure.

Some transmission losses are inevitable in any electrical system, and for HS1 these are driven by the location of the three feeder stations along the route. The study will highlight the degree of such losses and any options to reduce them.

Some of the "losses" relate to power used for back-up systems. Part of the study will assess the level of risk for switching off appropriate hot standby back-up systems. The case rests on the trade-off between electricity saved and the impact on performance. In the event of a fault, there would be a finite time required for the standby system to power-up, leading to additional delay and potentially the failure to initialise on demand.

Tenders have been received for the transmission loss study. The expected start date is November 2013 with completion anticipated by mid-2014.

Phase 1 will examine what the losses are and potential solutions.

Phase 2 will develop the cost benefit analysis

Phase 3 will develop the scope/ITT

Dewatering well controls upgrade (Stratford box)

In order to prevent the Stratford box structure from floating as a result of rising ground water levels, affecting the passage of trains, ground water is pumped out on a continuous basis. The pumps have been changed recently and incorporate energy efficiency improvements. The upgrade of the controls will further improve efficiency by ensuring the pumps are only activated when required.

Proposed lineside metering upgrade

Currently many of the lineside meters are manually read, particularly in Kent. We propose to add communications equipment to the meters to enable automatic half hourly metering. This will enhance our ability to monitor consumption and therefore to investigate the potential for energy efficiency improvements.

Review of specific railway systems for energy efficiency benefits

Lineside plant and equipment, such as signalling rooms and points heaters, contribute to energy consumption. Achieving energy efficiencies in the management of this equipment may have direct implications for rail safety and the integrity of the equipment. We propose a review of key elements of this infrastructure to consider potential energy efficiency measures and their rail safety implications.

Q12 Do you support the work we are doing on reducing traction and non-traction power costs? Are there any other opportunities which you believe we should be considering?

11.9. Renewals in CP2

Renewal activities for CP2 were discussed in Section 10.8. NR(HS)'s estimate of the total renewal cost for CP2 is £23.0 million (£20.9 million plus a 10% markup) of which 69% is for signalling, control and communication systems renewals. CP2 renewal cost estimates are shown in Figure 19 with a breakdown by asset type in Table 63: costs shown are exclusive of markup. As CP2 renewal costs are taken directly from the NR(HS) 5YAMS they are the same for the Baseline and Asset Stewardship options.

The CP2 renewal plan has been developed by NR(HS) using the whole-life cost modelling tools, and independently reviewed by HS1 Ltd and Halcrow. As discussed in Section 10.9 the renewal plans form the basis of contributions to the escrow account. Before any money is spent on any specific project, we would need to convince ORR and DfT that the proposed spend is necessary and efficient. This would include evidence such as a competitive tender.

Figure 19: CP2 renewals costs (£ million, February 2013 prices)

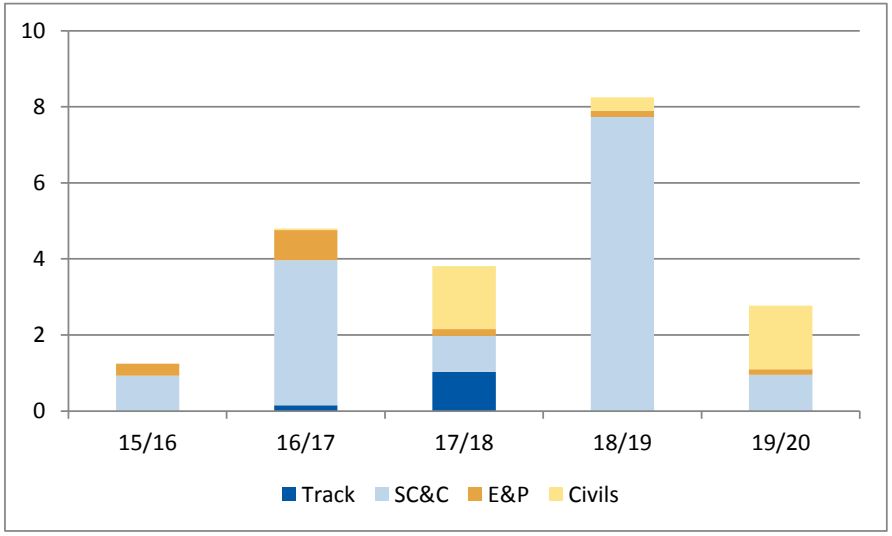


Table 63: CP2 renewals cost (£million, February 2013 prices)

	15/16	16/17	17/18	18/19	19/20
Track					
Ballast cleaning and renewal	-	-	1.0	-	-
Wheel impact detector	-	0.2	-	-	-
Subtotal	***0.0***	***0.2***	***1.0***	***0.0***	***0.0***
Signalling, control and communications					
Signalling - interlocking	-	0.3	-	-	-
Signalling – train detection	-	-	0.5	0.0	-
Signalling – POE	0.9	-	0.5	0.8	0.8
Control System - RCCS	-	1.8	-	-	-
Control System - EMMIS	-	0.6	-	-	-
Control System - VCS	-	1.1	-	-	-
Communications System – DTN	-	-	-	5.3	-
Communications System – other	-	-	-	1.6	0.2
Subtotal	***0.9***	***3.8***	***0.9***	***7.7***	***1.0***
Electrification and plant					
Uninterruptible Power Supply	-	0.1	0.1	0.1	0.1
Stratford Box dewatering control system	0.3	-	-	-	-
Drainage sump pumps control system	-	0.6	-	-	-
Signalling room air conditioning	0.0	0.0	0.0	0.0	0.0
Subtotal	***0.3***	***0.8***	***0.2***	***0.2***	***0.1***
Civil engineering and lineside buildings					
Viaduct expansion joints	-	-	-	-	0.7
Choats Manor Way bridge works	-	-	-	-	0.5
Medway drainage outfall	-	-	1.5	-	-
Boundary fencing	-	0.0	0.2	0.4	0.5
Subtotal	***0.0***	***0.0***	***1.7***	***0.4***	***1.7***
Total	**1.2**	**4.8**	**3.8**	**8.2**	**2.8**

11.10. Renewals for CP3+

Renewals activities beyond CP2 are discussed in Section 10.9. Baseline and Asset Stewardship options were developed and total 40 year renewal costs for these options are shown in Figure 20 and Figure 21.

Figure 20: 40 year renewals cost – Baseline option (£ million, February 2013, undiscounted)

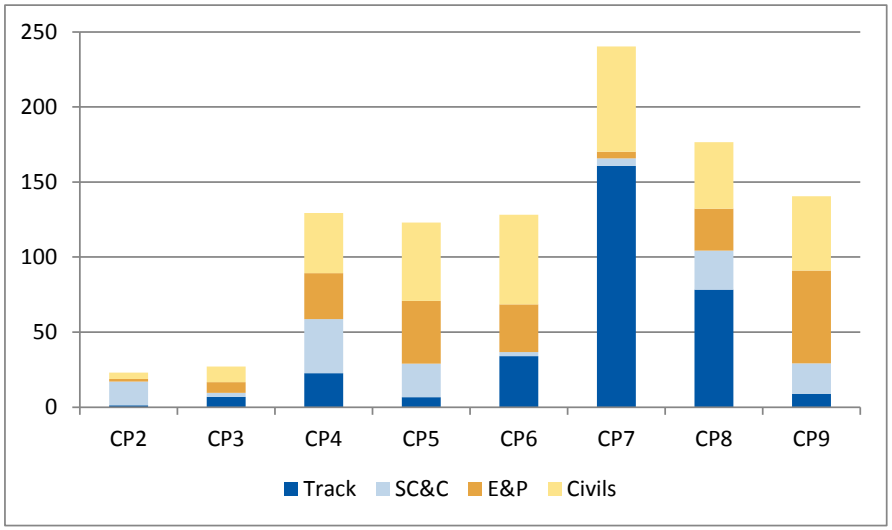


Figure 21: 40 year renewals cost – Asset Stewardship option (£ million, February 2013, undiscounted)

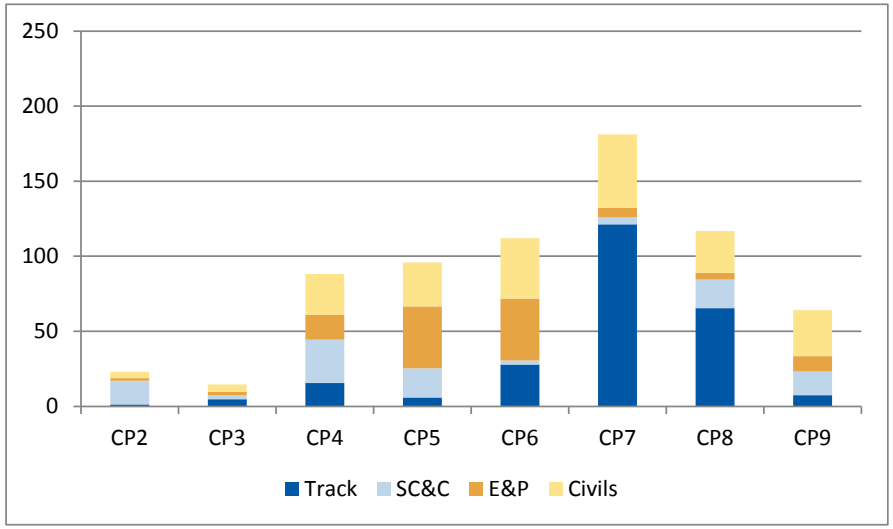


Table 64 compares the total renewals costs for the two options with the renewals costs in the CP1 model.

Table 64: Comparison of renewals costs with the CP1 model (£ million, February 2013 prices, undiscounted)

	CP1 model	Baseline option	Asset Stewardship option
Track	177	319	249
SC&C	55	131	109
E&P	15	207	124
Civils	29	330	213
Total	**275**	**988**	**695**

Before CP1 no detailed work had been done to assess renewals requirements. In the last year we have developed more detailed plans as set out in Section 10.9. For the Baseline option, which was based on manufacturers' recommendations, this resulted in 40 year renewal costs of approximately 3½ times those in the CP1 model. The main drivers of this increase were:

- Higher volumes of work across all asset areas, particularly in civils and electrification and plant. The CP1 assumptions systematically excluded renewals driven by obsolescence, and classified items as Specified Upgrades where we consider that it is more appropriate to classify them as renewals; and
- On-costs which were omitted from the original calculations.

We have worked hard to challenge the Baseline forecast given the affordability implications for train operators. In doing so we have remained mindful of our asset stewardship obligations, including the requirement to hand back the asset in equivalent condition, as well as the need to continue to provide appropriate performance levels.

Our Asset Stewardship option has three main changes compared with the Baseline option:

- Reduced volumes driven by extending asset lives in instances where we consider we can move to a more condition-based intervention approach in future;
- Lower unit rates where we judge that known new technologies can be implemented. For example, reballasting could be done using high-output machines by changes in practice; and
- Assumed annual efficiency savings applied as a 0.5% per annum reduction in unit costs from year 6 onwards. This represents technology and other efficiency savings from currently unknown sources.

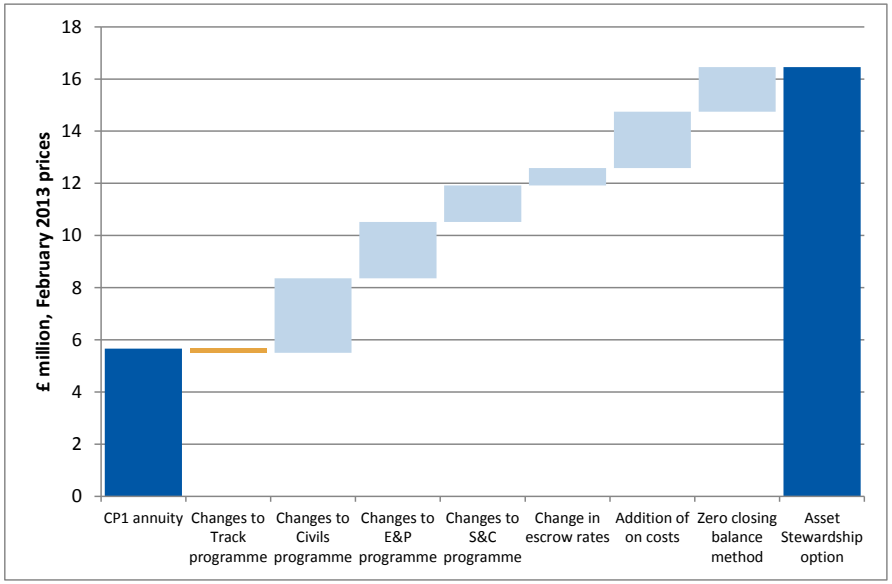
Whilst this produces a significant decrease in costs compared with the Baseline, the Asset Stewardship option still has 40 year renewal costs of approximately 2½ times those in the CP1 model.

It should be noted that there is a caveat around the Asset Stewardship option that the underpinning assumptions about changes in practice need to be verified. It is possible that should our studies not produce the results anticipated then the annuity amount would not be sufficient to fund required future works and there would need to be an upward adjustment in subsequent control periods.

The 40 year renewal costs are then converted to an annuity which forms part of the OMRC. For CP1 the annual charge for renewals was calculated such that the present value of the charge was equal to the present value of the renewal costs. The methodology was changed for CP2 to prevent a negative escrow balance from occurring: the revised methodology gives a higher escrow requirement.

Figure 22 illustrates how the renewals annuity calculated for each of the Baseline and Asset Stewardship options compares with the renewals annuity being recovered from train operators in CP1.

Figure 22: Renewals annuity – changes from CP1 (£ million pa, February 2013 prices)



In addition to the changes in renewals volumes, unit rates and on-costs as already discussed, we have assumed a more realistic rate of return will apply to the escrow account than was assumed for CP1. Even though we will manage the account to maximise the return, limitations on how we can invest escrow monies as set out in the Concession Agreement mean that we assume an interest rate of 3.7% in the longer term. This contrasts with 7.5% in the lead-up to CP1. The impact of this is to increase the amount payable by operators.

Renewals – what is the right number?

The main challenge we have faced in preparing this 5YAMS submission is proposing the right renewals annuity for CP2 given:

- We don't want to be materially underfunded in the future and not meet asset obligations or end up with no funds available for unexpected but required costs.
- We don't want to be overfunded as any increase in the annuity is a major increase in operator charges and the assets being funded might not need replacing for 30 years.
- There is considerable uncertainty beyond CP2 on the renewals required given lack of asset failure information and renewals to date (the assets are still relatively new in terms of degradation data), and likely improvements in industry practice by 2053.
- Operators bear the risk on this and the phasing of when they bear these costs is important for their own business and financial success. We have an overriding asset requirement to return the asset in equivalent condition to the Government at the end of 2040.

What is clear and a position we believe most stakeholders understand is that the £6m pa in CP1 is too low a sustainable renewals annuity for CP2:

- The Lloyds Register review (available at: http://www.rail-reg.gov.uk/upload/pdf/hs1-asset-review-261012.pdf) indicated that track renewal unit costs were understated by c50% in the CP1 models.
- The majority of costs were for unit and labour only and therefore excluded normal on-costs you would expect for possessions, subcontractors fees etc.
- The CP1 model assumed a 7.4% interest receipt on escrow deposits. Recent rates have been c0.2% although we are assuming some longer term rate recovery to c3.7%
- The CP1 calculation included a number of expenditure items as specified upgrades to be funded by additional IRC which were therefore excluded from the renewals calculation (for example £90m of track costs in 2025-2027). From our interpretation of the Concession Agreement, the only expenditure that meets the specified upgrade definition post-CP2 is for ERTMS Level 3 upgrade in 2031 – track and other changes are effectively like for like renewals and therefore should be funded from escrow. In either case, the train operators pay but the CP1 assumptions resulted in deflating the CP1 annuity.
- The CP1 annuity was based on a present value calculation of future receipts and costs however this resulted in a large negative escrow balance at the end of 40 years. This logic appears incorrect and therefore the CP2 annuity has been calculated to give a zero balance after 40 years. This has a material impact on the annuity with the asset stewardship case reducing from £16.5m to £14.7m if the CP1 method is used – we are discussing this with the ORR and would welcome consultees' views on this.
- As this is a 40 year rolling look forward, we are now looking at years 6-45 and not 1-40 of HS1's life and therefore start to capture more of the mid-life renewals within the calculation. This will only increase the annuity during the next few price reviews.

Holistically this cost also looks low based on two factors:

- HS1 cost £6bn to construct. c£4bn of this was for stations, depots, tunnels and major civils like cut and cover and bridges which are covered elsewhere or have

very long renewal spend cycles. This leaves c£2bn of shorter renewal requirements, including track, signalling, OCS, points etc. At £6m a year, that would only renew 15% equivalent of this over 50 years. Under the asset stewardship case, 41% is renewed and 65% under the initial baseline position.

- NRIL is in a mature asset cycle of O&M and renewals and replacements. Over the first 4 years of CP4 their proportion of renewals spend to O&M has been virtually 1:1 (£10.3bn renewals v £10.2bn O&M). In CP5 they are planning on 1.14:1 renewals to O&M (similar to the 10 year average rate from 2002 to 2012 of 1.11:1). HS1 is different from the NRIL network, and on high speed lines there are factors that could indicate a higher O&M proportion, but this would indicate O&M charges of c£33m pa a long term annuity of £25m+ once HS1 is in a more "normal" 40 year renewal window timeframe.

As noted in Section 10.9.2, our initial detailed costing based on NR(HS) renewal cycles (themselves primarily based on manufacturers' recommendations plus known extensions where possible) and an independent view (Halcrow) on unit and on-costs delivered an annuity of £23.5m pa ("baseline").

Having considered this in detail and following some detailed workshops involving HS1, NR(HS) and Halcrow we have developed an alternative "asset stewardship" case which has gone through the all of the asset categories and delivered what we believe is a robust alternative plan costed at £16.5m pa. Some of the assumption changes from the baseline case include:

- Specific efficiency and technology improvements (e.g. high volume re-ballasting) and including a generic ½% pa efficiency unit price improvement from CP3 in line with the NRIL studies on frontier efficiency development.
- Stretching the renewals frequency where possible by not assuming the blanket replacement of assets due to obsolescence from increasing stock levels and reducing the risk of failure (an example already employed on HS1 is the Data Transmission System).
- Rather than "like for like replacement" of assets, assuming that new and more robust materials come to market which increase the asset renewals timeframes e.g. fencing (new plastics), switch blades (improved durability of metals).
- Post ERTMS Level 3 implementation, reducing renewals from reduced quantity of assets located on the track (signals and track circuits)
- Using information on bridge bearing, painting, waterproofing and expansion joints from other mature industries such as the highways authority to stretch the renewals of these asset types
- Moving away from today's approach to possession use, to a high output approach where concentrated possession and renewals activity can be employed. There may be a minor limited impact on TOC movements (at the end of the service window) but this would reduce the overall cost of ballast, cleaning and track renewals and have a limited short impact.
- Anticipating future asset degradation data in order to reduce the present more cyclic replacement assumptions for renewals (use – train paths for OCS contact wire, number of operations – points movements, cycle times – motor or pump run times, condition – tunnel lining, location – boggy areas will degrade/corrode fencing quicker).
- Reviewing major systems and their individual component parts, to determine which of the system's component parts can be replaced to extend the overall asset life of the system and moving away from whole system replacement, to a mid-term refit.

The proposed range of renewals requirements is therefore within £16.5m to £23.5m pa. We believe that £23.5m would prudently cover the expected renewal requirements over the next 40 years but conclude that the £16.5m asset stewardship case should be the base position for CP2 given:

- On what is known of the assets and forecast degradation, the engineering experience within HS1 and NR(HS) has concluded that this is a deliverable plan based on some of the assumptions noted above, though at a higher risk than the baseline.
- The CP2 renewals assumptions for the period 2015-2020 are robust and the same in either case.
- At this rate the escrow amount will increase from £30m in 2015 to c.£100m by 2020 (in money of the day) after CP2 renewal requirements – therefore there is minimal risk of unexpected costs being unfunded.
- The affordability of this increase to customers on HS1 and how these costs are best profiled over a 100+ year life asset.
- The CP3 renewals annuity is likely to increase as it covers years 10-50 of HS1's life and captures more major mid-life renewals. Steady state as per the holistic view above implies a long term renewal rate of c£30m pa – the increase to £16m from £6m is a major step towards a longer term rate.
- We will have the opportunity to review the position again in 5 years' time (and in subsequent control periods), with substantially more information available (CP3 will be based on 9 years v 4 years of data, technology/ best practice changes etc.).

This asset stewardship option is clearly not risk free and stakeholders should be aware that this case naturally increases the risk of underfunding v overfunding for future CPs compared with the baseline case.

We look forward to discussing this with consultees and stakeholders over the next few months – so that together we can confirm the right renewals cost to be recovered during CP2 that balances asset requirements with affordability.

Q13 Does our CP2 renewals annuity proposal of £16.5m p.a. correctly balance affordability with meeting long term asset renewal obligations?

11.11. Upgrades

11.11.1. Specified Upgrades

The work to upgrade GSM-R (as described in Section 10.10.1) will be undertaken by NRIL.

NRIL is the sole licence holder of GSM-R in the UK and represents the most appropriate solution for the UK rail industry. While we could use the French alternative this would be very high risk given interfaces with the NRIL network.

The estimated capital cost of the GSM-R upgrade is £4.4m: the cost breakdown is shown in Table 65. The total cost is made up of:

- £3.3m of NRIL costs, a reduction of 55% compared with the original cost estimate of £7.3m as a result of our negotiations with NRIL; and
- An estimate of £1.2m for other costs.

Table 65: GSM-R cost summary (£million)

Cost category	Original price/ estimate	Negotiated price/ estimate
Work Package 1	1.7	0.1
Work Package 2)	2.4	1.6
Connection fee	3.1	1.6
Subtotal NRIL GSM-R works	**7.3**	**3.3**
Temple Mills depot	0.1	0.1
Other costs[1]	1.0	1.1
Total	**8.3**	**4.4**

As noted in Section 10.10.1, there is a formal process for approval of Specified Upgrades set out in the Concession Agreement.

The cost of the transition to ERTMS (expected during CP5) is currently estimated to be approximately £70m. Operators should be aware of this Additional IRC funding requirement which is not included in our plans.

11.11.2. Other upgrades

All of the other upgrades discussed in Section 10.10.2 are at an early stage. Scope, costs, procurement strategy etc. are still to be developed. However, in order to give an idea of the potential scale of costs, we have provided some preliminary cost estimates in Table 66.

Table 66: Preliminary cost estimates for other upgrades in CP2

Asset	Estimated cost
Acoustic monitoring system	£0.33m
Panchex	£0.35m
Mobile telecoms	£2.6m
Regenerative braking	£5m for UKPNS asset upgrade
Transmission loss upgrades	£6m

[1] Emerging estimate of implementation costs including potential Network Change Notice costs, and NR(HS) Additional Services costs among others.

We will be developing the business cases for these schemes with train operators for subsequent approval by the ORR. These will not be funded out of escrow but will need to be funded by operators possibly through Additional IRC to spread the cost.

12. Charges

The final step is to convert the efficient costs into charges to be paid by train operators. Table 67 sets out the cost headings from the previous section and summarises how they are treated in calculating charges.

Table 67: Converting costs to charges

Costs	Calculation of charges
NR(HS) O&M costs HS1 costs Pass through costs Freight-specific costs	Forms part of OMRC charge to operators CP2 costs are apportioned between operators on the basis of forecast train services
Renewals	Forms part of OMRC charge to operators 40 year renewals costs converted to annuity which is apportioned between operators on the basis of forecast train services
Specified Upgrades	Investment recovered through Additional IRC Calculated to allow investment cost recovery on the basis of recovery period and WACC assumptions agreed with ORR.
Traction electricity	Charged separately to operators depending on usage (not part of OMRC)

The charges are then indexed. In CP1 the non-pass through elements of OMRC were escalated at RPI + 1.1% pa but in CP2 we are proposing indexation at RPI only which is a material saving to operators by 2020.

12.1. Structure of charges - OMRC

Our operating, maintenance and renewals charges (OMRC) are made up of four elements:

- **OMRCA1**: the variable costs reflecting wear and tear of additional trains on the common track. This mainly relates to track costs.
- **OMRCA2**: the avoidable costs on a long run incremental cost (LRIC) basis where the costs of infrastructure specific to a class of operator, that would be avoided (i.e. not required) in the event that that class of operator ceased operating services, are allocated to that particular class of operator.
- **OMRCB**: the common costs (also termed the long term costs of the operating phase of the project). OMRCB includes, for example, head office costs, and infrastructure costs that vary with the length of track but not the volume of traffic.
- **OMRCC**: the pass through costs. These are common costs that are largely beyond our control, such as insurance and business rates. For this category of cost there is an annual wash-up process to adjust for differences between actual and forecast costs.

Passenger train operators pay all four elements of OMRC. Operators of conventional freight trains are charged only OMRCA1 and OMRCA2.

12.2. Access charging model

In 2009 we developed a model to calculate the OMRC element of track access charges for CP1. As part of PR14 we engaged LeighFisher to update and improve this model for CP2.

The CP2 access charging model calculates cost components related to each of the four headings above and allocates them between train operators to produce a charge per train minute for passenger operators and a charge per train-km for freight operators. These are converted into a charge per train using chargeable journey time for passenger services or distance for freight services.

12.2.1. Inputs to the model

Key inputs required by the access charging model are:

- CP2 O&M costs by year by cost category;
- 40 year renewals costs by asset category – **the charges shown in this section are based on the Asset Stewardship renewals option**;

- For each year of CP2, the forecast of number of trains by operator and service group and minutes on each of international, domestic and common track;
- Train specifications (mainly speed and weight related) for calculation of relative levels of wear and tear on the track (EMGTPA); and
- Financial inputs: discount rates, interest rates, inflation rates and escrow account opening balance at the start of CP2.

12.2.2. Allocation between passenger operators

12.2.2.1. O&M (excluding pass through costs) and renewals

The charges per train minute for O&M (excluding pass through costs) and for renewals are calculated for each passenger operator as set out below.

Stage 1: Split costs into cost apportionment categories

Each of the functional cost categories is allocated across the following four cost apportionment categories in accordance with the way the cost varies with the network layout and level of train service:

- **Track and traffic dependent costs**: costs that would be expected to vary according to the length of the track and the volume of traffic over the track;
- **Track dependent, traffic independent costs**: costs that would be expected to vary according to the length of the track but to be independent of the volume of traffic;
- **Operator dependent costs**: costs that would vary if there were more or fewer operators using HS1; and
- **Fixed common costs**: the remainder of the cost base (excluding pass through costs).

The allocation of O&M and renewals costs to these cost apportionment categories is based on the experience of HS1 Ltd and NR(HS) management and their knowledge of the drivers of costs in each category. The allocation for CP2 is based largely on that used for CP1, with improvements where appropriate, and is set out in Table 68.

Table 68: Allocation of costs to cost apportionment categories

Cost apportionment category	O&M costs	Renewal costs
Track and traffic dependent costs	90% of direct track maintenance costs 80% of tamping costs 80% of grinding and track measurement costs 5% of train planning and performance management costs	100% of track renewals 50% of OLE renewals
Track dependent, traffic independent costs	The remainder of the NR(HS) O&M costs except General Manager and Business Manager	100% of track-related civils assets 50% of bridgeworks 50% of E&P 50% of SC&C
Operator dependent costs	5% of the cost of the NR(HS) Business Manager 50% of HS1 Ltd Office running costs	None
Fixed common costs	The remainder of the NR(HS) and HS1 Ltd O&M costs	50% of bridgeworks 100% of civils-other 50% of M&E assets and rail plant 50% of SC&C

Stage 2: Calculate an annuity for each cost apportionment category

For **O&M costs** a constant annual payment for CP2 is calculated such that the present value of the annual payment is equal to the present value of the CP2 O&M costs (excluding pass through costs).

A **renewals annuity** is calculated such that the closing balance of the escrow account (at the end of 40 years) is zero. This calculation takes into

account payments into and withdrawals from the escrow account and interest received on the escrow account.

Stage 3: Allocate between passenger train operators

The annual payments calculated in Stage 2 are allocated between train operators on the basis shown in Table 69. It should be noted that the cost of mothballing domestic, international or freight-only track is transferred from avoidable costs to fixed common costs.

Table 69: Allocation of costs between passenger train operators

Cost apportionment category	Basis of allocation between operators
Track and traffic dependent costs	Allocated between all operators (passenger and freight) on the basis of: No. of trains x EMGTPA weighting per train
Track dependent, traffic independent costs (net of mothballing costs)	
- International track	Train minutes on international track
- Domestic track	Train minutes on domestic track
- Common track	Train minutes on common track
Operator dependent costs	Each active operator has an equal share
Fixed common costs (including mothballing costs)	Total train minutes on all types of track

Stage 4: Calculate charges by operator

The model then calculates the total OMRCA1, OMRCA2, OMRCB for each operator by adding costs in each of the categories above:

- OMRCA1 = Traffic dependent costs
- OMRCA2 = Track dependent - international track + Track dependent - domestic track + Operator dependent costs
- OMRCB = Track dependent - common track + Fixed common costs

These are converted into a price per minute for each operator and a price per train service for each operator and service group.

12.2.2.2. Pass through costs

Pass through costs (OMRCC) are allocated between passenger train operators in proportion to their train minutes on HS1. These are converted into a price per minute and a price per train service for each operator and service group.

This is an indicative price used in the advance billing of train operators throughout the year. The washup process ensures that train operators are charged actual costs for the pass through costs.

12.2.3. Allocation between freight operators

Freight costs comprise:

- Freight variable costs (OMRCA1); and
- Freight avoidable costs (OMRCA2), made up of two elements;
    - Track dependent avoidable costs (net of mothballing costs); and
    - Other freight avoidable costs e.g. staff costs.

Freight variable costs for each freight operator are calculated as a percentage of total track and traffic dependent cost. The percentage is calculated on the basis of the number of trains x EMGTPA weighting per train (see Table 69).

For the calculation of track-dependent freight avoidable costs, the concept of equivalent track-km is used: this normalises freight-only track-km for the level of spend on these lightly used areas compared with the rest of the network. The freight-only parts of the network are assumed to attract 10% of the normal level of spend per track-km.

Freight track-dependent avoidable costs are calculated as total track dependent costs multiplied by the percentage of equivalent track-km that is freight only.

For freight avoidable costs a constant annual payment for CP2 is calculated such that the present value of the annual payment is equal to the present value of the freight avoidable costs.

Total freight charges are converted into a price per train-km for each operator.

Q14 Do you agree with the assumptions/cost allocation in the financial model used to generate track access charges? If not, please provide an explanation.

12.3. CP2 OMRC by operator

12.3.1. Charges for passenger operators

Table 70 shows the breakdown of CP2 OMRC per train per minute for passenger services currently operating on HS1. These charges are based on the Asset Stewardship renewals option, the total charge for the Baseline renewals option is shown for comparison. The figures in this table have been determined on the basis of the vehicle types currently used for these services: different vehicle types are likely to give rise to a different OMRC.

Table 70: OMRC per train per minute (February 2013 prices)

	International passenger services	Domestic passenger services
Vehicles	Class 373	Class 395
Charge per train per minute		
OMRCA1	£9.40	£3.28
OMRCA2	£15.03	£3.22
OMRCB	£21.46	£24.40
OMRCC	£7.73	£7.73
Total OMRC	**£53.62**	**£38.63**
OMRC for Baseline option	*£59.01*	*£41.71*

Table 71 shows the chargeable journey time for passenger services currently operating on HS1 and the corresponding OMRC per train for each service group. Again, this is based on the vehicle types currently in use.

Table 71: OMRC per train (February 2013 prices)

Service Group	Chargeable journey time (minutes)	OMRC per train
International (all services)	31.0	£1,662.22
Domestic		
Ashford Intl - St Pancras Intl (and vice versa)	31.0	£1,197.53
Springhead Jn - St Pancras Intl (and vice versa)	16.5	£637.40
Ebbsfleet Intl - St Pancras Intl	14.0	£540.82
St Pancras Intl - Ebbsfleet Intl	15.0	£579.45

12.3.1.1. Comparison with current OMRC

Table 72 compares the OMRC per minute calculated for CP2 with the equivalent CP1 start and exit values. The CP1 exit values shown take into account the pass though cost refunds received by train operators through the annual washup and the share of the discount passed on to train operators as well as the 1.1% real increase in OMRC in CP1.

Table 72: Comparison of OMRC per train per minute CP2 v CP1 (February 2013 prices)

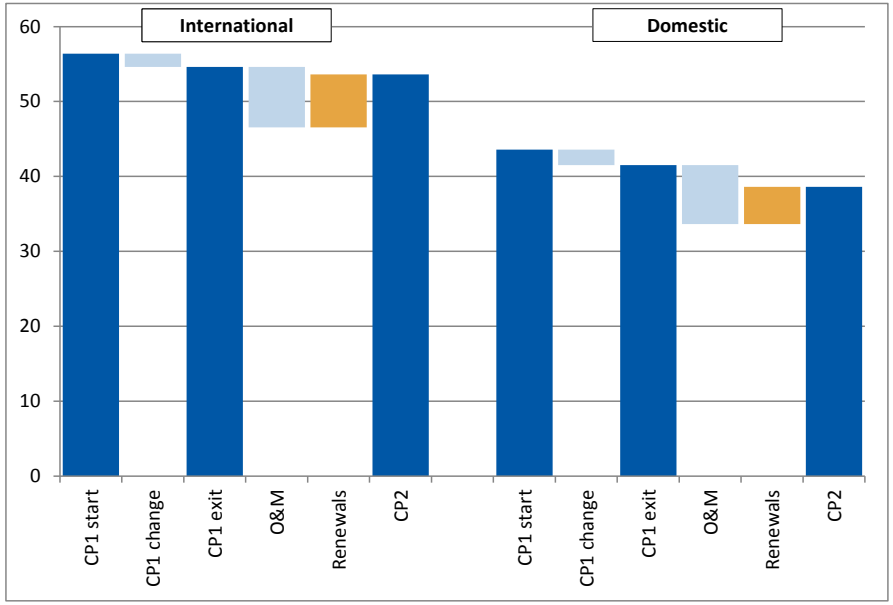
	International passenger services	Domestic passenger services
CP1 start OMRC (2009/10)	£56.38	£43.58
CP1 exit OMRC (2014/15)	£54.61	£41.52
Proposed CP2 OMRC	£53.62	£38.63
% reduction		
- from CP1 start	-5%	-11%
- from CP1 exit	-2%	-7%

Changes between CP2 and CP1 are:

- A reduction in the element of charge related to O&M costs;
- An increase in the element of charge related to the renewals annuity as a result of revised renewals programme which involves substantial increases in volumes and costs; and
- A change in the allocation of avoidable costs between international and domestic as a result of the improved accuracy of the allocation of track km (mainly the reclassification from common to international of the track between Ashford East Junction and Ashford West Junction on the main line).

The changes in OMRC per minute for international and domestic passenger train operators are shown in Figure 23.

Figure 23: Change in OMRC per minute between CP1 and CP2



12.3.2. Charge for freight operators

Absolute freight costs are forecast to reduce from an underlying £1.5m pa in CP1 to £0.6m pa during CP2 as noted in Section 11.7.

Table 73 shows the freight charge calculated for CP2 broken down into variable and avoidable elements.

Table 73: CP2 freight charges (February 2013 prices)

Service Group	Charge per train-km	km per train	OMRC per train
OMRCA1 (variable)	£3.52	88.20	£310.46
OMRCA2 (avoidable)	£27.53	88.20	£2,428.15
Total	£31.05	88.20	£2,738.61

The current undiscounted freight charge of £6.92 per train-km (Feb 2009 prices) was set by ORR in July 2012 for the remainder of CP1 (see ORR decision: High Speed 1 Limited ("HS1 Ltd") freight avoidable costs review 2011).

Table 74 compares the proposed CP2 charge with the CP1 charge. The freight charge for CP2 has increased substantially over the CP1 charge. Although there has been a significant reduction in costs this is more than offset by the reduction in expected train numbers (from 2,530 to 208 per annum).

Table 74: Freight charges CP2 v CP1 (£ per train-km)

	OMRCA1	OMRCA2	Total charge
CP1 (Feb 09 prices)	£2.05	£4.87	£6.92
CP1 (Feb 13 prices)	£2.40	£5.70	£8.10
CP2 (Feb 13 prices)	£3.52	£27.53	£31.05
Change CP2 v CP1	£1.12	£21.83	£22.95

There is currently a discount for conventional freight operating at night which ends on 31 March 2015. This discount is made possible by Government support currently provided via the "freight supplement" (see Section 13.10). It is unlikely that freight will continue to operate if Government support is withdrawn in CP2. We and the freight operators are separately making the case to DfT that there is a benefit in DfT continuing support freight so as to preserve the option value of having freight on HS1 into the future.

Because of the possibility that freight traffic will be different to the level forecast, we propose changes to the freight re-openers as set out in Section 13.3.

12.3.3. Indexation

In CP1, OMRCA1, OMRCA2 and OMRCB are indexed by RPI + 1.1%. OMRCC is passed through to train operators at cost so is not indexed.

For CP2, we have undertaken a detailed line by line analysis of costs. We have presented our cost forecasts in February 2013 prices with any expected changes above or below RPI built in to the forecasts.

We therefore propose to index all elements of OMRC by RPI rather than RPI + 1.1% (as in CP1), saving train operators £4.4m in 2020 and £14.5m over the whole of CP2.

Our proposal to index our charges at RPI is valid for CP2 only on the basis of our forecast cost changes for CP2. We reserve the right to reassess this position for future control periods.

12.4. Traction electricity charge

Charges for traction electricity do not form part of the OMRC. Train operators are charged separately for traction electricity depending on usage.

Indicative charges for CP2, based on our forecast of electricity costs in Section 12.4, are an average of £407 per train for EIL and £95 per train for LSER.

12.5. Upgrades and Additional IRC

As noted in Section 10.10.1, the only Specified Upgrade expected in CP2 is the upgrade of GSM-R. The estimated £4.4m investment in this upgrade will be paid for through an Additional IRC chargeable to train operators.

The Additional IRC is intended to recover the initial efficient investment cost and is subject to ORR approval.

The Concession Agreement does not define how the Additional IRC should be calculated. We are currently making the following assumptions in order to calculate the Additional IRC associated with GSM-R:

- Costs are recovered over 10 years based on the useful life of the GSM-R assets;
- Discount rate of 6.6% nominal, our weighted average funding rate as disclosed in our 2013 statutory accounts, based on our actual debt and equity mix; and
- The allocation of costs between train operators is as follows:

    - Work Package 2 (international roaming) costs will be split between any international operators;
    - Temple Mills depot costs will be allocated to EIL; and
    - All other costs are considered to be common costs and will be split between all train operators on the basis of minutes on HS1.

On the basis of these assumptions and our current estimate of costs, the Additional IRC per minute would be £0.58 for EIL and £0.19 for LSER.

The details of GSM-R are provided in this 5YAMS for information only: we are not asking for approval as part of this 5YAMS. There is a separate process for GSM-R approval. As noted in Section 10.10.1, we are preparing a detailed information pack for the GSM-R upgrade which will be sent to ORR and DfT.

The costs of other potential upgrades highlighted in Section 11.11.2, such as regenerative braking, could be covered in a similar way to the GSM-R specified upgrade.

13. Regulatory Framework

13.1. Introduction

The regulatory framework is the set of rules governing interaction between the parties, and provides incentives for organisations to do the "right thing".

We propose largely rolling over the existing framework because it is working well, was extensively reviewed only recently in the lead up to letting the HS1 concession, and there is limited appetite for change among stakeholders. Respondents to ORR's PR14 consultation agreed that a wholesale review of the contractual incentives mechanisms was not necessary for CP2 and ORR endorsed this view. ORR noted that it will expect to see that the incentives regime still works to encourage efficient operation of the railway, drives the right behaviours and takes into account the entry of new operators.

The HS1 Passenger Access Terms and HS1 Freight Access Terms specify that, in addition to the level and apportionment of OMRC, the periodic review should cover any proposed changes to the following items:

- Wash up provisions;
- Pass through cost categories;
- Carbon costs;
- Capacity reservation charge;
- Performance regime (other than the cap);
- Possessions regime (other than the cap on liability); and
- Freight supplement.

In addition, we have:

- Reviewed the structure of charges for compatibility with the Railways Infrastructure (Access and Management) Regulations 2005;
- Reviewed the "Review Event" provisions (which specify how certain changes in the number of timetabled train services trigger reapportionment of OMRC); and
- Developed proposals for outperformance sharing (as a consequence of the provisions of the new Operator Agreement).

Our review of each of these items and proposals for CP2 are set out below. Table 75 summarises our proposals.

Table 75: Regulatory Framework proposals

Area	Proposal	Justification/ reasoning
Structure of charges	No change	Our charging regime is consistent with regulatory requirements
OMRC apportionment re-opener	No change	The existing provisions remain appropriate and cater for the introduction of a new operator
Wash up provisions	Introduce formal quarterly wash up	To spread the access charges more accurately across the year. Already introduced informally for EIL.
Pass through cost categories	No change	Current categories remain appropriate
Carbon costs	No change	Need to recover costs related to CRC Energy Efficiency Scheme. Costs to train operators are subject to ORR approval
Capacity reservation charge	No change	To continue to incentivise efficient use of capacity
Performance regime	No change	The recalibrated payment rates and thresholds do not better incentivise the parties

Area	Proposal	Justification/ reasoning
Possessions regime	No change	Not yet used so too early to consider changing
Freight supplement	Remove this provision	DfT will not continue to support freight on HS1 through the freight supplement
Outperformance sharing	Introduce outperformance sharing provisions into the Access Terms	To reflect financial outperformance sharing provisions in our Operator Agreement with NR(HS)

We have pre-consulted with train operators and ORR on the majority of these proposals.

13.2. Structure of charges

As part of PR14, the ORR is required to confirm that our charging regime is consistent with the relevant European directives. We have undertaken a review of our OMRC drawing on advice and analysis from the lead up to the sale of HS1 and recent European Court cases. This review is summarised here.

13.2.1. Regulatory requirements

The Railways Infrastructure (Access and Management) Regulations 2005 (as amended) (the "Regulations") give effect to European directives on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure.

In relation to the recovery of an infrastructure manager's costs, the Regulations require charges to be set at "*the cost that is directly incurred as a result of operating the train service*". This will be substantially lower than the total costs of providing the infrastructure services so, in order to allow for the recovery of total costs incurred, the Regulations set out two exceptions to the charging principles:

1. The infrastructure manager may levy mark-ups, the effect of which must not be to exclude the use of infrastructure by market segments which can pay at least the cost that is directly incurred, plus a rate of return which the market can bear; or
2. For specific investment projects, the infrastructure manager may set higher charges on the basis of the long term costs of the project. For this to apply the project (i) must increase efficiency or cost-effectiveness; and (ii) could not otherwise have been undertaken without the prospect of such higher charges.

13.2.2. Comparison of HS1 charges with the Regulations

13.2.2.1. Full cost recovery

We recover our full costs using the second exception in the Regulations. We satisfy the requirements for this exception on the following basis:

- *The project must increase efficiency or cost-effectiveness*: HS1 has enabled substantial efficiencies in terms of reduced journey times on international routes and for Kent commuters. The project created enhanced transport hubs at King's Cross/St Pancras and Stratford and a new hub at Ebbsfleet and contributes to wider economic efficiency by enabling the regeneration of land at those locations. The cost-effectiveness of the project is demonstrated by its delivery in accordance with the planned timetable and budget. Furthermore, we are subject to periodic reviews of our costs and charges under the Concession Agreement.
- *The project could not have been undertaken without the prospect of such higher charges*: the nature of the construction of HS1 and the private sector risk taken was possible only with the prospect of recovering the full costs of running the railway. This applies to both the construction phase and the current phase with HS1 Ltd as operator under a Concession Agreement.

13.2.2.2. Structure of charges

The structure of our charges was established as a result of considerable work and industry consultation in the lead-up to the sale of HS1 and is set out in our Network Statement. A distinction has been drawn between (i) costs directly incurred as a result of operating the train service (the

charges for which are levied under the general charging principle); and (ii) common costs (the charges for which are levied on the basis of the long term costs of the operational phase of the HS1 project). Our OMRC categories are as follows:

- Directly incurred costs:
    - OMRCA1: the variable costs reflecting wear and tear of additional trains on common track. This mainly relates to track costs.
    - OMRCA2: the avoidable costs on a long run incremental cost (LRIC) basis where the costs of infrastructure specific to a class of operator (e.g. international passenger train operators) that would be avoided (i.e. not required) in the event that that class of operator ceased operating services are allocated to that particular class of operator. An example is the section of infrastructure from Ashford International to the Channel Tunnel which is used only by international passenger operators.[1]
- Common costs:
    - OMRCB: the common costs (also termed the long term costs of the operating phase of the project). OMRCB includes, for example, head office costs, and infrastructure costs that vary with the length of track but not the volume of traffic.
    - OMRCC: the pass through costs. These are common costs that are largely beyond our control, such as insurance and business rates. For this category of cost there is an annual wash-up process to adjust for differences between actual and forecast costs.

Charges to passenger train operators comprise all four elements of OMRC. Freight operators are charged only the elements of charge related to directly incurred costs (OMRCA1 and OMRCA2).

[1] This section is also used by freight traffic. However, we charge freight on the basis of it being marginal traffic. That is, we allocate the costs associated with the infrastructure to international passenger operators, then calculate the additional wear and tear associated with freight trains.

There is considerable debate relating to the exact meaning of the term "directly incurred costs", although recent European Court cases have provided some insight:

- In Case C-512/10, the European Court of Justice held that that "fixed costs relating to the provision of a stretch of line on the rail network which the manager must bear even in the absence of train movements" may not be "directly incurred" costs but that "costs connected with signalling, traffic management, maintenance and repairs are liable to vary, at least partially, depending on traffic and, accordingly, may be considered, in part, to be directly incurred" and that there is a "certain discretion when transposing and applying that term into national law".
- In Case C-545/10, the opinion recognised that the interpretation of "directly incurred" costs as being "marginal costs incurred as a result of the real operation of the train service" is difficult, in practice, to interpret and apply and stated that "it is not therefore possible to apply the marginal costs principle in the strict sense". He noted that "if the statistical data do not allow marginal costs to be calculated, it is possible to use an estimate corresponding, for example, to around 20% of the total costs for financing the infrastructure".

We consider that these cases add further support to HS1's existing categorisation of OMRCA1 and OMRCA2 as directly incurred costs:

- OMRCA1 covers short-run marginal costs only;
- OMRCA2 covers the LRIC costs for sections of the HS1 infrastructure which are used by a specific class of operator and where the costs would not arise in the absence of that class of operator;
- Together OMRCA1 and OMRCA2 equate to approximately 20% of HS1's total costs charged to operators.

The recast Directive 2012/34/EU (establishing a single European railway area) states that by June 2015, the Commission will define what can be included as directly incurred costs and that infrastructure managers may decide to adapt to this over a period of four years after the entry into force of the implementing acts.

13.2.3. CP2 proposal

Our review indicates that our charging regime remains consistent with regulatory requirements.

We consider that it is unnecessary to amend the current categorisation of OMRCA1 and OMRCA2 as directly incurred costs pending clarification from the European Commission of what comprises directly incurred costs.

Furthermore, we consider that there is no basis to depart from our use of the second exception (long term costs of a specific investment project) for the remainder of our charges to passenger operators.

We therefore propose to retain our existing structure of charges for CP2. We have discussed this position with the ORR and understand that they are minded to agree with our position. For future control periods we will review this position with ORR in the light of any clarification from the European Commission on directly incurred costs.

13.3. OMRC apportionment re-opener

13.3.1. Current provisions

OMRC is set on the basis of forecast traffic levels. As the majority of our costs are fixed, and because the intent of our regulatory framework is that we neither over- nor under-recover our costs, there are volume re-opener provisions to reapportion costs between train operators if changes in train numbers exceed certain thresholds.

Under the HS1 Passenger Access Terms a “Review Event” will trigger a reapportionment of OMRC between train operators. A Review Event is defined as:

- the total anticipated timetabled train movements on HS1 in respect of a timetable year is at least 4% more or less than the actual number of timetabled train movements in the year following the last Review Event; or
- any individual train operator's anticipated timetabled train movements on HS1 in respect of a timetable year is at least 4% more or less than that train operator's actual timetabled train movements in the year following the last Review Event.

In the HS1 Freight Access Terms a Review Event is defined as a 4% change in total anticipated timetabled passenger and freight train movements, there is no trigger related to an individual freight train operator.

In these circumstances, the OMRCA2 and OMRCB elements of OMRC shall be determined by reapportioning the operating, maintenance and renewal costs between operators as set out in Section 12.2 above. The OMRCA2 element of charge is applicable to both passenger and freight operators, OMRCB is applicable to passenger operators only.

On the basis of the forecast number of trains in 2015/16, the 4% triggers would be equivalent to the following changes in timetabled trains:

- EIL 763
- LSER 2,145
- Total 2,908

13.3.2. CP2 proposal

13.3.2.1. Passenger services

For passenger services, our proposal is to roll over the existing re-opener provisions contained in the HS1 Passenger Access Terms.

The choice of the trigger level should balance certainty for train operators across a control period with the flexibility to handle significant changes on the network.

We considered the possibility of reducing the trigger to +/-2% but concluded that the existing +/-4% trigger is more appropriate. A narrower band would pass more of the volume risk to train operators and is likely to be administratively more cumbersome. The main source of significant change in the number of trains is the introduction of a new operator and this is already catered for in the existing provisions.

ORR agrees with this proposal. From previous discussions with train operators, we note that there is no real appetite for change to the re-opener provisions.

13.3.2.2. Freight services

Because of the possibility that freight traffic will be different to the level forecast, we propose that freight charges per train-km be subject to review in the following cases:

- Freight volumes change by +/-50% compared with the current forecast of 208 freight trains per year. The higher percentage compared with passenger traffic is warranted due to the relatively low absolute number of freight trains currently operating on HS1. This would trigger a recalibration of the freight charges only.
- There are a material number of freight trains running to the North London Line connection rather than to Ripple Lane. This is due to both the impact on the assumptions used to calculate the per train-km charge, and also the opportunity for NR(HS) to take track possessions.
- If there is a move to greater than 5 night a week working. This is likely to be triggered by the +/-50% volume re-opener in any event, but again reflects the impact on NR(HS) opportunities to take possessions.

13.4. Wash up provisions

13.4.1. Current provisions

Under the HS1 Passenger Access Terms the IRC, OMRC and Capacity Reservation Charge elements of the track access charges are invoiced quarterly in advance on the basis of the number of trains in the New Working Timetable (formerly the First Working Timetable) and an estimate of the Pass Through Costs for the year.

The HS1 Passenger Access Terms provide for a wash up:

- To take into account additional train paths operated as a result of spot bids or reductions in the number of train paths operated as a result of HS1 cancellations; and
- To allow us to recover the actual, rather than estimated, pass through costs.

The HS1 Passenger Access Terms require a wash up at the end of each year but also entitle us to wash up on an interim basis during a year.

In order to spread the access charges more accurately across the year, we have agreed a quarterly wash up with EIL commencing in 2013/14.

Under the HS1 Freight Access Terms, freight operators are invoiced in arrears on the basis of actual trains operated and there is therefore no wash up for freight.

13.4.2. CP2 proposal

For CP2, we propose to introduce a formal mechanism for a quarterly wash up in the HS1 Passenger Access Terms to reflect current practice with EIL track access charges. This will be applicable to all passenger train operators.

This proposal will assist cashflow, and reduce the administrative burden at the end of the financial year.

Our key customers agree with this proposal.

13.5. Pass through cost categories

13.5.1. Current provisions

The Concession Agreement provides for us to recover in full, from train operators, the elements of cost considered as pass through costs, providing they have been efficiently incurred. The Concession Agreement provides an initial list of pass through cost categories but allows for ORR to determine which elements of cost are suitable for inclusion as pass through costs at periodic review.

For CP1, the relevant cost categories are defined in the HS1 Passenger Access Terms as:

- rates;
- insurance;
- non-traction energy costs;
- any sums payable by us in connection with the provision of dispute resolution services; and
- operations, maintenance, renewal and replacement costs of the UKPNS assets.

Other than costs in connection with dispute resolution services, these cost categories are identical to the initial list of pass through costs in the Concession Agreement.

Pass through costs are not controllable by us but we can take steps to minimise them: Section 5.6.5 discusses the significant reductions made in pass through costs through procurement efficiencies in CP1.

As pass through costs do not fall under the definition of directly incurred costs, there is no pass through cost element of OMRC for current freight traffic.

13.5.2. CP2 proposal

There have been no issues in relation to the current provisions for CP1. We have reviewed all of our costs and believe that the cost categories currently identified as pass through costs are appropriate and have not identified any additional categories to be included.

Our proposal for CP2 is therefore that there is no change to the current pass through cost categories in the HS1 Passenger Access Terms.

We will continue to pursue any further opportunities to reduce the level of pass through costs in CP2.

Our key stakeholders agree with our proposal to retain the same pass through cost categories. They support steps to reduce the level of pass through costs through procurement efficiencies and reducing energy usage and would expect to be involved in reviewing pass through costs and examining options to reduce them. These issues are discussed in Sections 0 and 0 above.

13.6. Carbon costs

13.6.1. Current provisions

The HS1 Passenger Access Terms and HS1 Freight Access Terms contain a provision for us to recover costs incurred in relation to the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme.

The scheme excludes energy used by trains and network services such as signalling systems but includes energy used for heating, lighting and power in buildings. The majority of our costs in relation to the CRC Energy Efficiency Scheme are therefore related to stations and there are provisions to recover them in the Station Access Conditions. The elements of CRC Energy Efficiency Scheme costs which are included in the track access charges include costs related to the office at the Singlewell infrastructure maintenance depot and the HS1 office.

We made our first payment under this scheme for the year 2011/12. The CRC payment related to track access charges is approximately £8,000 per annum.

13.6.2. CP2 proposal

We believe it is important that we retain the ability to recover costs related to meeting our CRC Energy Efficiency Scheme requirements. The Access Terms require that any costs borne by the train operators as a result of meeting our commitments will be subject to approval of the ORR.

Our proposal for CP2 is to leave the current provisions unchanged.

13.7. Capacity reservation charge

13.7.1. Current provisions

The Railways Infrastructure (Access and Management) Regulations 2005 allow an infrastructure manager to levy a charge for capacity that is requested but not used. The imposition of such a charge must provide incentives for the efficient use of capacity.

The Capacity Reservation Charge on HS1 applies to capacity which is reserved but not used in the New Working Timetable. It is set out in the HS1 Passenger Access Terms and HS1 Freight Access Terms as follows:

- For passenger services, the charge is 25% of the full IRC per train (i.e. ignoring any IRC discount)
- For freight services, the charge is 25% of the avoidable directly incurred costs element of the Freight OMRC per train
- If a train operator surrenders reserved capacity it will be entitled to a rebate of part of its capacity reservation charge if the surrendered capacity is utilised by another train operator.

The Capacity Reservation Charge acts as a disincentive to the reservation of large amounts of capacity which a train operator does not realistically intend to use. It supports the promotion of competition on HS1 by helping to ensure the efficient utilisation of capacity by train operators.

The current level of the Capacity Reservation Charge for passenger services is sufficient to incentivise efficient use of capacity.

For freight services the Capacity Reservation Charge is much lower and, on its own, may not be sufficient to incentivise efficient use of capacity. However, this charge works in tandem with the Use-It-Or-Lose-It provisions in Part J of the HS1 Network Code. Part J enables us to alter access rights where they are not being used: it sets out a mechanism whereby capacity can be made available to other users if the train operator fails to exercise its access rights as part of a timetabling process and requires the surrender of train slots where they are not being utilised and such non-use exceeds certain thresholds.

13.7.2. CP2 proposal

As it is possible that a new international passenger operator will commence operating on HS1, it will therefore become increasingly important to incentivise the efficient use of capacity. As the current provisions have been successful in doing so we propose to leave them unchanged.

Our key stakeholders support our proposal to retain the current approach.

13.8. Performance regime

13.8.1. Current provisions

The Railways Infrastructure (Access and Management) Regulations 2005 require infrastructure managers to establish a performance regime to encourage the infrastructure manager and the train operators to minimise disruption and improve the performance of the network.

Our performance regime is structured so that payments are made only in the event of major delays and cancellations. A key principle in the development of the performance regime was that the regime should not be a revenue generating mechanism for any party. It should incentivise all parties to minimise the impact of delays and cancellations.

The HS1 performance regime is defined in the HS1 Passenger Access Terms and HS1 Freight Access Terms. Payment rates and the thresholds at which payments are triggered are set out in the individual operators' Track Access Agreements. The Access Terms also include a cap on performance payments: this cap is not subject to periodic review. Performance is monitored using Network Rail's TRUST system, as on the national rail network.

There are three categories of delay:

- HS1 delay: HS1 Ltd is responsible for, and pays compensation to, TOCs for disruption resulting from such incidents;
- TOC-on-TOC delay: TOCs are responsible for incidents caused by them and pay compensation to other TOCs for disruption resulting from such incidents; and
- TOC-on-Self delay: TOCs are responsible for incidents caused by them and any resulting disruption is their own responsibility.

Table 76 shows the parameters which are set out in each operator's Track Access Agreement: these determine whether payments are made and the rate at which they are made.

Table 76: HS1 performance regime thresholds, benchmarks and payment rates

HS1 Poor Performance Threshold (minutes)	HS1 Ltd pays a penalty to the TOC if performance is worse than the HS1 Poor Performance Threshold and the TOC pays HS1 Ltd a bonus if performance is better than the HS1 Good Performance Threshold. No payments are made for performance that falls in the band between these two thresholds.
HS1 Good Performance Threshold (minutes)	
Payment Rate (per minute)	The rate at which payments are made to the affected TOC by HS1 Ltd and other TOCs
Bonus Payment Rate (per minute)	The rate at which bonus payments to HS1 Ltd are made. This rate is 25% of the Payment Rate.
Cancellation Minutes	The factor by which a cancellation is converted to delay minutes for performance regime calculations
TOC on TOC Receipt Benchmark	TOC on TOC payments are made if the performance experienced by the affected TOC is worse than its TOC on TOC Receipt Benchmark
Train Operator's Performance Benchmark	These benchmarks are not payment triggers but are used to determine when a performance improvement plan is required.
HS1 Ltd Performance Benchmark	

Key points to note are:

- The HS1 Poor Performance Threshold was calculated as the average HS1 caused delay per train plus 1 standard deviation and the HS1 Good Performance Threshold was calculated as the average HS1 + TOC-on-TOC delay per train minus 1 standard deviation. This creates a "neutral zone" within which no performance payments are incurred.
- The Train Operator's Performance Benchmark was calculated as the average TOC-on-TOC delay per train caused by the train operator plus 1 standard deviation.
- The payment rate was calculated as 60% of the Marginal Revenue Effect (MRE). The purpose of this was to limit the expected liability to all parties under the regime. 60% was chosen as the proportion which ensured that payments would only exceed 1/13 of the annual cap in a very extreme period.

The following graphs show delays over the three years 2010/11 to 2012/13 compared with the performance thresholds, indicating the periods in which HS1 penalty and bonus payments were incurred. Figure 24 and Figure 25 show HS1 performance compared with the HS1 Poor Performance Threshold. Over the 39 periods shown, we paid £1,756k in penalty payments to EIL relating to poor performance in five periods and £419k in penalty payments to LSER relating to poor performance in eight periods.

Figure 24: EIL – HS1 delays v HS1 Poor Performance Threshold

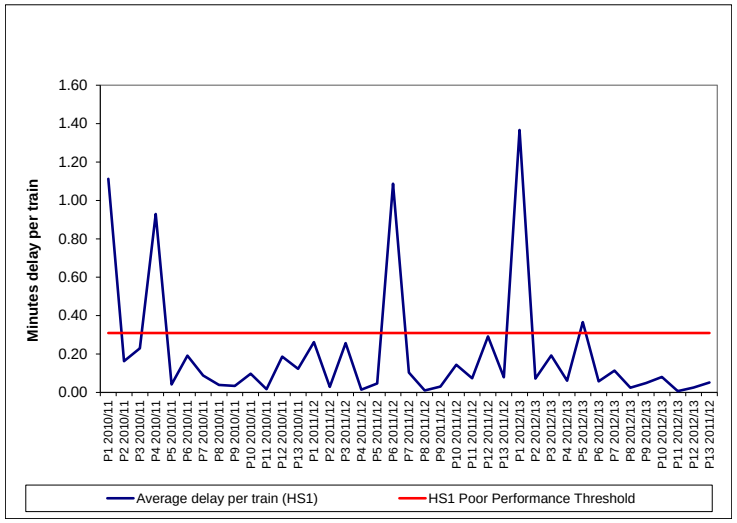
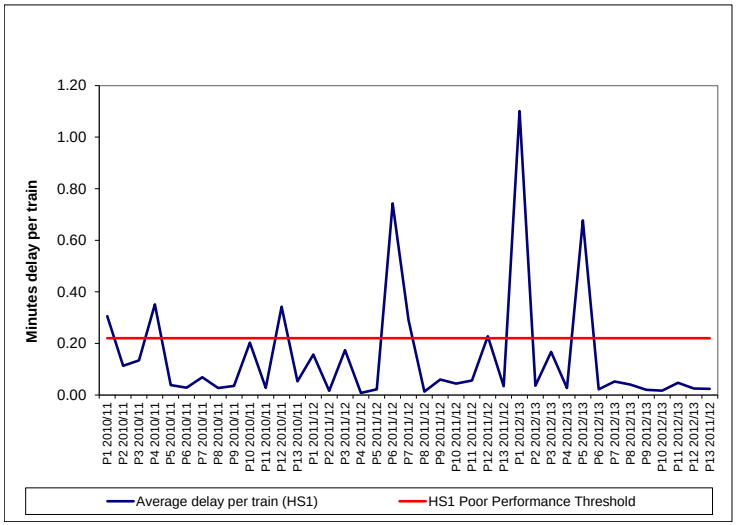


Figure 25: LSER – HS1 delays v HS1 Poor Performance Threshold



Bonus payments depend on combined HS1 and TOC-on-TOC performance. Figure 26 and Figure 27 show HS1 plus TOC-on-TOC performance compared with the HS1 Good Performance Threshold. Over the 39 periods shown, we received £255k in bonus payments from EIL relating to performance better than the HS1 Good Performance Threshold in 22 periods and £102 in bonus payments from LSER relating a single period.

Figure 26: EIL – HS1 and TOC-on-TOC delays v HS1 Good Performance Threshold

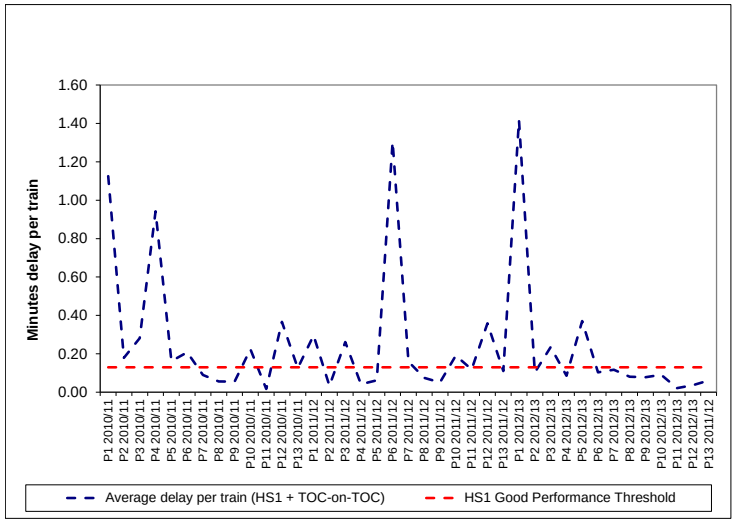
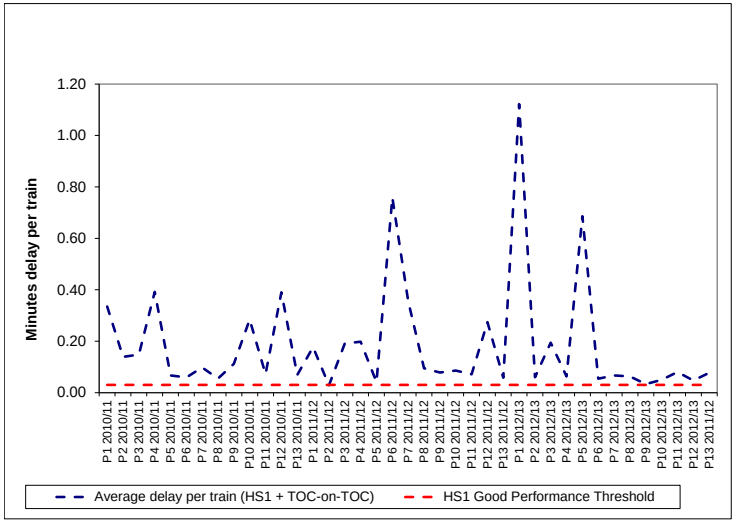


Figure 27: LSER – HS1 and TOC-on-TOC delays v HS1 Good Performance Threshold



Payments under the freight performance regime have been approximately £300 to date.

13.8.2. Initial regime and recalibration

The HS1 performance regime was developed before domestic services commenced and calibrated using simulated data. The HS1 Passenger Access Terms required us to recalibrate the performance regime thresholds, benchmarks and payment rates on the basis of actual performance on HS1 for the year ending June 2011, the purpose of this recalibration being to determine what changes, if any, should be made which would better incentivise the parties to keep delays and cancellations to a minimum. We appointed AECOM to undertake this recalibration based on their experience and understanding of rail industry performance regimes.

The results were largely consistent with the existing regime, and on balance it was agreed that the existing regime should be retained because it better incentivised all parties to minimise delays and cancellations on the HS1 network.

The Concession Agreement requires us to review the performance regime as part of the periodic review. Feedback from train operators is that the structure of the performance regime should remain and that the focus of this review should be on payment rates and thresholds. Our review for PR14 was split into two parts:

- Core Exercise: recalibration of payment rates and thresholds using latest performance, demand and revenue data; and
- Future Proofing: consideration of the definition of a Material Change which would trigger a recalibration of the performance regime.

AECOM was again appointed to undertake the recalibration and to provide support for the future proofing exercise.

Stakeholders have been involved throughout the PR14 recalibration process, including in the definition of the remit for AECOM. There have been five stakeholder sessions on the performance regime.

13.8.3. Core recalibration exercise

The recalibration involved reviewing and recalculating the thresholds at which compensation payments are triggered and the associated payment rates. As agreed with freight operators, freight payment rates and thresholds were not included in the recalibration exercise.

The recalibration exercise used two years of data from Period 10 2010/11 to Period 9 2012/13 (12 December 2010 to 8 December 2012). During the Olympic and Paralympic Games there were significant changes in service levels, passenger demand and revenue: the data used in the recalibration was adjusted to remove the impact of the Games.

13.8.3.1. Recalibrated thresholds and benchmarks

The thresholds and benchmarks were originally calculated from simulated performance. The recalibration used the same calculation methodology as the original but replaced the simulated performance data with actual

performance data. Table 77 compares the revised thresholds and benchmarks with those currently in use for CP1 and those calculated in the previous recalibration exercise.

Table 77: Comparison of performance thresholds and benchmarks

	HS1 Poor Performance Threshold	HS1 Good Performance Threshold	Cancellation Minutes	TOC Performance Benchmark	HS1 Ltd Performance Benchmark	TOC on TOC Receipt Benchmark
EIL						
Recalibrated	0.51	-0.09[(a)]	60	0.08	0.20	0.59
Previous recalibration	0.41	-0.01[(a)]	60	0.06	0.18	0.46
Current	0.31	0.13	60	0.08	0.16	0.63
LSER						
Recalibrated	0.50	0.02	30	0.10	0.24	0.54
Previous recalibration	0.24	0.03	30	0.11	0.12	0.29
Current	0.22	0.03	30	0.33	0.11	0.29

[(a)] In effect, the threshold is 0

The changes in the performance thresholds between this recalibration and the previous recalibration exercise are due to the greater variability of performance in this recalibration period. Specifically, there were spikes in delay during Period 6 2011/12 and Period 1 2012/13.

13.8.3.2. Recalibrated payment rates

Payment rates for the HS1 performance regime are based on a Marginal Revenue Effect (MRE) calculation, following the standard approach used for the national rail network. Delay multipliers and generalised journey time (GJT) elasticities are based on PDFH v5.

The payment rates in the HS1 performance regime were originally set at 60% of MRE in order to limit the expected liability of all parties under the regime. 60% was chosen as it ensured that payments would only exceed 1/13 of the annual performance payment cap in a very extreme period.

In the recalibration exercise, payment rates were recalculated using the same methodology as the original calculation but with demand and revenue data for December 2010 to December 2012 provided by EIL and LSER. Revenue data was rebased to February 2009 prices for comparison with current payment rates. Payment rates were calculated at both 60% and 50% of MRE. Both 50% and 60% of MRE should only breach 1/13 of the annual cap in an extreme period.

Updates to PDFH (v5.1) were recommended in early 2013, including to delay multipliers and GJT elasticities. PDFH v5.1 has not yet been finalised. A sensitivity test was undertaken in which payment rates for the HS1 performance regime were estimated on the basis of PDFH v5.1 parameters. The result would be a reduction in the EIL payment rate and an increase in the LSER payment rate.

Table 78 compares the recalibrated payment rates with those currently in use and those from the previous recalibration exercise.

Table 78: Comparison of payment rates (February 2009 prices)

	EIL	LSER
Recalibrated PDFH v5.0 – 60% MRE	£614	£41
Recalibrated PDFH v5.0 – 50% MRE	£511	£34
Recalibrated PDFH v5.1	£487	£47
Previous recalibration	£641	£38
Current	£522	£46

13.8.4. Future proofing

The future is uncertain and many factors will influence performance. It is important that our regulatory framework gives us the ability to review the performance regime to ensure that it continues to provide appropriate incentives to all parties.

The HS1 Access Terms include a provision that entitles any party to require that the payment rates and thresholds are recalibrated following a Material Change, which is defined as:

- a significant physical modification to the network; or
- a physical modification to HS1 due to an inherent defect in the construction of the network; or
- an increase or decrease of not less than 4% in the number of timetabled train movements on HS1 in any Timetable Year; or
- a significant change in the performance and reliability of the train operator's rolling stock; or
- a change in the performance regime of another train operator or the entering into of a track access agreement with a train operator which has a material effect on the performance regime.

We consider that these reopener provisions remain broadly appropriate for CP2. The current provisions cover recalibration of the regime when a new train operator is introduced. In this case, we consider that there should also be a recalibration of the performance regime using data from the first 12 months in which the new operator runs commercial services.

13.8.5. CP2 proposal

13.8.5.1. Payment rates and thresholds

For CP2, we propose to leave the performance regime payment rates and thresholds unchanged as the existing payment rates and thresholds better incentivise all parties to keep delays and cancellation to a minimum. The rationale for this proposal is as follows:

- The “neutral zone” in the recalibrated regime is wider than under the current regime, i.e. performance payments are less likely to be triggered. The recalibrated regime does not therefore better incentivise the parties. In addition, this wide neutral zone has been generated as a result of two major incidents which caused spikes in performance.
- The recalibrated regime renders performance payments for good performance at a level which we are unlikely to reach and, in the case of EIL, at a level which it is impossible for us to reach. In essence, the incentive to keep improving performance would be eradicated through adoption of the new good performance thresholds.
- The recalibrated regime results in the poor performance thresholds being increased, meaning that we are less likely to breach the thresholds and therefore less likely to trigger penalty payments. It is arguable that the revised threshold would not better incentivise us to minimise delays and cancellations.
- If we were to retain the existing thresholds and use recalibrated payment rates this would create a mismatch in the overall performance regime with thresholds and payment rates generated from two separate calibration periods.
- The revised payment rates are not significantly different from the existing payment rates and we do not therefore consider that they would provide materially different incentives to all parties to minimise delays and cancellations.

The proposed payment rates and thresholds are summarised in Table 79. It should be noted that the payment rates shown in Table 78 above have been uplifted to February 2013 prices. The bonus payment rate is 25% of the payment rate.

Table 79: Proposed payment rates and thresholds for CP2

	EIL	LSER
HS1 Poor Performance Threshold	0.31	0.22
HS1 Good Performance Threshold	0.13	0.03
Cancellation Minutes	60	30
TOC Performance Benchmark	0.08	0.33
HS1 Ltd Performance Benchmark	0.16	0.11
TOC on TOC Receipt Benchmark	0.63	0.29
Rates (£ per minute, February 2013 prices)		
Payment Rate	£719	£48
Bonus Payment Rate	£180	£12

EIL accepted our proposal to retain the current thresholds and payment rates for CP2. LSER did not object to retaining current thresholds but did not consider that we had made a case for retaining existing payment rates in our pre-consultation: we have attempted to address this issue in this 5YAMS.

13.8.5.2. Future proofing

Our proposal for CP2 is:

- To keep the same definition of Material Change as in the current HS1 Access Terms; and
- To introduce a requirement to recalibrate the performance regime using data from the first 12 months in which a new operator runs commercial services.

AECOM has developed a model to generate revised thresholds and payment rates in the event that a reopener provision is triggered. This model has been shared and discussed with the train operators as part of the stakeholder sessions.

13.9. Possessions regime

13.9.1. Current provisions

The HS1 Passenger Access Terms and HS1 Freight Access Terms contain a possessions regime by which we compensate train operators for the direct costs they incur as a result of possessions taken outside the possessions allowance.

Direct costs include bus and taxi hire costs, publicity costs, train planning and diagramming costs and other costs directly related to the organisation and management of the train operator's response to a restriction of use. The compensation is adjusted by adding any increase in costs which results from increases in train mileage and deducting any decrease in costs which results from decreases in train mileage. Our liability is capped and the cap is not subject to periodic review.

So far in CP1 there have been no possessions outside the allowance and so no compensation has been payable.

As the possessions regime has not been tested stakeholders are keen to leave it unchanged and for us to focus on a possessions strategy that will result in improved access.

13.9.2. CP2 proposal

Our proposal for CP2 is to retain the existing possessions regime.

Respondents to the ORR consultation did not suggest any changes to the possessions regime for PR14.

13.10. Freight supplement

13.10.1. Current provisions

The freight charge for CP1 was calculated on the basis of a medium term forecast of freight usage of five return train services per weeknight from Ripple Lane to the Channel Tunnel boundary (2,530 trips per annum).

The initial freight charge was £7.13 per train-km which was reduced to £6.92 per train-km following a review of freight avoidable costs. For CP1, the charge was discounted to £4.00 per train-km for freight operating at night in order to encourage short and medium-term development of the freight market.

Charging for freight train paths on this basis results in stranded costs (i.e. we recover less in freight charges than the cost of providing for freight services). Stranded costs arise from:

- actual freight usage being lower than forecast (which was expected initially as the charge was based on a medium term forecast); and
- discounting of the charge.

In order to compensate us for these stranded costs franchised passenger train operators are subject to the freight supplement, a charge in respect of the stranded costs arising from the freight charging arrangements. The charge is levied on the basis that franchised passenger train operators are best able to bear such charges owing to their franchise agreement with the Secretary of State.

Despite the discounting of the charge, actual freight usage during CP1 has been considerably lower than the forecast used in calculating the charge. Current usage is 2 return trips per week (208 trips per annum), only 8% of the number on which CP1 freight charges were calculated. Freight usage is not expected to increase in CP2 (see Section 7.1.3).

Q15 Do you believe that an alternative to the CP1 freight supplement is required to support the continuation of freight traffic in CP2? If so, what is the right mechanism for this support?

13.10.2. CP2 proposal

For CP2, the freight supplement will be discontinued as DfT will not continue to subsidise freight services on HS1 through this mechanism.

We are discussing other support options with freight operators and DfT, to allow freight to continue to run on HS1.

13.11. Outperformance sharing

13.11.1. Current provisions

Our Concession Agreement does not contain any outperformance sharing requirements in respect of operations and maintenance costs.

In 2012, we negotiated a new Operator Agreement with NR(HS). The renegotiated Operator Agreement includes a mechanism for calculating financial outperformance (the Outperformance Share) during years three, four and five of each of CP2 and CP3 and a mechanism for NR(HS) to split the Outperformance Share 50:50 with us. Although there is no requirement for us to share this with the train operators in CP1, we have elected to do so and the Operator Agreement includes a provision which requires us to share 60% of our portion of the Outperformance Share with train operators. This is split between train operators in proportion to the OMRC paid by each train operator under its track access agreement in the relevant financial year.

This Operator Agreement financial outperformance sharing mechanism is not reflected in the HS1 Passenger Access Terms or HS1 Freight Access Terms. As part of the PR14 process, we have committed to establish a formal mechanism for CP2 by which we will share financial outperformance under the Operator Agreement with train operators.

13.11.2. CP2 proposal

Our proposal is to update the HS1 Passenger Access Terms and HS1 Freight Access Terms to reflect the following:

- The sharing of the Outperformance Share between NR(HS), HS1 Ltd and train operators will reflect the provisions of the Operator Agreement:
    - The Outperformance Share will be calculated during years three, four and five of each of CP2 and CP3;
    - We will share 60% of our portion of the Outperformance Share with train operators;
    - This will be split between train operators in proportion to the OMRC paid by each train operator.

- Only train operators with Framework Track Access Agreements will be entitled to a share of the Outperformance Share in a financial year.
- The OMRC per train minute will be fixed for CP2 and will not be adjusted as a result of any financial outperformance.
- The relevant proportion of the Outperformance Share for the financial year will be credited to train operators. It will be net of a Management Fee of no less than 10%.
- The process will be completed no later than 120 business days after the end of the financial year. The stages in the process will be:

    - Stage 1: NR(HS) notifies us whether there is any Outperformance Share for the financial year and provides details of its calculation. We invoice NR(HS) for 50% of the Outperformance Share.
    - Stage 2: We notify train operators of the total Outperformance Share and the portion of this to which the train operator is entitled including sufficient supporting information to satisfy train operators about the calculation of the Outperformance Share.
    - Stage 3: We issue a credit note to train operators for their portion of the Outperformance Share.

Q16 Do you agree with our proposal for each regulatory framework item?

14. Risk

All businesses and delivery plans have risks. It is important that these are identified and where possible mitigated. Risks have been split into those inherent in a rail infrastructure business and specific risks in delivering this 5YAMS.

14.1. Risk inherent in the business

Table 80 sets out the risks inherent in the business and our plans to mitigate them.

Table 80: Risks inherent in the business

Risk item(s)	PR14 Output(s)	Risk description	Response strategy
Safety	Deliver world class safety performance with zero harm to our staff, contractors, customers, passengers and neighbours.	Potentially a fatality or major injury on the HS1 network to our staff, contractors, customers, passengers or neighbours.	Continue to monitor and maintain safety performance by: ▪ NR(HS) and HS1 Ltd audit programmes ▪ monthly assurance reports ▪ ongoing reporting (e.g. FWI metrics) and joint (NR(HS) and HS1 Ltd) safety tours by senior management. Passenger safety delivered by a safe railway and working closely with operators (e.g. new door locks on Eurostar trains) Continue to concentrate on the three key components of safety: ▪ Situational - what the organisation does for safety - development as required and implementation of procedures and standards ▪ Behavioural - ensure appropriate competencies, training and ownership/challenge culture ▪ Psychological - increase workforce engagement in the management of safety so that people understand and challenge 'why we do what we do', take ownership of safety and feel empowered to confront poor behaviours and unsafe environments.
Asset stewardship	Build on whole life cost analysis to drive our asset management approach with informed collection of degradation and innovation data going forward to underpin continuous improvement/preparation for challenges in CP2 and beyond.	Potentially unable to deliver the asset management strategy and policy in accordance with the our General Duty specified in the Concession Agreement.	▪ Continue to build on our understanding of the HS1 asset through collecting asset degradation and condition information in order to validate the whole life cost models and derive enhanced value from the assets reducing the cost of maintenance and renewals to our customers yet maintaining present levels of safety and performance ▪ Ensure staff/resources are equipped to deliver the asset management strategy and policy in line with our General Duty and asset stewardship obligations ▪ Explore the introduction of new asset management systems to record asset information/data which will assist in understanding asset behaviour.

Risk item(s)	PR14 Output(s)	Risk description	Response strategy
Asset availability	Provide opportunities to improve asset availability to meet the operational needs of the train operators.	Possessions and maintenance regime could have huge impact on providing further/flexible access on HS1 for planned and unplanned service requests from train operators.	▪ Continue to provide a flexible and well-coordinated possessions plan/regime with stakeholders to ensure operational needs are meet. This will be done through engaging with operators throughout the establishment of the Engineering Access Statement and Timetabling Planning Rules ahead of a New working Timetable ▪ Work with NR(HS) to review maintenance/possessions regimes to identify possible opportunities for passenger and freight operators. ▪ Effective policing by BTP and security contractor to minimise the effects of trespass and vandalism, theft and terrorism.
Performance	Maintain/improve the current level of operational performance in CP2	Performance worsens and the impact of big incidents increases during CP2. Extreme weather or other factors cause major disruption on the railway	▪ Use the performance regime framework to provide incentives to all parties to minimise the impact of delays and cancellation on HS1 ▪ Use previous experience, joint communication plans and operational judgement to reduce the impact of big incidents on the network ▪ Take a holistic view of performance and continue to play a proactive role in bringing all parties together, on and off the HS1 network ▪ Work with operators on winter preparedness plans and jointly review/test business continuity plans ▪ Further development of our business continuity measures
Finance/costs	Continue to drive down overall operating, maintenance and renewal costs through efficiency initiatives/best practice. This will result in lower track access charges for train operators.	Significant changes could occur on the HS1 network that may affect some elements of OMRC and the apportionment of OMRC between operators.	▪ Continue to monitor and anticipate potential significant changes to train volume for each operator on the HS1 network. This will be done by reviewing changes in train volume per operator ahead of each New Working Timetable and analysing the potential impact upfront. ▪ Continue to monitor key contracts to identify additional opportunities building on work done in CP1. ▪ Continue to understand what the train operators want and consider trade-off options.
Finance/costs	Ensure the escrow account has sufficient funds over the next 40 years to cover all renewal activities identified in the 40 year renewal plan. Introduce processes/procedures to manage withdrawal of appropriate renewal costs over the next 40 years.	The amount placed in the escrow account is insufficient to fund renewal activities over the next 40 years.	▪ Annual review of the amount in the escrow account to ensure it is appropriately funded throughout the control period. This will be done by producing reports for the key stakeholders detailing potential use of funds and estimated spend in each year of the control period. ▪ Ensure procedures/processes are in place to withdraw funds from the escrow account when required.

In addition to the above, we have High Impact/Low Probability Risks. These are catastrophic risks that could result in multiple fatalities, extended period of non-service, substantial financial loss and / or reputational impact. Examples include terrorism incidents, train derailment, major asset failures and major off

route incidents (e.g. extended closure of the Channel Tunnel).These risks are reviewed regularly and whilst inherently hard to mitigate, risk management and insurance is regularly updated. In addition, HS1 Ltd and NR(HS) have and test Business Continuity Plans and Emergency Plans respectively, which often involve customers and outside agencies such as BTP. More joined up testing of continuity plans is a focus in the next year.

14.2. Plan delivery risks

In addition to the inherent business risks, this 5YAMS has specific risks within it that could result in elements of the plan not being delivered. These are described in Table 81 along with our plans for mitigation.

Table 81: Plan delivery risks

Risk area	Specific risks	Mitigants/comments
Latent defects	Although we now have 10 years of operation on Section 1 and 6 years on Section 2, there remains a risk of latent defects on the infrastructure that could result in major disruption or closure.	Ongoing detailed inspection and monitoring programme.
Possessions availability	As noted in the LeighFisher benchmarking report, HS1 already has the shortest possessions window of the high speed lines considered in which to undertake overnight maintenance. Further erosion of this risks delivery efficiency and plan.	Advanced discussions required with operators. Additional costs are likely if we move from the current arrangements.
Freight deliverability	Freight traffic at current volumes is only commercially viable with DfT support. There is a risk that this support is not available in CP2. There would then be no freight traffic on HS1 and mothballing costs of freight-specific infrastructure would need to be recovered.	Minimise freight costs and, if required, mothballing costs as much as possible. Demonstrate value to DfT to keep the HS1 freight option open.
Renewals escrow insufficient to fund required CP2 renewals	Unexpected additional renewals spend is required in CP2. Interest rates on deposits below assumptions.	£30m in escrow expected at the start of CP2 will provide a buffer. Detailed plans/review done of likely requirements in CP2. Forecast renewal expenditure in CP2 is relatively low as HS1 is still a relatively new railway. In discussion with to DfT to allow authorised investments to maximise interest rate.
Signalling, control and communications delivery	The work planned is deliverable but risks exist of: ▪ pressure on access time availability ▪ obsolescence or disruption in support from second line support contracts ▪ interface works such as canal tunnels on the EMCL interface.	Minimise through signalling, control and communications renewal delivery plan.
Electrification and plant delivery	Reliance on the one road rail vehicle assumed with no replacement or refurbishment assumed	Regular inspection and maintenance of the vehicle. Review options for hire/other vehicle sources.

Risk area	Specific risks	Mitigants/comments
Major TSI requirement / other regulatory change	Plan assumes installation of GSM-R. No further requirements expected in CP2 – any major new requirements could cause disruption and delay.	Active engagement on European changes. Likely specified upgrade in CP3+ if required.
Delivery of cost saving plans	Both NR(HS) and HS1 Ltd include cost and headcount savings compared with current establishment. There is a risk that these savings cannot be delivered. This risk is on NR(HS) and HS1 Ltd respectively in CP2 but it reduces the opportunity for outperformance share and further reductions from CP3.	Detailed planning and successful execution of business plan to ensure continuous improvement savings.
Pass through costs increase in real terms	The risk and opportunity for pass through costs (insurance, rates, UKPNS and electricity) sit with train operators. Costs can go up as well as down.	HS1 Ltd continued focus on efficient procurement as delivered during CP1. Joint projects with train operators (e.g. regenerative braking) and involvement of operators if key changes are to be made (e.g. in any decision to go for a further rates review, whether to lock in electricity prices more than one year ahead)

Q17 Do you believe we have properly and completely identified the key risks?

Part D: Conclusions

15. Concluding statement

This 5YAMS sets out our plans for CP2 and beyond. It shows how we will deliver what our customers want from HS1, which is primarily to maintain the current excellent performance. It outlines how we will meet our long term asset obligation to hand back HS1 with capability equivalent to that at the start of the concession despite it being 30 years older. And it illustrates the progress we have made in making HS1 more affordable. Our plans have been developed in collaboration with our partner NR(HS), as well as train operators, ORR and DfT.

15.1. ORR determination

The ORR's approach to determining the level of OMRC payable for CP2 was set out in the ORR consultation on the periodic review process. ORR will consider:

- Our **outputs** (as set out in Section 8)

We are delivering outputs that our customers want in a way that underpins their business models. We have worked with operators to define these outputs and have agreed key areas and metrics that we will track over time. The needs of the train operators are in turn driven by what their customers want, providing a line of sight from HS1 outputs to passengers.

- Our **regulatory framework** (as set out in Section 13)

We propose largely rolling over the existing framework because it is working well, was extensively reviewed only recently in the lead up to letting the HS1 concession, and there is limited appetite for change among stakeholders. The key change is the introduction into the Access Terms of a mechanism to share outperformance with train operators.

- Our **asset management strategy** (as set out in Section 10 and the NR(HS) Five Year Asset Management Statement and supporting documentation)

Our world class performance levels show we are operating and managing the asset well. Asset management is key going forward, as the asset ages, and we are challenging ourselves to do more with less, drawing on accumulated professional expertise and learning from others where possible. Our work is underpinned by new techniques and analysis, such as whole life cost modelling, and improved data collection to inform better decisions over time.

- Our **efficient costs** (as set out in Section 11 and the NR(HS) Five Year Asset Management Statement)

Our cost plans have been built from the bottom up and embody significant stretch. We have shared them with stakeholders at a very granular level to allow challenge on an individual line basis. Our plans respond to, and largely incorporate, the recommendations from external bottom up and top down benchmarking, which has provided high speed rail comparators that we can continue to develop during CP2.

Our operations and maintenance costs have reduced by £63m/13% in CP1 against the original agreed budget and £44m of this saving has been delivered to customers. Our CP2 plans propose an additional 15% operations and maintenance cost reduction on this CP1 exit.

Our approach to long term renewals balances our long term asset stewardship obligations with affordability considerations. Before CP1 no detailed work had been done to assess the renewals requirements. In the last year we have developed detailed plans to put renewals on a more sustainable footing. The renewals annuity has increased from a low CP1 base (of £5.7m pa) to £23.5m pa in the Baseline renewals option and to £16.5m pa in the Asset Stewardship option. We are proposing to apply the Asset Stewardship case for CP2.

The ORR determination will identify separately the costs for NR(HS) and the remaining costs of HS1 Ltd. Total OMR costs for CP2 are shown in Table 82 with the NR(HS) costs split out.

Table 82: CP2 costs (£million, February 2013 prices)

	15/16	16/17	17/18	18/19	19/20	Total
NR(HS) Annual Fixed Price +1.1% escalation	40.5	39.7	38.7	38.0	37.6	194.4
Other O&M costs	25.2	25.2	25.7	25.6	24.9	126.5
Renewals annuity	16.5	16.5	16.5	16.5	16.5	82.3
Total OMR cost	**82.1**	**81.4**	**80.8**	**80.0**	**78.9**	**403.2**

- Our proposal for the **level of OMRC payable** in CP2 which is shown in Table 83. In CP1, OMRC was indexed by RPI + 1.1%. During CP2 we propose to index OMRC by RPI only, saving train operators £4.4m in 2019/20 and £14.5m over the whole of CP2.

Table 83: OMRC per train per minute/per train-km (February 2013 prices)

	International passenger services £ per minute	Domestic passenger services £ per minute	Conventional freight services £ per train-km
Vehicles	Class 373	Class 395	Class 92
OMRC			
OMRCA1	£9.40	£3.28	£3.52
OMRCA2	£15.03	£3.22	£27.53
OMRCB	£21.46	£24.40	-
OMRCC	£7.73	£7.73	-
Total OMRC	**£53.62**	**£38.63**	**£31.05**

15.2. Impact on passenger services

We have proposed a package of initiatives to address operator challenge identified in the line of sight discussions. We are keen to work with operators to refine and develop them, so we can implement a set of agreed projects. These initiatives will deliver benefits in terms of:

- Improving our response to big incidents, both in terms of performance recovery but also information flow;
- Working to achieve carbon reductions and reduce electricity costs; and
- Making a number of improvements to customer experience through better station environments. While not within the scope of this review, we want to take a holistic approach.

Operators also challenged us on value for money. We are pleased that we are able to propose reductions in OMRC for international and domestic passenger operators. Table 84 shows the evolution of OMRC from the start of CP1 to CP2.

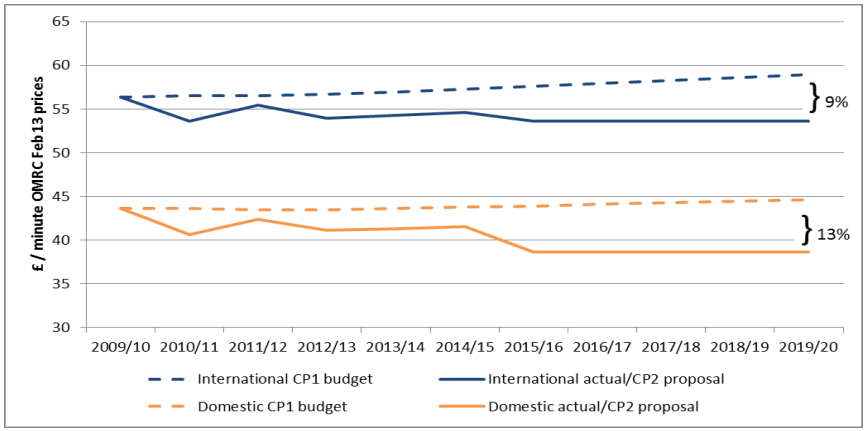
Table 84: CP1 and CP2 OMRC (£ per train minute, February 2013 prices)

	International passenger services	Domestic passenger services
OMRC CP1 start (2009/10)	56.38	43.58
OMRC CP1 exit (2014/15)	54.61	41.52
Proposed OMRC for CP2	53.62	38.63
% reduction		
from CP1 start	-5%	-11%
from CP1 exit	-2%	-7%

The change within CP1 reflects significant savings in pass through costs from better procurement and sharing of benefits from the renegotiated Operator Agreement. These savings have more than offset the RPI+1.1% indexation rate for CP1.

In CP2 the substantial savings in operations and maintenance costs more than offset a significant increase in renewal requirements. In addition we propose to escalate CP2 OMRC by RPI only, removing the real increase of 1.1% p.a. As shown in Figure 28, together these changes have a material impact on proposed charges.

Figure 28: OMRC savings



Compared with a continuation of the charge set out at the start of CP1, our charges in 2019/20 are expected to be 13% lower for domestic operators and 9% lower for international operators.

The current reviews of OMRC and LTC cover 33% of overall charges in 2013/14. The remainder is (i) IRC which was set at the start of the concession to recover construction costs and is not subject to periodic review and (ii) Qx which is agreed annually with train operators.

The impact of the proposed CP2 OMRC and LTC compared with CP1 exit is a £6.6m pa real saving on OMRC by 2019/20 partially offset by a £1.3m pa increase in station LTC charges (which of course are subject to finalisation in 2014), resulting in a net £5.3m pa saving in combined charges.

15.3. Impact on freight services

We want to support the availability of HS1 for freight services and hence have worked hard to reduce the freight specific costs. Although we have reduced these costs by 60% compared with CP1 levels, the very low volumes predicted (208 trains a year) result in high per train costs. Our freight operating customers are discussing funding options with the DfT and we will continue to support this discussion.

Q18 Overall do you believe that this 5YAMS plan when delivered is the right balance of affordability and asset stewardship and that it will support a safe, reliable and great customer experience railway?

Q19 What are the three most important issues for you within these plans?

16. Next steps

During the consultation period we will continue to engage with stakeholders to discuss our proposals in more detail. We have the following sessions planned:

- Operators / DfT 6/7 November, 26/27 November
- Discussion with ORR 8 November
- Whole industry workshop 11 November.

By early November we will also have had discussions with DfT, freight operators and the Rail Freight Group (RFG)

Given the level of detail shared within this consultation and the time available we want to run a targeted and efficient consultation. If operators would like more in-depth sessions on specific topics these should be possible.

We are seeking responses to the questions raised in our 5YAMS by Friday 29 November 2013. Please send your responses to:

Chinua Labor
Regulatory Contracts Manager
Email: chinua.labor@highspeed1.co.uk

and

Geoff Jones
Head of Regulation
Email: geoff.jones@highspeed1.co.uk

Following receipt of consultation responses, we will update the 5YAMS and submit the final version to the ORR in accordance with the timescales specified in the Concession Agreement, i.e. by the end of December 2013.

By April 2014, ORR will approve the 5YAMS or advise that it is not consistent with our general asset stewardship duty. In the latter case, the ORR will give reasons explaining its decision and details of the deficiencies to be remedied. There is then an iterative process to agree changes to our 5YAMS and supporting documentation as necessary.

We will also reflect ORR's final determination in changes to the following regulatory documents:

- HS1 Passenger Access Terms;
- HS1 Freight Access Terms;
- Passenger and freight track access agreements and templates; and
- HS1 Network Statement.

The new charges and changes to our regulatory framework will take effect from 1 April 2015.

Part E: Stations

17. Stations review

As noted in Section 4.1, stations are outside the scope of this periodic review. There is a parallel process with DfT on the review of the station Long Term Charges (LTC).

The original date for submission of the stations review to DfT was June 2014. However, in order to allow customers to consider overall charges for CP2, we brought this forward as much as possible, to February 2014 with emerging results presented in this 5YAMS.

This section presents a summary of the stations review process to date and emerging costs and charges. These emerging results are also under preliminary (interim) review by DfT and so do not reflect our formal stations review input to DfT. A six week consultation with train operators on these findings is scheduled to begin in early December 2013.

17.1. HS1 stations

HS1 has four stations, St Pancras International, Stratford International, Ebbsfleet International and the international part of Ashford International (the domestic part of Ashford International does not form part of the HS1 asset base).

St Pancras International is a Grade I listed building, originally opened in 1868. It was refurbished as part of the construction of HS1 and opened as an international terminal in 2007. It is operated and maintained by NR(HS) under a Station Concession Agreement. St Pancras International has been named best station by Passenger Focus in its National Passenger Survey for six years in a row.

Stratford International and Ebbsfleet International are new stations built as part of Section 2 of HS1. Construction was completed in 2007. They are operated and maintained by NR(HS) under a Station Concession Agreement.

Ashford International station was completed in 1996. It is operated and maintained by Mitie under a Station Management Agreement.

The international zones at St Pancras International, Ebbsfleet International and Ashford International are currently operated and managed by EIL.

Current passenger train operators using HS1 stations are:

- St Pancras International EIL, LSER, East Midlands Trains[1]
- Stratford International LSER
- Ebbsfleet International EIL, LSER
- Ashford International EIL

17.2. Station charges and regulatory framework

Costs relating to operating, maintaining and renewing the stations are charged to train operators through either Qualifying Expenditure (Qx) or Long Term Charge (LTC). The allocation of costs between train operators is governed by the mechanisms in the HS1 Station Access Conditions.

Qualifying expenditure (Qx) covers the station operating, maintenance and repair expenditure. Best estimates of costs are provided by the station operators. Payments are based on the annual best estimate with a wash-up every six months to reflect the difference between estimated and actual costs. Train operators can challenge the estimated and actual costs.

Long Term Charge (LTC) covers expected expenditure on asset renewal activities at stations over a 50 year horizon. The principle is that over 50 years, the LTC income will be sufficient to fund the necessary expenditure on these activities. LTC is a fixed annual amount indexed annually by RPI. LTC for each station is apportioned between the train operators using the

[1] Additionally, First Capital Connect (FCC) is a “diversionary” user of St Pancras International. For normal operations, FCC uses an area outside our concession that we do not manage, but it is contiguous, and FCC may use the station when its own services are perturbed.

station based on a combination of vehicle departures and the relative size of the international, domestic and common areas at the station.[1]

The LTC element of station access charges is subject to review for each control period. The LTC review process is governed by provisions in the HS1 Lease and HS1 Station Access Conditions. LTC costs and charges are subject to approval by DfT.

17.3. LTC review process

As part of this review process and through our day-to-day operations, we have already consulted with train operators to understand their concerns and their aspirations for the stations and to find the best way forward within our contractual framework.

We have fully reviewed the CP1 documentation and the CP1 models and updated them for CP2. We appointed Halcrow as a specialist independent consultant to support this process, with a scope agreed with DfT.

In the initial phase of this work we:

- Built four new life cycle cost models (one per station), including significant extra assets/areas built and/or brought into service since the start of CP1;
- Developed and applied asset criticality ratings;
- Improved model functionality;
- Reviewed underlying costs and refined treatment of "on-costs" reflecting a better understanding of the assets and their requirements;
- Aligned with the 2012 Station Access Conditions by reallocating a number of line items to Qx; and
- Updated the LTC financial model, based on the results of the life cycle cost modelling.

The output of this was a CP2 Baseline set of life cycle costs and a resulting LTC annuity.

Following this we worked with our advisers Halcrow and the station operators NR(HS) and Mitie to develop an "Asset Stewardship" position which included:

- A review of intervention frequencies, applying HS1 Ltd engineering judgement and actual experience to add value to manufacturers asset life recommendations;
- A further review of on costs;
- Applying appropriate lessons learned from the 17 years of experience at Ashford International across the other stations.

During the process we held tri-lateral meetings with ORR and DfT to ensure transparency, consistency and no double counting of costs and a workshop with the train operators.

As part of PR14, we developed a set of output measures (including station measures) and asked our current passenger operators to tell us where we stand against each of them. Section 8 sets out a summary of their responses and an overview of how we are addressing their concerns. More detailed proposals for the measures related to stations will be included in our final stations review submission to DfT in February 2014.

17.4. Emerging results

Emerging results are provided here to allow passenger train operators to consider overall access charges (track and station) for CP2. It should be noted that at this stage they are indicative only and are subject to further work and to DfT review and comments.

Table 85 shows the change in life cycle costs between CP1 and CP2. Both Baseline and Asset Stewardship cases are presented.

[1] We are responsible for the roof of the Thameslink box at St Pancras International. However, this is not expected to require renewal within the 50 year term considered in this LTC review.

Table 85: 45 year total lifecycle costs CP2 v CP1 (£million, Feb 2013 prices)

Station	CP1	CP2 Baseline	CP2 Asset Stewardship	Change Asset Stewardship v CP1
St Pancras	269	335	256	-5%
Stratford	43	76	46	+7%
Ebbsfleet	44	68	54	+23%
Ashford	36	46	33	-8%
Total	392	525	389	-1%

The life cycle costs are funded through the Long Term Charge (LTC) element of station access charges. LTC is calculated in a similar way to the route renewals annuity. LTC is deposited in an escrow account for each station.

Table 86 compares the LTC totals for CP1 and CP2. Both Baseline and Asset Stewardship results are shown.

Table 86: CP2 LTC summary of emerging results (£million per year, Feb 2013 prices)

Station	CP1	CP2 Baseline	CP2 Asset Stewardship	Change Asset Stewardship v CP1
St Pancras	4.4	7.2	5.4	+24%
Stratford	0.8	1.6	1.0	+21%
Ebbsfleet	0.9	1.4	1.1	+18%
Ashford	0.8	1.0	0.7	-8%
Total	6.9	11.3	8.2	+19%

The main drivers of the change from the CP1 LTC are:

- On-costs: an asset-specific view of the different classes of on-costs related to the renewals required replaced a general application of an assumed flat percentage;
- Intervention frequency: in the Asset Stewardship approach, we propose to move towards applying the experience learned in 20 years of managing Ashford International station, where less frequent intervention has been applied successfully; and
- Alignment with Station Access Conditions: moved a number of repair items from LTC into Qx, in accordance with the changes agreed in 2012. This led to a £64m increase in Qx over 45 years: we do not expect any impact on Qx in CP2. Examples of items moved to Qx are:
    - Consumables for lifts, escalators and travelators;
    - Back of house painting; and
    - Minor repairs to terrazzo.

The other adjustments from CP1 to both CP2 proposals are the increased station area made available and updated unit costs for materials and rates.

The Asset Stewardship annuity increases over CP1, despite the small decrease in underlying lifecycle costs primarily because of new interest rate assumptions which are consistent with those used for the PR14 route review. In addition, the escrow financing position is affected by new deeper peaks and troughs on LCC and differing intervention cycles.

Table 87 shows the allocation of LTC between train operators for both the Baseline and Asset Stewardship cases.

Table 87: CP2 LTC allocation to train operators (£million per year, Feb 2013 prices)

Station	Baseline			Asset Stewardship		
	LSER	EMT	EIL	LSER	EMT	EIL
St Pancras	1.5	1.7	4.1	1.1	1.2	3.1
Stratford	1.6			1.0		
Ebbsfleet	0.5		0.9	0.4		0.7
Ashford			1.0			0.7
Total	3.6	1.7	6.0	2.5	1.2	4.5

17.5. Timeline

Table 88 shows the timeline for the remaining elements of the stations review.

Table 88: Stations review timeline

Date	Activity
13/14 November 2013	Train operator update
6 December 2013	Train operator consultation starts
February 2014	CP2 submission to DfT
March 2014	DfT decision
April 2015	Start of CP2, new charges to take effect

Part F: Appendices

Appendix 1: Glossary/acronyms

5YAMS	Five Year Asset Management Statement
ACC	Ashford Control Centre
ARM	Asset Recovery Manager
ASP	Asset Specific Policy
BTP	British Transport Police
CA	Concession Agreement
CaSL	Cancellations and Significant Lateness
CBRE	Advisers to HS1 Ltd on rates valuation
CP1	Control Period 1 (October 2009 to March 2015)
CP2	Control Period 2 (April 2015 to March 2020)
CP3	Control Period 3 (April 2020 to March 2025)
CSR	Cab Secure Radio
DB	Deutsche Bahn
DBS	Deutsche Bahn Schenker
DfT	Department for Transport
DTN	Data Transmission Network
EAMs	Enterprise Asset Management System
EIL	Eurostar International Limited
EMGTPA	Equivalent Million Gross Tonne-km Per Annum
EMMIS	Electrical Mechanical Management and Information Systems
FOC	Freight Operating Company
FTAA	Framework Track Access Agreement
FWI	Fatalities and Weighted Injuries
FWSI	Fatalities and Weighted Serious Injuries

GSM-R	Global System for Mobile Communications – Railway
HPSS	High Performance Switch System
IGC	Channel Tunnel Intergovernmental Commission
IRC	Investment Recovery Charge
ITCS	Integrated Train Control System
JPIP	Joint Performance Improvement Plan
KICC	Kent Integrated Control Centre
KPI	Key Performance Indicator
LSER	London & South Eastern Railway Limited
M&E	Mechanical and Electrical
MAA	Moving Annual Average
NCN	Network Change Notice
NPS	National Passenger Survey
NR(HS)	Network Rail (High Speed) Limited
NRIL	Network Rail Infrastructure Limited
O&M	Operations and Maintenance
OA	Operator Agreement
OCS	Overhead Catenary System
OMA	Operations and Maintenance Agreement (covers the interface assets between the NRIL network and HS1)
OMRC	Operation, Maintenance and Renewal Charge
ORR	Office of Rail Regulation
PABX	Private Automated Branch Exchange
PDFH	Passenger Demand Forecasting Handbook
POE	Points operating equipment

PR14	2014 Periodic Review of HS1
QEOP	Queen Elizabeth Olympic Park
Rail Regulations	Railways Infrastructure (Access & Management) Regulations 2005 (as amended)
RCCS	Route Control Centre System
RFF	Réseau Ferré de France
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
ROGS	Railways and Other Guided Transport Systems (Safety) 2006 (as amended)
RPI	Retail Price Index
RSSB	Rail Safety and Standards Board
S&C	Switches and Crossings
S&T	Signalling and Telecoms
SGP	Signaller Generated Possession
SNCF	Société Nationale des Chemins de fer Français, the French national rail operator
SPIR	Significant Performance Incident Review
SRS	Strategic Route Sections
SoS	Secretary of State for Transport
TAA	Track Access Agreement
TOC	Train Operating Company
TSIs	Technical Specifications for Interoperability
TSM	Train Service Manager
UKPNS	UK Power Networks Services
UPS	Uninterruptible Power Supply
VCC	Switch locking system
VCS	Ventilation Control System
WLC	Whole life cost

Appendix 2: Summary of consultation questions

No	Question
Q1	Are there any gaps in how we have addressed the Concession Agreement requirements for the 5YAMS? If yes, please explain?
Q2	Do you believe that the NR(HS) asset management plan assumptions are appropriate? Are there any additional assumptions required that we have not captured in this section?
Q3	Can you please confirm that we have properly captured the output requirements for customers?
Q4	Do you have any comments on the appropriateness of our safety policy and approach in CP2?
Q5	What other factors should we consider in developing our asset management plans?
Q6	Are there any other upgrades that we should be considering for CP2?
Q7	Do you have any comments on the appropriateness of NR(HS)'s CP2 cost plans?
Q8	Please comment on the benchmarking work performed - and its application in the CP2 plans and usefulness in driving efficiency from CP3 onwards?
Q9	Do you have any comments on the appropriateness of HS1's CP2 cost plans?
Q10	Do you have any comments on the appropriateness of pass through costs in CP2? Have we properly captured the options to reduce pass through costs in the remainder of CP1 and CP2? Would you consider a rates review within the next 12 months?
Q11	Please provide comments on the robustness of our freight cost forecasts. Are there any factors that we have not considered?
Q12	Do you support the work we are doing on reducing traction and non-traction power costs? Are there any other opportunities which you believe we should be considering?
Q13	Does our CP2 renewals annuity proposal of £16.5m p.a. correctly balance affordability with meeting long term asset renewal obligations?
Q14	Do you agree with the assumptions/cost allocation in the financial model used to generate track access charges? If not, please provide an explanation.
Q15	Do you believe that an alternative to the CP1 freight supplement is required to support the continuation of freight traffic in CP2? If so, what is the right mechanism for this support?
Q16	Do you agree with our proposal for each regulatory framework item?
Q17	Do you believe we have properly and completely identified the key risks?
Q18	Overall do you believe that this 5YAMS plan when delivered is the right balance of affordability and asset stewardship and that it will support a safe, reliable and great customer experience railway?
Q19	What are the three most important issues for you within these plans?