

# HS1 Strategic Asset Management Plan (SAMP)



# HS1-AMS-201

## June 2022



Status	Final
Version	1.1
Date	21/06/2022

# 1. Foreword

The HS1 Strategic Asset Management Plan (SAMP) sets out the HS1 Asset Management Objectives giving them strategic context and describing the methodologies to be followed. The SAMP has been revised as part of HS1's preparation for Periodic Review 24.

This SAMP brings together a single strategy for all HS1 assets, reinforcing a consistent approach to asset management across the business. This aligns with the likely transfer of HS1 station asset regulation from DfT to the ORR.

The key drivers that are currently steering our business and shaping our asset management decisions are the impact of the Covid 19 Pandemic, Sustainability and Growth.

The Covid 19 pandemic recovery and ongoing reduced passenger numbers has put significant commercial strain on the HS1 system and our strategic partners. Our central assumption is that train paths will return to somewhere close to pre-pandemic levels within the next 2-3 years, however this is not a certain outcome and this SAMP presents four recovery scenarios to help us consider a future state that differs significantly to that of pre-pandemic.

This SAMP will help HS1 and our strategic partners to continue to deliver excellent operational performance and prioritise investment consistently, improving cost efficiency and reducing costs for train operators.

We hope that this document is useful for all readers and we really do welcome your feedback.

## 2. Purpose and scope

### 2.1. Introduction

What is HS1 if it isn't the physical infrastructure – our magnificent stations used by millions of people every year, with passengers travelling along the fastest railway in the UK, through tunnels under London and the Thames, over the award winning Medway Viaduct, all powered by environmentally friendly electricity.

How we look after our assets is fundamental to our business. Beyond our legal duty to operate, maintain and renew our assets, we have an important role contributing to the overall success of the UK plc. Many thousands of jobs in Kent and London rely on us providing reliable and economical infrastructure.

Our long term thinking supports public and business confidence in London and the South East. And our infrastructure is not only one of the most convenient connections to the continent of Europe, it's also the most environmentally sustainable.

Our asset management strategy sets out the methodologies that we, and our strategic partners, will follow to deliver our strategic objectives. Ultimately, this is about coordinating all our processes and activities to continue to deliver a world leading high speed rail experience: to be the sustainable transport system connecting London, Kent and Europe.

As part of our responsibility for the stewardship of the railway we, at HS1, provide strategic leadership as an intelligent client. We actively listen to our customers who are vital for the viability of our business. And we work closely with our strategic partners who we depend on to make sure the railway is available for use every single day. Put simply, for us to be successful, both our customers and our strategic partners must be successful.

In this light, we are sharing this strategic asset management plan widely, with transparency and openness. We want to not only set out what we will do, and our expectations for our strategic partners, we also want to invite our customers, regulators and wider stakeholders to engage with us, to help us improve and refine our approach as we continue on our asset management journey together.

The first sections of this document set out some strategic context which frames our overall approach. This includes the impact of the COVID 19 pandemic, and how things will recover in the future. We are keen to hear feedback from all stakeholders on these sections (sections 1 to 3).

Section 4 describes our asset management objectives – the outcomes to be achieved through the operation, maintenance, and renewal of the infrastructure. This section is important as it sets out what it is we are trying to do. We would especially appreciate feedback from our customers and regulators in this section.

Section 5 sets out our expectations of our strategic partners and how we want to align our organisations around delivering the asset management objectives. This will also show how we make decisions and set out the expectations for our partners which will enable those decisions to be made. A huge part of this is about how we will put forward a credible plan for the next regulatory control period (CP4) and also sets the direction for the 10 years thereafter.

Sections 6 onward, framed as appendices, provide more extensive detail and context supporting the strategic asset management plan. These sections are intended to be useful for specific aspects of our overall approach to asset management, and while everyone is most welcome to do so, we do not expect all stakeholders to read the appendices.

## 2.2. Strategic partners and stakeholders

With over a decade of experience working with our strategic partners, we are grateful to have ongoing support and positive working relationships aligned around the delivery of our purpose: to be the sustainable transport system connecting London, Kent and Europe. Working with our strategic partners we act as both a supplier and a client.

Our customers provide domestic passenger services and international passenger and freight services between the UK and Europe. Our strategic partners are essential in supporting us to operate, maintain and renew the infrastructure our customers rely on.

We are regulated, with the primary obligations set out in our concession from the UK government to operate, maintain, renew and replace the HS1 assets until 31 December 2040.

Our shareholders are a consortium comprising funds, with a proven track record of owning and managing UK infrastructure businesses, advised and managed by InfraRed Capital Partners Limited and Equitix Investment Management Limited.

The following figure sets out our interactions with our stakeholders.

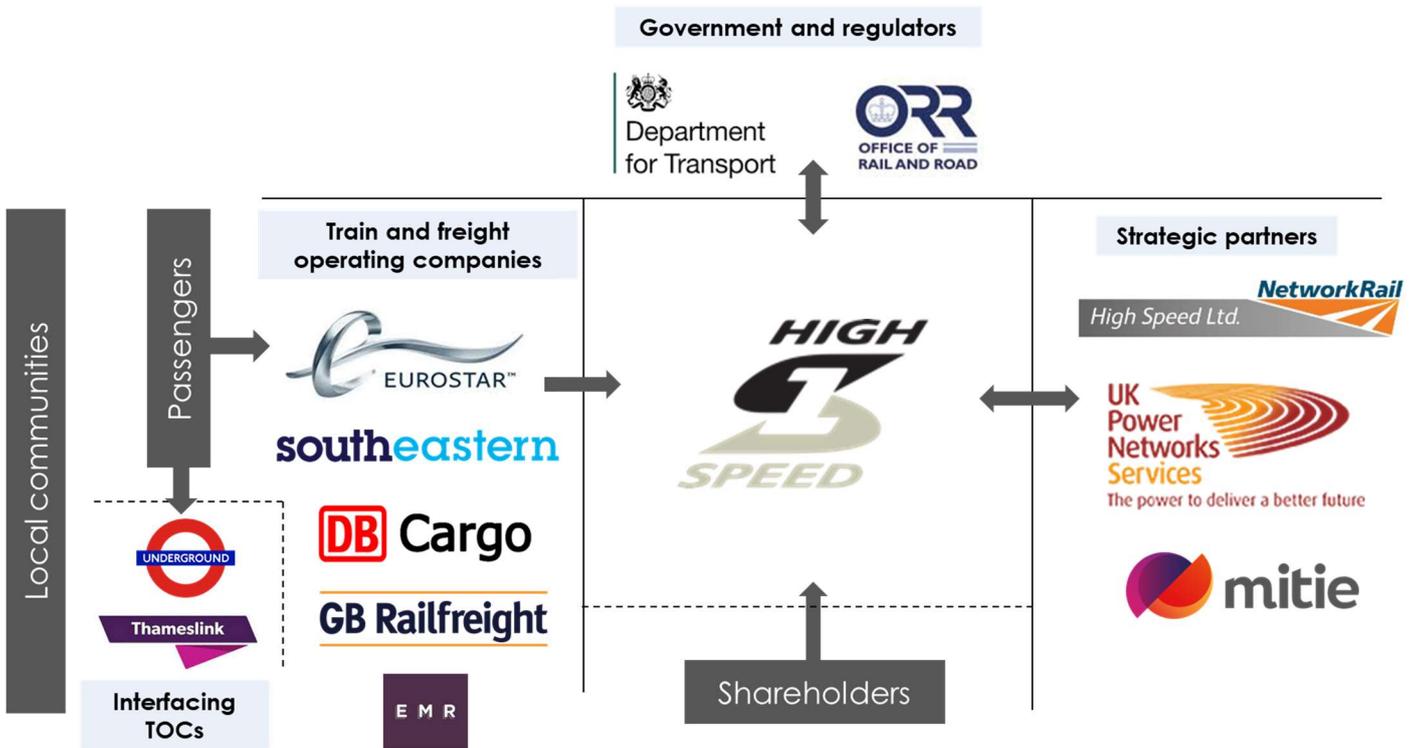


Figure 1: Stakeholder interaction map

## 3. The future of our assets

### 3.1. Strategic drivers for HS1 asset management

Our core business is about ensuring that the HS1 infrastructure is available for our customers when they need it. As set out in the HS1 concession agreement, our primary revenue stream is the sale of train paths. Our drivers are aligned with our strategic partners and their successes are to our benefit. Our strategic drivers are listed below:

- Impact of the COVID 19 pandemic
- Sustainability
- Growth

Our asset management approach is ultimately about sustainably delivering service to our customers, with long term reliability and performance. Everything we do is centred on maximising the value of our assets, and minimising our costs. One of the most significant challenges to our asset management approach has been the COVID 19 pandemic.

The COVID 19 pandemic has been brutal, impacting every aspect of our business – particularly the health and wellbeing of our people and of our strategic partners.

With the various travel restrictions and lockdowns, passenger demand massively reduced and has only recently started to recover. This has been a big shock to the system. The way that we use our assets to support our customers has changed, and our customers' requirements have also changed.

Although the future is uncertain – one thing we do know is that we will continue to work hard to respond to the ongoing changes in demand and utilisation.

Some fundamentals of HS1 have remained consistent throughout the pandemic.

Safety remains at the heart of what we do. We are proud of our safety record, and always strive to improve safety for our people, our strategic partners, and the general public who interact with our assets.

We still believe in the value of providing an environmentally friendly and sustainable connection for London, Kent and Europe. The value is not just social - but also serves part of the unique proposition to passengers that will encourage a return to growth.

The performance demands from the system will continue to be high, with continued expectations for consistently reliable world class performance, and resilience improvements to be maintained.

Likewise, the terms of our concession agreement have not changed, and we are obligated to consider the long term stewardship of the assets in terms of condition and performance, through the whole of our concession and for the whole life of the assets.

All of this together represents a need to improve our baseline asset management capability over time, keeping pace with industry good practice.

We are driven to maximise the value of our assets, where value is framed by the concession agreement. Working with our strategic partners, we are also driven to reduce the costs of the assets, both in the short and long term, where costs are regulated through the periodic review process. We believe that the balance of value and cost will return broadly to what it was before the pandemic, however the rate of this return is uncertain. To ensure resilience against a longer term step change, we need to consider alternative futures.

To be clear – we completely understand that cost must be optimised to support the regrowth in demand. This is essential for our customers as it is essential for our own business needs. It is absolutely critical therefore, that future interventions – everything we do to look after the infrastructure – need to be carefully considered in terms of timing, delivery methodology, and cost impact.

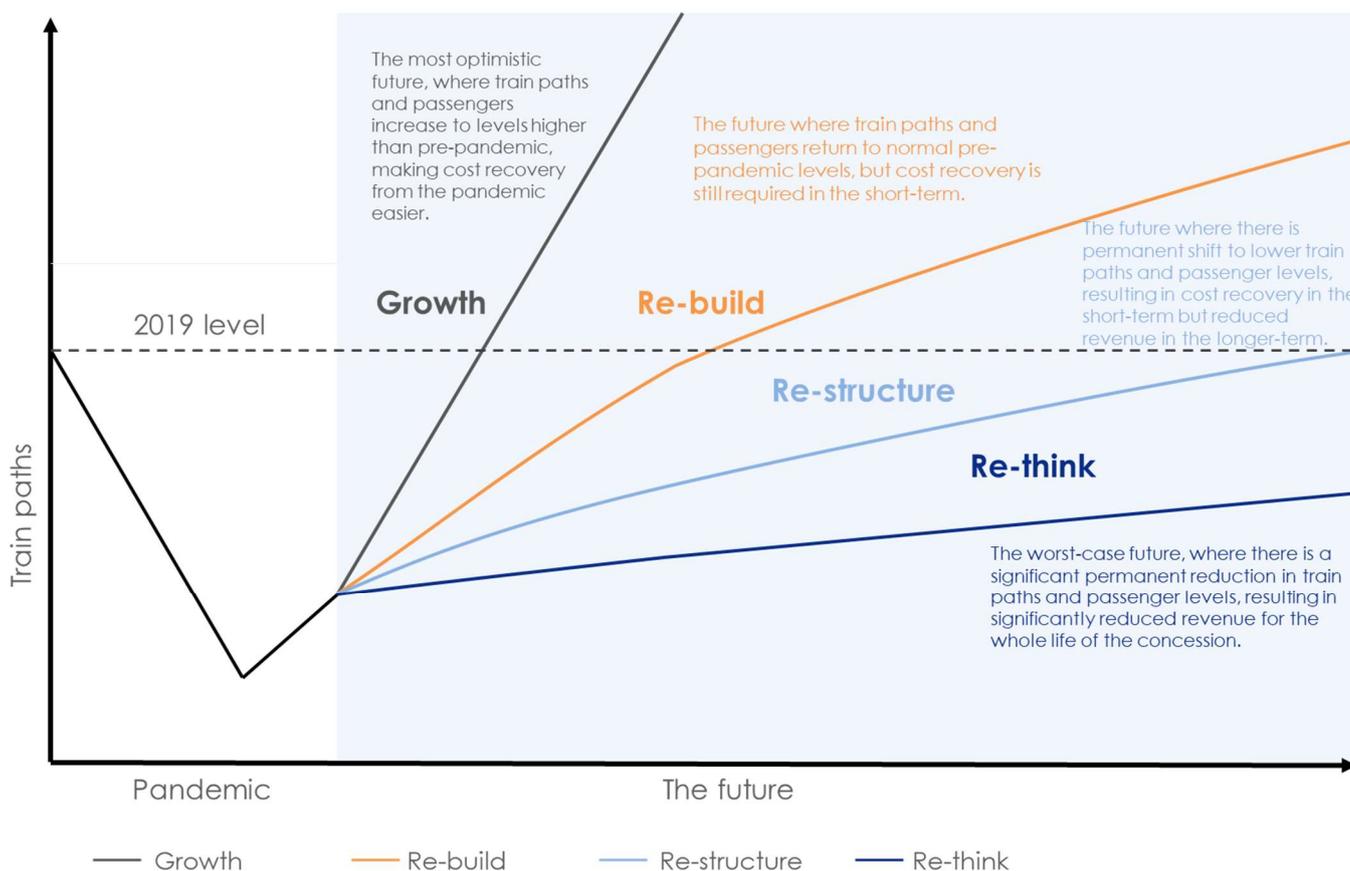
Further context for our strategic drivers is provided in appendix section 6.2.

### 3.2. Reference future states

The COVID 19 pandemic means the future for the rail sector is uncertain. Our central assumption is that train paths will return to somewhere close to pre-pandemic levels within the next 2-3 years, however this is not a certain outcome and we must consider a future world which is very different to the one that existed in early 2020.

We have set out four reference future states which are shown in the diagram below. We expect that the most likely future state will be 're-build' however we must consider all future states: what can we do to support 'growth', and how might our asset management approach change under 're-structure' or 're-think'?

Figure 2: Our reference future states (illustrative only)



We believe that the 're-build' scenario is not only most likely, but the most prudent to plan for in terms of our assets, balancing the recognition that overall demand has taken an unprecedented trajectory over the last two years, with the sensible assumption that it will return in future.

We recognise that the demand trajectory through the pandemic has put significant commercial strain on the High Speed 1 system and its stakeholders. Consequently, our objective with this document is to set out the process we will follow with our strategic partners to develop optimised and efficient asset management plans that consider a full range of options. This will ensure our asset management activities are resilient to an uncertain future, and efficient enough to help drive recovery.

Expectations of our strategic partners are set out within section 5 of this strategic asset management plan. However, in relation to the future of our assets in particular we are expecting 4 high-level scenarios from our strategic partners, one for each future state. These will ensure that we have fully considered all possible options and enable us to agree a consensus on the costs of delivering the railway with our customers. These scenarios will set out the expected condition for the assets at the end of the concession, for each future state, along with the associated costs. Once a consensus has been agreed, we will work with our strategic partners to develop detailed plans that we, our customers, the ORR and DfT have confidence in.

To support our strategic partners in the development of the different scenarios and condition estimates, we will continue to lead engagement with our regulators, through our established relationships with both the Office of Rail and Road and Department for Transport.

One of our principles is to be agile. We expect our strategic partners to be adaptable to whatever future state we find ourselves in. When planning for each future state, ideas and scenarios may be generated that could add value to the core future state. It will be important to capture opportunities and lessons learnt through the planning process to ensure that all plans provide the best value. This is set out using the asset management objectives.

## 4. Our asset management objectives

Within HS1 we are united around our asset management policy and we all have a role in delivering our asset management objectives. Our asset management objectives are based on our organisational purpose and vision and have the full backing of our senior management team.

This is about more than executing our duties set out in the concession agreement, this is about how we continually add value to our business, reduce cost, control risk and improve performance.

We use our asset management objectives to define the outcomes to be achieved by us, and our strategic partners. Further – using our asset management objectives is the primary methodology by which cost is balanced against the other outcomes to be achieved.

### 4.1. Our organisational objectives

Figure 3: HS1 purpose, vision, and values



Our purpose, vision and values drive the outcomes we want to achieve through our ownership of our infrastructure, this is achieved through our seven supporting workstreams, one of which is asset management. The vision and values provide the overarching framework in which we set out our asset management objectives (AMOs).

### 4.2. Asset management objectives

The asset management objectives listed below in Table 1 consider our legal, regulatory and stakeholder requirements. The AMOs have been modified to take into account external factors such as the COVID 19 pandemic and subsequent impact on TOC revenues. Environment and social also now features as a standalone objective, reflecting the current challenges around sustainability including carbon net zero, environmental and social impacts. An objective for growth is also included, reflecting the needs of our shareholders.

The weightings shown in the table represent level of effort/importance of each objective for each reference future state. As each future state is different, there is changing importance of each objective. The weightings are used by our strategic partners to determine the criticality of an asset to achieving the objectives.

Table 1: HS1 Asset Management Objectives (AMOs)

Business attribute	Asset management objective	Weighting for each future state			
		Growth	Re-build	Re-structure	Re-think
<b>Safety</b>	We will manage our assets so that the risk of a safety incident is as low as reasonably practicable.	40%	40%	40%	40%
<b>Performance</b>	<p><b>Punctuality</b> - We will manage our assets so that passengers arrive on time.</p> <p><b>Availability</b> - We will manage our assets such that the availability of route assets will meet the needs of our passengers and the train operating companies.</p> <p><b>Satisfaction (stations)</b> - We will manage our assets to maintain the asset related elements of the NRPS score at or above the current levels of scoring. Recognising the importance of station architecture, internal design, cultural significance and general ambience in influencing passengers' experience.</p>	30%	30%	25%	20%
<b>Cost effectiveness</b>	<p>We will ensure that the total cost (operational and capital) of managing our assets (over the concession time period) is demonstrably cost effective and provides good value whilst balancing external cost pressures (such as the impact of the COVID 19 pandemic) with the need to minimise risk and maximise performance.</p> <p>Costs will be different for the different future states – for example, in a 're-think' future state, short term cost reductions may be more important than whole life cost. Likewise, in a 're-build' future state, whole life cost becomes more important.</p>	10%	15%	25%	35%
<b>Environment and social</b>	We will manage our assets to enable our sustainability strategy, including: protect and reduce our impacts on the natural environment and on our local communities; and achieve our carbon net-zero ambitions.	5%	5%	5%	0%
<b>Growth</b>	We will manage our assets to support long-term growth in capacity and revenue, taking future demand into account.	15%	10%	5%	5%
<b>Legal compliance</b>	We will comply with all legislation, HS1 consents, Historic England conditions, concession agreement, (station) leases and environmental policy commitments.	Mandatory	Mandatory	Mandatory	Mandatory

### 4.3. How asset management objectives are used to support periodic review

In October 2009, the Office of Rail and Road (ORR) published a statement setting out their approach to the regulation of the HS1 network. Subsequent periodic reviews have been generally consistent with this approach. Revisions have been made to align the DfT regulation of stations with the ORR's role as the rail regulator.

The periodic review process is important, as this is the principal mechanism for realising changes to costs in response to the current and anticipated strategic context.

Figure 4 sets out the key milestones in the periodic review process and how the asset management process fits in, with more detail provided in appendix section 6.1.2. Figure 5 provides a timeline for indicative dates for each of the key milestones. It should be noted that these dates may change dependant on both the ORR's periodic review process document, and the five year asset management statement production plan as agreed with the strategic partners.

An opportunity has been identified to agree concensus on a single scenario earlier in the periodic review process for PR24 and discussions are ongoing. The timelines in Figure 4 and Figure 5 may be revised upon conclusion of these discussions.

Figure 4: Periodic review key milestones and asset management process

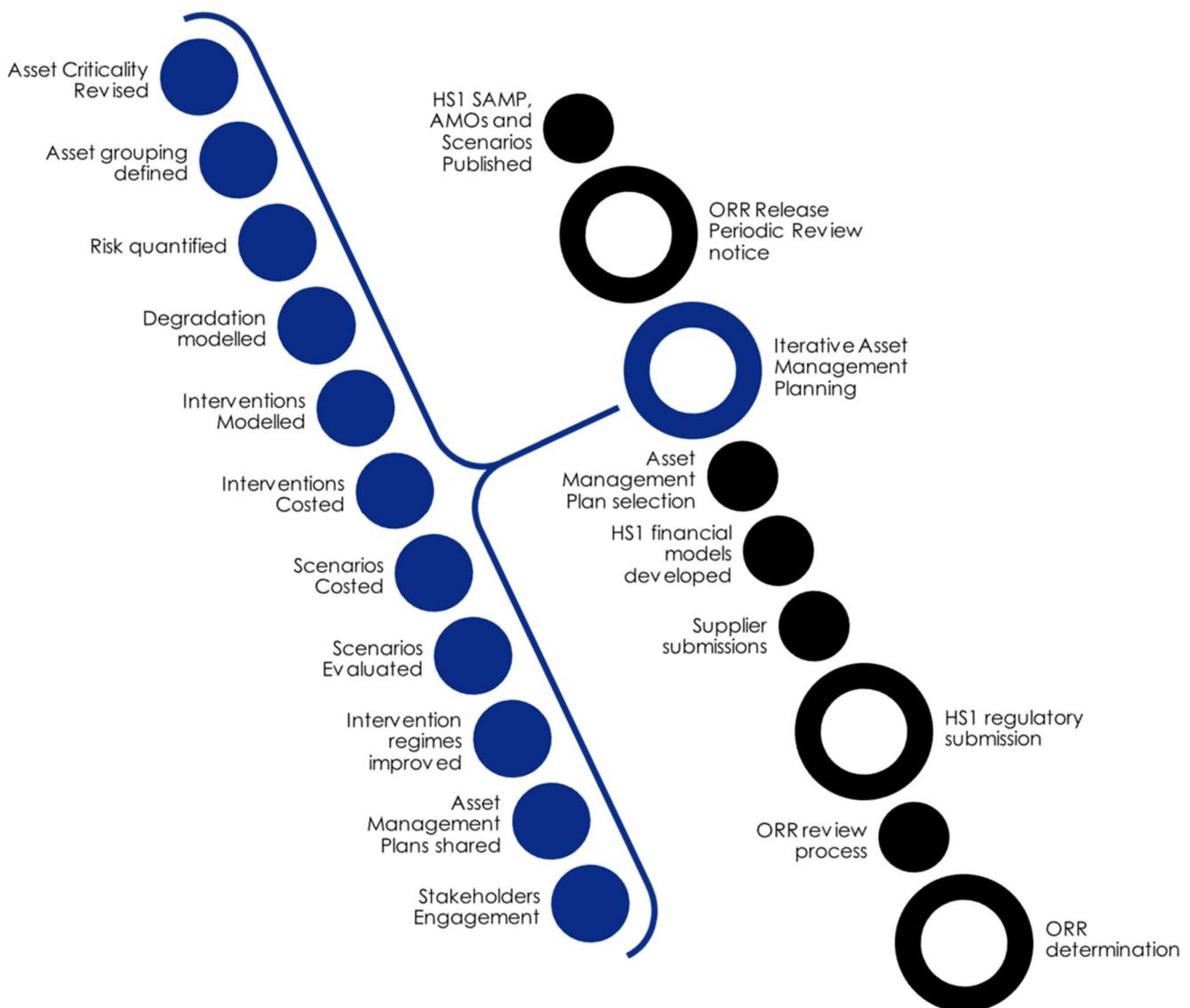


Table 3 in the appendix 6.1 sets out the key activities to be undertaken by HS1 strategic partners within the development of their asset management capability and in support of the iterative asset management planning process. This list provides guidance and is not to be considered exhaustive, HS1 welcomes innovation, continuous improvement, and encourages strategic partners to identify and share asset management best practice.

Figure 5: Periodic review indicative timeline



## 5. Expectations of our strategic partners

Our strategic partners are critical to our success. We all want to do a good job, continuing to make a positive impact for the communities we serve across London, Kent and across continental Europe.

In addition to setting out expenditure and investment scenarios aligned to the future states, we expect all strategic partners to apply best practice asset management and to be able to demonstrate their maturity level against the ISO standard, through independent assurance and/or accreditation.

This will enable us and respective partners to be agile and meet the challenges of whatever future state we find ourselves in.

We also expect our strategic partners to demonstrate:

- The impact of the scenarios on the HS1 AMOs over a 5 and 40 year timeframe;
- How they will deliver against the HS1 AMOs during PR24. This should include definition of associated measures/KPIs to track progress against achievement;
- The impact on asset condition for each future scenario over a 5 and 40 year timeframe;
- Achieve the contractual minimum expected performance in all future scenarios; and
- Maintain a base level of asset management system maturity, set out in appendix section 6.7.5.

### 5.1. Asset management system documentation

Our partners are required to develop and maintain documentation for their asset management systems, including a plan for continual improvement. The documents and processes listed below are a basic requirement of ISO 55001 and for good practice asset management, therefore we expect all our partners to have these developed as a minimum:

- A strategic asset management plan (SAMP) that sets out the AMOs, the strategy for managing the assets and the strategy for the partner asset management system;
- Asset management plans (AMPs) for each asset type which set out in detail the plan, cost and resources required to deliver the AMOs;
- An asset information strategy (AIS) which sets out a strategy to manage asset information (required for decision making) and an improvement plan;
- A documented decision-making framework, which sets out how investment decisions are made including development of investment scenarios, asset criticality and risk; and
- An asset monitoring and reporting framework that underpins the risk management framework, focused on critical assets.

This is set out diagrammatically with further context in appendix section 6.6.

### 5.2. Asset management plans and underpinning

#### 5.2.1. Developing scenarios

In section 3.2 we set out the reference future states which we expect our strategic partners to use in developing scenarios for their asset management plans. It is essential that the plans are underpinned with high quality evidence, whilst some assumptions will be required, these should be kept to a minimum. The expectations for underpinning evidence include:

- Use of whole life cost models to demonstrate impact of expenditure on risk and performance;
- Use of actual historical cost data to underpin assumptions for future costs in models;
- Use of asset degradation models to understand change in condition over time;
- Use of actual historical quantified and/or empirical condition data to underpin asset degradation models; and
- Where degradation models are not available, then use of expert judgement to underpin assumptions.

## 5.2.2. Summary of asset condition

We expect our strategic partners to provide a statement of the expected asset condition, for each asset group or system, for multiple time horizons. This includes for 2030, and for 2040 to provide insights into the expected asset condition at handback.

We expect that NR(HS) will continue to use the electronic asset management system (eAMS) for route assets and FSI Concept for Station assets, along with the associated condition scoring framework (scores from 1-5) to collate and report asset condition. This will ensure consistency of reporting and enable trending of data. We also expect all our partners to use the latest technologies to help understand asset condition, such as remote condition monitoring and live telemetry data to inform of issues before they result in asset failures.

The route asset condition information will be transferred to the replacement eAMS system once an appropriate solution has been identified, approved and implemented.

## 5.3. Asset criticality

Criticality is the importance of an asset group or system in delivering the asset management objectives, in the context of the probability of the asset group or system failure. We expect our strategic partners to understand the criticality of the assets and ensure that criticality informs investment decision making to ensure that critical assets and systems are prioritised. Our partners will also be able to articulate how they determine asset criticality and how it changes over time.

Understanding the relative importance of asset systems helps determine the focus for maintenance expenditure and renewal activity, especially if the budget available is constrained. Importance also helps define redundancy in design performance standards or the factor of safety required to be designed into the assets. The importance of the system will also help define which systems need contingency plans should an asset fail.

Our approach to criticality is described in appendix section 6.4.

## 5.4. Risk management

We expect our strategic partners to be able to identify, assess and manage risks their assets pose to the achievement of the AMOs. Risks should be articulated in terms of consequence of impact and probability of occurrence. Best practice risk management allows for risks to be monetised, in terms of consequence cost and cost of treatment, however in practice many organisations will articulate risk as a score on a risk matrix. Risks should also be clearly differentiated from issues, as risks by definition have not occurred yet. Our partners will clearly define their risk management frameworks in the own SAMPs including how risk informs asset related decisions.

Understanding the cause of failures is critical in determining the risk of it happening again and defining the suitable mitigation, therefore we expect our partners to be conducting fault tree analysis on failures to understand root causes. This type of analysis should be used to inform probability and impact of the risk assessment.

It is our intention to develop a common risk framework which can be applied across all our partner organisations, allowing us to understand where the highest risks are on a common basis, this will be done in collaboration with our partners.

We require our partners to consider resilience as part of the risk management approach, this includes monitoring assets to understand where failures might occur before they do. Resilience should also consider the impact of externalities such as flooding, power outages and terrorism.

# Appendix

## 6. Appendix

### 6.1. Context of the organisation

We have the 30-year concession to own, operate and maintain High Speed 1 (HS1), the UK's only high-speed railway, as well as the stations along the route: St Pancras International, Stratford International, Ebbsfleet International and Ashford International.

HS1 is the 109km rail line between St Pancras International in London and the Channel Tunnel and connects the international high-speed routes between London and Paris, London and Brussels and London and Amsterdam, as well as the domestic route from London to Kent. Our railway infrastructure has physical connections with Eurotunnel, the DBS freight depot at Dollands Moor and the Network Rail classic railway at Ashford, Ebbsfleet, Ripple Lane and domestic lines north of London. We operate domestic (SE Trains Limited) and international (Eurostar International Limited) services, and also accommodate freight services.

#### 6.1.1. Stakeholder relationship overview

Table 2: Stakeholder relationship overview

	Stakeholder	Overview
Government and regulators	Department for Transport (DfT)	The DfT is the government department responsible for the transport network including HS1. The department is run by the Secretary of State for Transport and their role is to approve our Asset Management Strategy (AMS) and Life Cycle Reports (LCRs) which determine any changes to the Long Term Charge (LTC) agreed between us and the train operating companies (TOCs) through the <a href="#">periodic review process</a> . The purpose of the LTC is to cover the costs of maintenance and renewal of our stations and the periodic review is to determine these charges every 5 years as part of a Control Period.
	Office of Rail and Road (ORR)	As our regulator, <a href="#">ORR</a> is a non-ministerial government department responsible for the economic and safety regulation of Britain's railways and monitoring of National Highways. The ORR is responsible for approving track access to the HS1 network for train operations, conduct periodic reviews including current performance and interim access charges reviews.
Customers	Train Operating Companies (TOCs) and Freight Operating Companies	TOCs provide the funding for the operations, maintenance and renewals works through the purchase of train paths from HS1. They are consulted on the determination documents and complex projects. They also have the opportunity to provide comments on the annual statements. As a key stakeholder the TOCs are kept regularly informed of progress and consulted on individual projects where applicable.  TAAs set out the terms and conditions for access to the HS1 track and incorporate the HS1 Passenger Access Terms (PAT) or HS1 Freight Access Terms (FAT) as appropriate and include track charges, the performance regime, the possessions regime and periodic review provisions. Framework Track Access Agreements (TAAs with a duration of more than one year) require ORR approval.
		HS1 has granted SE Trains Limited and Eurostar International Limited ("EIL") access to the HS1 network through the relevant Track Access Agreements (TAAs). Certain revenues obtained by HS1 from SE Trains Limited are underpinned by HMG's Department for Transport.
		East Midlands Railway has a Stations Access Agreement with HS1 and contributes towards funding of stations assets and services.
	Station retailers and car parking facilities	Station retailers and car parking at stations provide unregulated income to HS1 Ltd.  The retailers' and the car parking facilities' owners would expect that each station be in good condition, and be accessible to any station users and passengers as described in the Station Access Agreement.

Stakeholder	Overview
Strategic Partners	<p>Network Rail High Speed Ltd. (the 'Operator')</p> <p>HS1 subcontract with NR(HS), a wholly owned subsidiary of NRIL, to operate, maintain, renew and replace the HS1 route assets and three stations (St Pancras International, Stratford International and Ebbsfleet International) on our behalf. NR(HS) holds the safety authorisation as the Station Facilities Operator and our relationship with NR(HS) is governed by a Station Concession Agreement.</p> <p>The Operator is required to comply with the Station Concession Agreement and Operator Agreement and to undertake good Asset Stewardship of the 'OA Infrastructure'. This includes developing the OA Asset Management Strategy based on the 'OA Policy' provided by HS1, meeting the minimum operational standards and providing the required infrastructure capabilities to enable HS1's service procurement.</p> <p>NR(HS) has two functions that we engage with regularly: Route and Stations, who manage different parts of our infrastructure.</p>
	<p>UK Power Network Services</p> <p>UK Power Network Services financed, designed, built and now operates, maintains and renews the electricity substations and high voltage distribution network under a series of agreements, which expire in 2057.</p> <p>The agreements encourage performance improvement, with incentives based on the impact of outages on HS1. The agreements also promote information sharing which helps the planning process and facilitates better integration of maintenance and renewals with the rest of HS1's strategic partners. Asset management commitments have been included within the arrangement between HS1 and UKPNS, which includes a stronger emphasis on asset stewardship.</p>
	<p>Mitie</p> <p>Mitie is appointed by HS1 Ltd to operate, maintain and renew the international section of Ashford International Railway Station on its behalf. The relationship between HS1 and Mitie is governed by a Station Management Agreement.</p> <p>Mitie is responsible only for asset management at Ashford International with EIL responsible for railway operations. Mitie also holds the Safety Authorisation and is required to undertake periodic station audits and inspections which include safety.</p>
Shareholders/ Investor	<p>The shareholders/investors have a reasonable expectation that HS1 has adequate resources to continue in operational existence for the foreseeable future. Relevant key factors include:</p> <ul style="list-style-type: none"> <li>The Company demonstrates satisfactory financial resources at the balance sheet and future cash flow projections; and</li> <li>The Company operates in a low risk, stable regulatory and commercial environment as noted in the principal risks and uncertainties section of the Strategic Report.</li> </ul>
Passengers	<p>Passengers have high overall expectations of their train journeys and station services. They expect their train tickets provide value-for-money, the provision of train services achieving high punctuality/reliability, an acceptable level of crowding, passenger-centred delay handling approach. These expectations are reflected in the <a href="#">National Rail Passenger Survey</a>.</p>

## 6.1.2. Partner activities to inform the periodic review process

Table 3: Partner activities to inform the periodic review process

Strategic partner activity	Description
<b>Asset criticality revised</b>	Partners use revised AMOs to review Asset Criticality. The asset management criticality is the relative importance of an asset group or system in delivering the Asset Management Objectives, in the context of the probability of the asset group or system failure to be available for its purpose.
<b>Asset grouping defined</b>	Partners grouping asset groups and systems to allow for the efficient consolidation of asset knowledge. Attributes may include, but are not limited to, condition, capacity, utilisation, and would be expected to be made with historic, current and forecast operational contexts.  This should be undertaken in the context of the HS1 Asset Information Strategy and the HS1 Asset Information Vision: supporting intelligence led asset management.
<b>Risk quantified</b>	Partners quantify risk for each asset group or system, described through failure to meet the asset management objective. Risk can be understood through application of performance, reliability, availability, maintainability and safety methodologies.
<b>Degradation modelled</b>	Partners use the accumulated asset knowledge to model predicted degradation of asset health over the asset lifecycle for each group or system, mapped to the HS1 regulatory business planning cycles. Specific time periods will include current and future Control Periods as well as a sufficient forward projection to inform 40 year whole life cost analyses. This degradation is to be modelled within the context of the future states and scenarios as set out in this document.
<b>Interventions modelled</b>	Partners set out intervention strategies for each asset group or system, informed by the degradation modelling, to include operations, maintenance and renewals, and predicting intervention impact on asset health.
<b>Interventions costed</b>	Partners model costs of interventions, both through top-down portfolio analysis, as well as bottom-up unit rate analysis per intervention per asset group or system. To support the costing of the interventions, the capabilities and competencies, and processes and systems, are to be defined and collated such that required resourcing per intervention can be determined.  These costs are expected to be estimated within historic, current and forecast operational contexts, and are to be made for the core future state to support the CP4 submission with additional consideration for how the plans would change for the alternative future states set out.
<b>Scenarios costed</b>	Using the costed interventions for each asset group or system, within the context of the possible future states, partners determine cost estimations for each scenario and future state.
<b>Scenarios evaluated</b>	Supported by HS1 and through stakeholder engagement, partners combine intervention options and costed scenarios to evaluate options with impact described in terms of the HS1 asset management objectives over a 5 year and 40 year timeframe.
<b>Intervention regimes improved</b>	Supported by HS1, partners identify improvements to the different intervention options through an iterative process. This can include, but is not limited to, cross-disciplinary reviews, and engagement across different partners, or through the use of subject matter experts and external benchmarking.
<b>Asset management plans shared</b>	Partners share asset management plans over a 5 year and 40 year timeframe responding to the scenarios and future states, in terms of asset management objectives, setting out benefits, drawbacks, risks, and opportunities.
<b>Stakeholder engagement</b>	HS1 facilitates stakeholder engagement which further informs development across each aspect of asset management planning.

### 6.1.3. Key milestones for the strategic planning process

Table 4: Key milestones for the strategic planning process

Key milestones	Description	Date
<b>HS1 strategic asset management plan, asset management objectives and scenarios published</b>	<p>As set out in this document, HS1 has reviewed and revised the asset management objectives to be used to understand the relative importance of each asset group or system. HS1 has also set out possible future states and developed scenarios to be used by partners to support partner iterative asset management planning.</p> <p>In parallel with the preparation of asset management plans, partners are expected to improve their asset management capability in preparation for the ORR's release of the periodic review process document.</p> <p>Outcomes: HS1 strategic asset management plan, asset management objectives, preparation of partner asset management plans and capability improvement.</p>	Starting May 2022
<b>ORR release periodic review notice</b>	<p>It is anticipated that the ORR will conduct an initial consultation in 2022. At least 26 months prior to the end of the current control period (CP3), the ORR will issue its periodic review process document notifying HS1 Ltd and stakeholders of the process it intends to adopt for the conduct of the next periodic review.</p> <p>Outcomes: Preparation for periodic review process.</p>	January 2023.
<b>Iterative asset management planning</b>	<p>Partners will undertake an iterative process to respond to the future scenarios and develop asset management plans with the best outcomes described in the context of the asset management objectives.</p> <p>This will be informed by this HS1 SAMP document and the expected subsequent asset management capability improvement to be undertaken by HS1 partners thereafter.</p> <p>During the iterative asset management planning, HS1 will facilitate stakeholder engagement to test and develop the scenarios.</p> <p>Outcomes: Asset management plan development.</p>	
<b>Asset Management Plan selection</b>	<p>Following the iterative asset management planning processes, final asset management plans are to be selected to be developed as the basis of regulatory submission.</p> <p>Outcomes: Finalised asset management plans.</p>	October 2023
<b>HS1 Financial models developed</b>	<p>Governed through the terms of the concession agreement, HS1 produce financial models used to support the creation of the 5YAMS, notably used to set out proposed access charges, that are regulated by the ORR.</p> <p>Outcomes: HS1 financial models.</p>	December 2023
<b>Partner submissions</b>	<p>It is expected that HS1 and its partners will work closely to create a coherent regulatory submission. In line with the various partner obligations, partners will provide their submissions to HS1, to be appended to the overall regulatory submission to the ORR.</p> <p>Outcomes: Regulatory submissions to HS1.</p>	January 2024
<b>HS1 Ltd submits draft 5YAMS to ORR and commences</b>	<p>In line with schedule 10 of the HS1 concession agreement, HS1 will submit a draft 5YAMS to ORR and will commence a formal public consultation, during which period formal representations from key stakeholders are anticipated, including (but not limited to) train operating companies.</p> <p>This must occur at least 13 months prior to the end of CP3.</p>	February 2024

Key milestones	Description	Date
<b>formal public consultation</b>	Outcomes: Draft 5YAMS submitted to ORR, formal public consultation process initiated.	
<b>HS1 Ltd shall produce and submit to ORR the Final 5YAMS</b>	In line with the HS1 concession agreement, HS1 submits a final regulatory submission to the ORR at least 10 months prior to the end of CP3.  Outcomes: Final 5YAMS submitted to the ORR.	May 2024
<b>ORR review process</b>	Following HS1's submission of the final regulatory submission, the ORR scrutinises the finalised plans, issue a draft determination, and commence a public consultation. This must occur at least 6 months prior to the end of CP3.  During this consultation HS1 may make amendments to the 5YAMS, or submit additional information, in response to ORR findings.  Outcomes: Draft determination by ORR.	September 2024
<b>ORR determination</b>	The ORR will issue their final determination, as set out in HS1 Ltd's passenger and freight access terms. ORR will publish an implementation notice by the end of April 2025 that will implement the final determination through amendments to the track access contracts, passenger access terms and freight access terms.  The ORR determination must occur at least 60 business days prior to the end of CP3.  HS1 Ltd will then submit a revised Final 5YAMS in line with ORR final determination, within 20 business days of the ORR's final determination.  The final determination will be adopted and implemented at the start of the new control period (CP4) on 1 <sup>st</sup> April 2025.  Outcomes: Final determination by ORR.	ORR Determination - January 2025  Final 5YAMS – February 2025

## 6.2. Further context for strategic drivers

### 6.2.1. Impact of the COVID 19 pandemic

The COVID 19 pandemic has had a significant impact on the train operating companies as the travel industry experienced an unprecedented fall in demand. The pandemic and associated local, national and international guidelines and restrictions, meant that fewer passengers have been travelling resulting in a fall in revenue for train operating companies. The government decided to keep trains running during this period. In terms of timetabled services there was a one third reduction in 2020-21 compared to the previous year, this includes an 84% reduction in international services. Fewer people visiting stations has also impacted retail businesses in our stations.

Eurostar's traffic took a significant hit during the pandemic however, SE Trains Limited was able to keep running a steady level of service. Due to UK government's decision to keep running trains during the pandemic, attrition on our assets continued, requiring ongoing maintenance.

This has presented and will continue to present a challenge for us, our strategic partners and train operating companies as we move towards an uncertain future where it is not entirely clear whether train paths will return to pre-pandemic levels. Going forward, asset management plans will need to account for the uncertainty brought about by the significant impact of the pandemic on the rail sector including the restricted revenues to keep up with an asset base that continues to age and experience usage.

## 6.2.2. Sustainability

We aim to provide the most sustainable option for transport across the UK and Europe and to protect and reduce our impacts on the natural environment and on our local communities.

Our sustainability strategy<sup>1</sup> is aligned to creating a more sustainable and environmentally friendly future. There are six areas of priority, which are core to the strategy. Each priority area has defined targets which we are committed to achieving.



Climate impacts



Energy use



Resource use & waste impacts



Social impacts



Biodiversity



Transparency

We have an important role to play in society in offering low-emission transport for the future. We are continuously looking to further reduce our impacts on climate change and ensuring the resilience of our infrastructure to account for future climate change. In line with our pledge to be fully carbon neutral by 2030, we are working with partners and stakeholders to develop a green energy procurement strategy. The strategy will include a mix of options such as energy reduction and efficiency and sourcing energy from green generation. We have already taken the first steps to achieving green energy generation.

We look to minimise energy use wherever possible, working with our partners to identify and implement energy efficiency measures, and building on the work we have already done such as upgrading to more efficient LED lighting. We are also developing standards which will be applied to those working on our infrastructure where applicable, outlining principles of energy minimisation in construction, operation, and maintenance. Minimising energy use will also promote cost reductions in a time where there is a particular focus on financial capital.

It is important to use products and materials more efficiently and to reduce waste. We are developing standards for project suppliers so that non-hazardous waste can be diverted from landfill. We are also embedding good practice waste minimisation within our organisation.

We are committed to providing a positive contribution to communities in and around our stations and lineside, and protecting and enhancing the lineside habitat under the requirement of the Channel Tunnel Rail Act 1996.

Our sustainability strategy is aligned with our partners who we work closely with to deliver improvements to the rail industry and promote best practice. We understand that each of our partners will have their own sustainability strategies focused on their specific impacts, but where there is cross over and alignment we will work together for greater gains. The collaboration is overseen by the Sustainability Steering Group, which is formed of senior representatives from all our partner organisations.

## 6.2.3. Growth

In line with our growth objective, we will manage our assets to support long-term growth in capacity and revenue. There is an opportunity of a modal shift to the rail sector. We will consider new business models as people are adopting new ways of working following the pandemic and explore new destinations.

We need to promote recovery in the coming years to encourage growth and we will continue to develop our understanding of what is important to drive this in the uncertain future such as maintaining performance, controlling track access costs, and facilitating new routes and traffic.

We appreciate that there are challenges in terms of growth in the current environment but there are also opportunities that can help push us forward to achieve our objectives.

---

<sup>1</sup> [hs1-sustainability-strategy-2020.pdf \(highspeed1.co.uk\)](#)

## 6.3. Overview of our asset portfolio

Our corporate strategy informs our asset management policy and directs how we manage our assets. As HS1 operates primarily through an outsourced model, our strategic partners play an important role in the realisation of our objectives. We have developed collaborative working relationships through previous control periods within the concession timeframe and we provide direction to our partners to improve their practices and deliver efficiently, and challenge where appropriate.

### 6.3.1. Route

NR(HS) operates, maintains, renews and replaces our route assets on our behalf under the operator agreement. For CP3, the operator agreement was renegotiated, with a break clause in 2035, to include a fixed price for operations and maintenance, which was to be determined through the PR19 process. The operator agreement contains separate provisions for renewal and replacement activities and specific additional services.

Historically, route has been divided into four main regions:

- St Pancras to Stratford
- Stratford to Ebbsfleet International
- Ebbsfleet International to Ashford International
- Ashford International to Euro Tunnel

NR(HS) route assets can be split into several categories, covering a multitude of assets:

Table 5: NR(HS) Route asset breakdown

Category	Assets
<b>Civils and environment</b>	Access (93,307km), Acoustic Barriers (70), Ancillary Structures (17), Bridges (248, 25.5km), Culverts (115), Drainage (226.5km), Earthworks (167.5km), Fencing and Boundary measures (331.0km), Lineside Buildings (117), Retaining Walls (128, 16.2km), Tunnels (29, 47.643km), Landscaping (324.45ha)
<b>Mechanical and engineering (M&amp;E)</b>	Marshalling Boxes (397), Ventilation Control System (VCS) (527), Cross-passage Doors (304), Pumping Systems (1172), Lighting (2566), Uninterruptible Power Supply (UPS) systems (462), HVAC (Heating Ventilation & Air Conditioning) (2639), Fire Systems, Points heating system (1570), Security Systems (25), Lifts, Auxiliary Power Distribution (2429)
<b>Overhead contact system (OCS)</b>	OCS Grouped and Linear (Virtual Assets) (791), Neutral Section and Section Insulators (121), OCS Tensioning Equipment (Anchors) (1913), OCS Supporting Structures (Masts) (5284)
<b>Traction power supply (TPS)</b>	HV Switch Gear (257), Traction Bonds (247), Voltage Transformers (63), Surge Arrestors (39), AC/DC Isolation Transformer Compounds (9), Motorised Switch Drives (138)
<b>Signalling and communication systems (SCS)</b>	Signalling: Point Operating Equipment (143), Integrated Train control System (9894), Train Detection (545), Automatic Train Protection (207), Signals (643), Train Dispatch (25), VHME (8), Markers (564), Relays (3400), Lineside Switches (1230) Control Systems: RCCS (13), EMMIS (8), VCS (35) Communication Systems: DTN (92), GSM-R (34), CCTV (80), LAN (1), FON (200 km), FOAEC (60km), RF Propagation System (1), Emergency Radio System (1), Telephony System (1)
<b>Track</b>	S&C (151), Ballast (8.6 t/m), Slab (45km), Buffer Stops (24), Rail Management Products (15), Road Rail Access Points (9), Expansion Devices (17.5), Glued Insulated Joints (~400), Wheel Impact Loading Detector (1)

A more detailed breakdown of asset inventory can be found in the NR(HS) Route SAMP<sup>2</sup>. Each of these asset classes also have dedicated specific asset strategy (SAS) documents<sup>3</sup> which provide more detail.

Given the average condition of the assets it is important that NR(HS) manages assets to optimal sustainable levels in line with the asset management objectives. All asset groups have completed a common suite of maintenance vs renewal appraisals and have WLC analysis performed on each. In previous control periods, the number of renewals was minimal. Moving into CP4, the expected number of renewals is expected to increase.

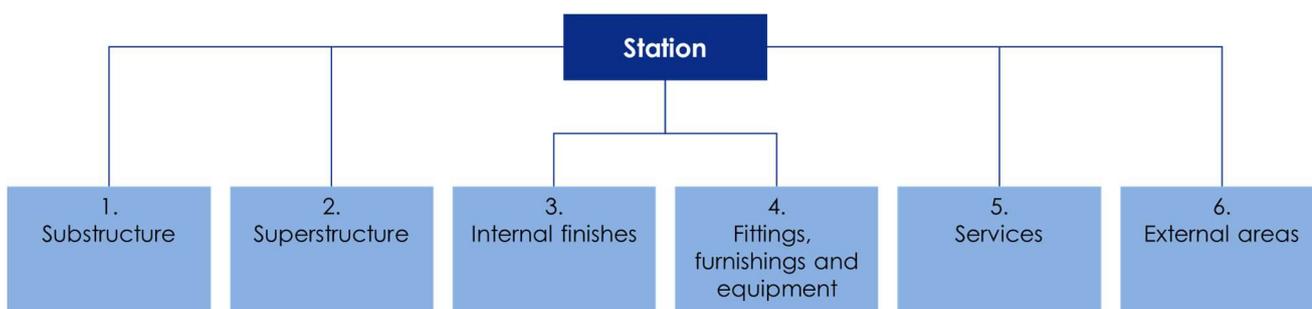
There are opportunities to implement the latest technologies to obtain remote condition information and better integrate end-to-end delivery. Network Rail is developing a holistic approach to IT strategy to support enhanced digital information and visualisation, which will in turn support better decision making. This development will also help address data availability challenges. We have a documented asset information strategy<sup>4</sup> that details our approach to asset information.

### 6.3.2. Stations

#### NR(HS) Stations

The NR(HS) Stations assets are split into six groups, as illustrated below. For each group, details of how the methodologies described in this strategic asset management plan have been applied are described in specific asset strategy (SAS) documents.

Figure 6: NR(HS) Stations asset breakdown



A challenge faced by NR(HS) Stations is the prioritising of assets. Services have historically been prioritised as assets such as lifts, escalators, lighting, and toilets, tend to have high relative impact on customer satisfaction scores. Due to an increase in incidents around civils and fabric assets, this focus may require shifting. We are continuously collaborating with NR(HS) stations to ensure that investments are appropriately prioritised in accordance with the asset management objectives.

For assets that influence the safety, availability, and punctuality aspects of asset management objectives, NR(HS) undertakes a cost benefit analysis when thinking about major maintenance interventions. NR(HS) stations also use decision support tools to model financial aspects of a range of interventions and asset failures, accounting for changing probability of asset failure, cost of interventions, and cost of asset failure.

It is acknowledged that St Pancras International station, given its nature, is highly prioritised and has a significant impact on the realisation of asset management objectives. There is an opportunity for respective stations to have more bespoke strategies.

<sup>2</sup> Appendix A\_NR (HS)\_SAMP\_December\_2021

<sup>3</sup> Appendix B\_NR (HS)\_SAS\_Civils\_July\_2021, Appendix C\_NR (HS)\_SAS\_M&E\_July\_2021, Appendix D\_NR (HS)\_SAS\_OCS\_July\_2021, Appendix E\_NR (HS)\_SAS\_TPS\_July\_2021, Appendix F\_NR (HS)\_SAS\_SCS\_July\_2021, Appendix G\_NR (HS)\_SAS\_Track\_July\_2021

<sup>4</sup> HS1-AMS-007-1 Asset Information Strategy 5.0 Authorised

## Mitie stations

Mitie manages the operations and maintenance of Ashford International railway station on behalf of HS1.

Maintenance of the station's assets is conducted in line with the contract under SFG20. Efficiency has improved over recent years through improvements in digital maintenance.

A key challenge and opportunity going forwards is centred around the strategy of capital replacements. Mitie is moving to using more real-time data to support decision making, as well as improving whole life cost modelling. Mitie will also use a PowerBI dashboard to support asset data visualisation.

## Retail trading

The retail estate includes over 60 units across 4 stations, St Pancras, Stratford, Ashford and Ebbsfleet. These brands are defined into three categories: food and beverage, retail, and services. St Pancras station in particular hosts exciting retail brands under one iconic roof.

We aim to set a new benchmark for individuality and quality, providing convenient and memorable touchpoints. This is supported by an operational eco system which removes barriers to trade for tenants and positively encourages consumer spending.

We pride ourselves on consistently delivering a high level of service and we are always aspiring to improve this based on the principle of 'great hosts, inspired guests' and there is opportunity to grow our income through driving sales growth and customer experience.

## Car parking

Car parking is a support service to the railway network, and our focus is to maintain a service level and tariff that supports passenger growth on the trains and in turn drives more transactions and unregulated income through the car parks themselves.

Unlike most national railway routes, there is capacity in our car parks though we also operate with a web of legacy agreements, competition and planning constraints that restrict or limit our abilities without significant and/or controversial change.

We manage four car parks consisting of a total of 8,500 spaces. Our customers range from the casual 20 minute user to long term daily commuters. We also have some long term leasing customers and have diversified our business to include some alternative uses for our estate.

Several challenges will impact on all car park estates across the UK in the near future. These factors include:

- Reduction in car ownership; and
- Autonomous vehicles

### 6.3.3. Power network

UK Power Network Services (UKPNS) provide the traction power distribution system providing electricity to the overhead catenary system which powers the trains. They also provide electricity for electromechanical plant, signalling, stations, shafts, portals, tunnels and depots along the route.

The assets that UKPNS manage are: three feeder stations, nineteen autotransformer stations and four ODS (Overhead Derived Supplies used for points heating and as backup to signalling supplies) that make up the traction power distribution system for HS1. Assets across 6 No. 11kV networks and one 6.6kV network make up the non-traction power distribution system for HS1.

A challenge faced by UKPNS in managing the operations, maintenance, and renewals of electricity substations and high voltage distribution network is an aging asset base. Consequently, it becomes even more important to ensure that assets are monitored, data is collected and analysed to inform investment decisions and manage risk.

## 6.4. Asset criticality

To understand the importance of an asset, each asset or group of assets is assessed against each of the objectives and then is scored out of 5 using the guidance in the table below that assesses the impact of failure (not considering the likelihood). Application of this process by all our strategic partners ensures consistency of reporting of criticality.

Table 6: Identifying the importance of an asset to the AMOs

Safety	Performance	Cost effectiveness	Environment and social	Growth	Score
<b>Failure could cause multiple fatalities</b>	Failure causes service suspension of >1 hour Failure leads to complete station or a route outage	Without renewal the total cost of maintenance and renewals in CP4 make this the most expensive asset system Currently does not provide good value nor lowest whole life cost	Severe impact on the natural environment and local communities Not delivering HS1 sustainability strategy and not achieving net-zero ambitions	No capacity provision to support long-term growth Not delivering forecasted revenue	5
<b>Failure leads to single fatality</b>	Failure causes delay to many trains >15 mins each Failure leads to partial system failure at a station or on the route or loss of a piece of passenger sensitive equipment	Without renewal the total cost of maintenance and renewals in CP4 are above 80% of the costs of the most expensive asset system	Medium impact on the natural environment and local communities Delays delivering HS1 sustainability strategy and achieving net-zero ambitions by 1 Control Period	Capacity provision to support long-term growth delayed by 1 Control Period (or reduced by X%) Forecasted revenue decreased by 80%	4
<b>Failure leads to a reportable accident (Riddor)</b>	Failure causes delay to many trains (up to 15 mins each) Failure leads to a loss of passenger sensitive equipment)	Without renewal the total cost of maintenance and renewals in CP4 are between 50-80% of the costs of the most expensive asset system	Mild impact on the natural environment and local communities Delays delivering HS1 sustainability strategy and achieving net-zero ambitions by 3 years	Capacity provision to support long-term growth delayed by 3 years (or reduced by Y%) Forecasted revenue decreased by 50 to 80%	3
<b>Failure leads to minor injury</b>	Failure causes delay to only a few trains (up to 15 mins each)	Without renewal the total cost of maintenance and renewals in CP4 are between 20-50% of the costs of the most expensive asset system	Leads to an increasing impact on the natural environment and local communities No impact on delivering HS1 sustainability strategy and achieving net-zero ambitions	Capacity provision to support long-term growth delayed by 1 year (or reduced by Z%) Insignificant impact on forecasted revenue	2
<b>Failure does not cause injury</b>	Failure causes no delay Failure has no impact on route and station availability	Without renewal the total cost of maintenance and renewals in CP4 are between 1-20% of the costs of the most expensive asset system. Currently provides good value and lowest whole life cost	No impact on the natural environment and local communities No impact on delivering HS1 sustainability strategy and achieving net-zero ambitions	No impact on capacity provision to support long-term growth Does not impact forecasted revenue	1

The scoring is then weighted using the weighting assigned to each AMP and reference future state. An example is given in the table below for a lighting system and a track renewal.

Table 7: Worked example of impact x weighting for lighting systems and track

System and score	Safety	Performance	Cost effectiveness	Environment and social	Growth	Total weighted score
<b>Lighting (not emergency lighting)</b>	1	2	3	2	1	
Weighting for future state 1 – <b>Growth</b>	0.40	0.30	0.10	0.05	0.15	1.15
Weighted score for future state 1	0	0.60	0.30	0.10	0.15	
Weighting for future state 2 – <b>Re-build</b>	0.40	0.30	0.15	0.05	0.10	1.25
Weighted score for future state 2	0	0.60	0.45	0.10	0.10	
Weighting for future state 3 – <b>Re-structure</b>	0.40	0.25	0.25	0.05	0.05	1.40
Weighted score for future state 3	0	0.50	0.75	0.10	0.05	
Weighting for future state 4 – <b>Re-think</b>	0.40	0.20	0.35	0.00	0.05	1.50
Weighted score for future state 4	0	0.40	1.05	0.00	0.05	

System and score	Safety	Performance	Cost effectiveness	Environment and social	Growth	Total weighted score
<b>Track renewal</b>	4	4	2	1	2	
Weighting for future state 1 – <b>Growth</b>	0.40	0.30	0.10	0.05	0.15	3.35
Weighted score for future state 1	1.60	1.20	0.20	0.05	0.30	
Weighting for future state 2 – <b>Re-build</b>	0.40	0.30	0.15	0.05	0.10	3.35
Weighted score for future state 2	1.60	1.20	0.30	0.05	0.20	
Weighting for future state 3 – <b>Re-structure</b>	0.40	0.25	0.25	0.05	0.05	3.25
Weighted score for future state 3	1.60	1.00	0.50	0.05	0.10	
Weighting for future state 4 – <b>Re-think</b>	0.40	0.20	0.35	0.00	0.05	3.20
Weighted score for future state 4	1.60	0.80	0.70	0.00	0.10	

The overall importance is the sum of the weighted scores and shows us the overall importance of each asset or asset system to achieving our asset management objectives. For the examples above a track renewal would score higher than the non-emergency lighting system renewal in all scenarios, placing track renewals at a higher priority than non-emergency lighting renewal.

## 6.5. Our asset management policy

Our asset management policy reflects our commitment to deliver our shareholder requirements, comply with our contractual obligations, and endeavour to outperform stakeholder expectations. It is set out in the document HS1-AMS-001 and confirms that we will add value by being an intelligent client through three strategic themes, to **Protect, Evolve and Grow**:

- **Protecting our concession agreement** by keeping our asset base compliant with current regulations, interoperable for international train operators and fit for the future;
- Working with our strategic partners and adjacent infrastructure managers **evolving how the balance of risk, cost and performance is delivered** to keep maximising the value generated by our assets; and
- Delivering sustainable **growth** of our services and the environmental, social and economic benefits this generates to our stakeholders by meeting the targets set in our sustainability strategy.

We will also:

- Continue to build a customer orientated culture with a structured approach to stakeholder engagement; and
- Continually improve asset management capability in line with other leading industry practitioners, following the principles of ISO 55000 asset management best practice.

## 6.6. Overview of our asset management system (AMS)

Our asset management system includes an asset management policy, strategic asset management plan, asset management objectives and the processes to achieve those objectives. We will engage with strategic partners to ensure the asset management objectives are cascaded, and that the approach to asset management is consistent. We will define asset management roles and accountabilities between us and our partners.

sets out the key components of our asset management system and their relationship to our wider business management system. The three documents at the centre of the AMS are detailed below, as well as the adjacent components of the AMS.

Figure 7: The HS1 asset management system (AMS)

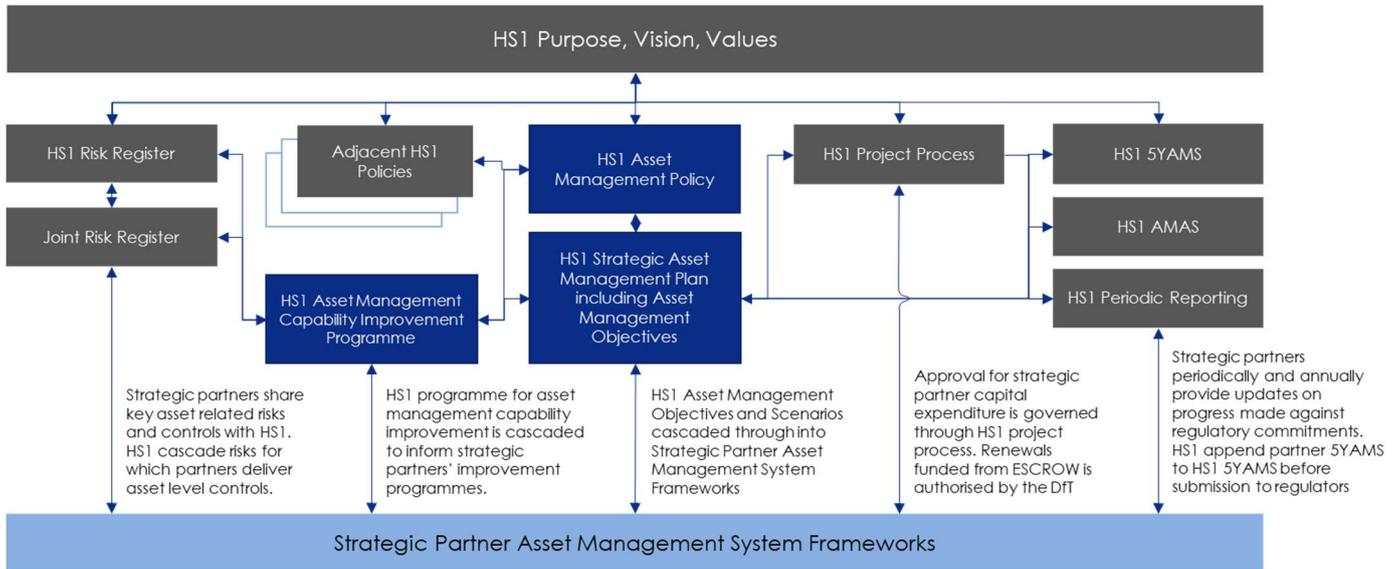


Table 8: AMS component descriptions

AMS component	Description
<b>HS1 asset management policy</b>	Sets out asset management principles aligned to HS1 stakeholders for the whole asset portfolio.
<b>HS1 strategic asset management plan</b>	Sets out the HS1 asset management objectives (AMOs) within a strategic context and setting out the methodologies to be undertaken to deliver those objectives.
<b>HS1 asset management capability improvement programme</b>	Sets out a roadmap for how HS1 and its strategic partners will continuously improve.

Table 9: AMS adjacent component descriptions

Adjacent component	Description
<b>HS1 risk register</b>	Uncertain events that may cause threats to the delivery of HS1 core purposes.
<b>Joint risk register</b>	Register of risks shared with strategic partners, where either party hold accountability or responsibility impacting the other's ability to deliver their core purpose.
<b>HS1 project process</b>	The overarching framework and governance for the delivery of projects within HS1, including processes for release of ESCROW funded capex works.
<b>HS1 5YAMS</b>	Regulatory document meeting the requirements of the HS1 concession agreement and principally setting out the stewardship of the assets for a given 5 year control period.
<b>HS1 AMAS</b>	Regulatory document meeting the requirements of the HS1 concession agreement and providing an annualised update to the 5YAMS in a given control period.
<b>HS1 periodic reporting</b>	4 weekly reporting in line with the concession agreement, covering asset and operational performance. Informed through strategic partner reporting.
<b>Strategic partner asset management systems</b>	For each strategic partner, the defined framework setting out the processes and artifacts by which they coordinate asset management activities, delivering the HS1 asset management objectives.

## 6.7. Monitoring and improvement

### 6.7.1. Monitoring of delivery and key performance indicators (KPIs)

We monitor delivery and asset management capability through a series of key performance indicators (KPIs). We are in the process of developing updated KPIs for both route and stations assets, aligned to each asset management objective.

These KPIs will be detailed in the HS1 AMO and KPI's document (HS1-AMS-004)<sup>5</sup>.

### 6.7.2. Vision and objectives for the AMS

Since the start of CP2, we have achieved improvements in asset management capability by improving our: leadership and culture; asset management system; asset condition data collection and analysis (including the asset criticality process); and development of specific asset strategies (SAs) by our strategic partners.

Our corporate vision needs to be underpinned by leading asset management practices. This SAMP sets out (in appendix section 6.7.5) a set of minimum capability expectations, which are aligned to good practice. We expect our partners to go beyond this minimum capability to unlock the potential value in our assets to help drive growth of the business.

The key areas of improvement for our AMS in the remaining years of CP3 and in CP4 are:

- Asset information
- Risk and review
- Strategy and planning
- Decision making
- Lifecycle delivery
- Organisation and people

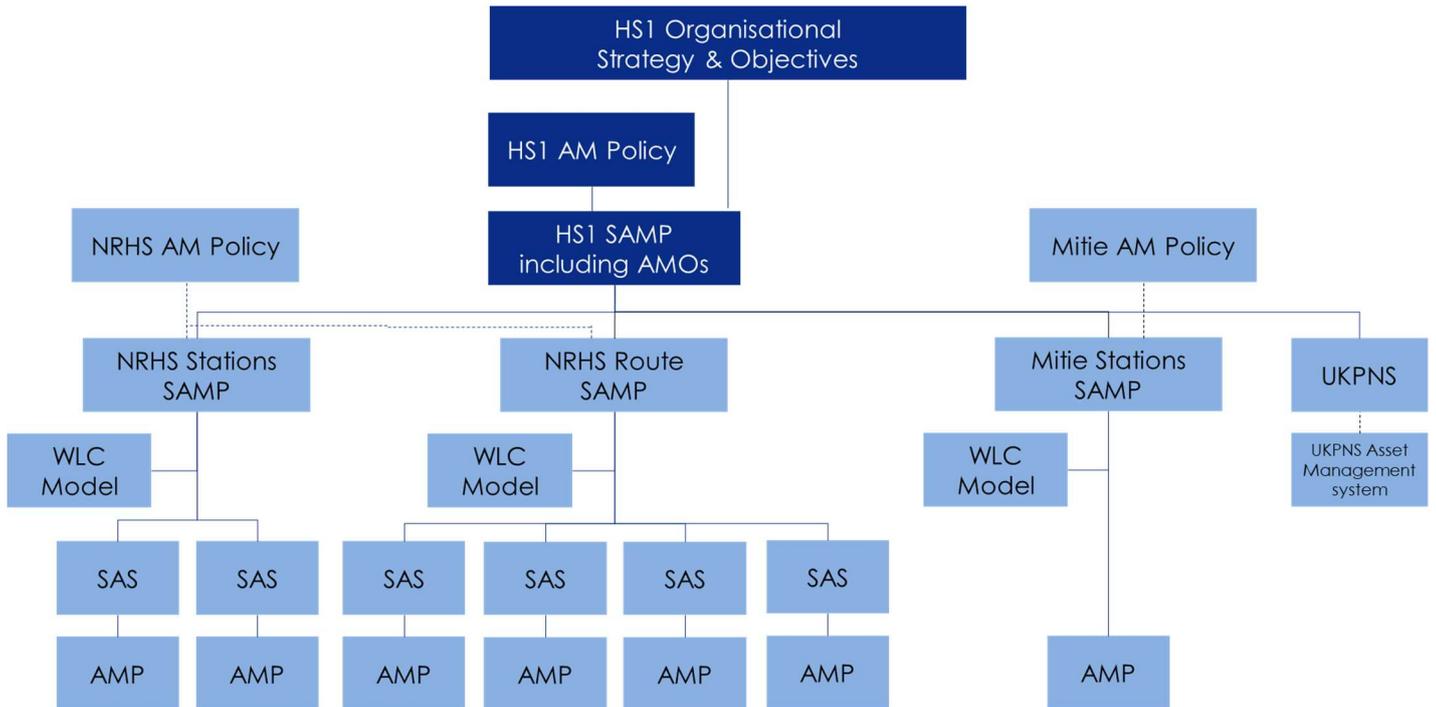
### 6.7.3. The HS1 asset management strategy and plans hierarchy

Our asset management strategy and plans hierarchy is illustrated in Figure 8. It contains our overarching elements that provide direction to our strategic partners' strategies and plans.

---

<sup>5</sup> HS1 AMOs and KPIs DRAFT V7

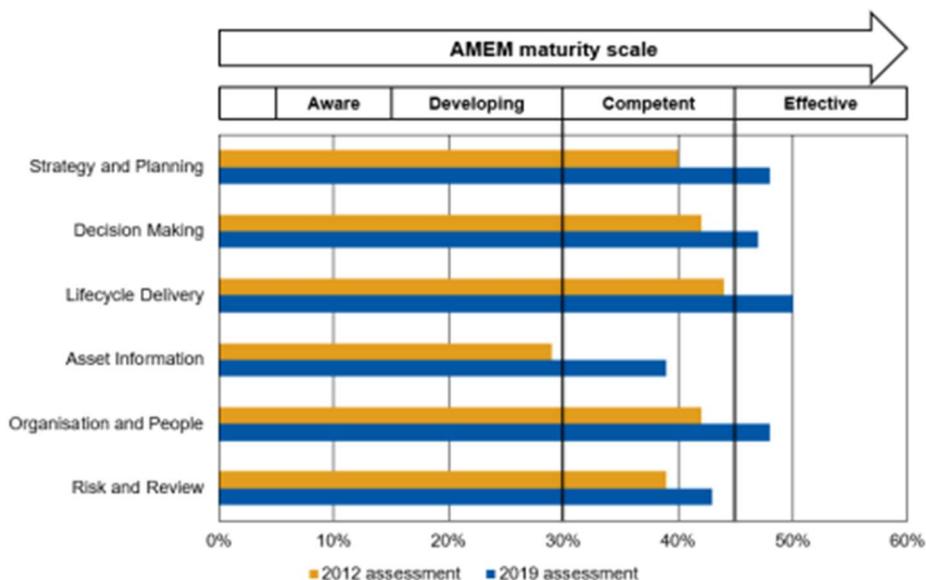
Figure 8: HS1 asset management strategy and plans hierarchy



#### 6.7.4. Current HS1 asset management capability

In 2018, we commissioned AMCL, to undertake an independent assessment of HS1 Ltd and NR(HS) competency in asset management using the Asset Management Excellence Model (AMEM) framework. The AMEM framework is used by both ORR and NRIL. AMCL found that HS1 Ltd and NR(HS) have made steady progress in the level of asset management maturity since the baseline assessment in 2012, as shown in Figure 9.

Figure 9: Asset management maturity scores



Our maturity scores have improved for all six subject groups since 2012. A maturity score of 45% is considered effective - asset management activities are fully effective and are being integrated throughout the business - and demonstrates compliance with ISO 55001. We have achieved effective scores in four of the subject groups. In the remaining two subject groups we have achieved competent maturity scores. A score of 30% to 45% is considered competent - asset management activities are developed, embedded and becoming effective.

The AMCL report included a number of high level recommendations as well as more detailed findings and opportunities for improvement. We will continue to improve asset management capability in line with other leading asset practitioners and will follow the principles of ISO 55001 asset management best practice. The key improvement activities are set out in appendix section 6.7.6.

### 6.7.5. Strategic partner asset management capability

Our strategic partners have achieved or have plans to achieve ISO 55001 accreditation. This is detailed in Table 10 below. We expect our partners to achieve and continue to maintain ISO 55001 certification, signalling good practice asset management.

Table 10: Strategic partner asset management capability

Strategic partner	Asset management capability
<b>NR(HS) Route</b>	We have worked with NR(HS) to develop its asset management capability. NR(HS) Route obtained certification to ISO 55001 in March 2018. Facilitated by the HS1 SAMP and asset management objectives, we will continue to provide asset management direction to NR(HS).
<b>NR(HS) Stations</b>	NR(HS) Stations is working to achieve ISO 55001 accreditation by the end of 2022. This HS1 portfolio SAMP, with the asset management objectives, will provide direction to the development of NR(HS) Stations' asset management documentation.
<b>Mitie</b>	Mitie has conducted a gap analysis on its asset management capability and is currently going through the ISO 55001 accreditation process. Mitie plans to be ISO 55001 accredited by the end of 2023.
<b>UK Power Network Services</b>	The asset management of the HS1 Distribution System was certified to ISO 55001 in December 2018 and continues to be accredited following a successful surveillance audit carried out in November 2020.

### 6.7.6. AMS development activities

From AMCL's assessment of route, the following improvement recommendations were made which we are working towards:

Table 11: 2019 route improvement areas and recommendations

Improvement area	Recommendation
<b>Strategy and planning</b>	<p><b>S&amp;P-1</b> – Implement the multiple aligned Asset Management System approach as described in Section 5.5 of the AMCL report, including top management governance in accordance with Recommendation O&amp;P01.</p> <p><b>S&amp;P-2</b> – As part of S&amp;P01 develop an enterprise-wide HS1 SAMP and set of Asset Management objectives.</p> <p><b>S&amp;P-3</b> – Incorporate longer-term demand forecasting into the strategic planning process that has developed between HS1 and NR(HS) to ensure the effects of increased traffic are captured and factored into NR(HS)'s planned work volumes.</p>
<b>Asset management decision-making</b>	<b>AMDM-1</b> – Formalise the strategic planning capability that has evolved between HS1 and NR(HS) through the development of an agreed Strategic Planning Framework, which will be a key interface document between HS1's and NR(HS)'s Asset Management Systems.

Improvement area	Recommendation
	<b>AMDM-2</b> – Develop a Maintenance Strategy within NR(HS) which enables controlled continual improvement of maintenance and inspection regimes over time, including the development and implementation of risk-based maintenance approaches.
<b>Lifecycle delivery</b>	<b>D-1</b> – Relax the requirement on NR(HS) to produce business cases for agreed renewal volumes, and replace with a validation step of five-year work volumes brought into the annual planning process.
<b>Asset information</b>	<p><b>AI-1</b> – Implement the Asset Information Management System as planned as part of the multiple aligned management system approach (S&amp;P01).</p> <p><b>AI-2</b> – Undertake an Asset Information needs investigation centred around Asset Management Capabilities, as defined by the Route AIBA, and develop a roadmap for improvement. Adopt a criticality-based approach when planning improvements to Asset Management Information.</p>
<b>Organisation and people</b>	<p><b>O&amp;P-1</b> – Implement a formal governance arrangement for the HS1 Asset Management System for which the HS1 Board has final accountability.</p> <p><b>O&amp;P-2</b> – Build closer strategic alignment between HS1 and NR(HS) as far as possible within the constraints of the OA. Encourage NR(HS) to innovate over the longer-term by enabling NR(HS) to share in any realised future benefits that result from their innovations.</p>
<b>Risk and review</b>	<p><b>R&amp;R-1</b> – Embed the Quarterly Assurance Board and enhance this with a formal Management Review process agreed between HS1 and NR(HS) where completion of the individual organisations' Asset Management objectives are jointly monitored.</p> <p><b>R&amp;R-2</b> – Establish and agree a Unit Cost Framework for both renewal and maintenance decision-making, ensuring that these frameworks are effectively and independently reviewed by each organisation as required within their formal Management Review processes.</p>

We are also committed to additional improvement activities in tandem with our strategic partners:

### Strategy and planning

- We are committed to supporting our strategic partners with asset management planning in response to the various future states laid out in this document to support the realisation of the AMOs.
- We will also facilitate demand analysis from TOCs to support capacity utilisation and degradation modelling for our partners.
- We will collaborate with strategic partners to identify trigger points that inform progress against each of the future states, such that partners' modelling and TOCs' forecasts can lead to agreement on the future path.

### Decision-making

- To support decision-making, we will provide all historic ADST modelling assumptions and access to tools for use by our strategic partners. This includes all associated data, precursors to failure identified, etc.
- We require our partners to have in-house capability to support decision-making, complying with our project process. We will facilitate engagement with DfT for ESCROW decision-making to fund renewals.
- We will further develop and establish the criteria and governance around enhancements and specified upgrades (especially where not covered by existing renewals plans) and in the context of the condition of assets at the end of concession.

### Lifecycle delivery

- We will hold condition statements for each asset group or system, as per our obligations to DfT, with forward estimations for key dates, especially, close of control periods and end of concession. Our strategic partners will provide support in this.
- We will, within the bounds of the operator agreement, undertake assurance and monitoring of delivery, including:

- Technical standards and legislation
- Asset creation and acquisition
- Systems engineering
- Configuration management
- Maintenance delivery
- Reliability engineering
- Asset operations
- Resource management
- Shutdown and outage management
- Fault and incident management
- Asset decommissioning and disposal

## Asset information

The aspiration for asset information is captured in our asset information vision: “*Integrating the physical railway and digital capabilities to enable the transformation of data into knowledge*”. This includes the evaluation, trial and implementation of innovative approaches that have the potential to deliver tangible benefits.

Possible technologies and approaches to explore include unmanned aerial vehicles (UAVs), to conduct inspections and surveys; autonomous maintenance systems; automatic identification and data capture technology (AIDC); and digital twins. Other emerging technologies may be considered if appropriate.

Table 12: Asset information focus areas

Period	Focus areas
2020 – 2025	Common asset hierarchy, common data environment, remote condition monitoring
2025 – 2030	Electronic dashboard reporting, building information modelling
2030 – 2035	Automatic identification and data capture, remote inspection and diagnostics
2035 – 2040	Autonomous maintenance systems, digital twin, end of concession condition assessment

## Organisation and people

- As an asset-centred organisation, we expect all our staff to have basic competencies in asset management, with key personnel holding asset management qualifications such as the IAM (Institute of Asset Management) certificate. We will continue joint asset management capability training exercises, to be attended by our staff and key strategic partners.
- Our contract management will continue to include established asset management best practices, including requirements on partner capability, and also ensuring contracts cover each aspect of asset management as set out in the asset management landscape.

## Risk and review

- There is an established risk framework with a joint risk register, and for HS1 at a corporate level. There are plans to link our risk management approach to our asset management objectives, which includes the consideration of risk appetite and risk tolerances, and our policies and business case methodologies.
- We will use quantification of risk for each asset group or system, which will facilitate comparisons across portfolios and support benchmark with external organisations.
- Asset management maturity assessments have been conducted on our capability and we will continue to use established assessment methodologies, and associated identification of good practice from other organisations, at an appropriate depth for our organisation, and in line with regulatory requirements. This includes engagement with the European Rail Infrastructure Managers.
- Our contingency planning and resilience analysis is to be shared with our strategic partners, for alignment with operational plans.

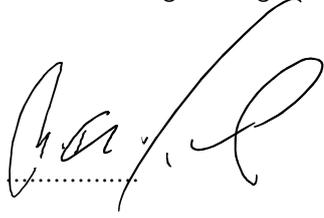
### **6.7.7. Continuous improvement**

To ensure continuous improvement within our organisation, we engage with other high-speed railways around the world. We are a member of the European Rail Infrastructure Managers (EIM), and through this channel, we are able to liaise with others to discuss best practice asset management in the industry.

Our SAMP will be reviewed regularly, with the rest of the asset management system, to ensure that it remains fit for purpose.

## HS1 SAMP authorisation and approval

HS1 Authorisation	Comments
<p><b>On behalf of HS1 Limited, I authorise this Strategic Asset Management Plan.</b></p> <p>Name: Dyan Crowther</p> <p>Role: Chief Executive Officer, HS1 Limited</p> <p>Signature </p> <p>Date 21/6/2022</p>	

HS1 approval	Comments
<p><b>On behalf of HS1 Limited, I approve this Strategic Asset Management Plan.</b></p> <p>Name: Richard Thorp</p> <p>Role: Director of Engineering and Sustainability, HS1 Limited</p> <p>Signature </p> <p>Date 21/6/2022</p>	

Prepared by	Comments
<p>Name: Joanne Parkes</p> <p>Role: Head of Asset Management, HS1 Limited</p> <p>Signature </p> <p>Date 21/6/2022</p>	

Reviewers	Comments
<p><b>This Strategic Asset Management Plan has been reviewed by representatives of the following organisations:</b></p> <p>HS1</p> <p>NR(HS)</p> <p>Mitie</p>	

## SAMP review

The SAMP will be subject to a minor review annually and a major review every 5 years.

## Glossary

Abbreviations	Description
<b>AIBA™</b>	Asset Intensive Business Architecture
<b>AMAS</b>	Asset Management Annual Statement
<b>AMO</b>	Asset Management Objectives
<b>AMP</b>	Asset Management Plan
<b>AMS</b>	Asset Management System
<b>CA</b>	Concession Agreement
<b>CDE</b>	Common Data Environment
<b>CP</b>	Control Period
<b>BCIS</b>	Building Cost Information Service of Royal Institute of Chartered Surveyors
<b>CCTV</b>	Closed-circuit Television
<b>CIS</b>	Customer Information System
<b>DfT</b>	Department for Transport
<b>eAMS</b>	Enterprise Asset Management System
<b>HS1</b>	High Speed 1
<b>ISO</b>	International Standards Organisation
<b>LTC</b>	Long Term Charge
<b>NR(HS)</b>	Network Rail High Speed Ltd.
<b>NRIL</b>	Network Rail Infrastructure Ltd.
<b>NRPS</b>	National Rail Passenger Survey
<b>ORR</b>	Office of Rail and Road
<b>QX</b>	Qualifying Expenditure
<b>RACI</b>	Responsible Accountable Consulted Informed
<b>SAIIP</b>	Stations Asset Information Improvement Programme
<b>SAMP</b>	Strategic Asset Management Plan
<b>SAS</b>	Specific Asset Strategy
<b>SCA</b>	Stations Concession Agreement
<b>SoS</b>	Secretary of State
<b>WLC</b>	Whole Life Cost