

HS2

Environmental Sustainability Progress Report

2022 – 2023





Contents

Introduction and context	2	Performance data and assurance	22
Executive summary	2	Scope and methodology	23
Executive summary: At a glance	4	Overarching commitments	25
About this report	6	HS2 Green Corridor	30
Environmental sustainability approach	7	Climate change	37
Our commitment	8	Community experience	44
Our objectives	9	Responsible consumption and production	51
Governance	12	Historic environment	64
Prioritising environmental sustainability topics	14	BSI Independent Assurance Statement	68
Stakeholder and community engagement	16	Global Reporting Initiative content index	70
HS2 and the United Nations Sustainable Development Goals	19		



Executive summary

This report looks in detail at the work we're carrying out to embed environmental sustainability in the design and construction of HS2.

It covers our activity from April 2022 to March 2023, before the Prime Minister announced his decision to change the scope of HS2. The performance data and information therefore reflects the project during this period. Next year's report is set to reflect any changes required following the announcement.

HS2 will transform intercity journeys between London and the West Midlands and boost economic growth. However, the success of the project will also be judged on how we minimise HS2's carbon footprint, our responsible use of materials and resources, the support we provide for nature recovery and the way we respect the people and places directly affected by construction activity. The railway must also operate efficiently in the face of climate change to provide an outstanding customer experience.

This is our third Environmental Sustainability Progress Report for HS2 and it covers the first complete 12-month period since we published two key documents in January 2022: our [Environmental Sustainability Vision](#), setting out how we'll provide zero carbon travel for a cleaner, greener future; and our [Net Zero Carbon Plan](#), which unveiled ambitious targets to cut carbon emissions.

Some of our environmental ambitions are long term, such as making HS2 net zero from 2035 and powering HS2 trains on zero carbon energy from day one of operation. However, the work is taking place now throughout scheme design and construction to make sure we achieve our goals.

Significantly, we're making steady progress in cutting carbon emissions by 50% by 2030. We've beaten our March 2023 target to forecast a 28% reduction in emissions, achieving a 29.6% carbon reduction for the 140-mile Phase One London – West Midlands route.

We're working hard to reduce the construction industry's reliance on diesel and 19 of our main works construction sites became diesel-free during 2022 – 2023. The use of cleaner energy and machinery is helping us to cut emissions and improve air quality for local people and our contractors. There are more than 350 sites across the project and we've set an ambitious target for all HS2 sites to be diesel-free by 2029. It's one of the ways we will raise standards for the industry and leave a legacy of cleaner construction.

We are leading the way with sustainable design for stations with Old Oak Common in west London becoming the second HS2 station to be given an 'outstanding' design stage rating by the Building Research Establishment's Environmental Assessment Method (BREEAM), the benchmark for the eco-friendly performance of buildings. HS2's Interchange station at Solihull was the first rail station to achieve BREEAM 'outstanding' for its design stage assessment in 2020.

We've now planted more than 890,000 trees and shrubs between London and the West Midlands as part of HS2's Green Corridor and we remain on target to plant seven million.

We are doing everything we can to minimise our impact on ancient woodlands. Through design, we've reduced the total area of ancient woodland that the London – West Midlands route affects by a third and we've reduced the number of ancient woodlands affected from 29 to 25 compared with our 2017 baseline.

Executive summary

The project is in the peak construction stage and we diverted 99.1% of all construction and demolition waste from landfill during 2022 – 2023, exceeding our target of 95%. We reported 89.3% beneficial reuse of excavated material this year, which did not meet our 95% target. This was due to large volumes of surplus excavated material being deposited in sustainable placement areas. We use this method of onsite disposal to reduce lorry movements but it does not count towards beneficial reuse.

This report has been prepared with reference to the Global Reporting Initiative (GRI) Standards, the world's most widely used framework for sustainability reporting. BSI, a leading assurance provider, has produced independent assurance on selected information and key performance indicators (KPIs).



Visualisation of HS2's Lower Thorpe viaduct, Northamptonshire.

Executive summary: At a glance



29.6%

carbon emissions reduced to date, contributing to our 50% target for the London – West Midlands route.



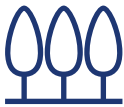
-7.52%

is outstanding against our biodiversity baseline in area-based Phase One habitats.



19

diesel-free construction sites.



890,481

trees and shrubs planted on HS2's Green Corridor between London and the West Midlands since 2017.



99.5%

of 5,192 non-road mobile machinery registrations (e.g. excavators) compliant with air quality standards.



99.97%

of 893,922 heavy goods vehicles trips (e.g. lorries) compliant with air quality standards.



UK's largest pour of environmentally-friendly concrete in London.



Creating the HS2 Green Corridor in Stoneleigh, Warwickshire.



An electric digger at HS2's Victoria Road site in west London.

Executive summary: At a glance



98.7%

of 45,589 light duty vehicle movements (e.g. vans) compliant with air quality standards.



267

complaints about construction-related noise and vibration, down on last year.



406

complaints about traffic and transport due to construction, down on last year.



67.7%

of water use non-potable, e.g. recycled or abstracted from the environment.



28.3%

of felled timber put to high-value beneficial reuse.



89.3%

of excavated material beneficially reused, against 95% target.



99.1%

of construction and demolition waste diverted from landfill, against 95% target.



0

number of the most serious level 1 environmental incidents.



94.5%

design stage BREEAM score for Old Oak Common station, achieving 'outstanding' rating.

Note: All data has been externally assured except for the data for complaints, which has been calculated internally based on the HS2 complaints process.



About this report

The HS2 Environmental Sustainability Progress Report 2022–2023 reflects the period April 2022 to March 2023. For any enquiries, please [contact us](#).

Environmental sustainability data

Data has been reported as figures and data visualisation to offer an accurate and transparent picture of our progress against our commitments. Detailed performance data for the topics covered in this report can be found in the performance data section.

Please note: the reporting period is the 2022–2023 financial year (April 2022 to March 2023). However, due to the way the data is reported into our main reporting platform, data is reported from March 2022 to February 2023, unless stated otherwise. This is in line with the annual corporate reporting period.

All data presented relates to the Phase One route between the West Midlands and London.

The only exceptions are as follows.

- The biodiversity accounting process on [page 30](#), which also includes the baseline for the Phase 2a route to Crewe.
- The number of trees and shrubs planted, on [page 32](#), and the carbon footprint data, on [page 37](#), which include some Phase 2a contracts. This has been noted next to the relevant data points.

Phase One data has been grouped into three categories.

- Early works contractors (EWCs) – CSJV, Fusion and LMJV.
- Main works civils contractors (MWCCs) – SCS, Align, EKFB and BBV.
- Stations – Euston, Old Oak Common. Our stations at Interchange, Solihull and Curzon Street, Birmingham are still at design stage so they are only included in the BREEAM data sets.

Reporting scope and methodology

Specific scope and methodology notes about our performance data are provided in the performance data section.

External assurance

The British Standards Institution (BSI) has provided ‘reasonable’ assurance on selected information and key performance indicators (KPIs). The KPIs verified by BSI are in the performance data section. Our assurance statement is reproduced on [page 68](#).

Frameworks and standards

This report has been prepared with reference to the latest Global Report Initiative (GRI) Standards: Core option and in line with the GRI Reporting Principles for defining report content. The GRI Index on [page 70](#) can be used as a reference for our disclosures against the relevant requirements.

This report has also been written in line with the considerations and recommendations of the [HM Treasury Sustainability Reporting Guidance 2022–2023](#). The GRI Index and Treasury guidance are outside the scope of BSI Group verification.



Environmental sustainability: Our commitment, objectives and approach

Our commitment	8
Our objectives	9
Governance	12
Prioritising environmental sustainability topics	14
Stakeholder and community engagement	16
HS2 and the United Nations Sustainable Development Goals Engagement	19

Image: The Oxford Canal viaduct, Warwickshire.

Our commitment

Environmental sustainability is part of our overall commitment to sustainability. It is fundamental to our strategic goal for HS2 to 'create an environmentally sustainable solution and deliver respectfully to people and places' – and it's key to our Environmental Sustainability Vision to provide 'zero carbon rail travel for a cleaner, greener future'.

Our environmental sustainability commitment is made up of five key areas, which form our environmental sustainability objectives for HS2. They are:

- HS2 Green Corridor
- climate change
- community experience
- responsible consumption and production, and
- historic environment.

In addition, our overarching commitments cover environmental requirements that aren't specific to a single objective, including environmental incidents.

Our progress against our objectives is shown in the performance data listed in this report.



HS2 Green Corridor

- Green Corridor approach
- Biodiversity and ecology
- Ancient woodlands
- Agricultural land and soil



Climate change

- Carbon emissions
- Adaptation and resilience



Community experience

- Community and Environment Fund and Business and Local Economy Fund
- Traffic and transport
- Air quality
- Noise
- Flooding



Historic environment

- Built heritage
- Archaeology
- Historic landscape



Responsible consumption and production

- Waste
- Responsible sourcing
- Water



Overarching commitments

- BREEAM
- Environmental incidents

Our objectives

What success looks like

Success means the new railway, its stations and HS2's infrastructure are designed, built and operated to deliver an environmentally sustainable scheme. It means working towards the UK's 2050 net zero target, minimising HS2's environmental impact and investing in nature recovery.

We will continue to respect people and places and support communities to improve their local environment, providing financial support through the Community Environment Fund (CEF) and Business and Local Economy Fund (BLEF).

Every aspect of HS2 – from planning and design to how we build the railway and run services – can contribute to our environmental objectives. We are committed to achieving our environmental sustainability commitments for the benefit of rail passengers, communities and the wider UK.

Detailed information on how we approach environmental sustainability, including our governance, how we prioritise topics, stakeholder engagement and our work in relation to the UN Sustainable Development Goals, is featured in the following pages of this section.

HS2 is supporting 30,000 jobs as we build the railway. We are a publicly-funded project and we must offer value for money to the taxpayer as we fulfil our commitments to work in an environmentally sustainable way.



An HS2 community event.

Our objectives

The foundation of our environmental sustainability objectives

Legislation and Environmental Statements

The legislation for HS2 sets out environmental requirements and standards that we must follow. For example, it provides a mechanism for local authorities to review specific elements of the scheme, such as viaducts, earthworks and landscaping proposals. We produce an Environmental Statement (ES) for the railway. The ES identifies the likely significant environmental effects, both positive and negative, along the route and the steps we plan to take to reduce the negative ones.

Environmental Minimum Requirements

The HS2 Environmental Minimum Requirements (EMRs) are legally binding documents that accompany the legislation for HS2. The Secretary of State requires HS2 Ltd, as the nominated undertaker, to adhere to the strict requirements of the EMRs in designing and constructing the railway. The controls in the EMRs aim to ensure the impacts that have been assessed in the ES are not exceeded.

The EMRs include general principles, together with:

- a Code of Construction Practice, which contractors must follow;
- requirements for planning, heritage, and the environment; and
- undertakings and assurances, which are commitments made to various parties during the passage of the legislation for HS2.

The EMRs set demanding minimum standards and push us to further reduce environmental effects. They also include a commitment to use recognised rating schemes for design and construction.

Development Agreement

The Development Agreement governs the relationship between the Secretary of State and HS2 Ltd. It sets out our role in developing, building and operating the high-speed railway and summarises the Department for Transport's (DfT) role as sponsor and funder of HS2. It also requires us to follow the rail industry's sustainable development principles and minimise adverse environmental impacts where they cannot be avoided.



Planting trees as part of environmental mitigation works.



Our objectives

Our performance requirements

Each year, we set ourselves targets against our KPIs in the HS2 Corporate Plan. Our targets for 2022 – 2023 and 2023 – 2024 are shown in the table to the right. Performance against these targets for 2022 – 2023 is included in this report's Green Corridor data section for biodiversity and the Climate Change data section for carbon emissions.

We also set performance standards for our supply chain partners to make sure environmental requirements are met and that we achieve our environmental sustainability objectives. For example, our stations and main works contractors are working to reduce carbon emissions by 50% from industry best-practice baselines. Our supply chain partners work closely with us to build the railway in a way that creates environmental benefits for local communities. We monitor our suppliers' performance through technical documents, technical assurance and reporting. This feeds into wider reporting to our Board and the Department for Transport (DfT).

Our policy for the London – West Midlands route is to achieve no net loss in biodiversity. We have opted to apply a year-by-year progression target based on an end date of 2026 when design will come to an end. Using the biodiversity metric, this would be a successive improvement in our biodiversity position of 2% per year. The KPI agreed for each year would also be adjusted as required, depending on achieving the target policy position of no net loss by 2026.

Indicator	Target	
	2022/23	2023/24 ¹
Environmental performance: biodiversity	Realise no net loss (0%) in biodiversity across the Phase One London – West Midlands route by end of March 2023.	Achieve a 2% improvement in our biodiversity no net loss position on our journey to the delivery of no net loss at final design stage of Phase One.
	Forecast 5% improvement in biodiversity against the baseline for Phase 2a design and delivery contracts by end of March 2023.	Achieve a 2% improvement in our biodiversity no net loss position on our journey to the delivery of no net loss at final design stage of Phase 2a.
Environmental performance: carbon emissions	Forecast 28% reduction in carbon emissions against the carbon baseline for Phase One by end of March 2023.	Forecast 31% reduction in carbon emissions against the carbon baseline for Phase One and Phase 2a by end of March 2024.

¹ Note that the 2023/24 targets were set before the rephasing of the project in March 2023 and the Prime Minister's decision to cancel Phase Two in October 2023.



Our approach

Governance

Environmental sustainability governance

Our environmental sustainability governance regime for the reporting year is detailed below. In 2022, we enhanced our environmental sustainability governance regime with the introduction of a quarterly Environmental Performance Review panel, chaired by our CEO. In July 2022, we also set up a Carbon Steering Group.

HS2 Ltd Board

The HS2 Ltd Board provides oversight on environmental sustainability for HS2. There is a sub-group of the Board for environment, the Environmental Sustainability Committee (ESC).

Environmental Sustainability Committee (ESC)

The ESC is responsible for providing strategic direction and scrutinising the delivery of our environmental sustainability objectives. It reviews the project's environmental performance to drive longer-term strategic outputs. It also has oversight for environmental reporting. Members of the ESC include non-executive directors, the DfT and senior executives with responsibility for technical requirements, project delivery and stakeholder engagement. The ESC meets quarterly and submits a report to the Board for information after each meeting.

Environmental Performance Review

This quarterly meeting is chaired by our CEO and provides management-level scrutiny on the project's delivery of environmental sustainability by reviewing operational performance. The panel holds delivery teams to account for achieving our environmental targets, as well as reviewing lessons learned.

HS2 Ltd Executive Committee

The Executive Committee manages our day-to-day governance and operations. Members are measured on the delivery of our corporate priorities, which are set out in the Key Performance Indicators (KPIs) in our Corporate Plan. In 2022 – 2023, this included commitments to carbon management and biodiversity. The CEO's remuneration is linked to the effective delivery of our KPIs.

Department for Transport

The DfT is the department that sponsors HS2 Ltd. Its environmental sustainability governance responsibilities include ensuring that environmental sustainability benefits are realised. Along with the Secretary of State for Transport, the Minister of State for Rail and HS2 at the DfT has responsibility for the HS2 programme and keeps Parliament informed about HS2 Ltd's performance, including environmental matters.

Technical Authority Panel

The Technical Authority Panel is a decision-making and review body responsible for managing technical change, technical communication with suppliers, and setting technical baselines.

Sub-groups and forums

The Safety, Health, Wellbeing, Environmental Leadership Team is a forum consisting of senior leadership from HS2 Ltd, including two executive committee members and board directors from our contractors. The group meets monthly and shares learnings. Specific aspects of environmental sustainability, such as BREEAM assessments, carbon, heritage and responsible sourcing are managed by topic-specific working groups, forums and sub-groups.



Our approach

Governance

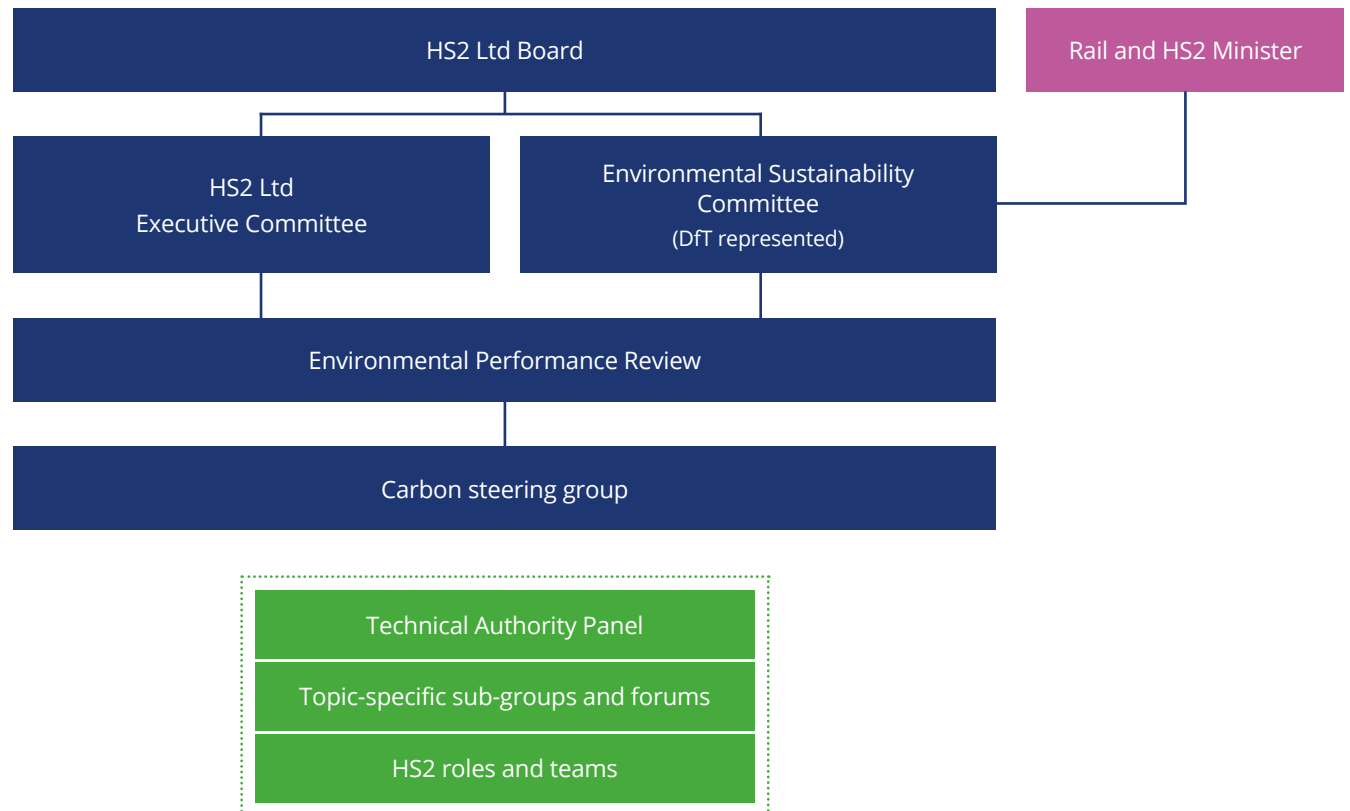
HS2 roles and teams

Our environment and town planning director and their direct reports are responsible for specialist topics and help set and oversee policy and assure outputs. The heads of environment and engineering make sure delivery by contractors and consultants meets environmental sustainability policies and contributes to our requirements.

Carbon Steering Group

Our Carbon Steering Group (CSG) provides operational leadership and guidance to manage and improve the delivery of our net zero target.

Environmental sustainability governance





Our approach

Prioritising environmental sustainability topics

Prioritising environmental sustainability topics

We need to identify the environmental topics that are most important to the high-speed railway. They are the environmental areas where we are most likely to have a significant impact and the areas that potentially affect the project. We call this process our materiality assessment and our material topics form the basis of what we report on.

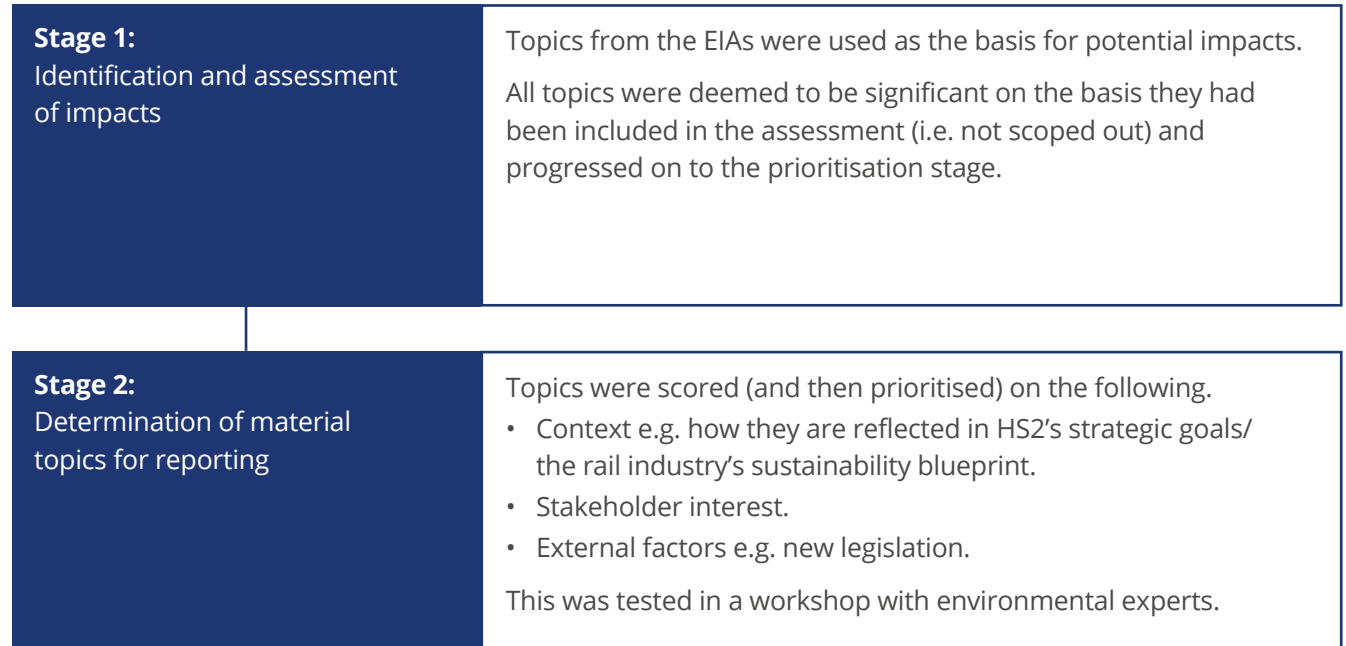
A materiality assessment was carried out in late 2020 and early 2021, following the Global Reporting Initiative Standard foundation principles that were in place at the time. The process we undertook can be found in our first [Environmental Sustainability Progress Report 2020 – 2021](#). We have revised our materiality assessment in line with updated 2023 GRI guidelines.

The materiality process

Following the GRI guidance, we identified our environmental impacts and then prioritised them to decide the most significant impacts for reporting.

We have completed Environmental Impact Assessments (EIAs) for HS2. These were major undertakings, assessing all environmental impacts along the route and they provide a good starting point for the environmental topics we affect. No topics were taken out of the EIAs. They were all assumed to be significant and moved to the next state of being prioritised for reporting.

Our materiality process



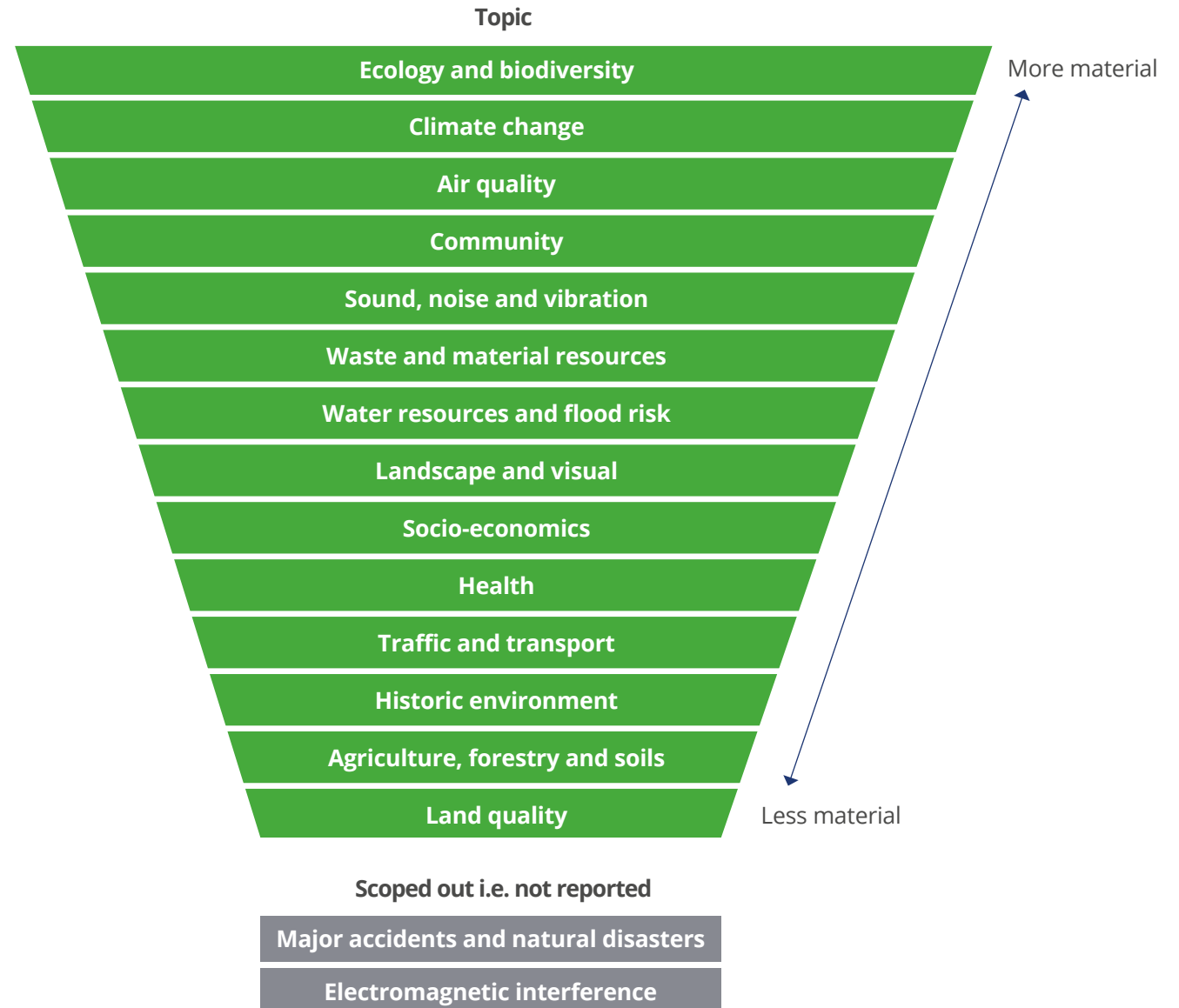


Our approach

Prioritising environmental sustainability topics

Prioritising material topics

Topics have been prioritised based on the scoring for context, stakeholder interest and external factors, such as new legislation. Two topics – electromagnetic interference and major accidents and natural disasters – have been taken out of the reporting because of low scoring. All other topics have been included for reporting and the figure on the right shows how we prioritise topics.





Our approach

Stakeholder and community engagement

Stakeholder and community engagement

As our work becomes increasingly visible, it is important we continue to work with local communities and understand their concerns, particularly people who are directly affected

by the new railway. We work closely with our environmental stakeholders to make sure we respect people and places in our decision-making and actions. The table below shows our stakeholder groups and how we engage with them.

Stakeholder group	Stakeholders	Engagement
NGOs	<ul style="list-style-type: none"> • Woodland Trust • Canal & River Trust • The Wildlife Trusts • The National Trust • The Country Land and Business Association • National Farmers' Union • IEMA 	<ul style="list-style-type: none"> • We engage with environmental NGOs to guide our activities and deliver our environmental programmes. Many NGOs are members of the HS2 Ecology Review Group. • We support an online portal with the Woodland Trust to share information. • Our SLA supports the Canal & River Trust to provide dedicated staffing to deal with our applications for consents in line with their statutory role via protective provisions to the Act.
Funded project partners	<ul style="list-style-type: none"> • Groundwork UK • Carbon Literacy Project • Forestry Commission (Woodland Fund) 	<ul style="list-style-type: none"> • We fund these organisations to administer grant schemes and carbon-related training. • We work with partners to report on environmental activity. Groundwork UK reports on our community and environmental programmes in its annual reviews.
Government departments and statutory bodies	<ul style="list-style-type: none"> • Department for Transport • Climate Change Committee • National Environment Forum (including Environment Agency, Natural England, Historic England, Forestry Commission, Defra) 	<ul style="list-style-type: none"> • DfT is HS2 Ltd's sponsor and we engage daily through our sponsorship team. There is a formal governance structure that includes boards, such as the Sponsor Board. • The National Environment Forum is used to facilitate senior-level discussions between HS2 Ltd, government departments and their statutory agencies in respect of environmental work. It also supports open discussion on upcoming Government policy.



Our approach

Stakeholder and community engagement

Stakeholder group	Stakeholders	Engagement
Parliament	<ul style="list-style-type: none"> • MPs (along route and off-route) • Select committees (e.g. Environmental Audit Select Committee, Transport Select Committee) 	<ul style="list-style-type: none"> • We engage with MPs across the UK to raise awareness of the project and its benefits. • Additional engagement programmes for MPs on the route keep them informed about HS2 in their area, including ecology works and environmental mitigation. • We also engage with Parliamentary select committees in order to inform Parliamentarians of the work being undertaken to protect and enhance the environment along the HS2 route.
Regional and local authorities	<ul style="list-style-type: none"> • Ecological Review Group (comprising NGOs, statutory bodies and local authorities) • Planning Forum (and sub-groups, e.g. environmental health and heritage) 	<ul style="list-style-type: none"> • We sit on the Ecological Review Group to achieve the best outcomes for ecology. • We attend bi-monthly meetings of the planning forums for HS2. The forums comprise line of route authorities, the DfT and HS2 Ltd.
Sector and industry groups	<ul style="list-style-type: none"> • UK Green Building Council • Infrastructure Client Group (through the Institute for Civil Engineers) • Supply Chain Sustainability School • Rail Safety and Standards Board (RSSB) • High Speed Rail Group 	<ul style="list-style-type: none"> • We are a member of the Infrastructure Client Group's (ICG) Carbon Task Group. • We are represented in RSSB groups, including the Sustainable Rail Leadership Group, the Sustainable Rail Executive and the Carbon Management Working Group. This allows us to share knowledge and help shape strategic documents, such as the Sustainable Rail blueprint.
Contractors and suppliers	<ul style="list-style-type: none"> • Multiple contractors and suppliers 	<ul style="list-style-type: none"> • We engage with suppliers on our environmental sustainability objectives through our HS2 Supplier Relationship Management programme. • Suppliers report sustainability data and take part in topic-specific forums.
Academic institutions	<ul style="list-style-type: none"> • Imperial College London • Centre for Low Emission Construction • University of Birmingham • University of Oxford • The Francis Crick Institute • Loughborough University • Cambridge Centre for Smart Infrastructure and Construction • The UK Rail Research and Innovation Network 	<ul style="list-style-type: none"> • We work with academic institutions to develop industry-leading research into sustainable solutions. • We are supporting a student at Loughborough University to complete a PhD on Embedding Circular Economy Principles into Infrastructure.



Our approach

Stakeholder and community engagement

Respecting people, respecting places

Our work planning and building HS2 is disrupting the lives of local people. We will always try to do the right thing and reduce any disruption as much as we can. In October 2021, we published our updated community engagement strategy, 'Respecting people, respecting places'. The strategy sets out how we will:

- tell communities what we are going to do and when;
- let communities know if things change; and
- if we get something wrong, we will listen to communities and do our best to make it right.

The strategy also outlines the roles of the independent Resident's Commissioner and Construction Commissioner. The Construction Commissioner mediates disputes about construction, which can include environmental issues, such as noise and dust.

Our service level agreements

We have several service level agreements (SLAs) with statutory authorities to ensure they have the resources to review and process our applications for licences and permits and provide technical advice. Where applicable, they also review our designs, mitigations and assessments and help us to reduce risk and consider solutions. Key organisations include the Environment Agency, Natural England, Historic England, the Forestry Commission and the Canal & River Trust. SLAs are agreed for a three-year period and then reviewed each year, as appropriate, and as HS2 develops. Due to the size, speed and demands of the project, the SLAs are an important way to ensure the statutory organisations can meet all of their statutory obligations and provide the necessary services and application reviews to meet the HS2 programme. To support our forecasted requirements, the SLAs 'ringfence' the necessary support of more than 40 full-time employees each year.

Our approach

HS2 and the United Nations Sustainable Development Goals

HS2 and the United Nations Sustainable Development Goals

The United Nations (UN) Sustainable Development Goals (SDGs)¹ are “a blueprint to achieve a better and more sustainable future for all”. They represent 17 social, economic and environmental priorities designed to combat the global challenges facing humanity by 2030. As Europe’s biggest infrastructure project, HS2 has an important part to play in the UK’s progress toward the UN SDGs.

As a public body, we report on the SDGs in line with the Sustainability Reporting Guidance 2022 – 2023, published by the HM Treasury. We have mapped our environmental sustainability work to seven of the 17 SDGs. We have looked at the goals where we can have the most impact based on our efforts and contributions and measured our performance. Our contributions listed here reflect our work on environmental sustainability and do not include our work on economic or social sustainability.







¹ UN Sustainable Development Goals: sdgs.un.org/goals



Our approach




HS2 and the United Nations Sustainable Development Goals

How our environmental policy objectives contribute to the delivery of the UN SDGs.

SDG	Link to topic	Our performance towards the SDGs
6 Clean water and sanitation 	Responsible consumption and production	<ul style="list-style-type: none"> 67.7% of water consumption used on our sites is from non-potable sources.
7 Affordable and clean energy 	Climate change and community experience	<ul style="list-style-type: none"> 19 sites achieved diesel-free status.
9 Industry, innovation and infrastructure 	Responsible consumption and production	<ul style="list-style-type: none"> Our innovation portfolio is enabling the removal of 1 million tonnes of carbon dioxide across the project. We are supporting a Loughborough University student for a PhD on Embedding Circular Economy Principles into Infrastructure.
11 Sustainable cities and communities 	About HS2 historic environment	<ul style="list-style-type: none"> We have taken precautions to protect and safeguard the historic environment around HS2. We have investigated and recorded our heritage and engaged the public in our cultural and natural heritage.

Our approach

HS2 and the United Nations Sustainable Development Goals

SDG	Link to topic	Our performance towards the SDGs
12 Responsible consumption and production 	Responsible consumption and production	<ul style="list-style-type: none"> • 100% of steel responsibly sourced. • 100% of concrete responsibly sourced. • 100% of timber responsibly sourced. • 99.1% of construction and demolition waste diverted from landfill. • 89.3% of excavated material converted into beneficial use. • 28.3% of felled timber beneficially reused.
13 Climate action 	Climate change	<ul style="list-style-type: none"> • 29.6% carbon emissions reduction against the carbon baseline for HS2 Phase One by March 2023. • PAS 2080 accreditation maintained. • HS2 is designed to be resilient to our changing climate – two further climate change adaptation and resilience reports have been completed by our Phase One contractors and assured by HS2 Ltd.
15 Life on land 	HS2 Green Corridor	<ul style="list-style-type: none"> • 1,028,870 trees successfully planted during the construction of HS2 to date. • 131.22 hectares of additional new woodland created to date through the Woodland Fund (£1,417,404 funding provided for 35 schemes).

Performance data

Scope and methodology	23
Overarching commitments	25
HS2 Green Corridor	30
Climate change	37
Community experience	44
Responsible consumption and production	51
Historic environment	64

Image: Visualisation of HS2's Lower Thorpe viaduct.



Scope and methodology

Reporting period

The reporting period covers April 2022 to March 2023. However, due to the way data is reported by our main reporting platform, the data used is from March 2022 to February 2023, unless stated otherwise. This is in line with our annual corporate reporting period.

Methodology

We have presented the data in line with our environmental policy objectives and our overarching commitments on environmental sustainability. This means the data covers:

- HS2's Green Corridor,
- climate change,
- community experience,
- responsible consumption and production, and
- overarching commitments.

We have not provided data for the historic environment due to the nature of the topic. This is because the value of our heritage cannot be quantified easily. For example, archaeological works vary in size, but can be equally informative and numbers do not adequately portray the value of the activities. However, we have provided case studies to highlight the value of our work.

We have provided a summary table after each data table, comparing progress to our 2020 – 2021 and 2021 – 2022 data. We have also provided some case studies to illustrate our work 'on the ground'.

Our environmental sustainability data has been prepared with reference to the Global Reporting Initiative (GRI) Standards: Core option. The GRI Standards index on [page 72](#) can be used as a reference for our disclosures against the relevant requirements. This report has also been written in line with the [HM Treasury Sustainability Reporting Guidance 2022– 2023](#).

Data collection/calculation

Notes explaining the methodology we use for data collection and calculations are included next to the relevant data table.

Scope

All data relates to the Phase One route we are building between London and the West Midlands. The only exceptions are:

- the biodiversity accounting process on [page 30](#), which also includes the baseline for the Phase 2a route to Crewe; and
- the number of trees and shrubs planted on [page 32](#) and the carbon footprint data on [page 37](#), which include some Phase 2a contracts. This has been noted next to the relevant data points.

Data has been grouped into three categories:

- enabling works contractors (EWCs) – CS Joint Venture (JV), Fusion JV, LM JV;
- main works civils contractors (MWCCs) – SCS JV, Align JV, EKFB JV and BBV JV; and
- stations – Euston and Old Oak Common. Our stations at Interchange, Solihull and Curzon Street, Birmingham are still at the design stage. They are therefore only included in the BREEAM buildings/ BREEAM Infrastructure (Projects) data sets.

The data only refers to current contracts. When further contracts are awarded, they will be included in the relevant data sets.

External assurance

'Reasonable' assurance on the Key Performance Indicators (KPIs) for environmental sustainability performance data has been provided by BSI Group. We have also included our independent assurance statement. The GRI Standards index is outside the scope of BSI verification.



Scope and methodology

The location of the works being undertaken by HS2 construction partners

Contract type	Partnership	Contractors	Location of works
Enabling works contracts	CS JV	Costain Group Plc, Skanska Construction UK Ltd	Within M25
	Fusion JV	Morgan Sindall Construction & Infrastructure Ltd, BAM Nuttall Ltd, Ferrovial Agroman (UK) Ltd	Leamington Spa, Warwickshire to M25
	LM JV	Laing O' Rourke Construction, J Murphy & Sons	Birmingham to Leamington Spa
Main works civils contracts	SCS JV	Skanska Construction UK Ltd, Costain Group Plc, STRABAG SE	Within M25
	Align JV	Bouyges Travaux Publics, Volkerfitzpatrick, Sir Robert McAlpine	Chiltern tunnel and associated works
	EKFB JV	Eiffage, Kier, Ferrovial Construction and BAM Nuttall	Leamington Spa to M25
	BBV JV	Balfour Beatty Group, VINCI Construction UK Ltd	Birmingham to Leamington Spa
Stations	MD JV	Mace Limited and Dragados SA.	Euston station, London
	BBVS JV	Balfour Beatty Group Ltd, VINCI Construction UK Ltd, VINCI Construction Grands Projets SAS and SYSTRA Ltd	Old Oak Common station, west London



Overarching commitments

Environmental sustainability performance data



Environmental incidents

Contract type	Contractor	Level 1 incidents	Level 2 incidents	Level 3 incidents	Level 4 incidents	Hours worked	Weighted Environmental Incident Rate (average over 2022/23)
EWC	CS JV	0	0	0	0	182,401	0.0
	Fusion JV	0	0	2	0	273,930	7.3
	LM JV	0	0	0	1	611,576	0.2
MWCC	Align JV	0	1	3	24	6,204,478	2.5
	BBV JV	0	5	64	67	14,888,152	8.1
	EKFB JV	0	6	65	207	12,287,112	11.9
	SCS JV	0	2	22	73	13,130,462	3.8
Stations	BBVS JV	0	0	7	18	2,857,064	3.1
	MD JV	0	0	3	4	1,828,988	1.9
Total Phase One contracts		0	14	166	394	52,093,504	6.6

Year-on-year progress comparison

Year	Contract type	Level 1 incidents	Level 2 incidents	Level 3 incidents	Level 4 incidents	Hours worked	Weighted Environmental Incident Rate
2020/21	Total Phase	0	12	112	240	22,875,633	11.2
2021/22	One contracts	0	14	122	339	38,256,008	7.8
2022/23		0	14	166	394	52,093,504	6.6

Notes:

Methodology

- The reporting period for this dataset is from April 2022 to March 2023.
- Methodology: $(\text{Level 1} \times 1000) + (\text{Level 2} \times 100) + (\text{Level 3} \times 10) + (\text{Level 4} \times 1) / (\text{Total hours worked} / 100,000)$.

Definitions

- The definition of the incident levels is as follows.
 - Level 1: Incident with a significant and extensive event or failure to comply with legislation likely to result in prosecution.
 - Level 2: Incident with damage/disturbance event or failure to comply with legislation with potential to result in regulatory enforcement action.
 - Level 3: Minor incident/disturbance. Breach of monitoring threshold or trigger level attributable to site activities.
 - Level 4: Incident that resulted in no harm, loss or damage. Failure to comply with HS2 Code of Construction Practice.



Overarching commitments

Considerate Constructors Scheme (CCS)		
Contract type	Contractor	CCS Score (average for all site visits in 2022/23)
EWC	CS JV	No site visit
	Fusion JV	No site visit
	LM JV	No site visit
MWCC	Align JV	42.75
	BBV JV	45.0
	EKFB JV	43.25
	SCS JV	45.14
Stations	BBVS JV	43.33
	MD JV	46.5
Total Phase One contracts		44

Year-on-year progress comparison

Year	Contract type	CCS Score (average for site visits in a reporting period)
2020/21	Total Phase	45/50
2021/22	One contracts	42.7/50
2022/23		44/45

Notes:

About this KPI

- In January 2022, CCS's monitoring and scoring system changed. Previously, sites were scored in five sections with a maximum score of 10 per section. With the new scoring system, each site is scored against three sections with a maximum of 15 points per section and a total of 45 points for a fully compliant site and a total of five points made available for innovations or best practices.
- HS2's former target for all sites was to achieve a score of at least 40/50. The new target is for a total score of 35/45, with a score of at least 11 in each of the three sections that is aligned to the relevant BREEAM Innovation credit. For more information regarding the new monitoring and scoring system, see [this Considerate Constructors Scheme checklist](#).
- The Considerate Constructors Scheme is a not-for-profit, independent organisation founded to raise standards in the construction industry.
- CS JV, Fusion JV and LM JV had no CCS visits this reporting period due to the stage of their programme.

Methodology

- Where a site was assessed more than once during the reporting period, the average score was used.



Overarching commitments

BREEAM Buildings/ BREEAM Infrastructure (Projects)

BREEAM buildings

Contract	Target rating	Design rating (as of March 2023)	Post-construction rating (as of March 2023)
Old Oak Common (BBVS)	Excellent (70%)	Outstanding achieved 94.5%	On target
Interchange (Ove Arup & Partners International Ltd)	Excellent (70%)	Outstanding achieved 86.0%	On target
Curzon Street (WSP)	Excellent (70%)	On target	On target
Euston (Mace Dragados)	Excellent (70%)	On target	On target
London Underground Station (Mace Dragados)	Excellent (70%)	On target	On target

BREEAM Infrastructure (Projects)

Contractor	Target rating	Design rating (as of March 2023)	Post-construction rating (as of March 2023)
SCS JV	Excellent (75%)	Excellent achieved 82.6%	On target
Align JV	Excellent (75%)	Excellent achieved 78.7%	On target
EKFB JV	Excellent (75%)	On target	On target
BBV JV	Excellent (75%)	Excellent achieved 83.4%	On target

Notes:

Methodology

- Enabling work contracts do not have separate environmental assessments, but feed information to the main work civils contracts.

Definitions

- BREEAM Buildings** is the world's leading science-based suite of validation and certification systems for sustainable built environments and the world's leading sustainability assessment method for buildings. It recognises and reflects the value in higher performing assets across the built environment lifecycle and captures all key environmental and sustainability disciplines and measurement indicators relevant to the built environment.
- BREEAM Infrastructure (Projects)**: (formerly CEEQUAL) is the evidence-based sustainability assessment, rating and awards scheme for civil engineering, infrastructure, landscaping and public realm projects.
- An 'Excellent' rating is achieved if the projected score is $\geq 70\%$ for BREEAM Buildings and $\geq 75\%$ for BREEAM Infrastructure: Projects.
- 'On target' is achieved if 'current projected score' minus any mandatory credits currently identified as high risk is equal to or above the mandatory target rating (70/75%) required across the HS2 programme. High risk definition – for a credit to be classified as high risk, one or more of the following criteria must be associated with it at the time when the quarterly progress report is submitted to HS2:
 - The evidence for the credit should have been in place prior to the current stage in the programme, hence immediate action is required to avoid losing the credit.
 - The credit, or at least one of its compliance details, is unlikely to be achievable due to non-compliance, technical uncertainty, design changes or programme changes.
 - The credit, or at least one of its compliance details, is prohibitively expensive and there is a low financial return (outside the agreed budget).
 - The credit is complex and there are a number of compliance details that are often missed or can easily be lost through not obtaining one piece of evidence or the project team have little experience of gaining the credit.

Note: Due to the long-term and entire project lifecycle coverage of both assessment types, certain credits may be assessed as high risk because the credit achievement can only be confirmed at a later stage of the construction and/or handover phase.

Performance commentary

- The target ratings for Interchange and Old Oak Common stations, respectively, are 'Excellent'. However, we have achieved a design rating of more than 85% on both, which is the threshold for the higher rating of 'Outstanding'.

Case studies

Overarching commitments

Case study



Artist's impression of the new Washwood Heath depot.

Washwood Heath depot

We revealed the first designs for HS2's Washwood Heath depot in Birmingham in summer 2022. The depot will be the main control centre and maintenance facility for the high-speed network, creating over 550 jobs in the local area. It has been designed by our engineering delivery partner to provide a comfortable and sustainable working environment. The designs maximise natural light to reduce artificial lighting in the daytime, alongside solar panels and other renewable energy sources. Rainwater will be collected from suitable rooftops for reuse, with the wider space using low carbon materials when we can.

The depot has been designed with pedestrian and cyclist access in an effort to reduce car use. Car parks will offer electric charging points and secure spaces for bikes and motorcycles.

Landscape design and green spaces play a key role, with each building having a landscape theme, outdoor social spaces for staff, and areas to promote biodiversity and better connect habitats. The depot is on track to achieve a BREEAM Buildings rating of 'excellent'.

Case studies

Overarching commitments

Case study



Artist's impression of Old Oak Common station.

Old Oak Common station

HS2's London superhub at Old Oak Common will be the largest newly built station in the UK, providing key links between London and the Midlands, the North and Scotland and allowing passengers to travel to Wales and the South West.

Over the past year, we've developed the underground section of the station. In line with our overarching commitments, we intend to make the site emissions-free by 2024. We've achieved an 'outstanding' rating in our BREEAM Buildings assessment, with an impressive score of 94.5%, surpassing our environmental minimum requirements. Only 1% or fewer of all assessed projects in the UK receive this rating. The score also exceeded the 85% threshold for 'outstanding' by a significant margin, highlighting our commitment to quality and sustainability.

Achieving the 94.5% score has been driven by a range of performance criteria.

The awarded credits that raised design and sustainability performance further included exemplary standards such as responsible construction practices, aftercare planning, cyclist facilities, lifecycle impact studies, exemplary waste management practices and studies on the adaptation of the building to climate change.

Additionally, HS2 stations have expanded the scope of key existing credits with bespoke assessments – for example, enhancing the connectivity requirements to the standard travel plan credit. This includes the requirement to design, appraise and report on enhanced connectivity and provide continuity between the station and onward destinations. It addresses areas such as local character, ways that help people better navigate spaces, station layout to ensure the best connections and maximising urban realm.

Innovation awards have been won for materials efficiency measurement and management and reusing felled timber for community sources.

Wider sustainability best practices have also been key at Old Oak Common, such as using electric cranes to reduce emissions, a conveyor system to remove large volumes of excavated materials – reducing traffic on local roads – and installing traffic management cameras to monitor lorry movements.



HS2 Green Corridor

HS2 Green Corridor



Biodiversity accounting process

Area-based habitats

Phase	Pre-construction		Post-construction		Summary		
	Area (ha)	Biodiversity units baseline	Area (ha)	Biodiversity units	Area (ha) difference (pre- vs post-)	Biodiversity unit difference (pre- vs post-)*	% change in biodiversity units
Phase One (2017 baseline)	6,775	22,059	6,777	20,484	2	-1,575	-7.14%
Phase One (2020 update)	6,361	21,091	6,419	20,423	58	-668	-3.17%
Phase One (June 2021 update)	6,425	21,389	6,433	20,834	7.86	-555.72	-2.60%
Phase One (March 2022 update)	6,426	21,043	6,434	20,427	7.47	-616.54	-2.93%
Phase One (December 2022 update)	6,462	20,649	6,473	19,097	10	-1,552	-7.52%
Phase 2a (2019 baseline)	2,979	7,887	2,973	6,545	-4	-1,342	-17.01%

All habitat groups

Phase	Habitat group	Pre-construction		Post-construction		Summary		
		Area (ha) / Length (m)	Biodiversity units	Area (ha) / Length (m)	Biodiversity units	Area (ha) / Length (m) difference (pre- vs post-)	Biodiversity unit difference (pre- vs post-)*	% change in biodiversity units
Phase One (2017 baseline)	Area-based habitats	6,775	22,059	6,777	20,484	2	-1,575	-7.14%
	Hedgerows	448,148	929,086	403,441	856,289	-44,707	-72,797	-7.84%
	Watercourses	76,371	139,902	78,063	146,143	1,692	6,241	4.46%
Phase One (December 2022 update)	Area-based habitats	6,462	20,649	6,473	19,097	10	-1,552	-7.52%
	Hedgerows	450,353	1,006,734	501,278	1,058,053	50,925	51,319	5.10%
	Watercourses	75,842	138,960	79,407	135,436	3,565	6,476	4.70%
Phase 2a (2019 baseline)	Area-based habitats	2,979	7,887	2,973	6,545	-4	-1,342	-17.01%
	Hedgerows	234,180	499,229	300,766	629,867	66,586	130,638	26.16%
	Watercourses	22,605	46,661	14,040	28,860	-8,565	-17,801	-28.15%

* Biodiversity unit difference is the difference in biodiversity units, as calculated for the habitats present before construction of the railway (pre-construction) compared with the habitats that will be present on completion of the railway (post-construction). It is based on the design at that point in time. As the design evolves and improvements or savings are made, this number will change.



HS2 Green Corridor

Notes:

About this KPI

- We are seeking to secure biodiversity gains, excluding irreplaceable habitats, such as ancient woodlands. To measure progress towards our goal, we developed a modified version of the Department for Environment, Food & Rural Affairs (Defra) pilot biodiversity offsetting metric, in consultation with Defra and Natural England. It is called 'the HS2 metric'. The HS2 metric uses habitats as a proxy for considering losses and gains of biodiversity and measures these losses and gains in 'biodiversity units'.
- Industry guidance has evolved since we started reporting our biodiversity accounting figures. To align with this, in addition to reporting on area-based habitats, we now report our biodiversity accounting figures for hedgerows and watercourses too.
- More information about our biodiversity targets is outlined in the [HS2 Environmental Sustainability Vision](#).

Methodology

- An HS2 metric has been used to calculate the figures shown above. The HS2 metric has not been used to define the level of biodiversity compensation that has been included in the scheme. It has been used as an accounting 'tool' and applied to the habitats present pre- and post-construction. It allows us to compare the losses and gains in biodiversity units due to HS2. This accounting process has been referred to as the 'no net loss calculation'. (For more information, see the [HS2 London-West Midlands, No net loss in biodiversity calculation report](#)). Since the launch of our Environmental Sustainability Vision, the 'no net loss' process has been renamed the 'biodiversity accounting' process to reflect our goal to secure biodiversity gains on Phase One and Phase 2a where this is cost-effective and possible within existing funding limits.
- Ancient woodlands are irreplaceable, and for this reason, any measures that could be seen as an attempt to compensate for their loss are not included in our calculation. HS2's impact on ancient woodlands are the subject of separate reporting and data for 2021 – 2022 has been published in our online ancient woodland interactive map and associated report.
- The metric calculates losses and gains to biodiversity on an area basis, except for linear features (hedgerows and watercourses). Separate calculations are made for these based on the length of the habitats affected. Further details are provided in the [HS2 London-West Midlands, No net loss in biodiversity calculation report](#).
- Methods are outlined in the technical notes that accompany the Environmental Statements for each phase of HS2:
 - [Phase One](#) (page 364)
 - [Phase 2a](#) (page 203)

These outline technical approaches as well as changes made to calculations between each phase of HS2.

Limitations

- The biodiversity accounting data represents a snapshot in time. Contractors are still progressing design work.
- Although achievement of biodiversity gains is being considered by contractors throughout the design stage, the calculation of biodiversity accounting is only realised towards the end of a design stage. Only assets that have reached an approved design stage have been taken into account.
- Contractors undertake and complete different stages of design using different timescales and this means the level of maturity of design and the resulting figures are not consistent across Phase One. For example, some design elements have completed proposed scheme design while other elements have completed detailed design or 'as-built' design.



HS2 Green Corridor

Number of trees and shrubs planted

Phase One

Year	Trees planted	Trees replaced	Net trees planted
2017–18	218,624	–	218,624
2018–19	125,852	6,553	119,299
2019–20	169,850	45,125	124,725
2020–21	271,707	30,405	241,302
2021–22	164,991	24,087	140,904
2022–23	119,563	73,936	45,627
Total	1,070,587	180,106	890,481

Phase 2a

Year	Trees planted	Trees replaced	Net trees planted
2022–23	138,389	–	138,389

Route-wide

Year	Trees planted	Trees replaced	Net trees planted
To date	1,208,976	180,106	1,028,870

Notes:

Methodology

- The annual planting season is from November to March. During this season we also replace trees that fail to grow in line with site-specific maintenance monitoring and management plans and to ensure that the original tree planting specification is being maintained.
- The basis of HS2's approach to tree planting and woodland creation is [The National Plant Specification – Handling and establishing landscape plants](#). This provides industry standard guidance on the processes of plant handling and establishment for large-scale planting projects.
- Failures in saplings should be expected in the early years following planting. Aligning to industry-wide guidance, HS2 Ltd expects typical failure rates of new tree and shrub planting across its construction sites to be within the industry best practice range of 5 to 15% (this being in a typical climatic year). However, during prolonged periods of lower than expected rainfall, it would be expected that failure rates can be higher. Given numerous summer drought conditions since HS2 planting commenced, higher failure rates in newly planted trees are not to be unexpected. It should be noted that, due to the typical industry-wide failures of a proportion of newly-planted trees and the variations in seasonality, the Forestry Commission advise that the success of any tree planted areas is best assessed after five years from initial planting, when the plantation should, by then, be as near to 100% of the original planting intention.
- Due to the large scale of HS2 planting, the watering of new plants is not undertaken. Replacing plants lost is considered a more cost-effective solution and a far more ethical use of water resources during dry summer conditions.
- The published [HS2 Information Paper E26](#) describes the minimum periods for the management and monitoring of habitats.



HS2 Green Corridor

Woodland Fund					
Phase One Woodland Fund £5m	Schemes	Value	Creation area (Gross area of woodland creation)	PAWS* area (Gross area for PAWS restoration)	Total tree numbers
Committed – agreement in place or offered, application approved, in progress or received	4**	£308,468	32.24 ha (56,513 trees)	5.37ha (7,159 trees)	63,672
Completed – interim or final claim received or paid	35	£1,417,404***	131.22 ha (220,663 trees)	66.18ha*** (113,909 trees)	334,572

* Plantations on Ancient Woodland Sites, or PAWS (previously referred to as Ancient Woodland Restoration), are ancient semi-natural woodlands that have been felled and replanted with other tree species, typically non-native trees, such as spruce, fir and larch.

** Reduced from previous figures as two applications were rejected as they did not meet the criteria.

*** Reduced from previous figures due to the applicant reducing the area of restoration at one of the schemes.

Notes:

The Forestry Commission administers the Woodland Fund for HS2. In December 2022, the Forestry Commission corrected scheme values in its grant register that has resulted in a correction to the values previously reported in the 2021–2022 ESPR.

Methodology

- This data presents our progress to date and refers to Phase One as of 31 March 2023.

Definitions

- Committed: new woodland creation or ancient woodland restoration projects where funding has been allocated, either firmly or tentatively. These projects have not yet been delivered. This category also includes restoration projects that are underway or where we have received or approved an application.
- Completed: new woodland creation or ancient woodland restoration projects that have been completed since the start of the Woodland Fund scheme.

Case studies

HS2 Green Corridor

Case study



Controlling invasive pennywort in the Colne Valley.

Funding pennywort control trials

Pennywort is an invasive plant that has affected watercourses in the Colne Valley. A £130,000 award from the Colne Valley Additional Mitigation Plan funding has enabled a trial project on using biological control, releasing a weevil that feeds exclusively on pennywort. The project has been endorsed by the Department for Environment, Food and Rural Affairs (Defra) and has involved local communities with volunteers being trained to carry out monitoring.

Case study



An example of an area for walkers and cyclists in the Chilterns.

Funding the Misbourne greenway

The Chilterns Area of Outstanding Natural Beauty Panel has contributed £330,000 towards the building of the Misbourne Greenway, a 1km stretch connecting the settlements of Great Missenden and Wendover away from the busy A413. It will be a traffic-free / low traffic route for people on foot or bike along the Misbourne valley.

Case studies

HS2 Green Corridor

Case study



Newyears Green Bourne following realignment.

River improvements to the Newyears Green Bourne and River Colne

As part of the Colne Valley viaduct works, main works contractor Align has enhanced and improved the chalk river habitats of the Newyears Green Bourne (NYGB) and River Colne. This was to mitigate the railway crossing both rivers and was agreed with the Environment Agency, offsetting the impact of viaduct piers and delivering further benefits to the channels. The NYGB was a steep-banked, featureless river, while the River Colne had deteriorated. The NYGB was realigned to vary its direction and flow and the Colne had berms, or edges, added downstream. Shallow landforms, known as riffles, were created upstream to vary the riverbed environment and water flow.

The new habitats we are creating will benefit the existing ones in these watercourses and improve water quality, helping aquatic species, including fish and invertebrates, to thrive. This will also benefit otters, water voles, kingfishers and a range of other species.

Case studies

HS2 Green Corridor

Case study

Partnership with the Great British Bee Project

In May 2022, we partnered with the Great British Bee Project (GBBP) to install hives for the threatened British Black Bees, our only native honeybee. We installed 14 hives in new habitats we have created along our Phase One Green Corridor in a bid to conserve this threatened species. The hives will be maintained by a network of beekeepers, with data recorded on an app and shared with Defra for analysis. Working with the GBBP, we've also run community events to raise awareness of protecting bees. The 'reintroduction' of this threatened species on a project the scale of HS2 hasn't been achieved before and provides an opportunity to promote a growth in numbers of this threatened species across the UK.

Jeff Castle, chief nectar collector at GBBP, said: "We're delighted that HS2 have come on board with our nationwide project to conserve the British Black Bee. Until the beginning of the 20th century, it dominated the landscape, pollinating crops, trees and flowers for wildlife. Recently however, due to habitat loss, climate change and viruses, the population of our native honeybee has plummeted and populations are only just holding on in a few scattered locations across the UK.

"Members from our UK network of over 300 beekeepers will regularly monitor and maintain the HS2 hives, record information in an app and share the findings with HS2 and Defra."

“
We're delighted that HS2 have come on board with our nationwide project to conserve the British Black Bee.”

Jeff Castle
Great British Bee Project



Beehives at Halse Copse, near Brackley.



Climate change

Climate Change



Whole-life carbon footprint – progress against targets per contract

Contract type	Phase	Contractor	Total carbon reduction target	Baseline carbon footprint (tCO ₂ e)	Current carbon footprint (tCO ₂ e) (March 2023)	Current percentage reduction against baseline (March 2023)
Enabling works contracts	Phase One	CS JV	–	0	0	N/A
		Fusion JV	30%	11,070	7,630	31.1%
		LM JV		191,575	110,822	42.2%
Main works civils contracts	Phase One	SCS JV	50%	1,399,449	938,464	32.9%
		Align JV		1,095,404	671,746	38.7%
		EKFB JV		2,890,071	2,216,111	23.3%
		BBV JV		4,148,208	2,376,654	42.7%
Stations	Phase One	Euston (MD JV)	50%	710,479	416,746	41.3%
		Old Oak Common (BBVS JV)		366,516	210,689	42.5%
		Interchange (Arup)		193,976	102,469	47.2%
		Curzon Street (MD JV)		158,151	70,847	55.2%
Rail Systems	Phase One and 2a	Track	50%	3,243,192	3,118,746	3.8%
	Phase One	Calvert IMD	50%	118,006	99,765	15.5%
	Phase One and 2a	Overhead catenary system (OCS)*	50%	42,634	42,634	0%
	Phase One and 2a	Cross passage doors (CPD)	50%	6,514	3,341	48.7%
	Phase One	Washwood Heath	50%	156,237	148,728	4.8%
	Phase One and 2a	Tunnel mechanical and electrical systems*	50%	191,595	191,595	0%

* Carbon data not yet available. Contracts either not yet awarded or at an early design stage, hence 0% progress against targets reported.



Climate change

Whole-life carbon footprint – progress against targets per contract

Contract type	Phase	Contractor	Total carbon reduction target	Baseline carbon footprint (tCO ₂ e)	Current carbon footprint (tCO ₂ e) (March 2023)	Current percentage reduction against baseline (March 2023)
Rolling Stock	Phase One and 2a	Rolling stock (Hitachi-Alstom)	See notes	2,465,966	1,668,033	32.4%
	Phase 2a	Main civils works (MCW)	50%	1,052,704	864,644	17.9%
	Phase One total		50%	16,356,677	11,521,580	29.6%
	Phase 2a total		50%	2,158,329	1,792,525	16.9%
	Programme to date total			18,515,006	13,314,105	28.1%

* Carbon data not yet available. Contracts either not yet awarded or at an early design stage, hence 0% progress against targets reported.

Year-on-year progress comparison

Year	Contractor	Total carbon reduction target by contract	Baseline carbon footprint (tCO ₂ e)	Carbon footprint at the end of the reporting period (tCO ₂ e)	Percentage reduction against baseline at the end of the reporting period	
2020/21	Phase One total	50%	14,544,000	10,855,000	25.4%	
	Phase 2a total		478,000	478,000	0%	
	Programme to date total		15,022,000	11,333,000	24.6%	
2022/21	Phase One total		14,488,000	10,934,000	24.8%	
	Phase 2a total		564,000	564,000	0%	
	Programme to date total		15,052,000	11,498,000	23.6%	
	Phase One total			16,356,677	11,521,580	29.6%
	Phase 2a total			2,158,329	1,792,525	16.9%
2022/23	Programme to date total		18,515,006	13,314,105	28.1%	

Notes:

- No permanent HS2 assets are being constructed by CS JV, therefore a carbon footprint calculation is not required.
- Rolling stock is subject to a carbon target/limit – however, it is not expressed as a percentage. For more information regarding the carbon reduction target/limit follow the [link](#) and go to TTS-847 (p.73).
- The tables above show the contract types with baselines produced to date. For Phase 2a and future phases, contract types will be added in future years when these contracts have baselines.
- Carbon reduction targets apply to the whole-life carbon footprint and are to be delivered during the contract period.
- Rail systems include: track, overhead catenary system, tunnel and lineside mechanical and electrical equipment, Calvert infrastructure maintenance depot and Washwood Heath depot and control centre.

Methodology

- The carbon data has been quantified in accordance with best practice industry standards (e.g. BS EN ISO 14040, BS EN ISO 14044, BS EN 15978).

Limitations

- The carbon data represents a snapshot in time. Contractors are still progressing design work.



Climate change

Energy and fuel consumption data

Contract type	Contractor	Total grid electricity	Onsite renewables	Petrol (100% mineral)	Petrol (average fuel blend)	Diesel (white/average biofuel blend)	Gas oil (red diesel)	LPG	Hydrogen	Other fuel types	Other fuel types
		kWh	kWh	litres	litres	litres	litres	litres	litres	kWh	litres
EWC	CS JV	0	0	0	0	3,600	0	0	0	0	0
	Fusion JV	0	0	0	0	13,666	8,000	0	0	0	0
	LM JV	0	0	0	0	7,981	91,663	0	0	0	0
MWCC	Align JV	45,850,449	2,160	0	652	1,071,776	277,454	454,834	495	0	3,472,606
	BBV JV	11,927,570	0	185	3,719	17,883,424	958,227	25	0	36,469	0
	EKFB JV	22,012	0	3,732	37,225	21,821,509	1,248,885	162	0	0	0
	SCS JV	5,348,494	0	0	858	0	331,776	0	0	0	6,641,403
Stations	BBVS JV	1,207,758	7,934	0	491	860,122	244,610	184	0	0	13,550
	MD JV	970,641	0	0	0	158,005	8,491	0	100	0	54,083
Total Phase One contracts		65,326,924	10,094	3,917	42,945	41,820,083	3,169,106	455,205	595	36,469	10,234,193

Energy and fuel consumption data

Year-on-year progress comparison

Year	Contract type	Total grid electricity	Onsite renewables	Petrol (100% mineral)	Petrol (average fuel blend)	Diesel (white/average biofuel blend)	Gas oil (red diesel)	LPG	Hydrogen	Other fuel types	Other fuel types
		kWh	kWh	litres	litres	litres	litres	litres	litres	kWh	litres
2020/21	Total Phase	1,038,184	4,323	16,686	47,091	1,400,483	9,289,152	1,175	0	104,874	16,402
2021/22	One contracts	22,454,371	3,682	26,314	44,697	2,436,122	23,308,065	297,331	2,560	368,167	3,051,854
2022/23		65,326,924	10,094	3,917	42,945	41,820,083	3,169,106	455,205	595	36,469	10,234,193



Climate change

Notes:

Definitions

- Petrol (average fuel blend): standard grade petrol sold in the UK contains a blend of just under 5% bioethanol and around 95% petrol.
- Diesel (average biofuel blend): the most common biodiesel blend is B20, which ranges from 6% to 20% biodiesel blended with petroleum diesel. However, B5 (a biodiesel blend of 5% biodiesel and 95% diesel) is also commonly used in fleet vehicles.
- LPG – Liquefied Petroleum Gas.
- Total grid electricity comprises conventional grid electricity and grid electricity from zero carbon tariffs.
- The ‘Other’ categories include:
 - natural gas received through the gas mains grid network in kWh; and
 - hydrotreated vegetable oil (HVO) in litres.
- More information about the supply of renewable road fuels in the UK can be found on the [renewable fuel statistics](#) web page.

Performance commentary

- Align’s electricity usage figure significantly increased due to the use of two electrically-powered 2,000 tonne tunnel boring machines (TBMs).
- SCS’ and Align’s ‘other fuel type’ usage increased in comparison to the previous year due to the replacement of petrol and diesel with HVO biofuel.

Case studies

Climate change

Case study

Wendover Dean viaduct

Located south of the village of Wendover in Buckinghamshire, the 450m-long viaduct is the first major railway bridge in the UK to be built with a 'double composite' structure, using significantly less carbon-intensive concrete and steel in comparison to a more traditional design.

During summer 2022, engineers working for main works contractor EKFB constructed 53 concrete piles to form the foundations for the structure. On top of each group of piles, which range from 38 metres to 46 metres deep, a concrete pile cap will support the pier which will in turn support the weight of the bridge structure. The piers, some up to 14 metres high, will be cast as shells before being assembled onsite and filled with concrete. This approach will reduce the amount of work onsite and cut disruption for local residents.

EKFB worked with design partner ASC and specialist architects Moxon on the 'double composite' approach, which was inspired by structures on the French high-speed TGV network. Instead of using solid, pre-stressed concrete beams to form the bridge spans, the viaduct will use two steel girders sandwiched between two layers of reinforced concrete to create a lightweight and super strong hollow span.



Construction progress on the Wendover Dean viaduct.

The approach is set to save an estimated 7,433 tonnes of embodied carbon emissions in materials, the equivalent of 20,500 return flights from London to Edinburgh. It will help HS2 achieve our goal of halving the amount of embedded carbon in construction.

Case studies

Climate change

Case study



Visualisation of an HS2 train.

Delivering cleaner, greener trains

Hitachi-Alstom High Speed (HAH-S) joint venture is manufacturing 54 next-generation high-speed electric trains. It will deliver some of the fastest, quietest and most energy efficient high-speed trains in the world.

HAH-S is the world's first train manufacturer to obtain the international BSI PAS 2080¹ certification for rolling stock and services. This provides a robust framework to evaluate and demonstrate a reduction of the carbon footprint through the design stages. This ensures the fleet has the lowest possible carbon footprint. It is achieved by ensuring the entire lifecycle of the train and emissions is thoroughly evaluated in the design stage and then incorporated into manufacturing and operations.

To assess and monitor the impact associated with the lifecycle of the train under development, HAH-S conducted a conceptual design, lifecycle assessment (LCA) at the early stage of the project. The results obtained from the LCA were used to identify the contributory factors that affect the carbon footprint of the train. Alternative solutions (technical/ technological, materials) were also identified, evaluated and, if practical, implemented.

This approach will be replicated for future design stages. The results obtained from the conceptual design LCA, reflected that the developed design impact is below HS2's target of 1.86 g CO₂ eq. per passenger kilometre.

¹ BSI (British Standards Institution) PAS 2080 Carbon Management in Infrastructure.

“

The Hitachi, Alstom High Speed (HAH-S) joint venture became the first rail manufacturer in the world to obtain the certification of BSI PAS 2080 (Carbon Management in Infrastructure) in March 2023. This internationally recognised certification ensures the design of the train will have the lowest possible carbon footprint and means HS2 will have one of the world's most energy efficient, fast, light and recyclable trains – helping to deliver a net zero railway.”

Davide Bonaffini

Global head of ECO design for Hitachi Rail

Case studies

Climate change

Case study



A visualisation of HS2's Interchange station, Solihull.

UK Green Building Council partnership

We partnered with the UK Green Building Council (UKGBC) to help develop and test its new framework, which aims to provide a consistent methodology for assessing climate-related physical risks to buildings.

We took part in a series of workshop sessions to apply the framework to some of HS2's key assets. The sessions increased our understanding of potential climate-related risks at an asset level and allowed us to discuss challenges and opportunities in a physical risk assessment processes with industry peers.

Through the workshops, we successfully demonstrated the application of UKGBC's framework on new build assets on a large-scale major infrastructure project.

A UKGBC spokesperson said: "This collaborative initiative involved testing the framework for measuring and reporting physical risks and identifying current challenges and solutions for climate resilience action in the UK built environment. By contributing to this project, HS2 has played a pivotal role in highlighting these solutions, and also producing much-needed case studies for climate-related risk assessments in action."



Roof detail at Interchange station.

“HS2's involvement has been particularly significant due to their unique infrastructure perspective. They have emphasised the importance of assessing climate-related risks for critical infrastructure assets in the UK.”

UKGBC spokesperson



Community experience

Community experience



Air Quality

Non-road mobile machinery (NRMM)

Contract type	Contractor	Target proportion of NRMM that meets HS2's emission standards	Proportion that was compliant in 2022/23
		Percentage	Percentage
EWC	CS JV	100%*	N/A
	Fusion JV	100%*	N/A
	LM JV	100%*	100%
MWCC	Align JV	100%*	99.39%
	BBV JV	100%*	98.77%
	EKFB JV	100%*	100%
	SCS JV	100%*	100%
Stations	BBVS JV	100%*	100%
	MD JV	100%*	96.15%
Total Phase One contracts		100%*	99.48%

* Including approved exemptions.



Community experience

Air Quality

Heavy goods vehicles (HGVs)

Contract type	Contractor	Target proportion of HGVs that are Euro VI or better	Proportion that was compliant in 2022/23
		Percentage	Percentage
EWC	CS JV	100%*	N/A
	Fusion JV	100%*	N/A
	LM JV	100%*	100%
MWCC	Align JV	100%*	99.99%
	BBV JV	100%*	99.97%
	EKFB JV	100%*	99.93%
	SCS JV	100%*	99.99%
Stations	BBVS JV	100%*	99.90%
	MD JV	100%*	99.95%
Total Phase One contracts		100%*	99.97%

* Including approved exemptions.



Community experience

Air Quality

Light duty vehicles (LDVs)

Contract type	Contractor	Target proportion of LDVs that are EURO 6 diesel or EURO 4 petrol	Proportion that was compliant in 2022/23
		Percentage	Percentage
EWC	CS JV	100%	N/A
	Fusion JV	100%	N/A
	LM JV	100%	87.50%
MWCC	Align JV	100%	98.92%
	BBV JV	100%	94.45%
	EKFB JV	100%	98.50%
	SCS JV	100%	99.50%
Stations	BBVS JV	100%	96.76%
	MD JV	100%	99.37%
Total Phase One contracts		100%	98.71%



Community experience

Air Quality

Year-on-year progress comparison

Year	Contract type	Vehicle type	Target	Proportion that was compliant
			Percentage	Percentage
2020/21	Total Phase One contracts	Non-road mobile machinery	100%	99.8%
		Heavy goods vehicles	100%	99.2%
		Light duty vehicles	100%	83.9%
2021/22		Non-road mobile machinery	100%	99.9%
		Heavy goods vehicles	100%	99.9%
		Light duty vehicles	100%	88.7%
2022/23		Non-road mobile machinery	100%	99.5%
		Heavy goods vehicles	100%	100%*
		Light duty vehicles	100%	98.7%

* 99.97% rounded to 100%.

Notes:

Methodology

- HS2 emission standards are included in both the [Code of Construction Practice](#) (Chapter 7), as well as the [HS2 Information Paper E31](#).
- The reporting period is April 2022 to March 2023.

Definitions

- Non-road mobile machinery emissions (NRMM) standards: HS2 has applied [NRMM engine emission requirements](#) route-wide, for all machines with an engine power of between 37kW and 560kW.
- NRMM: refers to all mobile machines and transportable industrial equipment or vehicles that are fitted with an internal combustion engine, not intended for transporting goods or passengers on roads – for example, excavators, cranes and dump trucks.
- Light duty vehicles: vehicles with a permissible maximum weight less than or equal to 3.5 tonnes.
- Heavy goods vehicles: vehicles with a permissible maximum weight greater than 3.5 tonnes.
- NRMM exemptions policy: The Greater London Authority [exemptions policy](#) set out in the Supplementary Planning Guidance (SPG) and applies routewide to HS2. They are awarded on a case-by-case basis to specialist plant and machinery or for short-term use where the NRMM may not be suitable for retrofit technology following clear justifications and review.
- HGVs exemptions policy: Certain HGVs may be exempt on the grounds of:
 - a. Specialism: being a specialist vehicle (not readily available as Euro VI compliant).
 - b. Unforeseen circumstances: for example, breakdowns or mechanical failure requiring a replacement vehicle that is not readily available as Euro VI compliant.
 - c. Triviality: if a particular vehicle is expected to make no more than 12 visits to all HS2 works in the London Low Emission Zone in any 12-month rolling period, it may be given a specific exemption.

The total of the exemptions shall account for no more than 8% of unique vehicles on an annual basis.

Case studies

Community experience

Case study

Managing noise at the Chiltern tunnel

In August 2022, work started on a new phase of our 10-mile Chiltern tunnel. The structure is being built using two large tunnel boring machines (TBMs), which create vibrations that travel through the ground. To limit possible impacts on residents, specialist software was used to identify properties that might be affected by vibrations.

The TBMs reached Chalfont St Giles, Buckinghamshire in October 2022 and 70 homes were alerted two months before they were due to pass through. Residents in houses expected to experience the highest noise and vibration levels were offered hotel accommodation and 70 residents took up our offer. We didn't need to make any emergency relocations and no complaints were received.

We measured the noise and vibration levels to improve the way we identify properties that could be affected by tunnelling.



Tunnelling machine Florence in the Chiltern tunnel.

Case studies

Community experience

Case study



An aerial view of the temporary access road.

Keeping construction vehicles off local roads

We completed the first stage of a 50-mile (80km) temporary access road linking HS2 construction sites across Buckinghamshire, Oxfordshire, Northamptonshire and south Warwickshire in May 2022. Closely following the railway route, the road is designed to carry about 400 to 500 vehicles every day. The access road allows workers, equipment and materials to reach rural construction sites quickly and efficiently and reduces congestion on local roads.

A temporary access bridge was completed in February 2022 to support the construction of the Colne Valley viaduct and take vehicles off local roads. Instead of using local roads, lorries making deliveries to the site from the M25 follow an internal access route via HS2's south portal construction site and the temporary bridge. The access bridge has taken more than 10,000 vehicle journeys off local roads in its first year of operation, significantly reducing the impact on the local community and improving road safety.

Case studies

Community experience

Case study

Innovative bridge-building reduces local disruption

The 190-metre Marston box bridge over the M42 in Warwickshire will connect Dunton Wood embankment and the Birmingham and Fazeley Canal viaduct. Building the bridge in a traditional manner would have caused major disruption. Works would have caused three months of overnight closures and two years

of reduced lane widths and speed limits. Instead, we took an innovative approach to minimise traffic disruption.

We constructed the 12,600-tonne structure on land beside the motorway and used a mechanism to 'slide' the bridge 165 metres into position. The task involved a 10-day road closure, which was completed over the Christmas period to further reduce disruption.



Construction of the Marston box bridge.

Case study



Restoration at Darnford Brook.

Canal restoration funding

We awarded £75,000 to Lichfield and Hatherton Canals Restoration Trust in Staffordshire from HS2's Community and Environment Fund. Our award, along with £41,200 from the European Regional Development Fund, is being used to support the trust in creating an ecology park at Darnford Moors.

The money will be used to improve habitats on the Darnford Brook wetlands as well as nearby woodland and hedgerows. The aim is to create a welcoming space for wildlife and restore water to a section of unused canal.



Responsible consumption and production

Responsible consumption and production



Responsible sourcing

Timber

Contract type	Contractor	Target for responsibly sourced timber	Certified timber	Total timber purchased	Proportion of responsibly sourced timber
		Percentage	Tonnes	Tonnes	Percentage
EWC	CS JV	100%	0	0	-
	Fusion JV	100%	7	7	100%
	LM JV	100%	0	0	-
MWCC	Align JV	100%	501	501	100%
	BBV JV	100%	275	275	100%
	EKFB JV	100%	25,317	25,317	100%
	SCS JV	100%	1,798	1,798	100%
Stations	BBVS JV	100%	1,266	1,266	100%
	MD JV	100%	114	114	100%
Phase One total		100%	29,278	29,278	100%



Responsible consumption and production

Responsible sourcing

Steel

Contract type	Contractor	Target for responsibly sourced steel	Certified steel	Total steel	Proportion of responsibly sourced steel
		Percentage	Tonnes	Tonnes	Percentage
EWC	CS JV	100%	0	0	-
	Fusion JV	100%	0	0	-
	LM JV	100%	0	0	-
MWCC	Align JV	100%	49,881	49,881	100%
	BBV JV	100%	180,368	180,397	100%
	EKFB JV	100%	4,519	4,519	100%
	SCS JV	100%	22,687	22,687	100%
Stations	BBVS JV	100%	11,690	11,690	100%
	MD JV	100%	531	576	92.2%
Phase One total		100%	269,676	269,750	100%



Responsible consumption and production

Responsible sourcing

Concrete

Contract type	Contractor	Target for responsibly sourced concrete	Certified concrete	Total concrete	Proportion of responsibly sourced concrete
		Percentage	Tonnes	Tonnes	Percentage
EWC	CS JV	100%	0	0	-
	Fusion JV	100%	0	0	-
	LM JV	100%	252	252	100%
MWCC	Align JV	100%	670,247	670,247	100%
	BBV JV	100%	653,812	653,813	100%
	EKFB JV	100%	108,337	108,337	100%
	SCS JV	100%	448,756	448,756	100%
Stations	BBVS JV	100%	159,488	159,488	100%
	MD JV	100%	11,017	11,017	100%
Phase One total		100%	2,051,909	2,051,910	100%



Responsible consumption and production

Responsible sourcing

Other material

Contract type	Contractor	Target for responsibly sourced other material types	Certified other material types	Total other material types	Proportion of responsibly sourced other material types
		Percentage	Tonnes	Tonnes	Percentage
EWC	CS JV	25%	0	0	-
	Fusion JV	25%	0	0	-
	LM JV	25%	153	934	16.4%
MWCC	Align JV	25%	589,381	589,381	100%
	BBV JV	25%	3,465,502	3,490,894	99.3%
	EKFB JV	25%	1,324,646	1,325,281	100%
	SCS JV	25%	399,540	399,540	100%
Stations	BBVS JV	25%	28,218	28,218	100%
	MD JV	25%	0	0	-
Phase One total		25%	5,807,647	5,834,248	99.5%



Responsible consumption and production

Responsible sourcing

Year-on-year progress comparison

Year	Contract type	Material	Proportion responsibly sourced (percentage)	Tonnes	Proportion responsibly sourced
2020/21	Total Phase One contracts	Timber	100%	10,561	99.9%
		Concrete	100%	501,759	100%
		Steel	100%	907,140	100%
		Other materials	25%	585,791	69.8%
2021/22		Timber	100%	4,353	100%
		Concrete	100%	999,043	100%
		Steel	100%	40,316	99.8%
		Other materials	25%	5,939,539	98%
2022/23		Timber	100%	29,278	100%
		Concrete	100%	2,051,910	100%
		Steel	100%	269,750	100%
		Other materials	25%	5,834,248	99.5%

Notes:

Methodology

- Responsible sourcing schemes are those identified in [BREEAM Guidance Note GN18](#).
- The 'other material' section includes all related materials apart from timber, concrete and steel, for example, glass and metal. For a list of applicable materials please refer to Table 44 on page 265 of the [BREEAM UK 2014 New Construction \(Non-domestic Buildings\) technical manual](#). The responsible sourcing of materials is also captured within the [BREEAM Infrastructure \(Projects\) technical manual](#), Section 7.5 Responsible Sourcing of Construction Products, which aims to encourage the procurement and use of sustainably and responsibly sourced construction products and materials.



Responsible consumption and production

Construction and demolition waste

Contract type	Contractor	Target (proportion construction and demolition waste diverted from landfill)	Total construction waste diverted from landfill in 2022/23	Total demolition waste diverted from landfill in 2022/23	Total construction and demolition waste diverted from landfill in 2022/23	Total construction and demolition waste in 2022/23	Proportion of construction and demolition waste diverted from landfill in 2022/23
		Percentage	Tonnes			Percentage	
EWC	CS JV	95%	0	0	0	0	-
	Fusion JV	95%	0	0	0	0	-
	LM JV	95%	610	0	610	610	100%
MWCC	Align JV	95%	19,521	0	19,521	19,607	99.6%
	BBV JV	95%	29,272	71	29,343	29,525	99.4%
	EKFB JV	95%	11,279	2,018	13,297	13,953	95.3%
	SCS JV	95%	28,240	629	28,869	28,884	99.9%
Stations	BBVS JV	95%	13,143	18,387	31,535	31,537	100%
	MD JV	95%	6,851	13,243	20,094	20,521	97.9%
Total Phase One contracts		95%	108,916	34,348	143,264	144,637	99.1%

Year-on-year progress comparison

Year	Contract type	Target: proportion construction and demolition waste diverted from landfill	Total construction waste diverted from landfill	Total demolition waste diverted from landfill	Total construction and demolition waste diverted from landfill	Total construction and demolition waste	Proportion of construction and demolition waste diverted from landfill
		Percentage	Tonnes			Percentage	
2020/21	Total Phase	95%	52,732	8,441	61,173	63,030	97.1%
2021/22	One contracts	95%	92,583	79,045	171,628	173,220	99.1%
2022/23		95%	108,916	34,348	143,264	144,637	99.1%



Responsible consumption and production

Excavated materials		Target (proportion of excavated material beneficially reused)	Total excavated material placed in permanent deposition or removed from site in 2022/23	Proportion of excavated material beneficially reused in 2022/23
Contract type	Contractor			
EWC	CS JV	95%	91	100%
	Fusion JV	95%	0	-
	LM JV	95%	2,546	0%
MWCC	Align JV	95%	3,205,608	100%
	BBV JV	95%	3,011,110	99.8%
	EKFB JV	95%	1,451,051	99.9%
	SCS JV	95%	1,847,509	43.6%
Stations	BBVS JV	95%	354,525	97.9%
	MD JV	95%	26,638	100%
Total Phase One contracts		95%	9,899,078	89.3%



Responsible consumption and production

Excavated materials

Year-on-year progress comparison

Year	Contract type	Target (proportion of excavated material beneficially reused)	Total excavated material placed in permanent deposition or removed from site	Proportion of excavated material beneficially reused
		Percentage	Tonnes	Percentage
2020/21	Total Phase One contracts	95%	880,764	94.6%
2021/22		95%	5,377,928	99.1%
2022/23		95%	9,899,078	89.3%

Notes:

Definition

- Beneficial reuse of excavated materials: for an excavated material management activity to be classified as beneficial reuse it must meet the following tests.
 - The activity will lead to beneficial reuse and bring land back into use or provide ecological benefit.
 - In the case of quarries or landfill sites, the activity has a planning requirement to be restored.
 - The material is suitable for its intended use and would not harm human health or the environment.
 - The minimum amount of material would be used to achieve the restoration required by any planning consent.
 - Alternative material, whether waste or not, would be required if the material was not to be used.

Performance commentary

- Total excavated material quantity only includes material that has either been placed in its final destination, for example, within the scheme earthworks, or removed from site. Any excavated material that has been placed in a temporary stockpile is excluded from these figures.

SCS JV:

- The beneficial reuse performance of SCS JV is significantly below the route-wide performance target of 95% due to the large volumes of surplus excavated materials sent to sustainable placement during the year. This is planned onsite disposal to avoid local traffic impacts and does not count towards beneficial reuse. Over the duration of the project, we expect to achieve the 95% target on a route-wide basis.



Responsible consumption and production

Beneficial reuse of timber				
Contract type	Contractor	Felled timber beneficially reused	Total felled timber	Proportion of felled timber beneficially reused
		m ³	m ³	Percentage
EWC	CS JV	0	0	-
	Fusion JV	0	0	-
	LM JV	0	0	-
MWCC	Align JV	0	0	-
	BBV JV	6	6	100%
	EKFB JV	1,796	6,390	28.1%
	SCS JV	0	0	-
Stations	BBVS JV	10	10	100%
	MD JV	0	0	-
Total Phase One contracts		1,812	6,406	28.3%

Year-on-year progress comparison

Year	Contract type	Felled timber beneficially reused	Total felled timber	Proportion of felled timber beneficially reused
		m ³	m ³	Percentage
2020/21	Total Phase One contracts	6,787	55,629	12.2%
2021/22		13,603	85,921	15.8%
2022/23		1,812	6,406	28.3%

Notes:

Methodology

- The beneficial reuse of timber includes:
 - reused on site;
 - provided for community uses; and
 - used for solid wood production.
- The beneficial reuse of timber does not include:
 - used for reconstituted board production;
 - used for biomass;
 - other type of reuse (not disposal); and
 - landfill.
- There is no set target for this KPI. Contractors look to beneficially reuse timber when it is possible.



Responsible consumption and production

Water usage

Contract type	Contractor	Total water use	Proportion of water consumption that is non-potable
		m ³	Percentage
EWC	CS JV	205	0%
	Fusion JV	59	0%
	LM JV	420	1.7%
MWCC	Align JV	2,104,569	75.0%
	BBV JV	483,519	72.2%
	EKFB JV	105,759	65.2%
	SCS JV	227,829	9.3%
Stations	BBVS JV	47,055	0%
	MD JV	14,521	0%
Total Phase One contracts		2,983,936	67.7%

Year-on-year progress comparison

Year	Contract type	Total water use	Proportion of water consumption that is non-potable
		m ³	Percentage
2020/21	Total Phase One contracts	714,060	11.5%
2021/22		1,231,462	32.7%
2022/23		2,983,936	67.7%

Notes:

Definitions

- Water types
 - Potable water is mains water.
 - Non-potable water is either:
 - water that has been captured and re-used from our processes; or
 - water that is abstracted directly from the environment and subject to approval by the Environment Agency.

Methodology

- Water use is a challenge for infrastructure projects and planning and selection of the appropriate water source for an activity is critical to operating in an environmentally sustainable way. We strive to use non-potable water for construction activities wherever possible through effective re-use of water, capture and storage of rainfall and sustainable abstraction from the environment, which is subject to regulation by the Environment Agency. There is no optimal percentage from each source; it depends on its uses and availability of sources on a given site. However, minimising potable water use for non-potable activities is typically beneficial as there is high cost and energy involved in treating, storing and transporting potable water through mains networks.

Case studies

Responsible consumption and production

Case study

Using excavated material to create habitats

We are reusing excavated materials as we build the 10-mile Chiltern tunnel to create 127 hectares of new chalk grassland, woodland, wood pasture and wetland habitats.

Instead of removing the material by road, materials excavated by our two tunnel boring machines are mixed with water to form a slurry that we pump out of the tunnel. At an onsite treatment plant, flint and water are removed, resulting in a chalk 'cake', which

we then lay out on the ground along with recycled concrete and aggregates from construction works.

In September 2022, we laid the millionth cubic metre of chalk in the area near the tunnel's south portal.

We carried out 34,800 square metres of landscaping field trails in 2022 and we're using the data we've collected to develop our design. Ninety hectares of chalk grassland will be seeded to sit alongside new areas of woodland, wood pasture and wetlands, including almost 65,000 trees and shrubs and nearly 3.5 kilometres of hedgerows.



Artist's impression of the new habitat on the Colne Valley western slopes.

Case study



The facility at the tunnel's south portal site.

Chiltern tunnel water treatment plant

The advanced water treatment plant at the Chiltern tunnel south portal focuses on managing water quality and conserving water use. The design aim of the water treatment system has been to allow us to reuse as much water as possible during construction. About 75% of the water used by our tunnel boring machines this year has been recycled, which equates to about 1.4 million cubic metres of water.

Case studies

Responsible consumption and production

Case study



The conveyor at Old Oak Common.

New conveyor keeps lorries off local roads

A new 1.7-mile network of conveyors in west London is allowing us to move huge amounts of excavated material and waste without using lorries.

The system, launched in November 2022, is helping reduce the amount of construction traffic and emissions in Old Oak Common and will remove the need for about one million lorry movements in the next few years.

The journey from Old Oak Common to HS2's logistics hub at Willesden Euro Terminal takes 17.5 minutes. From the logistics hub, materials are transported by rail to three UK destinations – Barrington in Cambridgeshire, Cliffe in Kent and Rugby in Warwickshire – for beneficial reuse.

We've put measures in place to reduce disruption to local people, including sound barriers and a cover to prevent noise and contain dust.

Old Oak Common is one of three conveyor spurs. Conveyors serving the Victoria Road crossover box site and the Atlas Road site, also in Old Oak Common, are further reducing congestion and carbon emissions in the area.

Case studies

Responsible consumption and production

Case study



The 3D concrete printing system in action.

Material efficiency: 3D concrete printing cutting carbon by up to 50%

In a UK first, on-site 3D reinforced concrete printing is set to deliver environmental, cost and community benefits for HS2.

The cutting-edge technology, called 'Printrastructure', will be deployed by HS2 Ltd's London tunnels contractor SCS JV (Skanska Costain STRABAG Joint Venture), in a move that represents a major step forward in construction technology.

Printing concrete with computer-operated robots will enable SCS JV to make structures on-site, instead of transporting them as precast slabs by road before being assembled and lowered into place by large cranes.

As flexible mobile technology, 3D concrete printing allows the technique to be used in physically-restricted areas – avoiding the need to develop complicated and potentially expensive logistical plans.

Historic environment

We have not provided data for the historic environment as part of this report because the value of our heritage can't be quantified easily. For example, archaeological works vary in size but they can all provide equally valuable information and numbers don't convey the value of the activities.

During the year, our team completed early works on archaeological field mitigation across sites on the West Midlands – London route including Coleshill Manor, Warwickshire; Wendover, Buckinghamshire; Grim's Ditch, Buckinghamshire; Hillingdon, west London, and Blackgrounds, Northamptonshire. We made several notable discoveries. At Coleshill Manor and its previously unknown gardens, we uncovered evidence of an early Civil War attack on the medieval gatehouse.

In addition to excavation, historic buildings have been subject to demolition, after a careful record has been made. For example, we worked with partners to salvage thousands of bricks, roof tiles, timber and sandstone blocks during the demolition of Coleshill Hall Farmhouse.

One way we share information, in line with our Heritage Memorandum commitments, is providing local authorities with historic environment data. This allows them to feed information into their historic environment records, supporting their management of, and engagement with, our shared heritage.



Visitors at the Coleshill Manor dig open day.

Case studies

Historic environment

Case study



The pendant discovered in Warwickshire.

Three lions pendant find

In July 2022, we uncovered a 12th century pendant depicting three golden lions. Discovered just ahead of the Women's Euro 22 championship, the serendipitous find shares the iconic heraldry associated with the England football team.

The pendant was beautifully preserved, showcasing a red background and three golden images. The artefact was found in Wormleighton, Warwickshire, on a site believed to have been an Iron Age or Romano-British settlement.

Case study



One of the remarkable Roman busts discovered in Buckinghamshire.

Roman busts museum loan

From July to October 2022, visitors to the Discover Bucks Museum were able to see two Roman busts we uncovered during excavation works at St Mary's Church in Stoke Mandeville, Buckinghamshire. The rare stone heads were discovered in October 2021, in what we believe was a Roman mausoleum. The remarkable artefacts bring us face to face with the people buried in the mausoleum over which the Norman church was built.

Coinciding with the Festival of Archaeology, the museum loan gave visitors the chance to examine a tangible link to the past.

Case studies

Historic environment

Case study

illuminating the Dark Ages

As part of our Heritage Memorandum, we are committed to handling discoveries of national importance with great respect and care. We put this into practice during our excavation in Wendover, Buckinghamshire, where we uncovered an Anglo-Saxon burial ground featuring 141 graves containing artefacts dating back to the 5th and 6th centuries. This period of history, known as the Dark Ages, is notoriously mysterious, and the artefacts – which included jewellery, swords, shields, spears and a pair of tweezers – are helping us to understand more about daily life during this period.

It's the largest Anglo-Saxon burial ground uncovered in Britain and we recognise the importance of sharing our discoveries locally and internationally. Our finds were featured on [Dan Snow's History Hit podcast](#) in June 2022. The artefacts will continue to undergo analysis to provide further insight into Wendover's past and allow us to piece together a picture of life in Anglo-Saxon Britain.



A pair of 5th or 6th century decorated copper alloy tweezers excavated in Wendover.

Case studies

Historic environment

Case study



An interactive art installation at St James's Church.

Working with dignity and respect

Working with the Archbishops' Council of the Church of England and Historic England, we've agreed with Brookwood Cemetery, Surrey, that reburials from St James's Gardens, Euston will take place there. When Euston station was extended west in the 1960s, some occupants of St James's Gardens were reburied at Brookwood. The agreement to rebury the remaining occupants of St James's at Brookwood means the buried population will remain together.

Brookwood Cemetery has reburied London's deceased for over 150 years. The 500-acre site is a Grade I listed park and the grounds are open daily to visitors who want to explore the cemetery's historic ties to London. The reburials from Euston will be commemorated with a monument.

In March 2023, St James's Church in Piccadilly opened its doors so visitors could experience an interactive art installation exploring the lives of five people who were buried at St James's Gardens. Part of the HS2 Archaeology Programme, the exhibition featured 3D printed sculptures of London residents from all walks of life – from a dressmaker to business owner Charles Fortnum, the grandson of one of the co-founders of Fortnum and Mason.



BSI Assurance UK Ltd Verification Opinion Verification Report

Verified as Satisfactory

Based on the process and procedures conducted, the Environmental Sustainability Progress Report 2022/23 for the financial year ending March 2023 produced by **High Speed Two Ltd (HS2)**

- Is materially correct and is a fair representation of the sustainability datasets listed in the verification engagement section below
- Has been prepared in accordance with HS2 Ltd Technical Standards for Environmental Sustainability Reporting and the associated technical standards for the relevant datasets.

With the following caveats

- During the course of the verification non-material errors were identified for several datasets due to missing data which should have been provided by contractors ahead of the verification. Where errors were identified, this was communicated to HS2 for investigation and correction.
- This verification opinion is based on the corrected datasets which were re-verified following correction.
- The verification activities conducted by BSI Assurance UK Ltd were limited to a review of historical data presented by HS2 Validation of the calculation methodology that has been used to determine some KPIs did not form part of the BSI verification engagement.

The following improvements were raised in relation to future Environmental Sustainability Progress Reports

- The potential for material and non-material errors in future Environmental Sustainability Progress Reports presented for verification could be reduced by conducting a more rigorous internal review of the information provided by contractors under a more rigorous data quality assurance process.
- Where corrections have been made to a dataset during the verification process a more robust review should be carried out to ensure that the amended data is accurately transposed into the final Environmental Sustainability Progress Report.

Verified as Satisfactory

Organization and Responsible party: **High Speed Two Ltd (HS2)**

Verification Objectives

To express an opinion on whether the following datasets included in the Environmental Sustainability Progress Report 2022/23 have been reported in accordance with the HS2 Technical Standards for Environmental Sustainability Reporting and are free from material error:

- Environmental Incidents
- Considerate Constructors Scheme
- BREEAM Buildings/ BREEAM Infrastructure: Projects (formerly CEEQUAL) ratings
- Biodiversity Accounting Process
- Number of trees and shrubs planted
- Woodland Fund
- Whole life carbon footprint



- Energy and fuel consumption data
- Air quality
- Responsible sourcing – timber, concrete, steel and other materials
- Construction and demolition waste
- Excavated material
- Beneficial reuse of timber
- Water Usage

The scope of the verification engagement was data related to the HS2 route being constructed between London and the West Midlands.

Note: The Biodiversity Accounting Process also includes the baseline for the Phase 2a route to Crewe; the number of trees and shrubs planted and the whole life carbon footprint data includes some Phase 2a contracts.

Materiality Level: As determined in the professional judgement of the verifier relevant to the dataset being evaluated.

Level of Assurance: Reasonable

Verification evidence gathering procedures:

- Evaluation of the monitoring and controls systems through interviewing employees, observation & inquiry
- Verification of the data through sampling, recalculation, retracing, cross checking and reconciliation
- Interview of HS2 Subject Matter Experts and selected main work civil/station Contractors responsible for submitting data to HS2

Verification Standards

The verification was carried out in accordance with the principles contained in ISO 14064-3:2019, ISO 14065: 2013 and ISO14016:2020

Note: HS2 is responsible for the preparation and fair presentation of the Environmental Sustainability Progress Report in accordance with the agreed criteria. BSI Assurance UK Ltd is responsible for expressing an opinion on the information provided in the document based on the verification findings.

Signed on behalf of BSI

UK&I Operations and System Certification Director

Issue Date: 09/08/23

Note: BSI Assurance UK Ltd is independent to and has no financial interest in High Speed Two Ltd (HS2). This 3rd party Verification Opinion has been prepared for HS2 only for the purposes of verifying data contained in the Environmental Sustainability Progress Report 2022/23.

Data reported within the wider sustainability Report that is not included in the Environmental Sustainability Progress performance data has not been verified by BSI. In making this Statement, BSI Assurance UK Ltd has assumed that all information provided to it by HS2 is true, accurate and complete. BSI Assurance UK Ltd accepts no liability to any third party who places reliance on this statement.



Global Reporting Initiative content index

Statement of use

HS2 Ltd has reported the information cited in this Global Reporting Initiative (GRI) content index for the period April 2022 to March 2023, with reference to the GRI Standards.

Information cited in this index may be found across the Annual Report and Accounts (ARA) and the Environmental Sustainability Progress Report (ESPR).

GRI index

Disclosure	Disclosure title	Location	Direct answers, notes and omissions
GRI 1: Foundation 2021			
GRI 2: General Disclosures 2021			
2-1	Organisational details	<ul style="list-style-type: none"> • ARA page 10 (Strategic Report) • ARA page 69 (Notes to the financial statements) 	High Speed Two (HS2) Limited Two Snowhill Snow Hill Queensway Birmingham B4 6GA Operational in England.
2-2	Entities included in the organisation's sustainability reporting		High Speed Two (HS2) Limited plus the supply chain where applicable.
2-3	Reporting period, frequency and contact point	<ul style="list-style-type: none"> • ESPR title page • ARA title page • ESPR page 6 (About this report) • ESPR page 23 (Scope and methodology) 	Annual Report and Accounts. The most recent report was published on 18 July 2023.
2-4	Restatements of information	<ul style="list-style-type: none"> • ESPR page 30 (Green corridor data) 	
2-5	External assurance	<ul style="list-style-type: none"> • ESPR pages 68–69 (BSI Independent Assurance Statement) 	
2-6	Activities, value chain and other business relationships	<ul style="list-style-type: none"> • ARA page 10 (Strategic Report) 	
2-7	Employees	<ul style="list-style-type: none"> • ARA page 78 (Staff numbers and costs) 	
2-9	Governance structure and composition	<ul style="list-style-type: none"> • ARA page 34 (Governance Statement) • ESPR pages 12–13 (Environmental Sustainability Governance) 	
2-11	Chair of the highest governance body		The Chair of the HS2 Ltd Board is a Non-Executive position.
2-12	Role of the highest governance body in overseeing the management of impacts	<ul style="list-style-type: none"> • ESPR pages 12–13 (Environmental Sustainability Governance) 	



Global Reporting Initiative content index

GRI index			
Disclosure	Disclosure title	Location	Direct answers, notes and omissions
2-13	Delegation of responsibility for managing impacts	• ESPR pages 12–13 (Environmental Sustainability Governance)	The Environmental Sustainability Committee (a sub-Board committee) is responsible for environmental impacts.
2-14	Role of the highest governance body in sustainability reporting	• ESPR pages 12–13 (Environmental Sustainability Governance)	The Environmental Sustainability Committee (a sub-Board committee) is responsible for the ESPR.
2-15	Conflicts of interest	• ARA page 31 (Director’s Report)	
2-19	Remuneration policies	• ARA page 51 (Remuneration and Staff Report)	
2-20	Process to determine remuneration	• ARA page 51 (Remuneration and Staff Report)	
2-22	Statement on sustainable development strategy	• ESPR page 8 (Our commitment)	
2-23	Policy commitments	• ESPR page 8 (Our commitment)	
2-24	Embedding policy commitments	• ESPR page 8 (Our commitment)	
2-25	Processes to remediate negative impacts	• ESPR pages 9–10 (Our objectives)	
2-29	Approach to stakeholder engagement	• ESPR pages 16–18 (Stakeholder and community engagement)	
3-1	Process to determine material topics	• ESPR pages 14–15 (Prioritising environmental sustainability topics)	
3-2	List of material topics	• ESPR page 15 (Prioritising environmental sustainability topics)	
HS2 Green Corridor			
3-3	Management of material topics	• ESPR pages 30–36 (Green corridor data and case studies)	
GRI 304: Biodiversity 2016			
304-2	Significant impacts of activities, products and services on biodiversity	• ARA page 18 (Environmental performance: biodiversity) • ESPR pages 30–36 (Green corridor data and case studies)	
Climate change			
3-3	Management of material topics	• ESPR pages 37–43 (Climate change data and case studies)	
GRI 302: Energy 2016			
302-1	Energy consumption within the organisation	• ARA page 20 (Related energy consumption) • ESPR pages 39–43 (Energy and fuel consumption data)	Corporate energy consumption is provided in the ARA. Supply chain energy and fuel consumption data is included in the ESPR.



Global Reporting Initiative content index

GRI index			
Disclosure	Disclosure title	Location	Direct answers, notes and omissions
GRI 305: Emissions 2016			
305-1	Direct (Scope 1) GHG emissions	• ARA page 20 (Non-financial indicators (CO ₂ e in tonnes))	Corporate emissions information is provided in the ARA.
305-2	Energy indirect (Scope 2) GHG emissions	• ARA page 20 (Non-financial indicators (CO ₂ e in tonnes))	Corporate emissions information is provided in the ARA.
305-3	Other indirect (Scope 3) GHG emissions	• ARA page 20 (Non-financial indicators (CO ₂ e in tonnes)) • ESPR pages 37–43 (Climate change data and case studies)	Corporate emissions information is provided in the ARA. Supply chain emissions are in the ESPR.
305-5	Reduction of GHG emissions	• ESPR pages 37–43 (Climate change data and case studies)	
Community experience			
3-3	Management of material topics	• ESPR pages 44–50 (Community experience data and case studies)	
Historic environment			
3-3	Management of material topics	• ESPR pages 64–67 (Historic environment case studies)	
Responsible consumption and production			
3-3	Management of material topics	• ESPR pages 51–63 (Responsible consumption and production data and case studies)	
GRI 301: Materials 2016			
301-1	Materials used by weight or volume	• ESPR pages 51–60 (Responsible consumption and production data)	Tonnes of timber, steel, concrete and ‘other material’ provided.
301-3	Reclaimed products and their packaging materials	• ESPR pages 51–60 (Responsible consumption and production data)	Excavated materials and beneficial reuse of timber provided.
GRI 303: Water and Effluents 2018			
303-5	Water consumption	• ARA page 21 (Water) • ESPR page 60 (Water usage)	Corporate water consumption is provided in the ARA. Supply chain water consumption is included in the ESPR.
GRI 306: Waste 2020			
306-3	Waste generated	• ARA page 21 (Waste) • ESPR page 56 (Construction and demolition waste)	Corporate waste information is provided in the ARA. Supply chain waste generation is in the ESPR.
306-4	Waste diverted from disposal	• ARA page 21 (Waste) • ESPR page 56 (Construction and demolition waste)	Corporate waste information is provided in the ARA. Supply chain waste generation is in the ESPR.



© Crown copyright 2023

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit nationalarchives.gov.uk/doc/open-government-licence/version/3

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

This publication is available at www.gov.uk/official-documents

Any enquiries regarding this publication should be sent to us at:

High Speed Two (HS2) Limited,
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: hs2enquiries@hs2.org.uk

Website: www.hs2.org.uk



Printed on paper containing 100% recycled fibre content minimum

HS2

High Speed Two (HS2) Limited

Two Snowhill

Snow Hill Queensway

Birmingham B4 6GA

HS2 Helpdesk: 08081 434 434

Email: HS2enquiries@hs2.org.uk

www.hs2.org.uk