

HS2

Environmental Sustainability Progress Report

April 2021 – March 2022





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Front cover image: Visualisation of the proposed HS2 viaduct at Balsall Common, near Solihull.

Reviewing our progress



Mark Thurston, Chief Executive Officer.

**“
As we build HS2, we have
a huge responsibility to
cut carbon emissions, innovate
and set new standards for the
infrastructure industry.”**

The challenges we face with environmental sustainability have never been clearer. The UK's pledge to bring greenhouse gas emissions to net zero by 2050 reflects one of the most pressing social and economic concerns of our time. As it stands, the transport sector is the largest single emitter of greenhouse gases. The zero carbon travel HS2 will provide – and the modal shift it will enable – is a crucial part of tackling climate change.

As we build HS2, we have a huge responsibility to cut carbon emissions, innovate and set new standards for the infrastructure industry. The UK needs more forms of zero carbon transport to help us combat rising global temperatures and HS2 must help develop these as we support the economy and a growing population. We will be part of the solution, both in construction and operation, with every new HS2 train being powered by zero carbon energy.

Our vision is for HS2 to be a catalyst for growth, helping to level up Britain by spreading prosperity and opportunity to the Midlands and the North. We will do this by building the best railway in the best way; providing a cleaner, greener alternative to long-distance car journeys and flights. Crucially, this includes our commitment to be net zero from 2035, as set out in our Net Zero Carbon Plan, which we launched this year.

This Environmental Sustainability Progress Report tracks how we have performed against our environmental targets in 2021 – 2022, highlighting our achievements and areas where we must improve. This year, we have seen our Phase One main works significantly ramp up along the route between Birmingham and London; HS2 now employs nearly 30,000 people with major works underway at over 350 sites. As we enter peak construction over the next few years, we must continue to focus on minimising our carbon footprint.

We are harnessing innovation to achieve our environmental sustainability targets. Earlier this year, one of our London sites became the first to become diesel-free and we are working to make all our sites diesel-free by 2029. Similarly, we became the first UK project to use 100% electric, heavy-duty 'crawler' cranes – one of the many ways we are leading the industry to support our environmental ambitions.

Importantly, our environmental responsibilities extend beyond the way we build and use materials. They cover the historic environment, the respect we show to local communities and our work creating the HS2 Green Corridor along the route, supporting nature recovery. We are making good progress, but we have much more to do, particularly as the next phase of works on Phase 2a takes HS2 further north.

Reviewing our progress continued

The passion and support from the HS2 family, including our supply chain, will help accelerate this progress. Our new HS2 Green Network – an internal staff forum that brings our environmentally-conscious workforce together – will help us to collaborate to further tackle the huge challenges we face.

We remain focused on the unique opportunity HS2 presents: to demonstrate how major infrastructure projects and high-speed railways can be built more sustainably, providing a fast, reliable, zero carbon alternative to long-distance travel and supporting national efforts to build a cleaner, greener Britain.

Mark Thurston
Chief Executive Officer



Environmental conservation work at Finham Brook, Kenilworth, Warwickshire.



Executive summary

The design, construction and operational planning of HS2 is guided by the fundamental need to build an environmentally sustainable high-speed railway. Our work today will play a vital role in moving Britain to a net zero carbon economy by 2050 and help combat climate change by providing cleaner, greener travel for millions of people.

HS2 will unlock transformational economic benefits and help the Government's drive to level up. However, the construction of the network will inevitably affect the environment. It is our responsibility to minimise this impact wherever we can.

We have an extensive programme to protect wildlife habitats and boost Britain's green recovery by seeking biodiversity gains; and we are using innovative low and zero carbon construction techniques. In operation, HS2 trains and infrastructure will be zero carbon.

The extensive work we are carrying out to build the world's most sustainable high-speed railway is considered in this Environmental Sustainability Progress Report (ESPR). It looks at our performance in the year April 2021 to March 2022 and follows the publication of our inaugural ESPR last year. The report provides context for the work we are undertaking and it looks at our future targets as we aim to make the railway net zero for construction from 2035 and extend HS2 to the North.

During the past 12 months, we have unveiled our Environmental Sustainability Vision and launched ambitious new targets aimed at cutting carbon emissions and boosting nature recovery. HS2's Net Zero Carbon Plan, which we launched with our Environmental Sustainability Vision in January 2022, set out the steps we will take to achieve our targets as we build and operate the most sustainable high-speed railway in the world. Our bold ambitions were supported by the Government announcement in January 2022 that HS2 trains, stations, depots and infrastructure will run on zero carbon energy from day one of operation.

This ESPR looks at the measures we are putting in place to realise these ambitions. It also looks at the environmental effects of construction on local communities and the steps we are taking to reduce noise and vibrations and monitor air quality. Our environmental work extends to an unprecedented archaeological programme that is unearthing remarkable discoveries dating back thousands of years, creating an unrivalled historical legacy for future generations.

As well as uncovering the past, HS2 is also shaping the future, pioneering innovative and sustainable techniques to build the railway, which this report also covers. We provide updates on how we are leading the industry with innovative techniques to cut carbon emissions in construction and build next-generation, eco-friendly transport infrastructure.



Executive summary continued

Both the environmental sustainability progress we have made and the challenges we have faced in the past year are featured in an 'at-a-glance' summary on pages 5 and 6.

We have prepared this report with reference to Global Reporting Initiative (GRI) Standards, the world's most widely used framework for sustainability reporting. LRQA, a leading assurance provider formerly known as Lloyds Register Quality Assurance, has provided independent assurance on selected information and key performance indicators (KPIs). This featured extensive sampling and reviews of both our internal data management and our supply chain's primary data. The assurance statement is on pages 65 to 67.

A comprehensive **Environmental Sustainability Progress Report Appendix** accompanies this report and comprises two main sections. The first section examines our approach to environmental sustainability including our governance, such as the roles of the Board, our Environmental Sustainability Committee and HS2's Health, Safety, Security and Environment Committee. This section also looks

at how we prioritise the diverse environmental sustainability challenges we face as we build – and then operate – HS2. The second section provides a detailed analysis of data across the programme, our environmental indicators and our GRI Index.

The UN Sustainable Development Goals (SDGs) represent 17 social, economic and environmental priorities set by the United Nations which are designed to combat our global challenges. We report on the SDGs in line with the **Sustainability Reporting Guidance 2021–2022** published by HM Treasury. Our contribution to the SDGs is on pages 6 to 8 of the appendix.

At a glance: our performance 2021–2022



24.8%

carbon emissions reduced against our 50% target for Phase One between London and the West Midlands.¹



2.93%

is outstanding against our biodiversity baseline for Phase One – an improvement of 4% since 2017.²



10%

net gain in biodiversity sought for Phase 2b between Crewe and Manchester.³



140,904

trees and shrubs planted on HS2's Green Corridor – more than 800,000 since 2017.



19.95

hectares of plantation on ancient woodland sites restored – 71.95 hectares to date.



31.65

hectares of woodland planted through HS2's Woodland Fund – 123.65 hectares to date.



Net Zero Carbon Plan commits HS2 to zero carbon journeys.



HS2 commits to net zero construction and operation from 2035.



First diesel-free construction site launched on HS2.

At a glance: our performance 2021–2022 continued



408

complaints about construction-related noise and vibration.⁴



609

complaints about traffic and transport due to construction.⁴



32.7%

of water use was non-potable, e.g. recycled.



15.8%

of felled timber was put to high-value beneficial reuse.



99.1%

of construction and demolition waste diverted from landfill.



0

no level 1 – the most serious – environmental incidents.



Excellent rating achieved by SCS Joint Venture for its BREEAM Infrastructure Design stage assessment.



First UK project to use 100% electric, heavy-duty 'crawler' cranes.



HS2 Green Network launched for staff.

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 HS2

Britain’s new high-speed railway will run between the South East and the North West, with HS2 trains connecting London, Birmingham and Manchester with the biggest cities in Scotland. Zero carbon passenger services will integrate with new lines and upgrades across the rail network to provide faster and more reliable travel.

HS2 will help to rebalance the UK economy by better connecting our regions and create new opportunities for work and leisure.

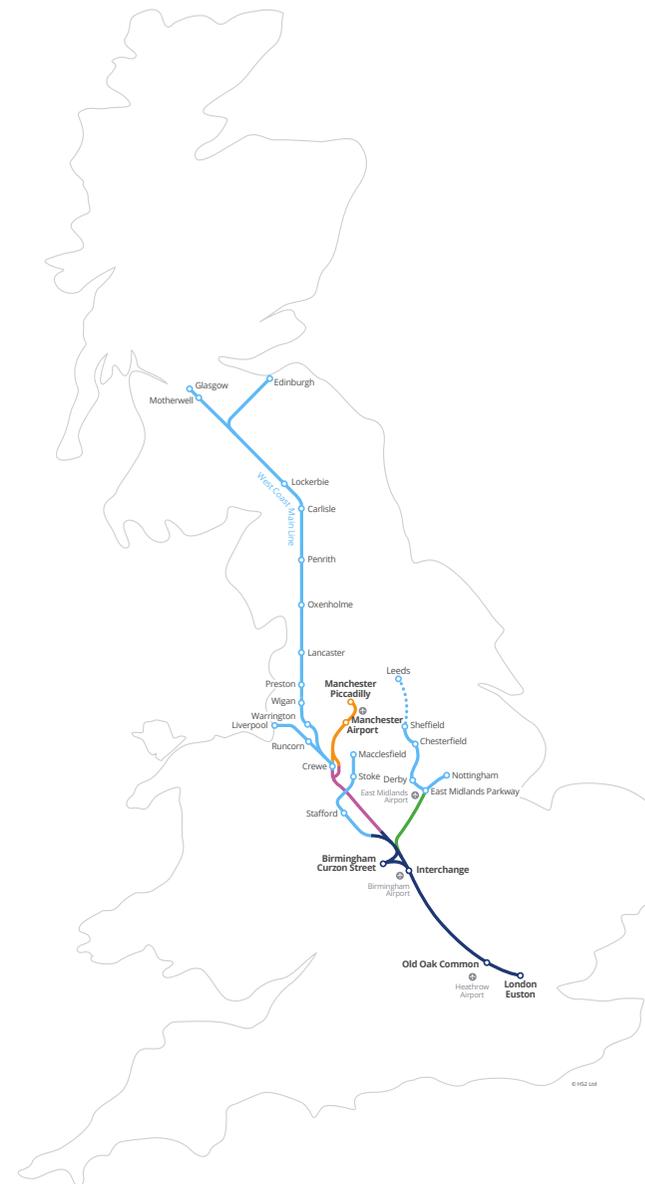
The **Government’s Integrated Rail Plan** (IRP) sets out how HS2 will link with other projects such as Northern Powerhouse Rail and the Midlands Rail Hub.

By moving long distance trains on to their own high-speed line, HS2 will free up space for more local, commuter and freight services on the existing network. This will help take cars and lorries off the roads, ease congestion and reduce emissions.

Due to its size, HS2 is being built in phases, starting with the route between the West Midlands and London, where work is well underway. At peak construction, more than 34,000 jobs will be supported. The programme already supports almost 30,000 jobs and thousands of UK businesses are helping to build the railway.

- Key**
- Destinations served by HS2
 - HS2 Phase One
 - HS2 Phase 2a
 - HS2 Phase 2b Crewe – Manchester
 - HS2 East
 - Potential HS2 services on existing network

The Government is looking at the most effective way to run HS2 trains to Leeds and to the North West and Scotland. Based on current indicative train service specification.





About HS2 continued

Phase One

The 140-mile Phase One route is being built between the West Midlands and London, featuring four new HS2 stations at Euston, Old Oak Common in west London, Interchange in Solihull and Curzon Street in Birmingham. It will take just 45 minutes to travel between central London and Birmingham, while freeing up vital capacity on the West Coast Main Line (WCML).

Phase One main works construction started in 2020 and includes tunnels, bridges, viaducts and cuttings as well as features such as 'green' bridges and ecological underpasses to allow wildlife to move safely across the line. The route is due to open between 2029 and 2033 with Old Oak Common operating as the temporary London terminus while Euston is completed.

We are building more than 32 miles of twin tunnels that will help reduce HS2's impact on the natural environment and local communities, including a 10-mile tunnel under the Chiltern Hills. We are also creating more than 33 square kilometres of woodland, wildlife and river habitats along the HS2 Green Corridor, an increase of 30% compared with what was there before.

Phase 2a

The Phase 2a route was approved by Parliament in 2021 and will extend HS2 from the West Midlands to Crewe. The 36-mile route will support 6,500 jobs during construction and includes a maintenance depot at Stone as well as two tunnels, 17 viaducts and 65 bridges. This part of the network is due to open between 2030 and 2034. HS2 trains will link with the WCML at Crewe, heading further north towards Scotland.

Based on our latest design, Phase 2a will result in a wildlife habitat increase of over 20% compared with what exists now. During 2022 – 2023, we will design and build ecological habitats as part of our early environmental works, integrating with the HS2 Green Corridor initiative.

We are appointing a design and delivery partner (DDP) in 2022 to drive the efficient design and construction of Phase 2a. The DDP will manage and co-ordinate major contracts for building main works structures. It will also make sure HS2's design matches the ambitions of our Environmental Sustainability Vision, targeting reductions in carbon emissions and boosting nature recovery.

Phase 2b

Phase 2b is the new high-speed line connecting Crewe and Manchester. It includes two new HS2 stations at Manchester Airport and Manchester Piccadilly, which will connect with Northern Powerhouse Rail services. The Government introduced a hybrid Bill into Parliament in January 2022 to seek the legal power to build and operate this part of the HS2 network. The legislation passed its second reading in the House of Commons in June 2022.

The IRP sets out plans to build a new high-speed line, HS2 East, between the West Midlands and East Midlands Parkway. Trains will then run to the city centres of Nottingham, Derby and Sheffield as well as Chesterfield.



Progress on our commitments

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Image: New wildlife habitats are being created in Cubbington, Warwickshire.

Our commitment to environmental sustainability

What we mean by environmental sustainability

Environmental sustainability is part of our overall commitment to sustainability. It is made up of five key areas, which form our environmental sustainability objectives for HS2. They are:

- **HS2 Green Corridor**
- **Climate change**
- **Community experience**
- **Historic environment**
- **Responsible consumption and production**

Environmental sustainability is fundamental to our strategic goal for HS2 to “create an environmentally sustainable solution and be a good neighbour to local communities”. It is also key to our Environmental Sustainability Vision to provide “zero carbon rail travel for a cleaner, greener future”.

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 boosting 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 ‘Our approach’ section of our **Environmental Sustainability Progress Report Appendix**.



Visualisation of HS2’s station concourse at Euston.



The Lower Thorpe viaduct will carry HS2 south of Thorpe Mandeville, Northamptonshire.



Our environmental sustainability objectives

HS2 is already playing a key role in levelling up across the UK, supporting almost 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.

The legislation that gave us permission to build Phase One and Phase 2a – and that we are seeking for the Phase 2b route to Manchester – requires us to meet strict environmental standards. However, our objectives allow us to go further, reducing our impact on the environment as much as we can and creating long-term environmental benefits.

The foundation of our environmental sustainability objectives

Legislation and Environmental Statements

The legislation for each phase of 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 each phase of 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. As the legislation passes through Parliament, there may be changes to the scheme in response to petitions from individuals or organisations.

Environmental Minimum Requirements

The HS2 Environmental Minimum Requirements (EMRs) are legally binding documents that accompany the legislation for each phase of HS2. The Secretary of State requires HS2 Ltd, as nominated undertaker, to adhere to the strict requirements in the EMRs in designing and constructing the railway. The controls in the EMRs are part of ensuring that the impacts which have been assessed in the ES for each phase will not be exceeded. There are EMRs for Phase One¹ and Phase 2a² and draft EMRs for Phase 2b.³ They include general principles: 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 reduce environmental impacts further. These requirements 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.

Our performance requirements

We 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 Phase One 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 to local communities. We monitor our suppliers' performance through technical documents, technical assurance and reporting. This feeds into wider reporting to our Board and the DfT.

Our environmental sustainability objectives continued

This report explores our five environmental sustainability objectives and looks at how we have performed for 2021 – 2022. It examines how we work with our employees, contractors and the supply chain to make sure we meet our objectives.

The objectives cover the legislation and requirements outlined in this section and also look at our approach to different environmental sustainability topics, such as net change in biodiversity and air quality. These are identified in our **materiality assessment**, which we use to prioritise the different environmental sustainability topics.

In addition, some environmental requirements are not specific to a single objective. We call these our overarching environmental commitments.



HS2 Green Corridor

- Green Corridor approach
- Biodiversity and ecology
- Ancient woodlands



Climate change

- Carbon emissions
- Adaptation and resilience



Community experience

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



Historic environment

- Built heritage
- Archaeology
- Historic landscape



Responsible consumption and production

- Material efficiency
- Waste
- Circular economy
- Responsible sourcing
- Water



Overarching commitments

- BREEAM
- CEEQUAL
- Environmental incidents

Progress on the HS2 Green Corridor

Our commitment

Create a resilient green corridor for both nature and people, that will conserve and enhance habitats, seek to achieve biodiversity gains through partnership working while designing mitigation to integrate into the character of the landscape.

Related UN Sustainable Development Goals (SDGs):



Image: An HS2 ecology site near Aylesbury, Buckinghamshire.



HS2 Green Corridor

Our activities and progress

The Green Corridor's goals are to:

- minimise and compensate for HS2's environmental impact through bespoke mitigation measures and find innovative ways to enhance the environment; and
- support stakeholders to improve their local environment through HS2's funding schemes, including our Community and Environment Fund and the Woodland Fund, which supports new woodland and restores ancient woodland.

The Green Corridor shapes our design for HS2 and the land on either side of the high-speed line. It also offers exciting opportunities for local communities to connect with the natural world in rural and urban areas, promoting healthy living and wellbeing. More information can be found in our **Green Corridor Prospectus**.

How we are minimising and compensating for HS2's environmental impact

HS2 is one of the largest and most complex infrastructure projects ever undertaken in the UK and the increase in construction activity during 2021 – 2022 has inevitable environmental effects. We are committed to reducing our impact as much as we can through sensitive design and respecting the people and places where the railway is being built. We are also making significant ecological and landscape investments to create a resilient green corridor along the railway. The scale of the environmental works requires a unique approach to realise our ambitions for HS2's Green Corridor.

We consider the Green Corridor at a landscape scale rather than individual sites. This allows us to create bigger, better and more joined up ecological networks. We are carrying out landscape mitigation to integrate our environmental works into the character of the surrounding landscape. We encourage our contractors to innovate with technology and develop environmental projects that set new standards to create sustainable, climate-resilient habitats and new green spaces for nature and for people to enjoy.



A new wetland area at Cubbington, Warwickshire.

The Green Corridor will comprise a network of vibrant, well-connected habitats, rich in diverse wildlife and resilient to climate change, where nature can flourish. It is a key part of the extensive environmental work we are undertaking to reduce, and compensate for, the impact of building HS2.

HS2 Green Corridor continued



Visualisation of the high-speed railway crossing Canley Brook near Kenilworth.

Case study

Design refinement avoids major diversion of brook

We revised HS2's design in the Canley Brook area near Kenilworth, Warwickshire, to significantly reduce environmental impacts and avoid a major realignment of a local river. This will help preserve the home of protected wildlife such as otters and bats.

The design changes mean HS2 will travel in a slightly shallower and longer cutting. A viaduct can be built over Canley Brook, which means it will need a smaller 80-metre diversion rather than the 700 metres in the original design. This will lead to reduced environmental impacts including about 600,000 cubic metres less material needing to be excavated. We will use 28,000 cubic metres less concrete.

HS2 Green Corridor continued

Biodiversity net gain – and our emerging action plan

The HS2 Environmental Sustainability Vision, published in January 2022, sets out targets for boosting nature recovery, including our commitments to achieve a 10% net gain on Phase 2b to Manchester, and our aspiration to go beyond our commitment no net loss on Phase One and Phase 2a.

HS2 contractors have made sustained progress towards our biodiversity targets over the past 12 months. The 2022 data shows we are in 'net gain' for two of the three measures used to demonstrate an overall biodiversity net gain for Phase One, namely, hedgerows at 10.23% and watercourses at 7.77%.

We have improved our biodiversity accounting position for area-based habitats on Phase One from a baseline position of -7.14% in 2017 to -2.93% in 2022. On Phase 2a, the baseline remains at -17.01% and we expect to publish an update to this in next year's report. The **appendix** for this report includes progress from our baseline for each phase of HS2.

While we are still in a biodiversity 'deficit' for Phase One and 2a, we are continuing to improve our position. Our targets are driving our supply chain to innovate, reduce biodiversity losses and prioritise actions that eliminate or lessen impacts on biodiversity.

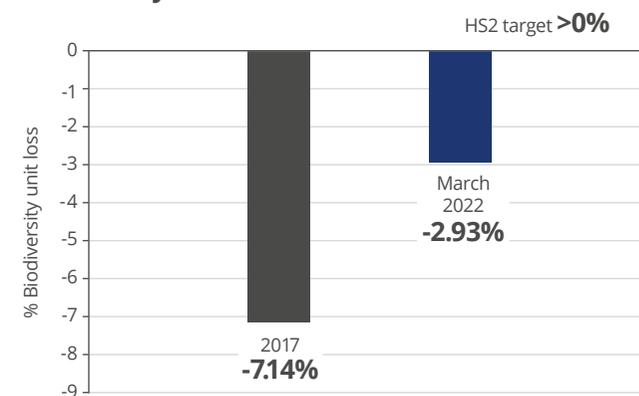
Our interim targets for 2022 – 2023 are to:

- realise no net loss (0%) in biodiversity across Phase One contracts by the end of March 2023; and
- forecast 5% improvement in biodiversity against the baseline for Phase 2a design and delivery contracts by end of March 2023.⁴

We are developing a route-wide HS2 Biodiversity Action Plan (BAP), due to be published next year, to drive our biodiversity ambitions and set out how we will achieve our targets. It will explain how we will leave a positive legacy for nature, with specific actions for our staff and contractors to explore biodiversity gains. As well as maximising biodiversity along the route, potential partnership working and environmental projects outside the immediate rail corridor will be a key component of the BAP. We hosted a series of workshops in connection with the BAP in November 2021 and are continuing to engage with stakeholders including statutory bodies, landowners, environmental groups, Non-Governmental Organisations and local authorities.

Since 2017, we have successfully planted 846,411 trees and shrubs as part of the seven million we will plant along Phase One. They include native species such as hazel, hawthorn, oak, blackthorn and silver birch. When trees fail, we replace them in the same location and continue to monitor progress. Full details of our work are provided in the **appendix**.

Phase One – net change in area-based biodiversity unit calculation



Oak saplings, grown during HS2 early works, were given to Warwickshire schoolchildren to plant.



HS2 Green Corridor continued

Ancient woodlands

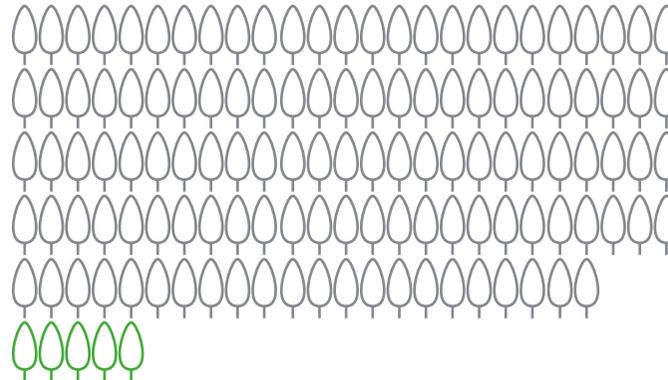
We recognise that ancient woodlands are unique, irreplaceable habitats and we are doing everything possible to reduce HS2's impact on these special sites. Further work has been carried out during Phase One design refinement and is being repeated for Phase 2a as we endeavour to minimise HS2's effects on ancient woodlands.

We published the **Ancient Woodland Summary Report** to support the Phase 2a High Speed Rail (West Midlands – Crewe) Act in February 2022.

The report provides further information on how we have reduced impacts to ancient woodlands during construction. The report focuses on Phase One, but we will update it as other phases move into construction.

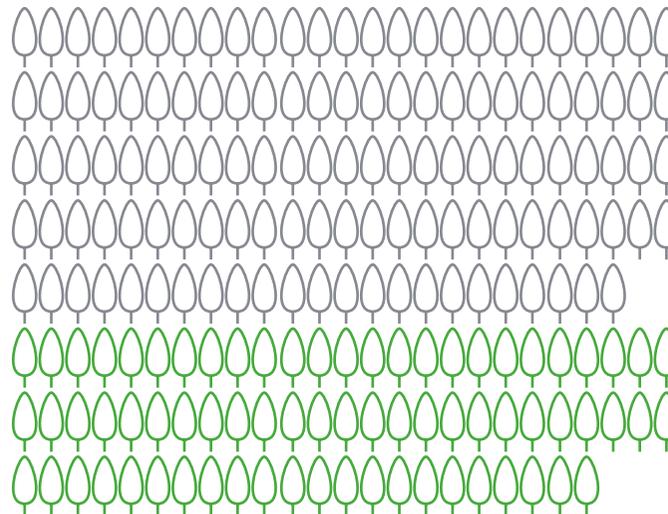
An online ancient woodland interactive map is being developed to allow people to see how our works are affecting ancient woodlands and how we are compensating for our impact in the context of the wider landscape. This shows further reductions in ancient woodland impact since last year's **Environmental Sustainability Progress Report**.

Hectares of new woodland created and Plantations on Ancient Woodland Sites (PAWS) restored – both committed and completed – as part of HS2 Woodland Fund projects.



£1.03m

funding committed



£1.46m

funding completed

Area of woodland creation Area of Plantation on Ancient Woodland Site (PAWS) restoration

HS2 Green Corridor continued

Case study

Compensating for HS2's impact on ancient woodland

We are creating a new woodland habitat to compensate for HS2's impact on Decoypond Wood, a semi-natural broadleaved woodland near Calvert, Buckinghamshire.

About 1.1 hectares of the 8.6-hectare ancient wood are being affected by the railway. We translocated, or moved, soils and other features, including dead wood habitat, from this woodland area between November 2020 and February 2021 while works continued at the site until May 2021. The soils were placed next to the remaining wood to create a new two-hectare site featuring woodland habitat with glades, trackways and water features.

The compensation habitat is part of the wider tree-planting programme in the area, partly designed for a nationally important bat population, which includes the rare Bechstein's bat. We are also monitoring the ancient woodland soils that have been moved to the site to chart the progress of the regenerating woodland flora.



The rare Bechstein's bat.

HS2 Green Corridor continued

Agricultural soil

We are taking steps to reduce the impact of construction work on the quality of agricultural soil. The success of sustainable soil handling will be known at the end of the construction stage, when we aim to restore any temporarily used agricultural land to a quality equivalent to its original condition and return it to landowners. The supply chain is working to identify surplus soil and how it can be reused sustainably.

We have conducted one of the largest soil survey projects since the Soil Survey of England and Wales was in operation in the 1980s. This is helping to inform our national database of soil information and is used to guide soil-handling practices to make sure agricultural land and soils are protected. Some of the data we are collecting is useful for understanding carbon sequestration while nutrient analysis of the soil is allowing the supply chain to identify potential uses for surplus soils, particularly for ecological mitigation areas.

HS2 is carrying out ancient woodland translocation, a niche practice that is receiving growing recognition in Environmental Impact Assessments. It involves carefully moving 'donor' soils and species from ancient woodlands to compatible receptor sites. The practice uses site-specific soil information, which is critical in identifying the best translocation method. Over time, ancient woodland type habitats could become re-established. Works we have carried out in the past year are informing best practice in the field.

We are building on the lessons we have learned on Phase One. We have engaged with stakeholders, including landowners and farmers, at an earlier stage for Phase Two. The move has been welcomed, in particular, by local authorities, and is improving understanding of the project and helping our progress. For example, about 90% of farm impact assessments were completed in six months of the Phase 2a route announcement. We used estate walks to help landowners understand the impact of the scheme at an earlier stage and provided opportunities to discuss further improvements.



Work to reduce the impact of HS2 on agricultural soil is underway.



HS2 Green Corridor continued

How we are supporting communities to improve their local environment

Working with local people and other stakeholders, we are supporting a range of environmental projects – and encouraging communities to identify new ones – as part of HS2's Green Corridor. Some of the projects are small and quick to deliver while others cover large areas of landscape and take years to complete.

The HS2 Community and Environment Fund (CEF) for Phase One and Phase 2a supports diverse projects as part of the HS2 Green Corridor. More details of our work in this area is featured in the **'Progress on community experience'** section of this report. The CEF projects expand HS2's Green Corridor beyond the immediate route and go further than what we could deliver alone, creating new woodlands, habitats and community green spaces. During 2021 – 2022, we continued to work in rural and urban areas to invest in a range of projects promoting conservation, education and 'green' infrastructure. As well as our wider funds, such as the CEF and the Biodiversity Investment Fund (BIF), we have local funds that offer targeted, additional mitigation.

Woodland Fund

Phase One and Phase 2a

The £5 million HS2 Woodland Fund supports the creation of native woodland and the restoration of ancient woodland sites within a 25-mile zone surrounding the railway between the West Midlands and London. The funds provide additional compensation beyond the mitigation measures outlined in the Environmental Statement (ES) and our Ancient Woodland Strategy.

Funding allocated this year has been lower than previous years as the Woodland Fund has been competing with the England Woodland Creation Offer (EWCO). The EWCO was launched by the Forestry Commission in May 2021, as part of the Nature for Climate Fund, following the Government's commitment to woodland creation. We are working with the Forestry Commission and the Department for the Environment, Food & Rural Affairs (Defra) to look at merging the HS2 Woodland Fund with EWCO. We believe this will benefit wider national aspirations for woodland planting and ensure HS2 funding is best used. Projects funded by the HS2 Woodland Fund will be reported separately and the fund will continue to offer stand-alone grant agreements, separate to EWCO, to fund the restoration of Plantations on Ancient Woodland Sites (PAWS).

An additional £2 million is available for the route between the West Midlands and Crewe and will be launched in 2022 when the approach for merging the Phase One Woodland Fund is confirmed.

Biodiversity Investment Fund

Phase 2a

We are allocating £2 million to fund biodiversity projects along the route between the West Midlands and Crewe. The Biodiversity Investment Fund (BIF) aims to produce biodiversity gains by creating and restoring ecological habitats. There is strong interest in the BIF and projects are being developed. Work is set to start in 2023 and we will ensure that biodiversity units generated through our funds are captured by the project.



HS2 Green Corridor continued

Colne Valley Regional Park Panel

Phase One

The Colne Valley Regional Park Panel (CVRPP) is comprised of statutory and non-statutory organisations including local planning authorities in the Colne Valley area, local wildlife trusts, DfT, Natural England and HS2 Ltd. The CVRPP has been allocated £3 million to support key proposals in its HS2 additional mitigation plan for the Colne Valley, with more than £700,000 allocated to date. As well as considering the design and mitigation of the railway, the panel looks at the potential for additional environmental schemes. A total of £13,240 has been awarded to the following projects this year:

- Tilehouse Lane Woods project – a £6,240 award will improve access in Colne Valley Park, bringing together recreational routes and enhancing woodland habitats; and
- supporting nature conservation – a £7,000 award will strengthen the conservation network in the Colne Valley, boosting training and improving volunteering opportunities for local communities and young people.

Chilterns Area of Outstanding Natural Beauty HS2 Review Group

Phase One

The Chilterns AONB review group includes local authorities in the Chilterns affected by HS2, the Chilterns Conservation Board, Natural England, the DfT and HS2 Ltd. The panel has a £3 million budget for an 'additional projects fund' to support the identification and delivery of local measures over and above that proposed in the ES or related detailed design to identify and run local projects in the Chilterns.

Priority projects and themes were identified by professionals and the public and featured in the Chiltern Environmental Integration Plan Part II. To date, more than £900,000 has been awarded to environmental projects. Last year, £292,000 was awarded to the Wendover Arm Trust to restore a canal towpath.

The review group panel assess enhancement projects and decide on the allocation of funding on a periodic basis. Due to the nature of the projects, many will not start until HS2's design and construction are further advanced.

North Buckinghamshire Environmental Fund

Phase One

A £1 million north Buckinghamshire fund has been set up in recognition of the environmental sensitivity of the landscape around HS2's infrastructure maintenance depot at Calvert. It will support the identification and delivery of local measures over and above those proposed in the ES or related detailed design. This focuses on supporting environmental based projects outside of HS2's Act limits.

The fund will be overseen by Buckinghamshire Council and is due to start assessing project submissions in July 2022.

HS2 Green Corridor continued

Trent Sow Parklands and Cannock Chase Area of Outstanding Natural Beauty HS2 Group

Phase 2a

The Trent Sow Parklands and Cannock Chase Area of Outstanding Natural Beauty (AONB) HS2 Group has developed a comprehensive **Environmental Enhancement Plan** as part of a £1.5 million funding package to develop the HS2 Green Corridor. Work on the environmental projects starts in Staffordshire in 2022 and the diverse schemes will enhance the landscape, preserve the historic environment, improve access and create new wildlife habitats. The projects are as follows.

- Shugborough Woodpasturescape (National Trust, supported by Natural England and Cannock Chase Area of Outstanding Natural Beauty Partnership): 40 hectares of new or restored



The Shugborough Estate and Trent Sow area in Staffordshire.
©National Trust Images and Chris Lacey.

habitat, 220 hectares of priority habitat linking Shugborough to Brocton Coppice and a veteran tree management plan.

- The Trent Sow Washlands Project (Staffordshire Wildlife Trust, Trent Rivers Trust, Environment Agency, National Trust, and Stafford Borough Council): working with local landowners to restore 50 hectares of grasslands and wetland habitats, wildlife ditches and clean water ponds.
- Connecting Towpaths (Canal and River Trust supported by Ingestre with Tixall Parish Council): improving the towpath on the Staffordshire & Worcestershire Canal.
- Ingestre Orangery Garden (Friends of Ingestre Orangery with Ingestre Hall and local residents): restoring the garden's historic features and creating new seating and a viewing area, tree planting, art installation and an outdoor learning space.
- The Shugborough Estate Gardens Project (The National Trust with local volunteers): improve the quality of the garden and the Grade 1 registered park.
- Tixall Hall (Cannock Chase AONB and Chase Through Time Volunteers with Staffordshire County Council): improve knowledge of the archaeology and heritage around Tixall Gatehouse.

Wybunbury Area Environment and Landscape Fund

Phase 2a

We have a funding agreement with Cheshire East Council to provide an Environment and Landscape Enhancement Fund of up to £850,000 to support local environmental and landscape enhancements in Cheshire East over and beyond those proposed in the Phase 2a ES or proposed through detailed design and located outside Act limits.

The fund will support the restoration and rewilding of a 50-hectare sand quarry, the creation of landscape corridors and 'stepping stones' in the form of restored and new hedgerow planting and the establishment of new woodlands in the landscape adjacent to HS2's mitigation. The project will deliver nature recovery and climate resilience and help reverse the decline in landscape quality in much of the area.

The project will be carried out over a seven-year period, starting in 2022 – 2023, to address nature recovery strategy targets for 2030.

Progress on climate change

Our commitment

Minimise the carbon footprint of HS2 towards a goal of net zero carbon emissions, build a network that is climate resilient for the long term and deliver zero carbon journeys from day one of operation.

Related UN SDGs:



Image: Zero-emission hydrogen power trials at HS2's Victoria Road site in Ealing, west London.





Climate change

Carbon emissions

Our activities and progress

Reducing the amount of carbon emissions produced as we design, build and operate HS2 is fundamental to our work. We published our Environmental Sustainability Vision this year, setting out how we will create a cleaner, greener future. The Vision was accompanied by our Net Zero Carbon Plan (NZCP), which explains our strategic approach and sets out our targets on cutting carbon emissions. Achieving our targets will allow us to 'build back greener' and provide zero carbon rail travel for HS2 passengers.

In January 2022, we made the significant commitment to use 100% zero carbon energy to power HS2 trains, stations, depots and infrastructure – making journeys on HS2 zero carbon from the start of service. This will substantially reduce the carbon footprint of HS2 and directly supports the decarbonisation of the UK's transport and energy systems.

Our targets on carbon emissions

- Introduce the first diesel-free construction site in 2022 and stop using all diesel on HS2 sites by 2029.
- Set science-based targets to further cut emissions in 2022 and support our supply chain partners and industry peers to set their own science-based targets.
- Invest in innovation and use partnerships, including our supply chain, to speed up ways to cut emissions across HS2.
- Cut emissions from sources we own or control as HS2 Ltd – and indirect emissions from electricity production – to become net zero by 2025.
- Use 100% zero carbon electricity to power HS2 trains, stations, depots and infrastructure for the start of services.
- Cut emissions from the concrete and steel we source by 50% by 2030 compared with 2021 levels.
- Achieve net zero carbon emissions from 2035, offsetting the residual emissions we cannot eliminate as the railway is built, maintained and operated.

During this reporting period, we signed up to the Carbon Reduction Code for the Built Environment. We were one of six early adopters of the code. Alongside Skanska UK, we were the first to meet the criteria for 'Champion' status – the highest level of compliance. The code is part of the Construction Leadership Council's CO2nstructZero initiative – the construction industry's zero carbon change programme. Achieving 'Champion' status recognises our Net Zero Carbon Plan and our work to collaborate and innovate to reduce carbon emissions and leave a legacy of clean construction.

We also passed independent verification to maintain accreditation to PAS 2080 – the leading practice standard for carbon management in the infrastructure industry. We joined the 'Business Ambition for 1.5°C' campaign, which calls on companies to set science-based net-zero aligned carbon reduction targets. We will develop our targets in 2022 and encourage our supply chain to join this global sustainability initiative. This commitment aligns HS2 to the Paris Agreement and key commitments from COP26, where HS2 attended several events and hosted webinars.

Climate change

Carbon emissions continued

We continue to raise awareness of cutting emissions through our work with the Carbon Literacy Project. By March 2022, 83 staff, including most of our Board and Executive Committee, achieved accreditation and we have been designated as a bronze Carbon Literate Organisation. We aim to achieve silver with over 300 staff accredited by the end of 2022.

We are collaborating across disciplines in our organisation to implement our Net Zero Carbon Plan and identify ways to speed up the adoption of net zero carbon solutions. For example, our innovation portfolio has the potential to remove over 1.5 million tonnes of carbon dioxide across the project. An example is the **Hollow Impressed Precast Energy Reusable (HIPER) pile trial at the Euston station site**, where the technology will draw ground heat up through the foundations of a newly built construction site office. It is estimated this will harness enough energy to supply 80% of the building's heating and hot water. We will continue to challenge traditional ways of working in the construction sector to raise the bar for carbon reduction in major infrastructure projects.



Find out more about our innovations in this video.



HIPER pile work at an HS2 site in Euston.

Climate change

Carbon emissions continued

How we've performed – and our challenges

The NZCP was published in January 2022, outlining our approach and targets on cutting carbon emissions. We will provide a detailed report on our progress against our targets in the Environmental Sustainability Progress Report for 2022 – 2023. We are developing delivery plans for the NZCP to make sure we achieve all our targets.

Carbon reduction performance

We are working to significantly reduce carbon emissions as we build, operate and maintain HS2. To help us do this, we have set a baseline to measure our performance.

Our baseline for Phase One is 14.5 million tonnes of carbon dioxide equivalent. This is the level of emissions Phase One could produce based on a 'business-as-usual' scenario – for example, if we were to use typical building materials and processes.

We set an interim target to reduce Phase One carbon emissions by 28% against the baseline during 2021 – 2022. We did not hit our target and achieved 24.8%. Our progress was significantly affected by design changes across our main works contracts. In 2020 – 2021, we reported projected carbon savings as railway assets, or structures, were removed from the design for HS2. However, as detailed designs have progressed, we have needed to reinstate some of the assets – and this also meant reinstating the carbon emissions associated

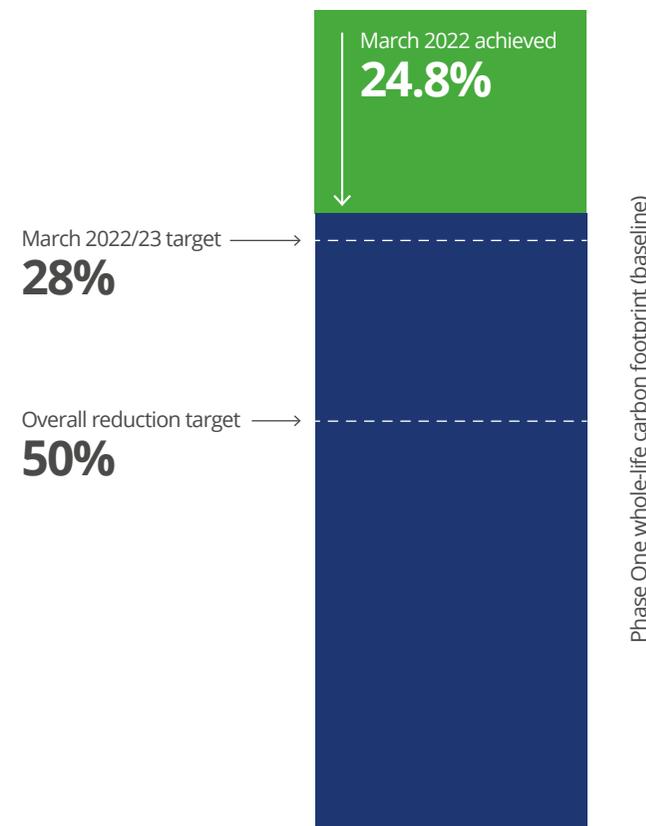
with them. Evolution in design is a feature of major infrastructure projects of the size of HS2 and it meant we did not reach our 28% target in 2021 – 2022. Looking ahead, we plan to achieve our target to cut emissions by 28% during 2022 – 2023.

We are working with our main works contractors to set carbon reduction 'pathways' for each contract to demonstrate how we can reduce emissions and meet our targets. The pathways help us to identify what actions need to be taken – and by whom – to achieve the carbon reduction benefits. Further reductions will be achieved through delivery of the rail systems. Carbon reduction associated with these works will be identified and reported when the rail systems contractors have been appointed and mobilised.

Our commitment to use zero carbon energy to power our trains, stations, depots and infrastructure represents a major step forward in our work to cut emissions. As this commitment, announced by the Government in January 2022, is in the planning stage, we have not yet included these carbon savings against HS2's whole-life carbon footprint. If we had included them this year, it would have increased forecast savings in the region of an additional 10% against our baseline. The carbon benefit of our zero carbon electricity commitment will be reported when the contracts for zero carbon electricity are in place.

Carbon reduction performance

% reduction from baseline



We are confident we will meet our objective to reduce HS2 carbon emissions by 50% by 2030 through the plans we have in place to accelerate 'near-term' carbon reduction action. The opportunity remains for rail systems to make further cuts in emissions.



Climate change

Carbon emissions continued

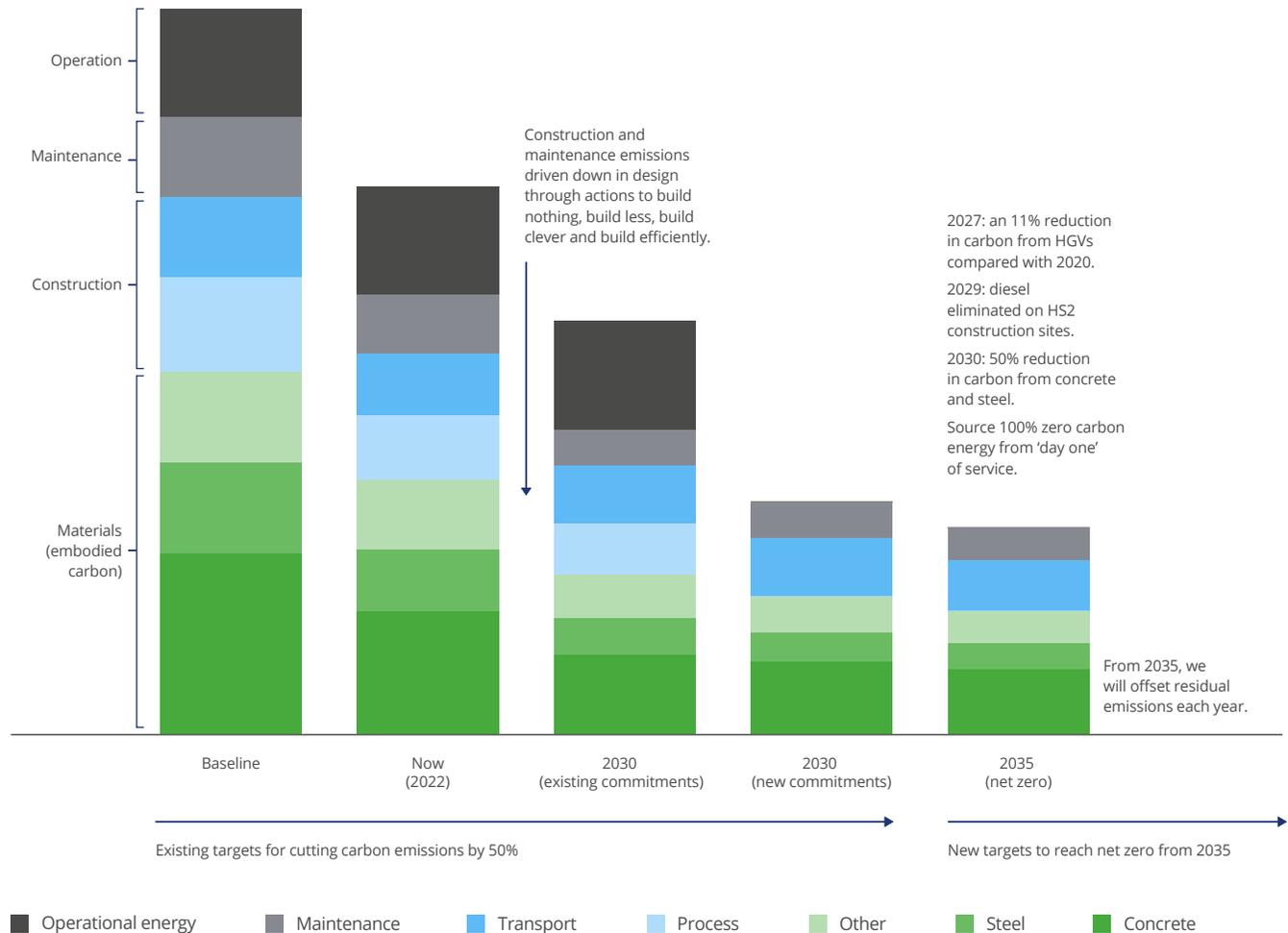
The anticipated carbon reductions from the actions set out in our Net Zero Carbon Plan are shown in the figure opposite. We will provide an update on progress against the plan in next year's Environmental Sustainability Progress Report and work is underway on many of the initiatives. For example, we are working with the DfT's other operational delivery bodies such as National Highways and Network Rail on specific groups focused on concrete, steel and diesel. By working closer together and aligning our innovation programmes, we believe we can accelerate the decarbonisation of these materials for the benefit of the whole construction sector.

We have established baselines for our Phase 2a early civils works and rail systems. This is set at 564,000 tonnes CO₂e in total. Our contractors are required to reduce carbon by 50% from this baseline. Baselines are being established for the Phase 2a main civils works. As our design delivery partner and main works contractors come on board, they will have targets to reduce carbon by 50% from this baseline, building on the lessons learned in Phase One construction.

The carbon assessment for Phase 2b has been published in the **Environmental Statement** accompanying the hybrid Bill to extend HS2 to Manchester.

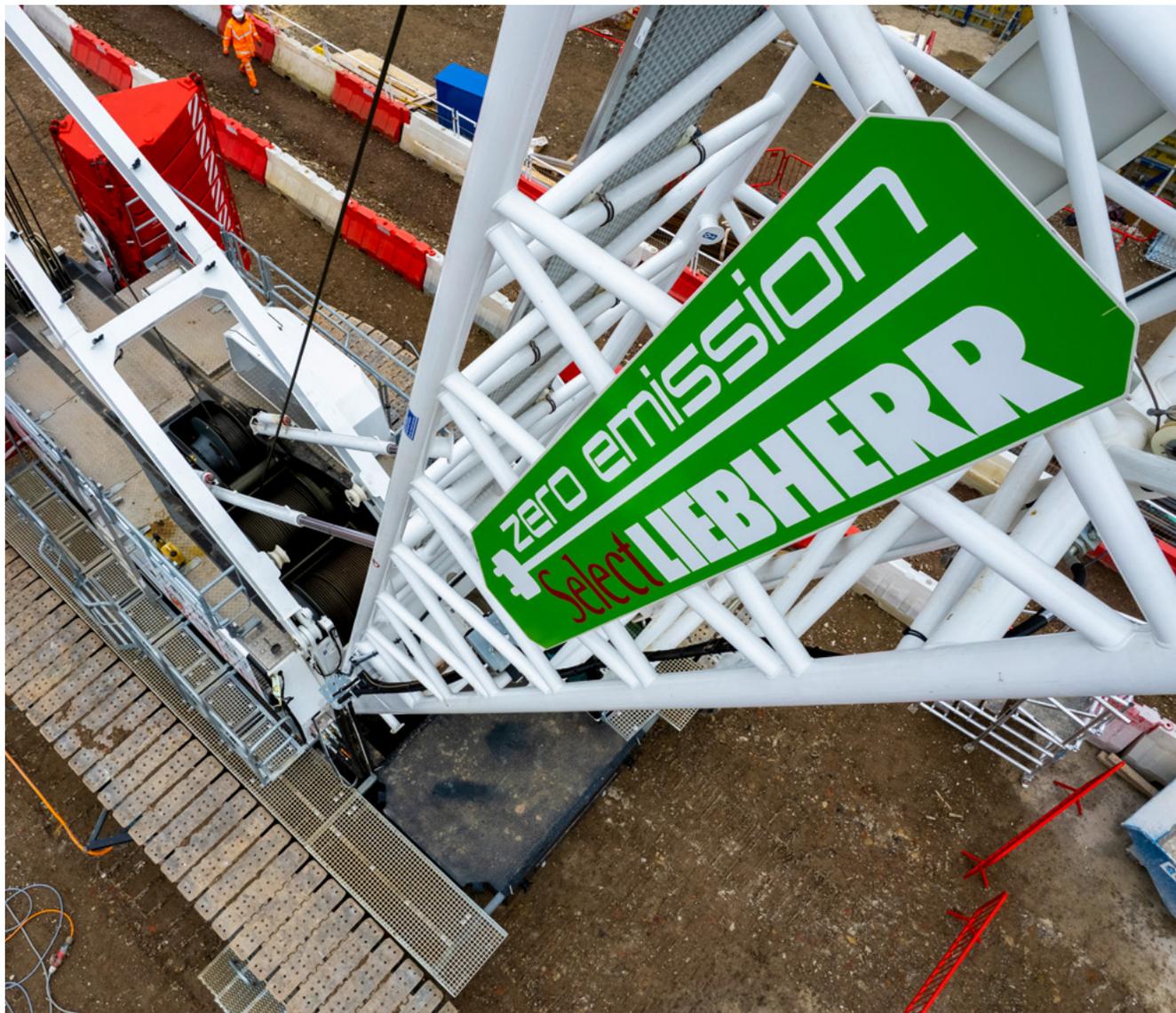
Destination net zero

How our planned carbon reduction actions will contribute to net zero from 2035.



Climate change

Carbon emissions continued



A zero-emission electric crane at HS2's Old Oak Common site.

Case study

Cutting emissions with giant electric cranes

We are championing innovation – and driving down emissions – using new low carbon technology and construction methods. As part of our clean construction commitment, HS2 became the first UK project to use 100% fully-electric, heavy-duty 'crawler' cranes.

The giant electric Liebherr machines run off mains power or a battery rather than diesel, allowing us to cut emissions, improve air quality and reduce noise. There are only five of the machines worldwide and three are helping to build HS2.

We trialled the crane during early works at Curzon Street station in Birmingham. Two are now being used at Old Oak Common in west London, where they are helping to build the 850-metre station box for six HS2 platforms, with a third in use at a vent shaft in Kilburn, London.



Climate change

Carbon emissions continued

Case study

Cutting carbon through modular design

Main works contractor EKFB has designed the Thame Valley viaduct, near Aylesbury, Buckinghamshire, to use pioneering pre-fabricated construction methods. It will see the 880-metre structure slotted together like a giant Lego set, cutting its carbon footprint by an estimated 33% and simplifying construction. Applying lessons from high-speed rail projects in Spain, the design team cut the amount of embedded carbon by simplifying the structure of the viaduct so that every major element can be made offsite.

The production of steel and concrete is a major contributor to carbon emissions and the new lighter-weight structure is expected to save 19,000 tonnes of embedded carbon in comparison to the previous design. As well as cutting embedded carbon in terms of materials, this approach requires fewer lorries to deliver material to site, cuts waste and will reduce disruption for the community during construction.



Pre-fabricated construction methods will help cut carbon emissions as we build the Thame Valley viaduct.

Climate change

Adaptation and resilience

HS2 is being designed and built as a high-speed rail network that reduces carbon emissions and provides reliable travel in a changing climate. As the new backbone of Britain's transport network, it is critical the railway can withstand changes to our climate including extreme weather events, which are becoming more common. The way the railway adapts to climate change and remains resilient is built into the planning, design and construction of HS2.

Our activities and progress

We produced our first **Climate Change Adaptation and Resilience Report** in December 2021. The report was our first contribution to the Adaptation Reporting Power (ARP) for the Department for Environment, Food and Rural Affairs (Defra) under the Climate Change Act 2008, and the first for a project that is in the design and construction phase. The independent Climate Change Committee hailed the report as a good example of 'integrated approaches to adaptation', demonstrating that climate adaptation and resilience is a 'fundamental part of the planning consent, design and construction programme'.⁵



HS2 infrastructure, such as the Network Integrated Control Centre at Washwood Heath, Birmingham, is assessed for climate resilience.



Climate change

Adaptation and resilience continued

As part of our work for the ARP report, we undertook a mapping exercise against the Government's UK-wide climate risk assessment, ensuring we have addressed all risks, are taking necessary steps to prepare for climate change risks that may affect the rail sector and have governance arrangements in place.

Our work on embedding climate adaptation and resilience into Phase One and Phase 2a is detailed in our ARP report. It demonstrates how we are developing best practice for the industry by embedding climate change into the design, planning and construction of HS2 and are reporting on our actions. We will report on our progress in future reporting rounds.

We have assessed the climate resilience of the Phase 2b route to Manchester during its planning and consent stage in the Environmental Impact Assessment (EIA). Using the Met Office's most recent UK Climate Projections (UKCP18), which were not available at the times of publication of previous EIAs, we have developed a high-level climate change resilience assessment. We have identified a range of potential risks posed by climate change including extreme hot and cold weather, heavy rain, high winds and storms, the risk these climate hazards pose to HS2 infrastructure, including tracks, tunnels, overhead line equipment,

trains, stations and earthworks, and the measures in place to reduce these risks. Based on our design standards and the way we are building climate resilience into everything we do, we are confident our plans ensure climate resilience.

Our assessment also considered the combined impact of climate change and HS2 on the local environment. Our risk assessments, design standards, and the way we are building climate resilience into HS2, ensures climate change has been considered.

While we integrate climate change in our design processes, we also include climate sensitivity tests when this is necessary. The tests allow us to understand our resilience to low-likelihood, high-magnitude extreme weather events and build in additional mitigations. In this way, we are designing HS2 to be resilient to long-term climate changes and short-term extreme weather events. For example, we are using slab track along our route, which is more resilient to extreme temperatures than conventional ballast track, and the design of our rolling stock will consider the effects of climate change.

We are working with industry peers to share knowledge and best practice on climate adaptation and resilience, ensuring the UK develops climate resilient infrastructure. We are part of the knowledge-sharing Infrastructure Operators Adaptation Forum, which includes infrastructure providers such as Network Rail and National Grid and promotes climate resilience for major infrastructure projects. We also belong to several stakeholder groups such as the Rail Safety Standards Board's Climate Change Adaptation Working Group and the Sustainable Rail Leadership Group. We are supporting the Great British Railway Transition Team to shape the rail sector's approach.

How we've performed – and our challenges

We are integrating climate change adaptation and resilience into each project stage. During 2021 – 2022, four Climate Change Adaptation and Resilience Reports have been completed by our Phase One contractors and we have assured them. These reports provide site-specific reviews of route-wide design impacts and interdependencies assessments at key design stages. They demonstrate that HS2's design, as far as reasonably practicable, maximises both resilience and the potential for adaptation to climate change while minimising the risk of loss of performance.



Climate change

Adaptation and resilience continued

One challenge we will always face is our evolving understanding of climate science. Since conducting our climate risk assessments for Phase One and Phase 2a, the Met Office has released new UK climate projections. Although broadly similar, these new projections (UKCP18) highlight an increased risk of wetter winters and hotter, drier summers, which could have greater impacts than previous projections suggested.

To overcome this, we are committed to reviewing and, where needed, updating HS2 standards and supporting documents considering new climate change evidence and guidance. In 2021, we updated our design standard relating to climate change adaptation and resilience as well as our flood risk and drainage climate change approach document to include the new climate projections. We are reviewing the potential implications of the new climate change projections across Phase One. Additionally, our climate risk assessments follow a precautionary approach, including consideration of multiple climate change scenarios to accommodate uncertainty in future projections.

We have established a Climate Change Resilience Collaboration Forum with Phase One contractors and held our inaugural meeting in February 2022. The group brings together specialist knowledge and experience on climate change resilience and adaptation from across the project, and ensures best practice is highlighted and shared. Lessons learned and good practice and innovation in climate adaptation and resilience will be highlighted in the **HS2 Learning Legacy** to help raise the bar for the industry.

We continue to ensure our designs integrate climate change adaptation and resilience measures. For example, we are completing a climate change design impact assessment for rail systems – including the track, ventilation and signalling systems – for Phase One and Phase 2a. This will allow us to assess the effectiveness of our standards for climate change and identify areas where we may need to bolster climate resilience.

Our Code of Construction Practice includes measures to reduce the risks posed by extreme weather and associated conditions at our construction sites including heat, rainfall and flooding, strong gusts, and snow and ice. We monitor the weather and manage onsite

activities and mitigations to reduce the risks of adverse conditions at our sites. We are developing climate resilience metrics for HS2's construction stage to provide improved tracking of extreme weather effects, allowing us to share lessons across the project.

Our construction partners are preparing and planning for extreme weather, using innovative technologies to capture data and provide accurate real-time forecasting onsite. Forecasting provides enhanced safety management and minimises the impact of adverse weather on the programme at construction sites. This work is underway for Phase One and will help develop our understanding and embed learning across all phases.

We are working to ensure our operational procedures for the future railway will minimise disruptions from extreme weather events and allow us to adapt to climate change over time. Considering the potential for extreme weather events during the planning stage will present a better and more resilient railway, supporting our objective to provide a fast, reliable service. HS2 services will also operate on existing rail infrastructure managed by Network Rail and we are working with them to increase climate resilience.

Climate change

Adaptation and resilience continued



Planned public spaces at Old Oak Common station.

Case study

Managing heat at Old Oak Common station

We have designed measures to manage the effects of high temperatures at Old Oak Common station. We have designed the orientation of the station to minimise solar gain and minimised the risk of indoor air temperature increases with north-facing rooflights and a north-facing façade. Natural ventilation is provided via rooflights and façade louvres.

These measures increase climate resilience and have the co-benefit of reducing the need for mechanical cooling and reduce the carbon footprint of the station. Where required, mechanical ventilation systems will be sized considering future climate change projections to ensure internal station temperatures remain low to prevent overheating of equipment and subsequent loss of service.

We will include shading devices to minimise the risk of overheating in outdoor spaces – for example, key access routes and seating spaces will include tree canopy cover. The surfaces of footpaths and cycle paths will use reflective materials to minimise the amount of solar radiation they absorb. Some hardstanding areas will be partially permeable to help cool the pavement through water evaporation.

Progress on community experience

Our commitment

Where reasonably practicable, minimise adverse impacts of HS2 construction and operation on people and the environment including effects from air pollution, flooding and noise and vibration.

Related UN SDG:



Image: The Birmingham-based Community Environmental Trust, supported by HS2 funds, encourages local people to help nature recovery.



Community experience

Our activities and progress

HS2 is already supporting almost 30,000 jobs both along the route and further afield throughout the UK supply chain. The railway is boosting economic opportunities for people in the infrastructure industry and helping to bridge the skills gap by training the next generation. However, our extensive activity at hundreds of urban and rural sites is an unwanted intrusion into the lives of local people. We try our best to reduce the noise, dust and traffic produced by building work but we cannot eliminate disruption. We need to balance our responsibilities to people with the demands of a vast construction project every day of the year.

The Phase One route between the West Midlands and London is the focus of construction now and we closely monitor our sites, including lorry numbers, air quality and the noise and vibrations caused by our machinery. We are using innovative new building methods and equipment to minimise disturbing residents and local businesses and continue to look at ways we can improve our performance. We are committed to respecting people and places and doing our best to act quickly if we fall short. We recognise the need to support vulnerable people and anyone who needs additional support when engaging with HS2. We offer specialist services including considering alternative methods of mitigation to minimise disturbance, providing advocacy support and language translation services.

We require our contractors to register their sites with the **Considerate Constructors Scheme** and have a target that all sites should achieve a score of 40 (from a possible 50). In 2021 – 2022, we averaged 42.7 across all our sites, meeting our target. One contractor, EKFB Joint Venture, fell slightly short of the target, achieving an average of 39.2. In each of the cases where a site scored below 40, corrective actions were introduced, the site was re-audited and achieved a score within target.

Supporting local communities through our funds

HS2's **Community and Environment Fund (CEF)** and the **Business and Local Economy Fund (BLEF)** provide benefits to local communities to allow local people to experience the positive changes HS2 is bringing to their area. The CEF is helping to improve community facilities, support access to the countryside and conserve the natural environment in disrupted communities along the route. The BLEF supports local economies in areas where businesses may experience disruption from our construction works. The funds are allocated in addition to the community and environmental mitigations and compensation we provide.

In total, we have awarded more than £11 million to over 200 CEF and BLEF projects along Phase One and Phase 2a. Of these, awards to 41 projects were announced in 2021 – 2022, totalling £2,028,700. The funds also help projects to leverage additional sources of funding. To date, more than £48 million⁶

in additional match funding has been leveraged towards projects funded by HS2. The latest information on HS2's CEF and BLEF projects can be found on our **project map**. The schemes include creating peace and healing gardens at a hospital in London, refurbishing a children's adventure playground in the West Midlands, establishing a community theatre in Staffordshire and supporting social enterprises and a woodwork club for adults with additional needs in Camden.

We opened applications for Phase One communities in March 2017 with a total of £40 million available for environmental schemes and projects supporting physical and mental wellbeing, the arts, culture and sport.



Holborn Community Association in London received £75,000 from an HS2 fund to help transform its centre.



Community experience continued

In April 2021, we extended the CEF and BLEF funds to Phase 2a. A total of £5 million is available for community and business projects between the West Midlands and Crewe. We awarded our first Phase 2a funds in November 2021, allocating £9,735 to a sailing club in Kings Bromley, Staffordshire.

We make sure funds are awarded fairly: we have made awards in 17 of 18 local authority areas and in 32 of 38 constituencies along the Phase One and Phase 2a route. This year, awards were made in 14 local authority areas and 23 constituencies.

Over the past year, 13 projects have been approved in Phase One priority areas, which have so far received lower-than-average levels of funding from the CEF and BLEF schemes. The first award in Westminster North was made, supporting an organisation to provide holiday clubs for young people. Three projects in Hillingdon, north-west London, have been allocated funds.

We have produced new guidance for BLEF applicants and revised guidance for applicants seeking support for health and wellbeing projects. This will help to improve understanding of our funds' criteria to make them as accessible as possible. We look forward to increasing the reach and impact of BLEF over the next 12 months.

Managing air quality

As part of our controls to manage HS2's impact on local air quality, we have set industry-leading emissions standards for construction vehicles, plant and large machinery, known as non-road mobile machinery (NRMM). In January 2022, we tightened our route-wide emission standards further to reduce emissions and improve local air quality for people living nearby and working on our sites.

During 2021 – 2022, more than 500,000 heavy goods vehicle (HGV) trips took place across Phase One, of which 99.87% were Euro VI compliant. Almost 3,700 pieces of NRMM were used and 99.86% were compliant with our emissions requirements.⁷ Additionally, just under 70,000 light duty vehicle trips took place with a compliance rate of 88.69%. The compliance rate has improved since last year (83.9%), but has been hampered due to the use of personal vehicles when it was advised to avoid public transport during the pandemic. Exemptions⁸ with requirements can be granted by HS2 on a case-by-case basis, for example, due to short use for NRMM, or speciality HGVs. During 2021 – 2022, 2.9% of NRMM plants received an approved exemption and 0.003% of HGVs. This is below our 8% maximum accepted exemptions percentage.

Vehicle emission standards



Non-road mobile machinery (NRMM) that meets HS2's emission standards.



HGVs (heavy goods vehicles) that are Euro VI or better.



LDVs (light duty vehicles) that are Euro 6 diesel or Euro 4 petrol.

Community experience continued

Case study

Green technology for better air quality

A major part of the construction industry's carbon footprint is due to the reliance on fossil fuels. We are working with policymakers, innovators, academic partners and local authorities to trial and develop cleaner solutions to roll out across the sector.

HS2 is pioneering several UK-firsts of electric and hybrid equipment including crawler cranes, forklifts, dumpers, wheelbarrows and excavators as well as trialling and using biofuels. We are retrofitting older machines to meet the cleanest diesel emission standards on our sites.

Technology developed by British company Eminox will help us to cut emissions on plant and machinery such as piling rigs, excavators and bulldozers. It will also cut waste and costs as it reduces the need to scrap older machines to meet the latest emission standards. The green technology can be used on larger NRMM, creating major benefits for the industry and leading to better air quality.



Charging an electric crane at HS2's Canterbury Road vent shaft in London.



Community experience continued

Reducing noise from construction and operations

Our contractors are required to show how they plan to reduce noise as far as reasonably practicable before they start work. This is achieved through Section 61 applications to local authorities for approval before works start. These applications protect the community because they set out the measures that will be put in place to minimise noise. Last year, more than 150 of these applications were approved along the Phase One route.

Our noise insulation and temporary rehousing policy is available to help people in properties that are significantly affected by construction noise despite the noise control measures that are agreed through Section 61 applications. In 2021 – 2022, we identified 65 properties that qualified for secondary glazing to reduce noise. Since we started construction, we have offered noise insulation to 1,123 homes.

The High Speed Rail (London – West Midlands) Act 2017 gave us permission to build Phase One but some aspects of the design are subject to further approvals through Schedule 17 of the Act. Last year, we made 18 applications relevant to operational noise control, covering about 18.5 miles of the route. Each application details proposed noise mitigation measures and information about the expected noise from the railway. It also sets out how noise

has been minimised and balanced with other concerns such as the visual impact of noise barriers. In some cases, applications show improvements on the noise impacts forecast in the Phase One hybrid Bill. This is because we have enhanced noise control compared with our original proposals.

Noise mitigation measures for the Phase 2b route to Manchester were included in the Environmental Statement with the hybrid Bill, deposited in January 2022. We also launched the Phase 2b environmental health sub-group of the Planning Forum, which allows local authorities, government departments and us to discuss environmental matters on the project. We already have forums for Phase One and Phase 2a.

We have started a study into the effects of construction noise and vibration on people's health in collaboration with main works contractor Skanska Costain STRABAG (SCS), Imperial College London and Camden Council. Building is unavoidable in urban areas and major projects like HS2 involve long construction phases. For the study, people will be asked about their health and wellbeing, the way they feel and how they view their environment. We will publish the findings and hope the research will lead to improvements in noise policy and mitigation measures for construction projects.

Community experience continued



Construction progressing at the huge Old Oak Common site.

Case study

Piling at Old Oak Common

As part of early works at Old Oak Common, a sheet pile comprising 120 sheets was installed. Typically, piling activities can produce high levels of noise and vibration depending on the method used. The site team responsible for the works used a WP150 Silent Piler system to reduce vibration. The Silent Piler produced far lower levels of noise and vibration compared with a standard piling rig.

Community experience continued

Case study

Specialist multi-purpose vehicles

To reduce noise and vibration, HS2 contractors are using rubber-tyred multi-purpose vehicles to get materials and workers to the tunnel boring machines inside our tunnels.

During the planning stages, it was thought deliveries would be made using temporary railways in the tunnels. This could have caused ground-borne noise and vibration. Using specialist vehicles is a good example of the way we are using new technology to tackle disturbance.



Vehicles serving HS2's tunnel boring machines are reducing noise disturbance.



Community experience continued



HS2 trains, providing zero carbon journeys, will be some of the quietest of their type in the world.

Case study

Reducing noise with quieter trains

We need to control the noise produced by our high-speed trains to reduce disruption to local people and the environment – and achieve the programme's environmental minimum requirements.

We have commitment to running trains that are quieter than the minimum requirements set out in UK legislation. As part of our procurement process, we included contract incentives to encourage potential suppliers to reduce train noise as far as possible.

Hitachi-Alstom Joint Venture was awarded the rolling stock contract for 54 HS2 trains for Phase One and Phase 2a having committed to build some of the quietest and fastest units of their type in the world. High-tech trains reaching speeds up to 225mph will be significantly quieter than the levels required under UK law. The appointment of Hitachi-Alstom is a significant milestone in delivering our environmental commitments because the noise performance of HS2 trains is secured through contract requirements.



Community experience continued

Managing flood risk on our communities

Under our commitment not to increase the risk of flooding to communities, we have incorporated updated climate change guidance on peak river flows, released by the Environment Agency in July 2021, into plans for each phase of HS2. The guidance reflects improved understanding of the potential effects of wetter winters and hotter summers on our river systems and is the second major change in flood risk guidance since the Phase One hybrid Bill was deposited in Parliament in 2013.

The revisions pose a significant challenge to HS2, working in our fixed land limits, not to increase flood risk for communities. Where design changes are needed to achieve this, we will make them in collaboration with the Environment Agency or the lead local flood authorities and make sure they are supported by hydraulic modelling to get the necessary consents and approvals.

We are also adapting the measures we use to manage flood risk by incorporating nature-based solutions, such as wetlands, using elements of natural floodplain management, in line with the Government's 25-year plan. This will maximise the use of the land, mitigate our impact on communities and boost nature recovery.

On Phase 2a, our flood risk specialists are supporting early environmental works designs where ponds, woodlands and wetlands are proposed, seeking to maximise the effectiveness of these sites in slowing the flow of water.

On Phase 2b, we assured the flood risk assessment supporting the Environmental Statement to minimise our flood risk impact on the communities between Crewe and Manchester, which includes areas of existing high risk such as the River Mersey floodplain.

The management of run-off from our construction sites is assessed and managed to ensure local people and the surrounding water courses are not affected and that our construction activities can continue safely. We design our temporary drainage systems to cope with heavy rainfall on our construction sites, however this is an ongoing challenge during the wettest periods or during extreme storm events.

Managing our traffic and transport impacts

We have prepared a route-wide traffic management plan (RTMP) to manage construction traffic and transport matters for our Phase One construction sites. The RTMP also sets out our requirements for monitoring construction traffic flows, as well as

setting the project's standards for vehicle and driver safety, the development of workforce travel plans and how we need to protect highways and other assets. Contractors are also required to prepare local traffic management plans in consultation with local traffic liaison groups.

A mass haul strategy ensures that excavated materials are used locally where possible to minimise vehicle movements. We use conveyors, temporary bridging and even tunnels to keep vehicles off roads and reduce our impact on local communities. This strategy includes building dedicated haul roads in the construction boundary, which allows us to move materials more effectively; and 'sustainable placement areas', like the one near Uxbridge, are used for depositing excavated material.

We try to minimise using local roads by transporting materials and bulk waste by rail or using 'A' roads and motorways. Where local routes are required, they are selected to minimise disruption to local people and risks are agreed with the local highways authorities in advance via traffic liaison groups.

Community experience continued

We also try to source some of our materials from local 'borrow pits', reducing the need to import materials over long distances, and we reuse most of the earth we excavate during construction in HS2's earthworks and landscaping. In these cases, the material does not need to be moved long distances on the road network.

To mitigate the impact of essential vehicle movements, we have conducted road safety campaigns including supporting Project EDWARD (Every Day Without A Road Death). We are working with our stakeholders across the industry to develop a road risk strategy that will identify and implement initiatives to mitigate further the impact of our operations on road safety, the environment, congestion and value for money.

Any disruption caused by HS2 construction traffic remains a sensitive issue and there are ongoing local authority concerns about some of our vehicle routes and movements in the Buckinghamshire area.

Responding to complaints

Despite construction activity increasing across the programme, the number of complaints, totalling 1,637, has decreased by 13% compared with 2020–2021. Most of the complaints, 1,549 were related to Phase One; 45 were for Phase 2a; and 24 were for Phase 2b. The remaining 19 complaints were route-wide.

Most complaints were about traffic and transport, or the noise and vibrations caused by construction. We received 609 complaints about traffic and transport and 408 about noise and vibration. We resolved 97% of complaints in 20 working days or fewer – and 99% were concluded at the first stage of the complaints process.⁹ No complaints were escalated to the Parliamentary and Health Service Ombudsman.

We are receiving more calls about construction-related issues that are having an immediate effect on people. These concerns need to be resolved quicker than our standard target of 20 working days. We are now committed to resolving all urgent construction enquiries and complaints in two working days. We received 324 urgent construction enquiries and complaints last year and responded in two working days in 94% of cases.



We aim to resolve urgent construction enquiries and complaints in two working days.



Community experience continued



A new tool will help people assess HS2's environmental impact in their local area.

Case study

Helping our communities understand environmental information

We launched an **online tool** to help stakeholders and interested parties to better navigate their way around the large amount of environmental information linked to the Phase 2b hybrid Bill, including the Environmental Statement (ES).

Based on geographic information system (GIS) mapping, the tool provides similar benefits to a digital ES including improved accessibility and navigation, making it easier for people to find information, see how HS2 might affect them and help them to respond to the ES consultation.

The tool went live on 25 January 2022, the day the ES consultation was launched. The consultation ran until March 31 and an independent assessor, appointed by Parliament, will prepare a report summarising the issues raised.

Progress on historic environment

Our commitment

Reduce harm to the historic environment and deliver a programme of heritage mitigation including knowledge creation through investigation, reporting, engagement and archiving.

Related UN SDG:



Image: Archaeologists working at St Mary's Church, Stoke Mandeville, Buckinghamshire.





Historic environment

Our activities and progress

Our early works contractors have completed most of the detailed archaeological excavations and the recording of historic buildings between the West Midlands and London during 2021 – 2022.

This historic environment fieldwork programme is the largest ever undertaken in the UK.

The work fulfilled the commitments in the Heritage Memorandum to ensure that proper regard is given to the historic environment and heritage assets during the design and construction of HS2. We have made incredible discoveries during our excavations including Roman settlements and Anglo-Saxon burials.

Our discoveries continue to generate significant community and media interest. We have hosted lectures, webinars and open days as well as featuring on several episodes of the BBC television series “Digging for Britain”.

We are building a digital archive that has been generated during our fieldwork investigations. Our contractors are beginning to deliver reports, maps and spreadsheets to the Archaeology Data Service (ADS), which will become a vast online resource for communities, researchers and history enthusiasts.

Following Royal Assent for the Act to build Phase 2a, we started fieldwork evaluation during advanced works on the route between the West Midlands and Crewe. We completed the historic environment chapters and supporting documents for the Environmental Statement (ES) that accompanied the Phase 2b hybrid Bill and carried out the ES consultation. Our planning forum’s heritage subgroup has started to share views and information with local council specialists, Historic England and Historic Environment Scotland. We have also started to shape the Phase 2b Historic Environment Research and Delivery Strategy, building on our experience of the delivery of these strategies on Phase One and 2a.

We continue to reveal fascinating secrets from British history as we build HS2, develop our knowledge and understanding of the past and create a rich legacy. These are some snapshots from another year of archaeological investigations as we unearth and document thousands of years of history along the route of Britain’s high-speed railway.

Coleshill Park

An exhibition at Coleshill Town Hall, Warwickshire, provided an overview of our discoveries at Coleshill Park, dating back to the Bronze Age. The investigations revealed remarkable Elizabethan gardens of national significance. The octagonal moat that surrounded the manor was set within ornamental gardens. Archaeologists revealed the foundations of gravel pathways, pavilions and ornaments arranged in a geometric pattern.

Uncovering Roman Britain

A Roman town was unearthed in Fleet Marston, near Aylesbury, Buckinghamshire, during 2021. A series of enclosures containing evidence of domestic structures, as well as commercial and industrial activity were investigated. The town developed either side of a major Roman road that linked the Roman capital of Verulamium (St Albans) with Corinium Dobunorum (Cirencester) via Roman Alchester (near Bicester). The settlement is likely to have been an important staging post for travellers and soldiers passing through Fleet Marston on their way to and from the garrison at Alchester. Along with domestic artefacts such as spoons and brooches, finds of gaming pieces and bells indicated gambling and religious activities. A late Roman cemetery was also excavated containing around 425 burials. The number of burials together with the development of the settlement suggested a population influx.

Historic environment continued

Our detailed excavations at Blackgrounds in south Northamptonshire revealed how the Iron Age settlement of 30 roundhouses expanded and became prosperous during the Roman period, with new stone buildings. A substantial 10-metre-wide road ran through the settlement and would have been busy with carts trading via roads and the nearby River Cherwell. The discovery of more than 300 Roman coins suggests the level of commerce that was conducted.

Archaeologists found a rare, well-preserved wooden carved figure in a water-logged ditch near Twyford, Buckinghamshire. Standing 67cm tall and 18cm wide, the figure was cut from a single piece of wood and was likely to be from the early Roman period. A surprising amount of detail remained including the figure's hat or hairstyle.

Historic railway architecture

We have started a major project to restore the Grade I listed Old Curzon Street station in Birmingham, one of the world's oldest surviving pieces of monumental railway architecture. A team of local experts have started to carry out the challenging and intricate work required on the iconic building, working with many stakeholders. The station opened in 1838 as the northern terminus for the London and Birmingham Railway, which linked the city with Euston. The historic building is being integrated into our plans for the new HS2 station. The public

space around the station will feature the historic track alignments of the former goods yard.

Phase Two

We learned valuable lessons from our Phase One historic environment works and we have introduced route-wide heritage assessments for Phase 2a to gain a more holistic understanding of evaluation and mitigation at an earlier stage.

Learning from our work on the Historic Environment Research and Delivery Strategies (HERDS) for Phase One and Phase 2a, we have started engaging with stakeholders on the Phase 2b HERDS much earlier. We have staged interactive, online workshops with key local authority and Historic England specialists together with community groups, contractors and academics to build understanding of HS2's historic environment work.

The future

The focus for Phase One now shifts from fieldwork to post-excavation analysis and communicating our results. The procurement of the post-excavation services contract is underway and will continue through 2022. We are seeking a specialist contractor to deliver an engaging and inclusive programme of analysis, publications and events. The contractor will also develop the physical and digital archives that will provide a vast resource for discovery and research.



The world's oldest railway roundhouse was unearthed at the Curzon Street station site.

Historic environment continued

Case study

Roman statues unearthed

Archaeologists made a major discovery while excavating a ditch around what is thought to have been the foundations of an Anglo-Saxon tower at old St Mary's Church near Stoke Mandeville, Buckinghamshire. They uncovered three stone busts, stylistically Roman. Two statues appeared to be a woman and a man, the other the head of a child, likely the same family. Specialists believe they were kept in a mausoleum, rather than being exposed to the elements, before being thrown into the ditch.

The square building that pre-dates the Norman church is believed to be a Roman mausoleum. Roman materials found in the ditch were too ornate and too low in number to suggest the site was a domestic structure. The Roman building appeared to have been demolished by the Normans when they built St Mary's church, after possible reuse during the Saxon period. In addition to the statues, a well-preserved hexagonal glass Roman jug was discovered. Despite being in the ground for over 1,000 years, large pieces were intact. Other finds included roof tiles, painted wall plaster and Roman cremation urns.

The field museum at St Mary's offered a programme of community open weekends, courses and films – and was highly commended at the 2021 Archaeological Achievement Awards.



One of the stone busts, Roman in style, found in a ditch by HS2 archaeologists.

Progress on responsible consumption and production

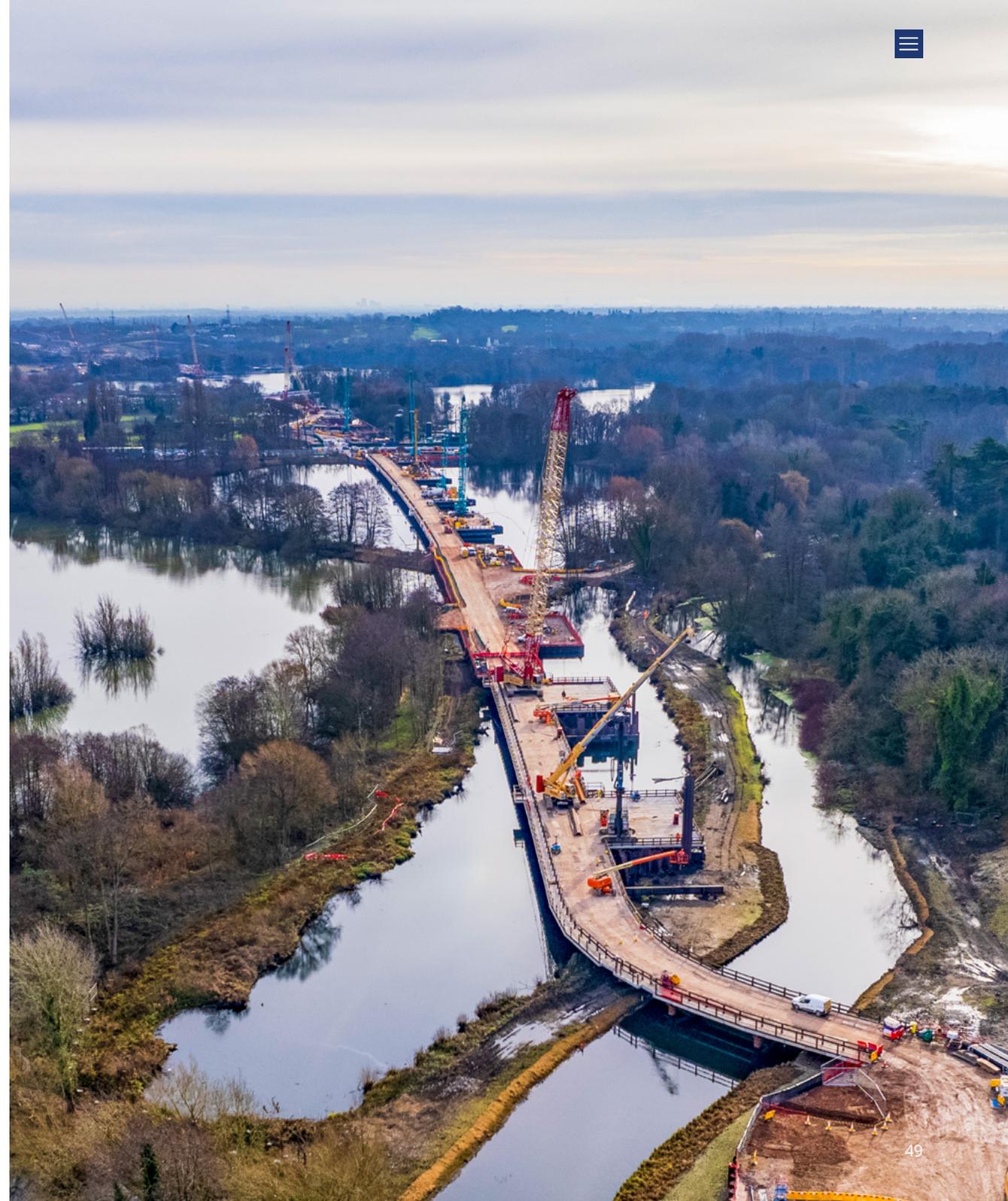
Our commitment

Promote circular economy principles, responsibly source and make efficient use of sustainable resources, reduce waste and maximise the proportion of material diverted from landfill.

Related UN SDGs:



Image: The site of the Colne Valley viaduct, which will be one of HS2's iconic structures.





Responsible consumption and production

Our activities and progress

We have started building the main structures and stations for Phase One, which has produced a significant increase in construction waste and excavated materials in 2021 – 2022. The tonnage of construction and demolition waste has increased about three-fold compared with the previous year. At the same time, the tonnage of excavated material that was beneficially reused has increased about six times.

The use of concrete and timber has doubled since our last report, which was expected as we progress with main works. Most of the Phase One early works contracts are being wound down while the main works and stations contracts – the biggest users of construction materials – are picking up speed. For these reasons, the use of steel has seen a decrease, which is in line with this stage of the project, but there has been an increase in all other types of materials such as glass, composite products and insulation materials, which are recorded in the ‘Other’ category in the [appendix](#).

We are making significant progress in getting the consents we need for construction to be carried out more sustainably, including permissions to reuse more materials and move them by rail rather than road where possible. For example, a waste transfer station at Willesden Euroterminal will receive excavated material from the London

tunnels and move it by rail for beneficial reuse. The site was granted an environmental permit in January 2022 and will be used to transport about 5.5 million tonnes of material during its operational life. Since the site started receiving HS2 material in April 2021, it has already handled about 220,000 tonnes of material.

However, during the last year, we have faced a challenge with moving material from Euston station. We originally planned to build Euston in two stages and move excavated material by rail. Following last year’s decision to build Euston in a single stage, we have considered options for moving material aligned with the new construction programme. The issue highlights the complexities of large infrastructure projects, such as building a new station for HS2 in a constrained city location. If road transport is the preferred option, all vehicles will be required to follow our stringent vehicle standards.

We have applied for a permit for a sustainable placement area near Uxbridge. It will be used to place material excavated from the Cophall tunnel and will help us to remove traffic from local roads. Facilities like this play a key role in reducing the use of heavy goods vehicles and their associated emissions. At Uxbridge, the site is expected to save about 111,000 lorry movements and will be restored to provide woodland and grassland habitats when the work is complete.

Two tunnel boring machines (TBMs) are building the 10-mile Chilterns tunnel under an Area of Outstanding Natural Beauty in Buckinghamshire. The TBMs are served by the south portal site in West Hyde, Hertfordshire, the largest area of construction on Phase One. During 2021 – 2022, more than 3.6 miles of tunnel have been built and work has started on the ventilation and intervention shafts.

Our TBMs need a steady supply of water and we have conducted environmental assessments and put safeguards in place to make sure we protect local supplies. We are reusing water: more than three-quarters of the water we needed at the south portal came from water we recycled onsite in 2021 – 2022. All work is carried out following years of liaison with the Environment Agency and the local water company, who provide oversight and advice.

At the same time as our tunnelling under the Chilterns, more than 120 piles have been installed to support the nearby Colne Valley viaduct. Public water supplies have not been affected by this significant programme of work and we will monitor HS2’s environmental impacts as the project progresses.

Responsible consumption and production continued

Performance and challenges

Despite significant increases in waste and excavated material quantities, we have diverted 99% construction and demolition waste from landfill, exceeding our 95% target.

A focus on advance work at several sites with historical contamination, including the Washwood Heath depot in Birmingham, has presented challenges for reusing excavated material. The Washwood Heath site has a legacy of contamination due to historical industrial development and this includes rail sidings, motor works, chemical and fuel storage, both underground tanks and waste tips. We rectify contamination when we can, but this is not always possible and we need to dispose this material safely offsite. This provides wider environmental benefits because the ground no longer poses a potential hazard.

At Washwood Heath, we have removed hotspots of hydrocarbon contamination in many areas. This means our contractor BBV has only beneficially reused 79.1% of its excavated material. The contaminated material has been taken to an offsite soil treatment facility for screening and biotreatment, with all treated material subject

to chemical testing. Any material that is suitable for reuse is returned to the site. This treatment process is ongoing and we have made the following progress to date.

- 10,633 tonnes of excavated material have been sent to a soil treatment facility.
- 2,810 tonnes of soil have been 'bio-treated' and returned to site for reuse.
- 1,983 tonnes of bricks and stones have been screened and returned to site for reuse.
- 876 tonnes of unsuitable soils have been sent to landfill.

We have met our targets for 'main' and 'other' construction materials, achieving all our responsible sourcing targets. In particular, we have responsibly sourced all timber, concrete and steel used on our construction sites and significantly over-performed on the 'other' construction materials target of 25%, achieving 98% responsible sourcing – a sign of our robust supply chain and the systems and processes we use for contract compliance.

We have improved our performance for the use of water that is non-potable, with 32.7% of all water being from non-potable sources, compared to 11.5% in 2020 – 2021. This is in the context of our total water use increasing by over 70%.

It is industry practice to avoid sending timber to landfill. Last year, just 0.4% of our timber was sent to landfill. Our contractors also look at ways to beneficially reuse timber in line with our circular economy principles. We want to make sure felled timber is kept at its highest value and we have narrowly defined what we classify as high-value beneficial reuse. It includes reuse onsite and community uses such as donating woodchip to local schools for outdoor areas. Of the timber felled during 2021 – 2022, 15.8% was recorded as high-value beneficial reuse (an increase from 12.2% last year). In many cases where it could not be reused beneficially, it was used as biomass to produce energy.

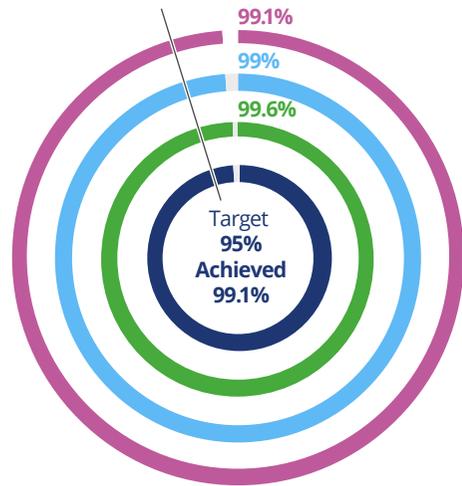


About 99% of construction and demolition waste was diverted from landfill last year.

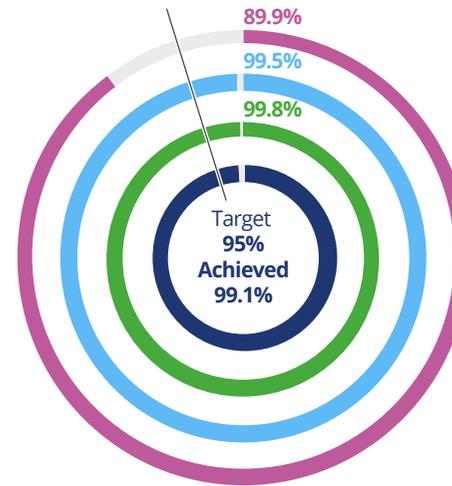


Responsible consumption and production continued

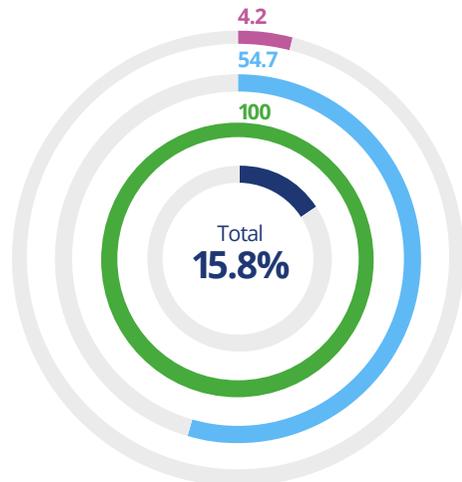
Proportion of construction and demolition waste diverted from landfill (%)



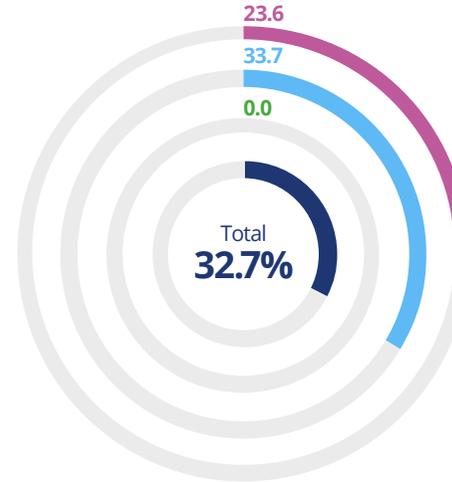
Proportion of excavated materials beneficially reused (%)



Proportion of felled timber beneficially reused (%)



Proportion of water consumption that is non-potable (%)



■ Enabling works ■ Main works ■ Stations ■ Total Phase One contracts



Responsible consumption and production continued

We continue to work with our main construction partners to improve skills in the supply chain, engaging through the **Supply Chain Sustainability School** to create a bespoke training system covering responsible sourcing and circular economy topics.

We work closely with the Environment Agency and our construction partners on waste management to make sure we get all necessary consents and comply with them. We have started working with the **Waste & Resources Action Programme** to explore opportunities to reduce plastics waste in construction and regularly engage with industry best-practice groups including the **Major Infrastructure: Resource Optimisation Group**, a forum for the UK's infrastructure operators to collaborate across the circular economy theme.

Proportion of construction materials responsibly sourced (by mass – tonnes)

Timber



Target 100%

Achieved 100%

4,353t

Concrete



Target 100%

Achieved 100%

999,043t

Steel



Target 100%

Achieved 99.8%

40,316t

Other materials



Target 25%

Achieved 98%

5,939,539t

Progress on overarching commitments

Some of our environmental commitments cover the whole project and are not specific to our five environmental sustainability objectives. They include the requirement for our contractors to achieve an 'excellent' rating under BREEAM and CEEQUAL, two external sets of sustainability standards for the construction industry.

Image: Work at Old Oak Common station, whose sustainability design target of 'excellent' is awarded to the top 10% of buildings.



Overarching commitments

Our activities and progress

The Building Research Establishment Environmental Assessment Method (BREEAM) and the Civil Engineering Environmental Quality Assessment (CEEQUAL) are independent sustainability assessment methods developed by the Building Research Establishment (BRE) for buildings and infrastructure projects. They help us assess each asset's environmental, social and economic sustainability performance and measure it against independent standards. CEEQUAL, the successor to the BREEAM infrastructure pilot scheme, is used to assess our infrastructure and rail systems and BREEAM UK New Construction is used to assess all stations, depots and our Network Integrated Control Centre (NICC) at Washwood Heath, Birmingham.

As a minimum, all main works and stations contractors must achieve an 'excellent' rating under both the BREEAM infrastructure pilot and BREEAM UK New Construction schemes at design stage. After successfully completing design stage assessments, the BREEAM infrastructure pilot scheme moves to CEEQUAL and must also achieve 'excellent'. HS2's early works feed into the main works assessments.

Although all HS2 buildings constructed as part of our contracts must achieve a BREEAM 'excellent' rating, we set requirements in excess of 'excellent' to drive the highest performance in priority areas. A BREEAM excellent rating is only awarded to the top 10% of buildings. All HS2 stations and depots will achieve this as a minimum.

All Phase One main works contractors have now completed the design stage BREEAM assessment. CEEQUAL pre-assessment for Phase 2a early works contractors have been finalised and we have also completed the CEEQUAL strategic assessment for Phase 2a. New additions to BREEAM assessments cover our depots at Washwood Heath and Calvert, Buckinghamshire.

We discuss our progress with the BRE each month, consider bespoke criteria for HS2 buildings and assets, and provide feedback from our supply chain.



Visualisation of HS2's Network Integrated Control Centre in Birmingham.



Overarching commitments continued

How we've performed – and our challenges

Achieving our ambitious targets for cutting carbon emissions is a key challenge on every BREEAM and CEEQUAL assessment and we are working with our contractors to discuss common challenges. This will help us make sure we hit our targets during the design and post-construction stages.

This table shows how we are performing under the BREEAM and CEEQUAL sustainability rating – both what we have achieved and the work that lies ahead.

We will continue to work on the BREEAM design stage submissions for all Phase One stations this year and on the pre-assessment stage for Washwood Heath depot and the NICC. For rail systems contractors, we will focus on the start of the CEEQUAL assessment with a target of 'excellent' to be achieved at design and construction stage.

Phase Two will be at the forefront of our activities as we work on the 2a CEEQUAL strategy level, the Phase 2a infrastructure works and the CEEQUAL assessment for 2a early works.

Environmental incidents

Together with our supply chain, we report and analyse environmental incidents. As shown in the appendix, we have a formula, known as the weighted environmental incident rate (WEIR), that allows us to compare incidents over reporting periods. Last year, our WEIR was 11.2 and we are pleased to report an improvement this year to 7.8. The most serious incidents are classified as level one, for example, an event that may lead to prosecution. There were no level one incidents in the reporting period.

BREEAM Buildings

BREEAM/CEEQUAL

Contract	Target rating	Design rating (as of March 2022)	Post construction rating (as of March 2022)
Euston	Excellent (70%)	On target	On target
Old Oak Common	Excellent (70%)	On target	On target
Interchange	Excellent (70%)	Outstanding achieved (86%)	On target
Curzon Street	Excellent (70%)	On target	On target

BREEAM Infrastructure/CEEQUAL

Contract	Target rating	BREEAM infrastructure		CEEQUAL
		Design rating (as of March 2022)	Post construction rating (as of March 2022)	
SCS JV	Excellent (70%)	Excellent achieved (82.6%)		On target
Align JV	Excellent (70%)	On target		On target
EKFB JV	Excellent (70%)	On target		On target
BBV JV	Excellent (70%)	On target		On target

Overarching commitments continued



Visualisation of HS2's station entrance at Euston.

Case study

New design for Euston station

The updated design for HS2's station at Euston is based on a less complex, more efficient, 10-platform terminus which can now be built in a single stage. We are targeting BREEAM's 'excellent' standard for the design with an aspiration for 'outstanding', the highest sustainability rating for buildings that reduce energy use, materials waste and minimise the impact on the natural environment.

The design now features a bold, geometric roof design to allow natural light to flood the station concourse. Elements of the roof can be prefabricated offsite and installed using modular construction techniques that reduce costs, carbon emissions and local disruption. The station will also have a major new public green space in the north and community gardens in the west.

The design encourages walking and cycling as part of a sustainable transport strategy, including cycle routes and 2,000 cycle parking spaces.



Technical information

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Image: New saplings are being planted at Finemere Wood in Buckinghamshire, near the route of HS2.



About this report

The HS2 Environmental Sustainability Progress Report 2021 – 2022 reflects the period April 2021 to March 2022.

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 our [Environmental Sustainability Progress Report Appendix](#).

Please note: the reporting period is the 2021 – 2022 financial year (April 2021 to March 2022). However, due to the way the data is reported into our main reporting platform, data is reported from March 2021 to February 2022, unless stated otherwise. This is in line with the annual corporate reporting period.

All data presented relates to Phase One. The only exemptions are: the biodiversity accounting process calculation on page 11 of the appendix, for which we also have the Phase 2a baseline; and the carbon footprint data on page 17 of the appendix, which includes 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, LMJV.
- Main works civils contractors (MWCCs) – SCS, Align, EKFB, 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/CEEQUAL data sets.

Reporting scope and methodology

Specific scope and methodology notes regarding our performance data are provided in the Environmental Sustainability Progress Report Appendix.

External assurance

LRQA has provided ‘reasonable’ assurance on selected information and key performance indicators (KPIs). The KPIs verified by LRQA are in the Environmental Sustainability Progress Report Appendix. Our assurance statement is reproduced in both this report and our Environmental Sustainability Progress Report Appendix.

Frameworks and standards

This report has been prepared with reference to the Global Report Initiative (GRI) Standards: Core option and in line with the GRI Reporting Principles for defining report content. The GRI Index within the Environmental Sustainability Progress Report Appendix 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 2021-2022](#). The GRI Index and Treasury guidance are outside the scope of LRQA verification.



Glossary

Biodiversity Investment Fund (BIF)	A fund that has been allocated for projects that will enhance biodiversity. The primary aim of BIF is to produce biodiversity gains through the creation and restoration of ecological habitats along the Phase 2a route. BIF will also encourage a broad range of secondary outcomes for a diverse range of projects.	Circular economy	Economic model that aims to keep resources in use and at their highest value for as long as possible. It looks at the lifecycle of a process, reconsidering what might be seen as waste and seeking the best whole-life outcome.
Biodiversity units	A biodiversity unit is a unit of account for a habitat according to its relative biodiversity value.	Code of Construction Practice (CoCP)	Control measures and standards to be implemented in the construction of HS2. Note Phase One, 2a and 2b western leg each have their own CoCP.
BREEAM	Global sustainability assessment method for infrastructure and building projects.	Phase One	
Business and Local Economy Fund (BLEF)	HS2 fund set up to benefit businesses and the local economy along the Phase One and Phase 2a routes.	Phase 2a	
Carbon Literacy Project	Education scheme run by the Carbon Literacy Trust, which aims to raise awareness of carbon emissions and climate change-related issues.	Phase 2b western leg	
CEEQUAL	Global sustainability assessment method for civil engineering and public realm projects.	Community and Environment Fund (CEF)	HS2 fund set up to benefit communities along the Phase One and Phase 2a routes.
		Department for Environment, Food and Rural Affairs (Defra)	Defra is a ministerial department responsible for improving and protecting the environment. Its aim is to develop a green economy and sustain thriving rural communities. It also supports the UK's food, farming and fishing industries.
		Department for Transport (DfT)	DfT is a ministerial department, working with agencies and partners to support the transport network that helps the UK's businesses and gets people and goods travelling around the country. It plans and invests in transport infrastructure to keep the UK on the move.



Glossary continued

Early works	The preparation of a site for the first stage of development, for example, ground clearance, groundworks or creating access roads. Also known as enabling works.	Historic environment	The National Planning Policy Framework defines historic environment as: "All aspects of the environment resulting in the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora."
Environment Agency	Public body sponsored by Defra, working to create better places for people and wildlife, and support sustainable development.	Historic Environment Research and Delivery Strategy (HERDS)	Our approach to historic environment works, establishing objectives and mechanisms for delivery.
Environmental Impact Assessments (EIAs)	A process to systematically assess the potential environmental effects of proposed development. An EIA is a legal requirement for some public and private projects.	HS2 Green Corridor	Network of climate-resilient habitats and green spaces that we are creating along the HS2 line.
Environmental Minimum Requirements for Phase One	The high-level environmental and sustainability commitments that accompany the legislation for HS2.	Main works	The major construction that takes place once early works are completed, such as building tunnels, viaducts, stations and the railway itself. Also called main works civils.
Environmental Minimum Requirements for Phase 2a		Major Infrastructure: Resource Optimisation Group (MI-ROG)	Circular economy forum for infrastructure operators.
Environmental Minimum Requirements for Phase 2b (Crewe – Manchester), General Principles		Net gain	Biodiversity net gain is an approach to development, and/or land management, that aims to achieve a biodiversity credit rather than simply preventing a deficit.
Environmental Sustainability Committee	An internal HS2 Ltd committee that provides strategic direction in support of HS2's sustainability goals.		
Global Reporting Initiative	The world's most widely-used framework for sustainability reporting.		



Glossary continued

Net zero	Net zero refers to achieving a balance between the amount of greenhouse gas emissions produced and the amount removed from the atmosphere. There are two different routes to achieving net zero, which work in tandem: reducing existing emissions and actively removing greenhouse gases. Net zero means any emissions are balanced by schemes to offset an equivalent amount of greenhouse gases from the atmosphere, such as planting trees or using technology like carbon 'capture' and storage.	Phase 2a	The HS2 route from the West Midlands to Crewe. This phase was given Royal Assent on 11 February 2021.
No net loss	When losses in biodiversity are compensated by gains. Details of HS2's Phase One no net loss metric are here .	Phase 2b	The HS2 route connecting Crewe and Manchester.
Non-Road Mobile Machinery (NRMM)	Mobile machines and transportable industrial equipment or vehicles that are fitted with an internal combustion engine and not intended for transporting goods or passengers on roads.	Phase One	The HS2 route between London and the West Midlands. This phase is under construction.
PAS 2080	Publicly available specification setting out the requirements for the management of whole-life carbon emissions in infrastructure.	Planning/Heritage/Environment memoranda	The Planning, Heritage and Environment Memoranda are three of the suite of documents forming Phase One of the High Speed Two (HS2) Environmental Minimum Requirements (EMRs) – the overarching commitments by the Secretary of State for Transport to afford appropriate management and protection of people, communities and the natural, cultural and built environment. Their aim is to cover requirements for planning, heritage, and environment respectively.
		Phase One memoranda	
		Phase 2a memoranda	
		Phase 2b (Crewe – Manchester) memoranda	
		Plantations on Ancient Woodlands Sites (PAWS)	Plantations on Ancient Woodland Sites are ancient, semi-natural woodlands that have been felled and replanted with other tree species, typically non-native ones such as spruce, fir and larch.



Glossary continued

Schedule 17

Schedule 17 of the HS2 legislation for **Phase One** and **Phase 2a** sets out the approvals and agreements required to be obtained by the nominated undertaker. These approvals are:

- plans and specifications (Schedule 17 paragraphs 2, 3 and 7);
- matters ancillary to development (Schedule 17 paragraphs 4 and 5);
- road transport (Schedule 17 paragraph 6);
- site restoration (Schedule 17 paragraphs 8 and 12); and
- bringing into use (Schedule 17 paragraphs 9 and 10).

Sustainable Development Goals (SDGs)

Priorities set up by the United Nations to address social, economic and environmental issues by 2030.

West Coast Main Line (WCML)

The West Coast Main Line is a 399-mile (641.6km) rail route between London and Glasgow, connecting major cities, including Birmingham, Liverpool and Manchester in the UK.



Resource list

The resources listed below provide further information on aspects of HS2 related to environmental sustainability.

General resources

- **Environmental Sustainability Progress Report Appendix**
- **HS2 Environmental Sustainability Vision**
- **HS2 Ltd Annual Report and Accounts 2021 to 2022**
- **HS2 Ltd Corporate Plan 2022 to 2025**
- **HS2 Phase One Environmental Minimum Requirements**
- **HS2 Phase 2a Environmental Minimum Requirements**
- **HS2 Phase 2b (Crewe – Manchester) Environmental Minimum Requirements, General Principles**
- **HS2 Sustainability Policy**
- **HS2 Environmental Policy**
- **Monitoring the environmental effects of HS2**
- **Net Zero Carbon Plan**
- **Information papers Phase One**
- **Information papers Phase 2a**
- **Information papers Phase 2b**

Topic specific resources

HS2 Green Corridor

- **Green Corridor Prospectus**
- **More than a railway: HS2 and the natural environment**

Community experience

- **HS2 Residents' Charter**
- **HS2 Community and Business Funds Annual Review 2021–2022**

Responsible consumption and production

- **HS2 circular economy principles**



LRQA Independent Assurance Statement

Relating to the Environmental Sustainability Progress Report Appendix of the HS2 Ltd Environmental Sustainability Report 2021/22 for the financial year ending 31st March 2022.

This Assurance Statement has been prepared for High Speed Two Ltd (HS2) in accordance with our contract but is intended for the readers of this Report.

Terms of engagement

LRQA was commissioned by High Speed Two Ltd (HS2) to provide independent assurance on key performance indicators in the environmental sustainability performance data section of the Environmental Sustainability Progress Report Appendix against the assurance criteria below to a reasonable level of assurance using LRQA's verification procedure.

Our assurance engagement covered HS2 Enabling Works Contracts, Main Works Civil Contracts and Stations Contracts in Phase One of the project. Specifically, we verified conformance with HS2 Ltd Technical Standards for Environmental Sustainability Reporting and the associated technical standards for the following selected datasets:

- Environmental Incidents
- Considerate Constructors Scheme
- BREEAM/ CEEQUAL
- Biodiversity Accounting Process*
- Number of trees and shrubs planted
- Woodland Fund
- Whole life carbon footprint*
- Energy and fuel consumption data
- Air quality
- Responsible sourcing
- Construction and demolition waste
- Excavated material
- Beneficial reuse of timber
- Water use

Note: * The Biodiversity Accounting Process also includes the baseline for the Phase 2a route to Crewe, and the whole life carbon footprint data includes some Phase 2a contracts.

LRQA's responsibility is only to HS2. LRQA disclaims any liability or responsibility to others as explained in the end footnote. HS2's responsibility is for collecting, aggregating, analysing and presenting all the data and information within the report and for maintaining effective internal controls over the systems from which the report is derived. Ultimately, the report has been approved by, and remains the responsibility of HS2.



LRQA's Opinion

Based on LRQA's approach, we believe that HS2 has, in all material respects:

- Met the requirements above
- Disclosed accurate and reliable performance data and information.

The opinion expressed is formed on the basis of a reasonable level of assurance and at the materiality of the professional judgement of the verifier.

LRQA's approach

LRQA's assurance engagements are carried out in accordance with our verification procedure. The following tasks were undertaken as part of the evidence gathering process for this assurance engagement:

- Interviewing HS2 Subject Matter Experts who were responsible for the HS2 Technical Standards which enable efficient and effective environmental sustainability reporting.
- Interviewing the HS2 Environmental Management System & Reporting Analyst who was responsible for reviewing and assuring the contractor data submissions.
- Interviewing Enabling Works Contractors, Main Works Civil Contractors and Stations Contractors responsible for submitting data into the HS2 data management system (HORACE).
- Auditing the HS2 data management systems to confirm that there were no significant errors, omissions or mis-statements in the report. We did this by reviewing the effectiveness of data handling procedures, instructions and systems, including those for internal verification.
- Interviewing the HS2 Senior Environmental Managers of the Project Delivery Team who were responsible for the collation of data and information disclosed in the data download.

Observations

Further observations and findings, made during the assurance engagement, are:

- Material errors were identified by LRQA in the monthly energy and fuel consumption, air quality, responsible sourcing, construction and demolition waste, excavated material, beneficial reuse of timber and water use data submitted by Enabling Works Contractors, Main Works Civil Contractors and Stations Contractors into the HS2 data management system. The material errors occurred due to contractor data being incomplete at monthly reporting deadlines and an ineffective HS2 data quality assurance system.
- Corrective action was taken by HS2 to carry out a full year review of contractor data submissions. The LRQA Opinion is based on the revised contractor data and follow up interviews held with the HS2 Environmental Management System & Reporting Analyst and contractor staff responsible for compiling the data.
- Effective processes are established to assure the Biodiversity Accounting Process and Life Cycle Assessment data submissions.
- The methodology used for the Biodiversity Account Process is based on consultation with the Department for Environment, Food & Rural Affairs (DEFRA) and Natural England. Ancient Woodland is considered to be irreplaceable and is not included in the calculation.
- HS2 should reduce the probability of material errors in energy and fuel consumption, air quality, responsible sourcing, construction and demolition waste, excavated material, beneficial reuse of timber and water use data by implementing a more robust data quality assurance process.



LRQA's standards, competence, and independence

LRQA ensures the selection of appropriately qualified individuals based on their qualifications, training and experience. The outcome of all verification and certification assessments is then internally reviewed by senior management to ensure that the approach applied is rigorous and transparent.

LRQA is HS2's certification body for ISO9001, ISO14001, ISO45001 and PAS2080. The verification and certification assessments are the only work undertaken by LRQA for HS2 and as such does not compromise our independence or impartiality.

A handwritten signature in black ink, appearing to read 'S. J. Fletcher', is written over a faint, light-colored circular watermark or seal.

Steve Fletcher
LRQA Lead Verifier

Dated: 26 July 2022

On behalf of LRQA Ltd
1 Trinity Park
Bickenhill Lane
Birmingham
B37 7ES

LRQA reference: LRQ00004067

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The English version of this Assurance Statement is the only valid version. LRQA assumes no responsibility for versions translated into other languages.

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Endnotes

Introduction and context

- 1 We provide a detailed look at the progress we are making against our targets for cutting carbon emissions on **page 26 to 27** of this report and on page 17 to 19 of the **Environmental Sustainability Progress Report Appendix**.
- 2 We started the HS2 project with a biodiversity baseline of -7.14% – a position of biodiversity deficit – for Phase One. This figure was based on the design for HS2 that we submitted as part of the Environmental Statement in 2017. It was calculated based on the difference in biodiversity units before we started building the railway and after we finish construction. We have made progress against the -7.14% baseline by refining the design of the railway and improving the amount of biodiversity we are including in our plans. This has allowed us to reduce the deficit from -7.14% to -2.93%.
- 3 We outlined our intention to seek a 10% net gain on biodiversity for Phase 2b Western Leg in our Environmental Sustainability Vision, published in January 2022.
In his six-month report to Parliament in March 2022, the then HS2 Minister Andrew Stephenson said: “The Vision confirmed that HS2 Ltd will seek to deliver a 10% net gain in biodiversity for replaceable habitats on the Phase 2b Crewe-Manchester scheme.”
- 4 We received 1,637 total complaints in 2021 – 2022 compared with 1,877 for the same period the previous year, a decrease of 13%. We resolved 97% of complaints in 20 working days or fewer – and 99% were concluded at the first stage of the complaints process. No complaints were escalated to the Parliamentary and Health Service Ombudsman. Our complaints process is outlined [here](#).

Progress on our commitments

- 1 [gov.uk/government/publications/environmental-minimum-requirements](https://www.gov.uk/government/publications/environmental-minimum-requirements)
- 2 [gov.uk/government/publications/environmental-minimum-requirements-for-hs2-phase-2a](https://www.gov.uk/government/publications/environmental-minimum-requirements-for-hs2-phase-2a)
- 3 [gov.uk/government/publications/environmental-minimum-requirements-for-hs2-phase-2b-crewe-manchester](https://www.gov.uk/government/publications/environmental-minimum-requirements-for-hs2-phase-2b-crewe-manchester)
- 4 The Phase 2a baseline (minus 17.01%) is shown in the appendix. The target is to reduce the deficit to minus 12.1%.
- 5 Understanding climate risks to UK infrastructure. Evaluation of the third round of the Adaptation Reporting Power – July 2022, Climate Change Committee, page 35 to 36
[theccc.org.uk/publication/understanding-climate-risks-to-uk-infrastructure-evaluation-of-the-third-round-of-the-adaptation-reporting-power/](https://www.theccc.org.uk/publication/understanding-climate-risks-to-uk-infrastructure-evaluation-of-the-third-round-of-the-adaptation-reporting-power/)
- 6 The cash match funding figures includes £27 million from a CEF strategic project. The match funding amounts are for fully approved projects only and do not include projects that are working through their conditions.
- 7 See appendix A and appendix C of the Phase One information paper E31: Air Quality for our HGV and NRM Emissions Standards.
- 8 For more information about the exemption policy of NRM and HGVs, refer to the air quality tables of the Environmental Sustainability Progress Report Appendix 2021 – 2022.
- 9 Our complaints procedure follows a three or four step escalation process, depending on the nature of the complaint
[hs2.org.uk/contact-us/how-to-complain/](https://www.hs2.org.uk/contact-us/how-to-complain/)



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