



# HS2

**Corporate Plan**

2020–2023

**Making history. Building Britain's future.**

We are

# building the railway

Our mission is to build a new high speed railway to better connect people across Britain. As a high-performing, innovative organisation, we will deliver value for money by applying the best in worldwide design and construction techniques.

We will achieve new standards in infrastructure delivery, resilient operations and passenger experience.

Ultimately, rail users will enjoy improved journeys across the current network as a result of the capacity released by HS2, while everyone will benefit from a low-carbon alternative to long-distance travel that better connects the country.

## Contents

Chair's foreword	12
Chief Executive Officer's introduction	16
Review of 2019: making history	20
Highlights of the year	28
Notice to Proceed	36
2020-2021 KPIs	38
Project milestones for the next three years	42
Phase One: building the railway	44
Phase 2a: planning the railway	72
Phase 2b: developing the legislation	80
Building Britain's future: leaving a positive legacy	84

ULIFFE

HS2

HS2



Prime Minister with HS2 apprentices at Birmingham Curzon Street site, February 2020.  
Cover: Old Oak Common progress, December 2018.



**We will**

## **create new dedicated high speed paths for long-distance services**

HS2 will add vital capacity to the existing rail network, more than doubling the seats available to passengers between London Euston, Manchester and Leeds, and creating new dedicated high speed paths for long-distance services. This will create the space needed for more local, commuter and freight services.

HS2 trains will carry over 300,000 people per day. By 2040, up to 18 high speed trains will leave London Euston every hour (on average, one HS2 train every 3 minutes 20 seconds) to destinations including Birmingham, Manchester, Leeds, Glasgow, Edinburgh and Newcastle.



Rush-hour travellers at Manchester Piccadilly. Integrating HS2 Phase 2b with Northern Powerhouse Rail will deliver much-needed capacity.

London Euston (14:22)	Wolverhampton (14:22)	University (14:22)
Truro (14:22)	Hinckley (14:30)	Sally Oak (14:22)
Morcaster Fore. St (14:31)	Harborough (14:38)	Bournville (14:22)
Makern Link (14:41)	South Wigston (14:43)	Kings Norton (14:22)
Great Makern (14:44)	& Leicester (14:50)	Northfield (14:22)
Colwall (14:50)		Longbridge (14:22)
Ledbury (14:57)		Barnt Green (14:22)
& Hereford (15:14)		

more than tickets      5 coaches      entry service formed of 3      Connect to 1

# WELCOME

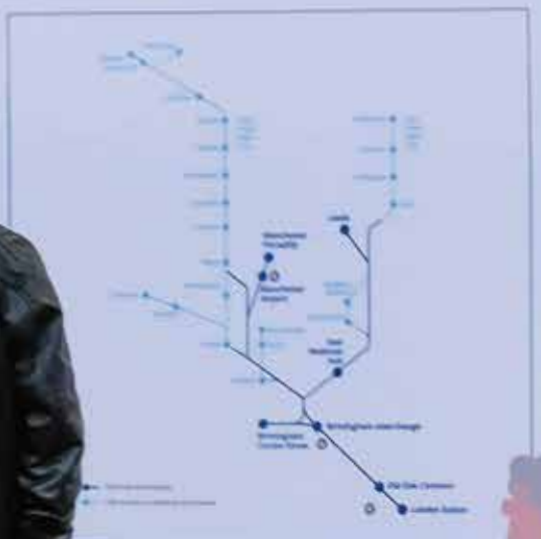
## High Speed Two (HS2) is the new high speed railway for Britain

It will be the backbone of our transport network, connecting eight out of ten of our largest cities.

HS2 is joining up Britain. Calling at over 25 stations, it will make it easier to move between the North and the South, cutting many journeys by half. It will be the backbone of the new high speed network, connecting eight out of ten of our largest cities, where they live, work and play.

By taking long distance services off congested routes, we'll also free up room for more local services. This will help to relieve overcrowding on congested routes.

But HS2 is more than a railway. We're bridging the north-south divide and opening up new opportunities for millions of people. Birmingham is already benefiting from HS2, with new investment in the city, more jobs being created and new businesses set up anywhere outside of London.



The West Midlands Combined Authority's HS2 Growth Strategy has the potential to support 100,000 jobs in the region and add £14 billion to the local economy.



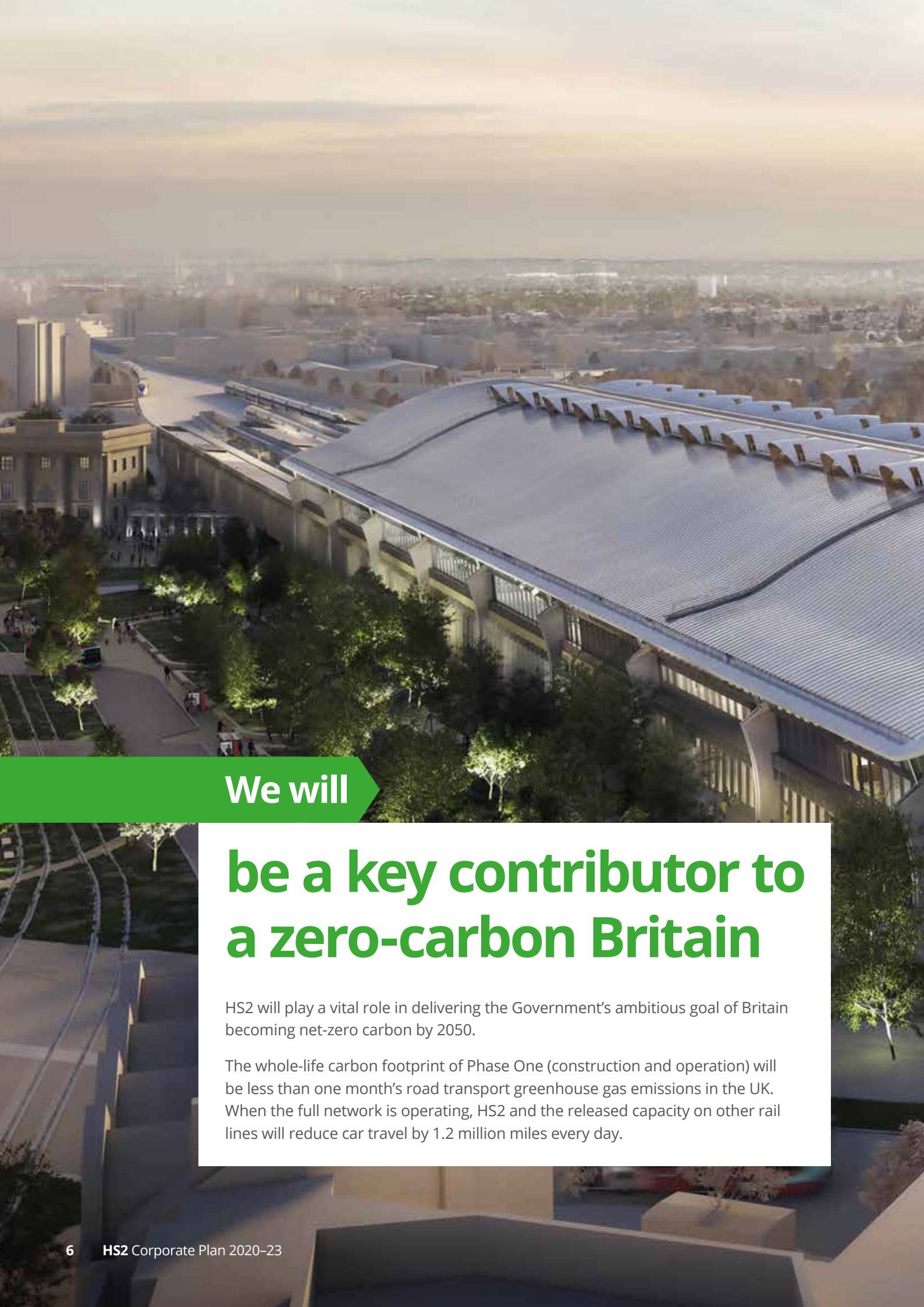
wsp Working on behalf of HS2

Curzon Street station design engagement event at Birmingham New Street station, January 2020.

We will

# reduce journey times and expand opportunities

With fast, frequent and reliable connections between eight out of Britain's 10 largest cities and their regions, HS2 services will be accessible to nearly half the UK population, opening up new employment and leisure opportunities for millions of people. Local economic plans based on HS2 show the potential for around 500,000 jobs to be created, including from the improved connections that high speed services will provide across Britain.



**We will**

## **be a key contributor to a zero-carbon Britain**

HS2 will play a vital role in delivering the Government's ambitious goal of Britain becoming net-zero carbon by 2050.

The whole-life carbon footprint of Phase One (construction and operation) will be less than one month's road transport greenhouse gas emissions in the UK. When the full network is operating, HS2 and the released capacity on other rail lines will reduce car travel by 1.2 million miles every day.





HS2 Curzon Street station design, by WSP and Grimshaw Architects, January 2020. HS2 will be the low-carbon alternative for long-distance travel, reducing the need for car and plane journeys.






**We will**

## **boost the North and the Midlands, levelling up Britain**

Poor transport links have contributed to large geographic disparities in the UK's productivity and economic performance.

HS2 will serve more than 25 stations from Scotland to the South East, cutting many journey times by half. Birmingham and the West Midlands will fall within an hour's commute of Manchester, Sheffield, Leeds, London, York, Preston and Wigan. By bringing Britain closer together, there will be more investment in the Midlands and the North.



 Quayside and bridges, Newcastle-upon-Tyne. HS2 will help to realise economic potential in the North.




We will

## be a part of leading Britain's recovery

In the economic uncertainty caused by the COVID-19 pandemic, HS2 is a shovel-ready project that will rapidly provide essential jobs and supply chain opportunities. Over 2,000 companies have already won work on HS2, with 10,000 jobs already supported. A total of 98% of HS2 contracts are going to UK-based businesses, 70% of which are small and medium-sized enterprises (SMEs). At peak construction, 30,000 people, including 2,000 apprentices, will be designing and building HS2, 70% outside London.



 Apprentices at HS2's Birmingham Curzon Street station site, February 2020.



**Building HS2 is  
a truly national  
endeavour.”**

**Allan Cook**  
Chair



Allan Cook meets leaders from across the East Midlands to discuss the benefits of HS2, 2019.

## Chair's foreword

In 2019, as HS2 Ltd and our partners prepared for construction, few would have predicted the challenge the whole country has faced over the last months.

The COVID-19 pandemic is testing us all in many ways – physically, mentally, financially – and it is testing the way we approach our task at HS2 Ltd. Working with our contractors, we have been able to progress safely and securely, with the health and wellbeing of all staff and local communities our top priority. It has meant working differently, but we are proving ourselves up to the task.

This new challenge has come after a year in which HS2 Ltd saw the consolidation of a decade of hard work, determination and skill, with the Government giving its backing to proceed with the HS2 Programme and enabling the issue of Notice to Proceed with construction of the railway between London and the West Midlands.

One of my major tasks as Chairman in the first half of the year was to undertake a full stocktake of the Project. I worked to three principles in compiling the report: transparency, honesty and the overriding desire to make sure that we could provide value to the UK taxpayer in a timely manner. On completion of the work, I remain convinced that HS2 is the right strategic answer for the whole of the UK. I also concluded that, while the benefits of HS2 have been understated, the budget and target schedule for the Programme also proved unrealistic. While this has been a source of frustration, it is vital that we are transparent about the Programme and what it entails.



**As we embark on this new chapter, we rededicate ourselves to the task in hand. We are committed to boosting the skills of British industry, raising the bar for major infrastructure projects and training a new generation of skilled workers.”**

**Allan Cook**  
Chair

# Chair's foreword

## continued

Following my Stocktake and the Oakervee Review, the Prime Minister concluded that HS2 should go ahead – but with a number of important recommendations, alongside those of the National Audit Office and Public Accounts Committee. It is vital we learn the lessons from these reviews as we move to the next phase of the Programme – construction of Phase One.

The Major Projects Review Group, Cabinet Office and Treasury have all assured HS2 Ltd's capability. This Corporate Plan sets out the immediate work ahead and the milestones we commit ourselves to meet in order to deliver a truly transformational railway system that will benefit the whole of the UK. From its inception, HS2 has always been more than a railway and, as our economy gradually rebuilds from the COVID-19 pandemic, it is more important than ever that we realise the immediate and future benefits of high speed rail.

HS2 will underpin the construction and engineering sectors for the next 20 years – sectors that support nearly 10% of UK jobs and around 7% of GDP. At peak construction, HS2 will directly support more than 30,000 jobs, with many thousands more supported in the supply chain. Already our workforce is over 10,000 strong and around 98% of the thousands of businesses involved in delivering the railway are UK-based, with two-thirds of them small and medium sized enterprises. They come from every region of the UK. Building HS2 is a truly national endeavour.





The benefits of HS2 will also be national. The rail capacity released on the existing network will provide more trains, more seats and better connections between regions and towns far from the HS2 line of route. This will encourage people out of their cars and on to trains, supporting the UK challenge for net-zero emissions by 2050. The increase in mobility will put more economic and social opportunities within reach of millions of people.

HS2 is not a standalone project. Northern Powerhouse Rail is planning to use the HS2 infrastructure for approximately half of its proposed route. The Integrated Rail Plan – commissioned by the Government and due by the end of the year – will ensure that Phase 2b of HS2 provides transformational improvements in the Midlands and the North. Across the Midlands, in towns and cities in the North and on to Scotland, civic and business leaders are gearing up to make the most of this once-in-a-generation opportunity. HS2 helps deliver on priorities across their social and economic plans, from housing to regeneration, employment to productivity, domestic tourism to climate change.

As we embark on this new chapter, we rededicate ourselves to the task in hand. We are committed to boosting the skills of British industry, raising the bar for major infrastructure projects and training a new generation of skilled workers. We are committed to being a good neighbour to the communities affected by our programme, to listen and be sensitive to their concerns. We are committed to meeting the world-class construction standards we have set, minimising disruption, protecting the countryside and leaving behind a green corridor for wildlife to thrive and local communities to enjoy. The Victorians first realised the dream of rail travel and shared a vision of connecting people and places. That vision was modern, progressive, and asserted national confidence. The same visionary spirit informs the people of HS2 as we now move to deliver, through a collective national endeavour, a railway to transform Britain.

**Allan Cook**  
Chair



Allan Cook meets leaders from across the East Midlands at Bridgeway Consulting Limited to learn how the region will benefit from HS2

“

**The need to invest in the regions outside London cannot be delayed; we will still need infrastructure that connects the major cities of our country and provides opportunities for regeneration, jobs and growth in the Midlands and the North.”**

**Mark Thurston**  
Chief Executive Officer



Mark Thurston media interview at the HS2 Interchange station site, 2020.



# Chief Executive Officer's introduction

As a country we have not undertaken a programme of the scale and ambition of HS2 in living memory and we are now at a crucial point in the history of the scheme. This Corporate Plan reflects the changing nature of the HS2 Programme – the next three years it covers represent nearly a third of the construction programme for Phase One. These years will therefore define the success of the Programme as it moves from concept to reality.

The whole country faces huge challenges in the wake of the COVID-19 pandemic and HS2 will be one of the cornerstones of the economic recovery. In early April, the Department for Transport (DfT) agreed that we had met the conditions necessary to enable HS2 to issue Notice to Proceed to the Main Works Civils contractors, allowing HS2 Ltd to issue contracts totalling £12 billion, the most significant tranche of contracts for Phase One. In total, around 400,000 contract opportunities for UK businesses will be created during Phase One construction, supporting tens of thousands of jobs on site, with many more thousands around the country. We estimate that 98% of those contract opportunities will be won by UK-based businesses and over two-thirds of those will be small and medium-sized firms. HS2's immediate impact is already being felt right across the country.

While it is too early to draw conclusions about the long-term impacts of the pandemic, the strategic case for HS2 – more capacity on our railways, better connectivity in the Midlands and North and cutting carbon – will all remain significant issues for the UK and for which HS2 provides effective answers. In particular, the pandemic has shown us the benefits of reducing the number of cars on our roads: lower emissions, improved air quality and a better overall environment for nature. The need to invest in the regions outside London cannot be delayed either; long after the health risks have passed, we will still need infrastructure that connects the major cities of our country and provides opportunities for regeneration, jobs and growth in the Midlands and the North.

It is vitally important we reflect on and learn from our experiences of the past year to help us go forward. Our capability and resilience as an organisation has vastly improved, and we now have a greater understanding of the complexity of the Programme and its interdependencies. The Chairman's Stocktake, rightly, focused on establishing more realistic estimates, with sensible ranges, for cost and schedule. It also established that the strategic benefits of HS2 remain valid for both the national rail network and wider economy. I understand the frustration caused by the increased cost estimate that came about once the complexity of the scheme was fully realised and it was absolutely right for us to focus on improving our capabilities. As the organisation responsible for delivery, we have been clear in our obligation to present Government with transparent and robust assessments to ultimately enable them to make a decision on the benefits of continuing with HS2.

# Chief Executive Officer's introduction

## continued

The Oakervee Review was the means for the Government to arrive at that decision. It concluded in October 2019 and made overwhelmingly clear that HS2 remains the right strategic choice for the country. Throughout the Review we saw significant support for HS2 from regional stakeholders across the country, noting that the Project is vital to underpin their economic growth strategies. Many regions have already seen significant investments made over recent years predicated on HS2's arrival and the regeneration opportunities around station sites.

The Prime Minister's confirmatory statement to Parliament was clear in its expectation for us to continue to mature and improve as an organisation, to hold to the new cost and schedule estimates as we begin construction, and to do more to be a good neighbour to our communities. We underwent intense scrutiny from the National Audit Office and Public Accounts Committee, who both offered their recommendations for driving positive change to the Programme. We take these reviews extremely seriously and are committed to continuous improvement and transparency around our performance.



Mark Thurston visits Crowders Nursery, where new trees are being grown for HS2's Green Corridor

Our delivery focus for the coming year is getting Phase One civil engineering and tunnelling underway, as well as advancing Phase 2a through its final legislative stages in Parliament to progress construction of the route to Crewe as soon as we can. Our crucial rolling stock contracts will be awarded in the next 12 months, moving us into a new design and manufacturing period, followed by the contracts for Curzon Street and Interchange stations. We will also work with the Department for Transport and the National Infrastructure Commission as they develop the Integrated Rail Plan for the North and Midlands. Our Corporate KPIs, which detail our focus and priorities for the year ahead, are on page 38.



Mark Thurston visits a construction site at Old Oak Common railway station, London



**Throughout the review we saw significant support for HS2 from regional stakeholders across the country, noting that HS2 is vital to underpin their economic growth strategies. Many regions have already seen significant investments made over recent years predicated on HS2's arrival and the regeneration opportunity around station sites."**

**Mark Thurston**  
Chief Executive Officer

Finally, I want to say thank you to our people. Every day we put thousands of men and women to work across the country. Their health, safety, and wellbeing, along with that of the local community, is our highest priority. This has become ever more critical as we adjust our approach to construction due to the impacts of COVID-19. With a project of the scale and ambition of HS2, we have a once-in-a-generation opportunity to change the face of our industry, including a more diverse workplace that reflects the country, with more opportunities for women, Black, Asian and ethnic minorities and disabled people, as well as graduates and apprentices.

The drive for greater diversity and inclusion is something to which I am personally committed. HS2 is so much more than just a railway and at its heart are the people who will design and build it; perhaps the most important legacy we can leave for the next generation is a culturally diverse workforce – men and women in equal measure – capable of delivering the UK's future pipeline of infrastructure projects.

**Mark Thurston**  
Chief Executive Officer



We are

# making history

It's 10 years since the UK Government presented the Command Paper 'High Speed Rail', proposing a publicly-funded high speed rail network for Britain. Since then, HS2 has grown from concept to reality. What has been achieved so far has meant operating in uncharted territory in terms of design, planning, project management, procurement, environmental practice, public engagement and many other areas of public policy. HS2 Ltd has been setting new industry standards – from the way consultation is carried out, to future-proofing design and engineering, to the health, safety and wellbeing of employees and affected communities. We have been making sure Britain's new railway is built to serve generations for the next century and beyond.

# Review of 2019



HS2 Curzon Street site.



Demolition at Old Oak Common, 2019.



# Review of 2019

## Laying the foundations

This year has seen milestones in design, employment and engagement, the culmination of major railway Enabling Works and the green light to make HS2 a reality.

Building a railway for the future enabled us to learn plenty about the past. HS2's southern terminus at London Euston became an international news story when our archaeologists discovered in St James's burial ground the remains of Captain Matthew Flinders, the Navy explorer who led the first circumnavigation of Australia. The final voyage of Captain Flinders came more than two centuries after his death as he was returned to his birthplace in Donington, Lincolnshire to be reinterred.

Stunning archaeological discoveries bookended the year, with the uncovering of the original Curzon Street Roundhouse in Birmingham, thought to be the oldest in the world. Our trial trenches initially unearthed the roundhouse at the south-eastern corner of the site, while further careful excavations revealed evidence of the base of the central turntable, the exterior wall and the 3ft deep inspection pits which surrounded the turntable.

Through 2020, further excavations will uncover more of the roundhouse and other historic railway structures for the first time, including the remains of the Grand Junction Railway terminus.

More modern sensibilities informed the designs for our other London station at Old Oak Common, revealed in February. With links to Crossrail, Heathrow and central London, the station will serve 250,000 passengers every day. We announced construction partners for Euston and Old Oak Common in February and expect the building of the stations to support 4,000 jobs.

Both London sites have seen huge transformations as we ready the ground for construction. We completed the biggest demolition on the Project so far with the clearance of eight buildings at Old Oak Common. More than 6,500 cubic metres of rubble from the old warehouses and industrial units were processed on site, with 98% of materials sent for recycling or reuse in the construction of the tunnels and crossover box. The next stages of work on the site involve clearing hardstanding, completing utilities diversions and collecting geological data.

The West Coast Main Line approach to Euston was fundamentally altered with the removal, after thousands of hours of planning, of Willesden's three landmark 22m yellow cranes. The disused container cranes make room for our 150,000m<sup>2</sup> Rail Logistics Hub, which will see up to 16 trains a day delivering equipment and construction materials. The trains will also take out material excavated by the tunnel boring machines as they make their way east to London and west to Old Oak Common. The Rail Logistics Hub will process more than six million tonnes of excavated material and moving these operations to rail equates to taking 300,000 HGVs off the roads.



Almost

# 98%

**of deconstructed material prepared for recycling or reuse**

Demolitions have also continued at Euston, where the receipt of the first crane in early 2019 enabled work to begin on dismantling One Euston Square and Grant Thornton House, in the biggest change to the Euston skyline for almost 50 years. Acoustic screening, limiting the noise and dust, has been a feature of the area for some time now as the deconstruction continues floor-by-floor, with almost 98% of the material being prepared for recycling or reuse.

# Review of 2019

## Laying the foundations continued

At the other end of the Phase One route, clearances have also now taken place at Washwood Heath, Birmingham which will be our rolling stock maintenance depot, over a site of 110,000 square metres. The demolitions of 782,622m<sup>3</sup> of building and structures yielded a total of 412,464 tonnes of demolition materials, which will be predominantly reused on site, reducing the need for landfill and lorries. Construction will soon begin on the site which, when operational, will employ up to 500 staff.



# 350

### apprentices working on HS2

Across London and along the line of the Phase One route, there are now 10,000 people working to prepare for construction, with land clearance, demolitions, tree planting, archaeology, utility diversions, and environmental mitigation having already taken place at more than 250 sites. We welcomed our 250th apprentice in the spring and there are now 350 apprentices working on HS2, both for the organisation directly and within the 2,000 businesses supporting us.

Our focus is not only on Phase One – work to bring high speed rail to the north of England and beyond as soon as possible is continuing. Phase 2a, extending HS2 from the Midlands to Crewe, is undergoing Parliamentary scrutiny. Following the end of the House of Commons Select Committee process in May, the Bill passed Third Reading in the House of Commons by 263 votes to 17. It entered the House of Lords for consideration, though this was adjourned in March 2020 due to COVID-19.

As the network expands across the country, it is more important than ever that we remain focused on integration and innovation. Delivering the very best we can to the communities we serve is a key component of our vision for the design and construction of HS2. Unveiling plans for an automated people mover at our Interchange station, quickly connecting passengers to the airport, and designs for the ‘sugar cube’ vent shaft and storage facility in Euston, enabled us to showcase our efforts to fully integrate HS2 with the unique characteristics of each area it serves. We are setting new standards in sustainable design too, with Interchange station becoming the first in the world to achieve a BREEAM Outstanding certification for environmentally friendly design.

Through our skills and engagement programmes, we are building on our promises to those next generations and leaving a diverse and lasting legacy for our industry.



Gas main diversion, Phase One Area North, 2018.

During 2019 our education ambassadors delivered a programme of innovative workshops in secondary schools, helping students explore a range of topics from the challenges of building infrastructure to designing new railway stations fit for the modern-day passenger.



## HS2 is vital for the UK as it seeks to boost its transport infrastructure for the whole country in the coming decades.”

**Darren Caplan**

Chief Executive, Railway Industry Association, 2020

Our commitment to embedding equality, diversity and inclusion across the sector was recognised too as we became the only company in the UK to achieve a Gold standard in all categories of the Clear Assured best practice benchmark.



We also improved the support we offer stakeholders by launching a new 24-hour helpline, based at our headquarters in Birmingham, in April. Further afield, our ‘Communities, Conversations and Connections’ roadshow visited 15 locations along the Phase One and 2a lines of route in May and June. The events explained the opportunities HS2 offers, including jobs, skills and education prospects, chances for SMEs to bid for work, and how community initiatives and projects can apply for parts of the £40 million fund currently available. We welcomed 61,000 people to various events and awarded over £5 million of the £40 million fund currently available to community projects.



Trial placement of the first modular bridge component, manufactured off site and brought to the Interchange site in Solihull by road, 2020.

# Review of 2019

## Laying the foundations continued

The end of 2019 nevertheless showed us that we have much to do. On 11 February 2020 the Prime Minister announced that the Government intended to proceed with HS2. This decision was made after careful consideration of the Oakervee Review and additional analysis undertaken by Government, and in the context of the substantial work that had previously been done in relation to all phases of the HS2 Programme.

While the Prime Minister and the Oakervee Review made an overwhelming case for HS2, the Prime Minister highlighted the improvements needed across the Project and detailed recommendations were made for the project going forward.

The Government committed to increasing oversight, accountability and transparency of the Programme. A dedicated HS2 Minister has been appointed to oversee the Project whose focus will be on holding HS2 Ltd to account for delivery. This has been complemented by a dedicated Ministerial Committee (Ministerial Task Force) chaired by the Secretary of State for Transport, that meets monthly with representatives from across Government.



Over

# 2,000

companies have already won work on HS2



**The Prime Minister gave the go-ahead for HS2 in Parliament on 11 February. We recognise that this is a huge commitment from the Government."**

**Allan Cook**  
Chair

Notice to Proceed (NTP) for Phase One was issued in April to the Main Works Civils Contractors, beginning an exciting new chapter of our story.

To help manage costs and schedule and strengthen accountability and oversight of the Project, it was also decided that the HS2 Ltd Board would benefit from having additional Non-Executive Directors with expertise in rail infrastructure delivery, integration, project controls and interfaces.

In July three new Non-Executive Directors were appointed by the Rt Hon Grant Shapps MP, Secretary of State for Transport, to respectively take up the roles of infrastructure specialist, community engagement leader and government representative, improving the way that HS2 Ltd is managed and instilling greater discipline across the Project.

These appointments are the latest step in the Government's commitment to reset the HS2 Programme, strengthen the leadership team and instil greater accountability to ensure decisions made by HS2 Ltd deliver on the Government's priorities.

# Review of 2019

## Highlights



# 98%

of HS2 contracts have been awarded to UK-based businesses. The benchmark was set at 95%



**10,000** jobs already supported by the HS2 Project



**263 votes** to 17 in favour at Commons Third Reading of Phase 2a Bill



# 70%

of UK registered businesses working with HS2 are SMEs – higher than Crossrail or the 2012 Olympics



**61,000** people at our engagement events



Over

# 16,000

linear metres of utilities have been diverted during HS2 preparatory works



# 1,200

properties purchased



**10,000+** people employed in our supply chain



**200+** sites open  
(as of July 2020)



Over

**£5 million**

awarded to community projects through our Community and Environment Fund (CEF), and Business and Local Economy Fund (BLEF)



**2,500**

HS2 staff volunteering hours



**350**  
apprentices working across the Project



**37,000**

responses to our Phase 2b draft Environmental Statement consultation



**50**  
Phase One wildlife habitats created



**430,000+**  
trees planted along the 'green corridor'



Over

**2,000**

companies have already won work on HS2



CSJV workers at the HS2 Euston construction site.

## Case study

# Enabling Works innovation in Health and Safety

Prototype digital headsets have helped us take a significant step towards eliminating hearing damage suffered on construction sites.

Noise-induced hearing loss accounts for approximately one-third of all work-related injuries in Europe, costing millions of pounds in hearing damage claims every year in the UK and making up 68% of all claims made through employer liability insurance. Generally, construction workers use earplugs or ear defenders to attempt to block out noise but clearly, on a construction site, this carries its own significant risk.

At the London construction sites of our Euston Enabling Works Contractor CSJV, we've been testing new hearing protection from smart technology company Eave. A digital headset protects the wearer's hearing against construction noise while on site, while 'hear-through' technology enables the wearer to clearly hear sound and conversation around them. The digital headset also gathers noise data, which is communicated to proprietary noise mapping software and analysed, producing accurate information about every worker's exposure to noise across the site. This enables site management to build profiles for workers and take targeted action to protect the wellbeing of individual staff.





This innovation not only has the potential to fundamentally change long-term wellbeing, it will also reduce the need for wasteful disposable plastic ear defenders. We are discussing the technology with all of the joint ventures delivering Enabling Works on the Project, as innovation is a critical part of HS2's mission. The Eave ear defenders are just one part of a portfolio of 18 innovation projects in development at HS2 Ltd, highlighting our ongoing commitment to raising standards across the rail and construction industries.



**The technology we've been developing with the HS2 Project will help manage noise in a way that is targeted, efficient and safe."**

**Dr David Greenberg**  
Eave Chief Executive Officer



The remains of the roundhouse at the original Curzon Street station, Birmingham, 2020.

## Case study

# Uncovering British history

In March 2020, archaeologists working at the Birmingham Curzon Street construction site uncovered the remains of what is believed to be the world's oldest railway roundhouse, on the site of the original Curzon Street station. HS2's initial programme of trial trenching revealed evidence of the base of the central turntable, the exterior wall and the 3ft deep radial inspection pits which surrounded the turntable.

The roundhouse, and specifically the turntable, was used to turn around the engines so locomotives could return back down the line. Engines were also stored and serviced in these facilities. The railway's 1847 roundhouse at the southern end of the line is now better known as the world-renowned Roundhouse music venue in London's Camden.

The 19th century station at Curzon Street opened in the 1830s as the first railway terminus serving the centre of Birmingham. Initially providing passenger services, it originally consisted of two station termini before being converted to a single goods station, following the opening of Birmingham New Street station in 1854. One of the earliest



examples of main line railway termini, it eventually closed in the 1960s. The limited later development of the site means that any surviving remains of the early station represent a unique opportunity to investigate a major early railway terminus in its entirety. Archaeological excavations will continue to uncover the roundhouse and other railway structures of historic significance and will determine whether the remains can be preserved in situ.

HS2 will see the site become home to the first brand new intercity terminus station built in Britain since the 19th century.



**The discovery of the railway roundhouse is extraordinary and fitting as we build the next generation of Britain's railways."**

**Jon Millward**

Historic Environment Advisor, HS2 Ltd



## Case study

# Funding local environmental initiatives

In April 2020, HS2 passed a key milestone for its Community and Environment Funds. After three years of operation, more than 100 projects have been funded across the Phase One route, with over £5 million distributed across a variety of projects.

One such project is Woodhouse Farm and Garden, on the outskirts of Lichfield, Staffordshire. The farm is a community interest organisation, providing a tranquil space for people to enjoy the outdoors and includes:

- an ancient walled garden and a cider orchard;
- rare breed cattle, pigs, chickens and sheep;
- seating areas for weekly community visits; and
- outdoor area with BBQ and fire pit for camping and evening activities.

The farm hosts local scout and guide organisations, as well as community events, including a summer BBQ, harvest festival, apple juicing and Halloween celebrations.



HS2 Community and Business funding has meant that the farm can remain open during the winter months, due to the creation of an indoor space for use as a learning, meeting and community space throughout the year. 'Project Pigsty' has also enabled the resident pigs to enjoy their own warm, dry space. Plans are underway for a new enclosed kitchen suitable for supporting a small, self-financing café that can be run as a volunteering project, offering skills and experience to those who wish to build confidence in the workplace.

HS2 funds have enabled the farm to allow visitors to enjoy nature, see the animals, and access seasonal produce all year round. The farm is free to visit, so everyone can enjoy the benefits.



**When applying to HS2 for funding, I found the process very easy."**

**Annamarie Stone**

Director, Woodhouse Farm and Garden



**We are going to  
get this done.”**

**Boris Johnson**

Prime Minister, February 2020

# Notice to Proceed

Achieving Notice to Proceed in April 2020 means more than a decade of research, engagement, design and preparation can be brought to life.

This major milestone gives the green light to our civil works contractors to begin construction along the Phase One route. It also provides them, their supply chains and the wider UK construction industry with much-needed certainty against the backdrop of COVID-19.



Social distancing on a CSJV construction site, 2020.

This is unquestionably the most challenging, but also the most exciting part of the Project – the part where the new high speed railway really begins to take shape and we start to see the legacy it will leave for the future. When completed, HS2 will transform capacity and connectivity in towns and cities across the country, delivering on the Government’s levelling up agenda and becoming a critical part of our low-carbon future.

Our Phase One Civils contractors are joint ventures and have been appointed to packages of work, divided into sections along the line of route. They cover the full detailed design and construction of Phase One of the main civils work, worth approximately £12 billion combined. Through these contracts, small and medium-sized businesses

have the guarantee of a pipeline of activity for the future – an estimated 400,000 supply chain contract opportunities for UK businesses will be created during Phase One of HS2, supporting thousands of jobs on site and many more around the country. We expect around 95% of those contract opportunities will be won by UK-based businesses, with around two-thirds being small and medium-sized enterprises.

HS2 is a railway of unprecedented scale, evidenced by the initial manufacturing of tunnel boring machines to excavate and build below the ground on the Phase One route. Weighing up to 2,200 tonnes, each 170m-long machine will bore and line the tunnels with pinpoint accuracy up to 80 metres below the surface, as they drive forward at speeds of up to 15 metres per day. Even then, working continuously from 2021, it will take three-and-a-half years to create the 32 miles of Phase One that will be in tunnel.

Construction of the railway will also see the creation of some of Britain’s longest viaducts, spanning valleys, lakes and rivers, specially designed and built to exacting standards in order to minimise noise and vibration. Well-proportioned and elegant, the Colne Valley viaduct designs give an exemplary insight into our innovative approaches to noise reduction and the application of our Design Vision. Designing for people, place and time has guided our development work up to this stage and will come into its own as the structures and systems slot into place along the line of route.

Notice to Proceed has only reinforced our stated commitments to delivering benefits across the UK. Despite its unprecedented scale, we endeavour every day to earn our licence to operate by delivering the railway in the safest, most sustainable and respectful way possible, protecting the health, safety and wellbeing of our workforce and being a good neighbour to all our communities.

# 2020–21 KPIs

The table below presents our Key Performance Indicators for 2020/21, as agreed by the Department for Transport (DfT) in July 2020. In accordance with the Framework Document, progress against our KPIs will be regularly assessed and shared with the Government's dedicated HS2 minister,

appointed following the Oakervee Review. Our progress will also be reported quarterly in an HS2 Client Report, shared with the DfT, as well as monthly review meetings between the Department, Ministerial staff, and our own Board.

## Are we safe?

KPI	Target(s)
<b>1. Improve Health and Safety Performance Index (HSPI) score</b>	HSPI $\geq$ 1.80

## Are we on time?

<b>2. Phase One Delivery Into Service (DIS)</b>	DIS Target Date maintained
<b>3. Phase One Progress</b>	Achieve the key Phase One delivery milestones for 2020/21
<b>4. Phase 2a Progress</b>	Achieve the key Phase 2a delivery milestones for 2020/21
<b>5. Phase 2b Progress</b>	Achieve the key Phase 2b delivery milestones for 2020/21

## Are we on budget?

<b>6. Annual Budget Performance</b>	Year end out-turn to not exceed Q3 Forecast by more than 1% and to be no more than 4% less than forecast for capital spend and 1% for resource spend
<b>7. Anticipated Final Cost (AFC) Performance</b>	AFC at or below Target Cost
<b>8. Earned Value Performance</b>	Cost Performance Index (CPI) score for Phase One $\geq$ 1.0 (Earned Value measured against Target Cost) Schedule Performance Index (SPI) score for Phase One $\geq$ 1.0 (Earned Value measured against Target Date)



## Are we a good neighbour?

KPI	Target(s)
<b>9. Land and Property Performance</b>	<p>≥ 80% of Advance Payments ready to be paid on time</p> <p>≥ 90% of land possessions for Phase One taken on time</p>
<b>10. Carbon Emissions</b>	<p>Forecast 23% reduction in carbon emissions against the carbon baseline for Phase One by March 2021</p> <p>Achieve PAS 2080 (carbon management in infrastructure) accreditation by March 2021</p>
<b>11. Public Survey Performance</b>	<p>Improve the survey score for 'Being a Good Neighbour' by 10%, achieving 60% recognition for Being a Good Neighbour from communities along the line of route</p>

## Organisational capability

<b>12. Improve Enterprise Capability</b>	<p>Deliver 'Level 4' maturity against 13 organisational capability areas by March 2021</p>
<b>13. Equality, Diversity and Inclusion</b>	<p>Improve the EDI balance for HS2 Ltd employees to 40% Women and 21% BAME representation</p>

The impact of COVID-19 has not been factored into these KPI targets and will be reflected in future updates as the impact becomes clearer.

# The UK has undertaken many large infrastructure projects...

Channel Tunnel

**32 miles**  
of tunnel

Crossrail

**7 million m<sup>3</sup>**  
of excavated material

Hinkley Point C

**3 million**  
tonnes of concrete

...but HS2 is larger than any that have gone before.

HS2: Phase One alone

**32 miles**

of tunnel

**63.4 million m<sup>3</sup>**

of excavated material

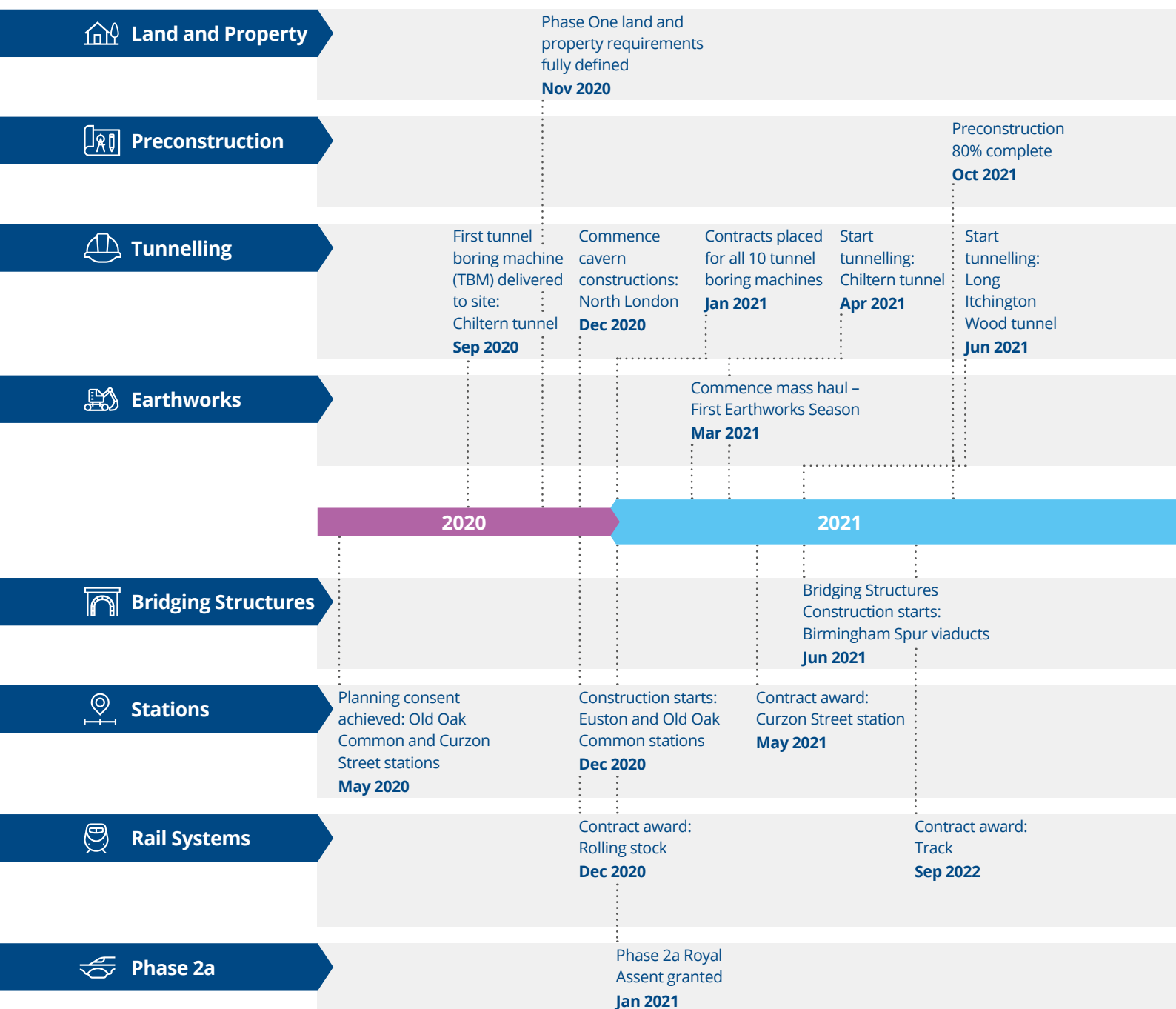
**13 million**

tonnes of concrete

# Project milestones for the next three years

We are about to embark on a collective national endeavour that will leave a legacy for our future. Our construction programme will be the biggest and the most challenging engineering undertaking the UK has seen since the Victorian era.

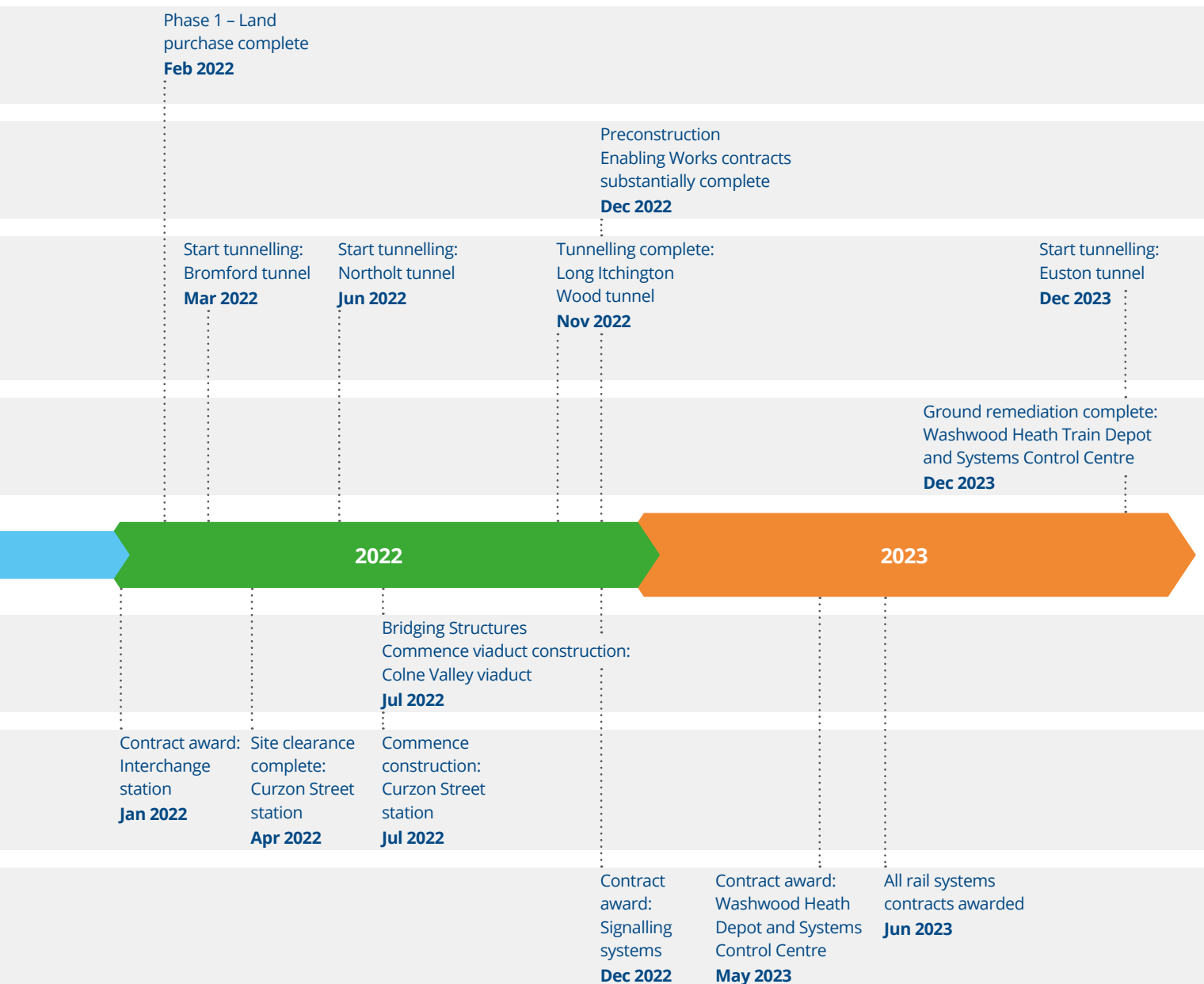
HS2 is less one mega-project, more several mega-projects planned together; the engineering and construction requirements dwarf the largest infrastructure projects ever seen in this country. We relish the opportunity to prove ourselves as the next generation of rail pioneers, demonstrating to the world the very best of British skills, innovation, ambition and human endeavour. We are proud



of the responsibility to deliver transformational capacity and connectivity to the UK while pioneering a greener way to travel.

In 2020 our Enabling Works contractors begin passing the baton to our Main Works contractors as construction sites take shape and materials start to arrive. Three of our tunnel boring machines (TBMs)

will be delivered this year – at 11m wide, they are bigger than anything used on HS1. Our sites will be hives of activity over the next three years. As a result, we and our supply chain will redouble our commitment to being a good neighbour every day, managing the impact we have on people and the environment.



# Birmingham

Phase 2a

Phase 2b

Birmingham  
Curzon Street

Birmingham  
Interchange

Section IPT

 **EKFB**  
Working in  
partnership with **HS2**

Section IPT

**Balfour Beatty**  **VINCI**  
Working in  
partnership with **HS2**

Phase One, planned to open between 2029 and 2033, is a colossal challenge. Its route comprises 140 miles of high speed rail, four high speed stations, two major depots, 10 tunnel boring machines, 32 miles of tunnels, over 50 viaducts, 110 embankments, 71 cuttings, over 150 bridges and over 100 construction sites. At its peak, a huge team of 30,000 people will be employed on the task of making HS2 a world-leader in environmentally-friendly construction, using low-emission machinery, cutting-edge technology and construction techniques – some of which do not even exist yet.

We have moved from a traditional client-and-contractor business to a new operating model, by establishing four Integrated Project Teams (IPTs) to lead the delivery of each Main Works Civils package, giving greater autonomy and decision-making to our supply chain. We have ensured that we have the right people, in the right place, as we move into construction. By encouraging greater collaboration, driving efficiencies and sharing innovation, we will improve our capabilities and reduce costs.

# Phase One

We are building the railway

## Section IPT

**ALIGN**

Working in partnership with

**HS2**

## Section IPT

**SKANSKA**

**BOSTAIN**

**STRABAG**

Working in partnership with

**HS2**

**London**

Old Oak Common

London Euston

Balfour Beatty



Working in partnership with

HS2



Large girders from the Explore factory at Workshop arrive at the Interchange site, May 2020.



# Phase One

## BBV – building into Birmingham

Balfour Beatty VINCI (BBV) will bring HS2 to the West Midlands and connect it to the West Coast Main Line so our trains can also serve destinations further north upon opening. BBV's approximately 90km section also requires the boring of some record-breaking tunnels, as well as the construction of 51 viaducts, totalling over 13km.

BBV will also provide more than 120 bridges for traffic and watercourses (overbridges, culverts and other underbridges). Four of the bridges for traffic will cross motorways, requiring box structures, and there will be six interfaces with the existing railway requiring both dive-under and overbridges.

Balfour Beatty's experience in major British infrastructure projects (Crossrail, HS1, Thames Tideway) will be combined with the extensive abilities of VINCI, as evidenced by their High Speed Tours-Bordeaux project in France, to deliver the northern section of the Phase One route. Together, BBV will undertake £5 billion worth of work, building HS2 from the Long Itchington Wood Green Tunnel to the Birmingham spur, and onwards to the West Coast Main Line tie-in, in a two-part design and build. This is a route and project of sufficient length and complexity that if it was a standalone project, it would be the biggest anywhere in the country.

Picking up the HS2 route in Warwickshire, BBV's 90km section will begin under Long Itchington Wood with the first of its bored tunnels. Emerging from a pass between Kenilworth and Coventry and crossing the A46 to arrive in the West Midlands, trains will roll into Interchange station, in Solihull, for connections to the airport, the national road network and beyond. A spur off the main HS2 line will carry trains into the central Birmingham terminus at Curzon Street and the line will continue north so our trains can serve destinations on the West Coast Main Line.



# 90km

section to be built by BBV

# 51

viaducts

# 120

bridges

### Record-breaking infrastructure

As well as delivering HS2 passengers to Birmingham, BBV is seeking permission to bore and line the Bromford twin-bore tunnel, which runs into Birmingham. A tunnel boring machine will drive west from the eastern tunnel entrance, then, because of site constraints at the western end of the tunnel, which includes the site for the Washwood Heath depot, it will be returned to the eastern portal to drive the second bore alongside the first.

The length of the tunnel has been extended from the original proposed scheme new designs will be shared with the community as they happen. Mindful of our commitment to our communities and the environment, this planned extension removes the need for complex engineering above ground in a built-up area, affects fewer properties and businesses in Castle Bromwich and means we are able to retain Park Hall Nature Reserve in its entirety, without the need to clear any of the area's ancient woodland. The extension and consequent purpose-built haul routes also reduce the anticipated construction traffic on the road network by 260,000 HGV movements.

“

**I look forward to working alongside HS2 Ltd and our expert supply chain partners, to safely and successfully deliver this critical piece of national infrastructure.”**

**Michael Dyke**

Managing Director, Balfour Beatty, 2020



Visualisation of platforms at Birmingham Curzon Street station, Grimshaw Architects, 2019.

# Phase One

## BBV – building into Birmingham continued

We also know that to mitigate the ‘tunnel boom’ – the loud noises caused by trains entering tunnels and pushing the air out – the eastern entrance will incorporate a porous portal, with openings along it to disperse the air evenly to the outside world. Excavated materials from boring the tunnels will also find a new purpose, reused near the Water Orton flyover and the Marsh Lane embankment.

BBV will continue preparatory works throughout 2020, including utilities diversions, site clearances, access roads, fencing and hoardings, and ecological mitigation. Towards the end of the year and into 2021 they will start building the portals, or tunnel entrance infrastructure, alongside the main construction compound for the work.

The Variable Density tunnel boring machine (so-called because it can deal with differing ground conditions such as those in Bromford) will begin its work in late 2021, on a record-breaking project for the West Midlands that will take around three years to complete. Further fit-out of the tunnel, including concrete infills, access between the two bored sections and walkways, will likely begin sometime in 2023.

### Building the heart of HS2

As well as being the home of high speed rail, Birmingham will be the home of the first HS2 trains themselves. The rolling stock depot at Washwood Heath will provide cleaning, servicing and routine repairs for the 54 train units that will be used on Phase One.

To ready the site for construction, demolitions have been carried out by our Enabling Works Contractor LM (a joint venture between Laing O’Rourke and J. Murphy & Sons). These will continue as we clear the 782,622 cubic metres of buildings and structures that made up the old depot over a 110,000m<sup>2</sup> area. As the demolitions finish and we prepare for construction, the 412,464 tonnes of demolition materials will be re-used on the Washwood Heath site, helping us reduce requirements for landfill and lorry movements to remove superfluous materials.

Once construction is complete, the maintenance depot will be fitted out by the chosen bidder for the rolling stock contracts, matching its capabilities precisely to the features of the brand new high speed trains.

### A green tunnel for the UK’s green corridor

BBV is also providing a green solution to community concerns in the village of Kenilworth. The section of the scheme nearest the village will be in a 1.8km ‘green tunnel’.

A green tunnel – created by filling the area around a tunnel ‘box’ with new land – allows us to provide excellent noise and visual protection from the railway for the area. It means we can also restore the connections to each side of the line over the top of the tunnel – which in this instance means we can reduce the railway’s effect on the Kenilworth Greenway Country Park and other environmental factors.

We recognise the importance of this feature locally and have developed proposals for both its temporary and permanent use. As BBV prepares to begin construction we are consulting with the local community on uses for the new area of land on the tunnel roof. Mirroring the character of the area and enabling the vegetation and trees to re-establish themselves here, and as part of the development of a new underpass, is central to our plans.

Both HS2 Ltd and BBV work on delivering commitments made and agreed in Local Environment Management Plans, which have been produced with each affected council area along the line of route. BBV is also committed in its own sustainability policies to reducing greenhouse gas emissions, water use and waste wherever possible, as well increasing the re-use and recycling of materials. Sourcing such materials for HS2 will favour those with low environmental impacts and BBV has committed to protect and where possible enhance the natural and historic environment in all its work on the Project.



Working in  
partnership with

HS2



Heave monitoring site, Southam,  
Warwickshire, 2020.

# Phase One EKFB – engagement-led design in Buckinghamshire

EKFB consists of four civil engineering and construction companies: Eiffage, Kier, Ferrovial Agroman and BAM Nuttall. Responsible for delivering the 80km section of railway linking the Chiltern tunnel with Long Itchington, the joint venture will manage a colossal 30 million cubic metres of excavations – almost half the amount required on the entire Phase One route.

Comparing this with the seven million cubic metres that Crossrail has excavated as it has tunnelled under London gives an idea of the task at hand. The JV will create 6.9km of tunnels on the line of route, all of which will be ‘green’ (excavated, constructed, and filled with new land over the top). And it’s not just digging – EKFB will also be constructing 15 viaducts, 22km of road diversions and over 70 bridges to carry traffic over the railway.

Located between two of HS2’s major tunnels – under the Chilterns and at Long Itchington – EKFB’s central section of the route will become the spine of the high speed rail line connecting the Midlands and the South. HS2 trains will hit their maximum speeds through this area, and a large proportion of the surface views that can be seen from the trains will pass by on this central section.

Here in Buckinghamshire and beyond, we are working with our partners and communities to design infrastructure that complements the local area. A huge amount of preparatory works for the main construction of the railway is already taking place, and will continue over the coming year through both EKFB and our Enabling Works partner Fusion.



## 30 million m<sup>3</sup>

of excavations

## 80km

of railway linking the Chiltern tunnel with Long Itchington

## 15

viaducts

### Ongoing works

Fusion and EKFB will create, monitor and maintain existing ecology sites and new habitats to protect wildlife and vegetation all along the line of route. Part of the preparatory work includes installing boundary fencing to establish clear dividing lines between the works area and the site itself. To develop the sites responsibly and manage their interfaces with HS2, they will also be conducting localised vegetation clearance, grass cutting and hedgerow trimming, as well as additional ecological surveys. The maintenance and clearance teams will work with an onsite ecologist to make sure the appropriate methods of clearance are used based on the site’s characteristics.

Archaeological investigations will continue along the line of route. Digs elsewhere on Phase One have already revealed some fascinating discoveries, providing a greater understanding of an area’s history and previous land use. The investigations are made up of several activities, such as geophysical surveys, and trial trenches numbering in their hundreds, excavated mechanically by teams of five workers at a time. They will all be backfilled when the work is completed.

# Phase One EKFB – engagement-led design in Buckinghamshire continued

The surrounding areas are also being prepared for the physical reality of construction. This predominantly involves upgrading and widening any road and rail infrastructure necessary for delivering materials to the site for the civils works when the EKFB teams begin construction later in 2020, or transporting materials away from the site to be reused in the surrounding areas.

## Detailed design for the spine of HS2

In preparation for construction all the main works civils contractors are undertaking a period of detailed design, in which the approaches to building the railway are developed in line with HS2 Ltd's design principles. Integrating HS2 into the rural landscape of the central area is a key part of EKFB's delivery and the JV will deliver three green tunnels on its section of the route, at Wendover, Greatworth and Chipping Warden. The latter, at nearly 2.5km, is the longest on the Phase One line of route.

Together, we are taking a considered approach to the natural environment, notably where EKFB will pick up the route at the north portal of the near 10-mile Chiltern tunnel. It is developing plans for extensive planting at the point that the trains exit the tunnel, maintaining existing woodlands but also creating new ones, as well as joining up numerous

disconnected habitats, linking wildlife and waterways. The north portal site will also be home to one of four dedicated bat houses, tailored to the needs of the local Common Pipistrelles.

Further north, in Warwickshire, just part of the mammoth excavation programme that EKFB will undertake occurs near Ladbroke. The route will pass by villages in the area in a deep cutting of 30m, hugely reducing its impact on the visible landscape. We will be creating new woodland and 12 new breeding ponds for the relocation of great crested newts.

There will also be places for animals to hibernate, as well as a 'green bridge' over the railway to ensure that people and animals are able to maintain their existing travel routes safely.

## Infrastructure of function and form

Although EKFB's section of the HS2 route is mostly rural, there are some standout pieces of railway infrastructure that will be delivered, and for which detailed design has been developed alongside community concerns. Nowhere has this been more evident than on the 880m, 36-span Thame Valley viaduct, which has been developed with input from Aylesbury Vale District Council, the HS2 Design Panel, a programme of local engagement and meetings with residents.

Sitting low in the landscape, the viaduct will reinforce the features of the existing shallow, broad floodplain over which it will carry HS2 trains. A minimalist design with an average underside ground clearance of two metres means the viaduct is largely masked by the undulating landscape. The 36 pairs of supporting pillars on which the viaduct is built are 'tucked in' to minimise its apparent bulk, but will also provide it with the functional support to transfer the braking load forces from the train – which can be as much as 770 tonnes – to the foundations. Beneath the viaduct, opportunities for otter dens, bird nesting habitats and significant planting are all being considered.



Heave monitoring site, 2019.

Construction will begin with the creation of access routes for site traffic and cranes, and the strengthening of the north embankment of the river channel. The river itself, which will eventually flow between two of the viaduct's central pillars, will be diverted as the foundations are laid. The shells of the pillars will be manufactured off site, reducing the impact on the environment and the site's carbon footprint. Once the pillars are filled, the main structure will also be constructed from concrete beams, pre-cast off site, and a concrete deck.

Our approach to noise is an important consideration on all key design elements of HS2, and the Thame Valley viaduct is no exception given its proximity to a residential area. EKFB will model noise created during both construction and operation and, in the lead-up to construction, is looking at measures such as screening, using low vibration equipment and broadband vehicle reversing warnings. The JV is also looking at how to implement ongoing monitoring of noise and vibration and reduce adverse effects on air quality both on the Thame Valley worksite and all along the line of route.

### The scale of the challenge

Even without any stations along the central section of the Phase One HS2 route, the scale of the engineering and construction challenge is vast. EKFB has carried out similar engagement to develop the design of another key viaduct,



Heave monitoring site, 2019.

at Wendover Dean, on which it has committed to provide noise insulation through noise barriers on both sides of the viaduct. In response to the feedback from local residents it will undertake a programme of planting to reinstate hedgerows once construction ends. HS2 Ltd and all our partners are well aware of our responsibility in building this high speed rail line and through such extensive engagement and attention to detail we are endeavouring to hold ourselves to the highest standards possible.



**If Britain is to reach net-zero emissions, the development of a high speed rail network is essential. If Britain is to get a fairer, more even distribution of opportunity and prosperity – smashing the north-south divide – then HS2 is essential.”**

**Will Roberts**

Director, High Speed Rail Industry Leaders (HSRIL), 2019



Manufacture of Align tunnel boring machines in Herrenknecht factory, 2020.



# Phase One

## Align – iconic civils structures

International JV Align brings together Bouygues Travaux Publics, Sir Robert McAlpine, and VolkerFitzpatrick to build and integrate the railway through Buckinghamshire to the outskirts of London. In 2020, the partners will lay the foundations for Phase One's iconic Colne Valley viaduct, a massive 3.4km structure with innovative protective acoustic screening. The JV is also preparing to tackle one of the biggest challenges on the route – the 16km, twin-bore Chiltern tunnel, the longest and deepest on Phase One, as part of its 21.6km section.

### The Chiltern tunnel – a 'mini' megaproject

The Chiltern tunnel will be the fifth longest in the UK, sufficiently large that two stacked double decker buses would fit through each bore. When operational, trains will speed through the tunnel at 320kph, taking a mere three minutes to pass through it and on to their destinations.

Extended during the hybrid Bill Parliamentary process, taking the route underground will significantly reduce the impact of HS2 on the region's Area of Outstanding Natural Beauty. Align will be constructing a twin-bored tunnel, consisting of two parallel tunnels, each containing a single rail track. The individual tunnels will be constructed using two giant, 11m-wide tunnel boring machines (TBMs), which will mine the earth to create the initial tunnels at a diameter of nearly 9m, at some points as much as 80m below the ground.

To construct such a massive piece of infrastructure, Align is building a dedicated site to manage the TBMs, and the huge amounts of spoil that will be excavated as the machines move up the country.



# 21.6km

section to be built by Align

# 16km

construction of the Chiltern tunnel

# 3.4km

foundations for the Colne Valley viaduct

A huge 136-acre construction site – the size of 80 football pitches – has been constructed next to the M25, at the tunnel's south portal. The site will house the tunnelling control centre and concrete batching plants, managing and dispatching a colossal 112,230 concrete segments, with seven segments per ring, to line the tunnels.

With a planned start in May 2021, it will take three years of operation to construct each tunnel. The upline tunnel, through which trains will head to Euston – will begin first. The launch of the TBM for the downline tunnel (for Birmingham-bound trains) will happen approximately two months later.

Technical specifications for tunnel construction also require Align to construct five ventilation shafts along the route, approximately every 3km, and ensure that the entrances and exits to the tunnels on both sides of the twin bore structure have porous portals to balance and disperse the flow of air when trains pass through. Each ventilation shaft requires a 'headhouse' to be constructed on the surface, requiring extensive engagement with the local community to ensure the visible aspect of the tunnel is appropriately and sympathetically designed.

# Phase One

## Align – iconic civils structures continued

### Preparing for construction

The main priority for the ongoing Enabling Works is to upgrade, divert and even create new roads to ensure the effects of construction are minimised. Given the construction site's size, and because of its proximity to the M25, new motorway slip-roads have been built to link the new site with the motorway, allowing direct access and diverting construction traffic away from local roads.

Temporary access roads are also being created so that construction of the ventilation shafts can begin in areas where the lanes are currently too narrow for HGVs. One of these is at Chalfont St Peter where Align has also been engaging with local communities on the design and construction of the vent shaft.

The outcome is a design for the vent shaft and headhouse (which contains the ventilation and fire control systems) significantly reduced in height, length and width from the initial proposals. By reducing the diameter of the vent shaft, Align is also reducing the number of lorries required for earthworks. The designs of the buildings themselves have been developed to reflect the character of the surrounding area, with an agricultural courtyard arrangement and a large roof wrapping around



Chalfont St Giles, 2020.

the main headhouse to mirror the appearance of a barn. All the components of the site are being kept as low as possible, and being constructed in darker, complementary materials to reduce the visible impact of the finished site.

Its unprecedented length and sensitivities make the Chiltern tunnel a flagship piece of infrastructure in HS2's subterranean construction programme.

### Colne Valley viaduct – an architectural statement

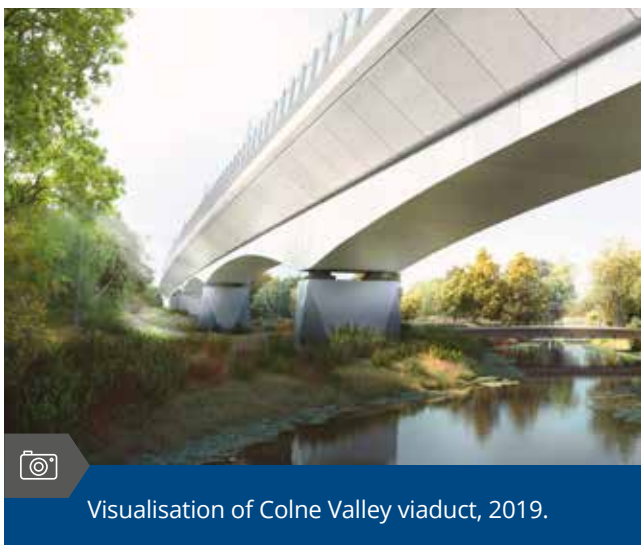
One of the iconic structures along the route will be the two-mile long Colne Valley viaduct, which will bring the route out of London and into Buckinghamshire. The site itself sits alongside the existing railway line running into London Marylebone, where the viaduct will cross multiple reservoirs, the Grand Union Canal and the A412.

Later in 2020 the building blocks for the viaduct will start coming into place, with the trestles being laid. It is the start of a monumental programme of work that will produce an elegant piece of engineering and design, with viaduct arches moving across the water like skimming stones and a lowered, pier design reducing visibility as it enters the landscape.

To minimise the impact on local communities, many of Align's preparatory and early construction activities are overlapping. The establishment of construction compounds has started and will be combined with the establishment of a construction corridor, a new haul road linked to the new M25 slip roads and jetties across the lakes so the initial laying of foundations can begin. On site, Align is committed to employing HGVs performing at the very highest emissions standards and recycling millions of cubic litres of water.

The main construction work on the viaduct will begin in 2021, running north to south from the main compound between the A412 and the M25, serviced with pre-cast concrete from a dedicated factory at Align's principal site for the construction of the Chiltern tunnel. The foundations and the arching piers of the viaduct will be constructed first at intervals of 80m in water and 60–80m through woodland, before the deck is laid over the top. A dedicated team of around 300 will work on the viaduct itself, part of a total site staff of over 1,000.

Laying the viaduct deck promises to be almost as spectacular a sight as the finished product. Scheduled for early 2022, Align will launch a walking crane laying gantry to lock the piers together piece by piece over the Colne Valley. The girder will transport 4,000 tonnes of concrete above the Colne Valley, pausing over individual piers to lay the decking while supporting the previous one. The construction of the deck is expected to be completed in 2024, after which Align will install noise protection (including partially transparent barriers to allow passengers views out across the valley), begin to plant new native species of trees, and create replacement habitats and recreational features.



Visualisation of Colne Valley viaduct, 2019.

## Leaving a legacy

Although the Align section of the route is relatively short in length, it features multiple, large-scale engineering challenges that the JV and its suppliers are overcoming using ingenuity and innovation. Not only will the infrastructure they create stand the test of time and be icons of high speed rail for generations to come, the approaches to design, site operation and local integration will raise the bar for future infrastructure projects.

HS2 is leaving a legacy for individuals too. When construction is underway, more than 1,200 Align staff and supply chain contractors will be employed in the design and construction of the Chiltern tunnel and Colne Valley viaduct, with 50 opportunities for apprentices. All will be learning and developing skills that will enable them to work on, and lead, high speed rail and other major infrastructure projects wherever their future careers take them around the world.



**There would be less of a need for more capacity for domestic air travel if Britain had a better high speed rail system in place."**

**Mark Goldstone**

Head of Policy and Representation for  
West and North Yorks Chamber of Commerce, 2020

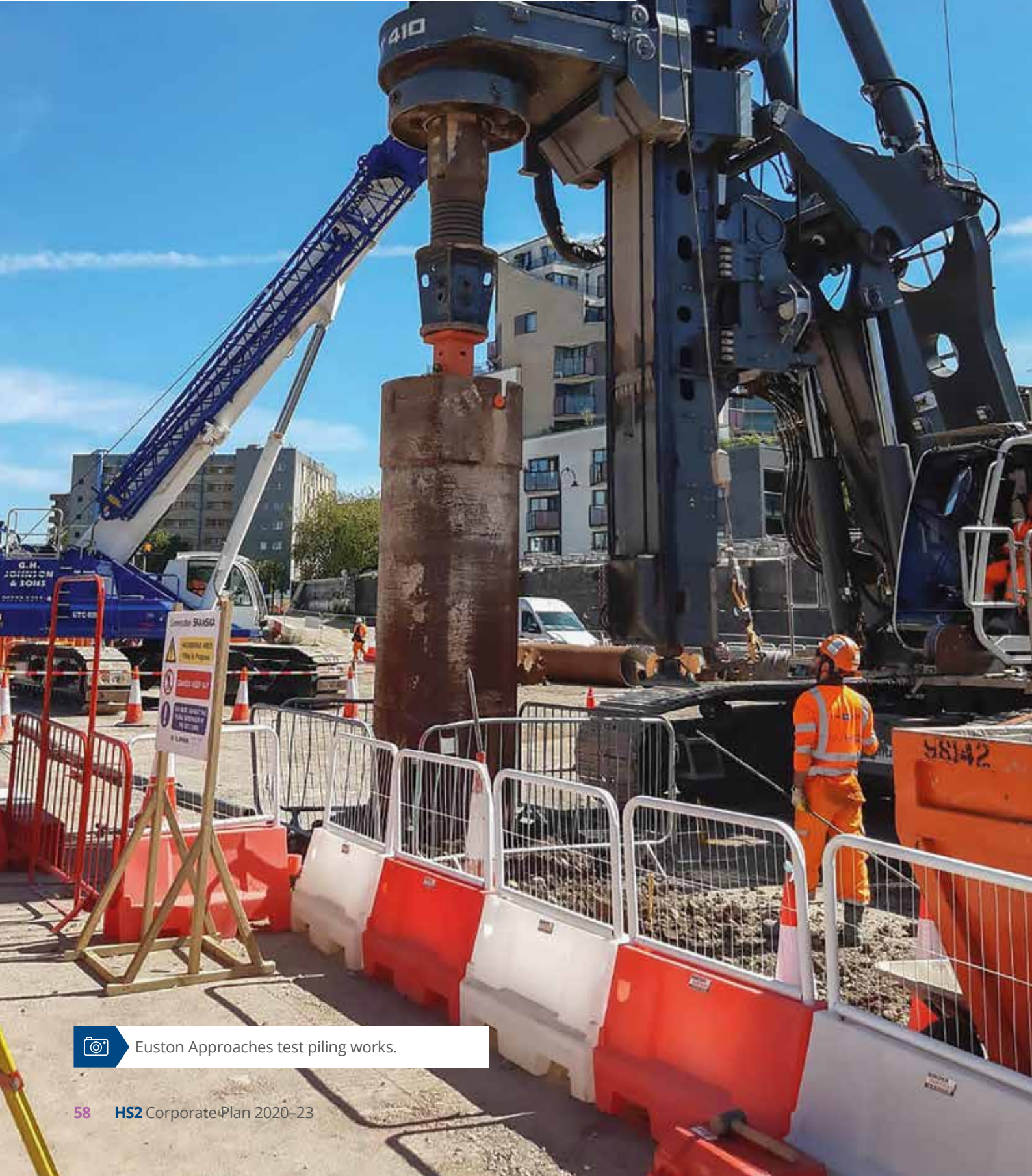
SKANSKA

COSTAIN

STRABAG

Working in partnership with

HS2



Euston Approaches test piling works.

# Phase One Skanska Costain STRABAG – tunnelling under the capital

SCS Railways, a joint venture of Skanska, Costain and STRABAG will collaborate to deliver HS2 along the final 26.4km of its journey to our southern terminus in Euston. The JV will complete challenging works taking the railway from Northolt to Euston via Old Oak Common, building a variety of structures requiring expert precision and care. As 95% (21km) of the route will be in tunnel, SCS will be running seven tunnel boring machines (TBMs), of which five will operate simultaneously.

## Northolt tunnel and two-way construction

The south section of the HS2 route picks up the railway east of the Colne Valley viaduct, running on an above-ground section for approximately 2.4km to the West Ruislip portal of the Northolt tunnel. The route comprises a green tunnel and embankments and includes bridges underneath Harvil Road near the viaduct, and over Breakspear Road South and the River Pinn as the railway approaches the Northolt tunnel into West London.

The Northolt tunnel is a 13.4km twin-bored tunnel, with an 8.80m/8.10m internal diameter at varying depths below the surface. Despite heading into London, trains will still be able to travel through the tunnel at 320kph, as fast as any other tunnel on the Phase One line of route.

Constructing the tunnel will be the work of four tunnel boring machines. Two TBMs will set off from the tunnel portal at West Ruislip, driving east towards the Green Park Way shaft to complete the western section of the tunnel. Two more will work from the west of the Old Oak Common site, heading towards the Green Park Way shaft to build the eastern Northolt section. The TBMs will be launched in 2022 and 2023 and the tunnelling teams will



# 26.4km

section to be built by SCS Railways

# 95%

in tunnel

# 7

tunnel boring machines

operate 24/7, 365 days a year until their respective sections are completed, which is currently scheduled for 2024.

The West Ruislip portal itself is a significant piece of infrastructure and encapsulates the factors SCS is taking into account for all the visible railway buildings on this section of HS2. As for many sites, internal haul routes will be used to minimise the use of local roads, with material from the excavations stockpiled in multiple locations in West Ruislip; one such location is the local Ruislip golf course, where material will later be used to reconfigure it, reducing the number of HGVs required were it to be removed by road.

SCS is also exploring different techniques for constructing the structure walls in order to reduce the time needed and the amount of evening work required. The portal will be porous, made of perforated concrete with openings to the outside air, to reduce the 'sonic boom' effect caused by high speed trains exiting tunnels.

The tunnel route is punctuated at 3km intervals by vent shafts and headhouses, with the vent shaft at South Ruislip demonstrating the positive impact of detailed design on our initial plans. The shaft structure has changed in shape from rectangular to circular, with a diameter of 25 metres,

“

**In the longer term, major upgrades like HS2 and Northern Powerhouse Rail will add thousands more seats to the network, supporting job creation and better connecting cities across Britain.”**

**Robert Nisbet**

Director of Nations and Regions,  
Rail Delivery Group, 2019



One Euston Square and Grant Thornton House,  
2020.



# Phase One Skanska Costain STRABAG – tunnelling under the capital continued

which still allows for efficient performance while enabling quicker construction. This will lead in turn to a reduction in the volume of excavated material and subsequent vehicle movements. The landscaping design now includes a ‘living roof’ and a mix of vegetation, making it easier for the completed structure to blend in with the surrounding environment and contributing to HS2’s green corridor.

We will also be finishing the above-ground construction elements in the southern section with materials appropriate to their surroundings. The recommendation for South Ruislip vent shaft and the West Ruislip portal headhouse buildings are timber structures, benefiting from some metal finishings, with the vent shaft headhouse softened by careful planting. The materials identified for the surface architecture will reflect the journey through rural areas where timber will predominate, to the use of brickwork as the railway makes its way into the city.

## HS2’s busiest station

In March 2020 our Enabling Works contractor, CSJV, paused works on the site of the former Great Western Railway depot at Old Oak Common to ensure they were compliant with government and Public Health England (PHE) advice on dealing with COVID-19. However, with plans and protocols implemented it has resumed operations in 2020 in line with PHE and industry guidance, protecting our staff and the communities in which they are working.

Works will continue to prepare the site for HS2’s busiest station, expected to handle 250,000 passengers a day. This includes excavations, compacting and relocation of soil within the site, removing concrete footpaths, removing and crushing old train shed foundations and former old concrete foundations, enabling waste materials to be recycled on site.

HS2’s impact on Old Oak Common will be profound. Through the station’s links to high speed rail,

Heathrow, central London, Wales and the west of England, it will transform the former railway and industrial area into a new neighbourhood which is expected to support up to 65,000 jobs and 25,500 new homes.

## The last leg to Euston

HS2 will carry passengers the final 8km to Euston from Old Oak Common almost entirely underground, emerging from a 7.2km tunnel at its southern portal on the site of Euston’s former carriage sheds, near Parkway and Delancey Street.

The two TBMs will drive from the east end of the new station at Old Oak Common towards Euston, arriving less than a kilometre short of the new high speed rail platforms in the redeveloped station. SCS will also be constructing a 1km logistics tunnel connecting the tunnel drive site at Old Oak Common, as well as extending existing bridges over the railway at Granby Terrace and Hampstead Road, and the 550m-long ‘Victoria Box’, a reinforced concrete ‘dive-under’ box structure.

New ventilation shafts and headhouses will be constructed at Adelaide Road, which will include a ‘living roof’ so it blends in with the adjacent local nature reserve, Canterbury Works in Kilburn and three locations in London including the ‘sugar cube’ on Stephenson Way.

The principal upcoming work in Euston consists of laying piles and ground anchors for HS2’s approach to the new station, which is scheduled to start in autumn 2020 and continue through 2021. Piles transfer the weight of the structure they support into the hardest or deepest rock underground. Those being installed in the Euston approaches will be up to 50m deep and 1.8m across and, once embedded, will support the structure above and strengthen the surrounding land. SCS will install hundreds of piles beneath track and ground level from Parkway to the Hampstead Road bridge to support the HS2 railway and future over-site development, which will be explored alongside the development contractors and the local community.



Visualisations of HS2 Birmingham Curzon Street and Interchange stations.



# Phase One

## Stations

### Birmingham Curzon Street

The new HS2 station will be a testament to the rich railway heritage of the site, while embracing new technology and materials in its stunning 70-metre arched structure. The existing Grade I-listed Curzon Street building, which has been a monument to rail travel since it was built in the 1830s, is being sympathetically incorporated into the wider site context of what will be the first intercity terminus built in the UK since the 19th century. Fittingly, Curzon Street was the first of our stations to gain Schedule 17 planning approval as it becomes a landmark for passengers once again.

We expect to appoint a design/build contractor in 2021. They will be responsible for delivering a seven-platform station that is forecast to serve 25,000 passengers a day when Phase One services begin, rising to 66,000 when Phase Two launches services to the North. The scale of the station, featuring a customer experience hub, a spacious concourse, waiting areas, retail outlets and food and drink outlets, is vast. Despite its size, the design incorporates seamless movements between different modes of transport. The Midland Metro will run alongside and underneath the station and pedestrian routes will connect to bus and Sprint rapid transit services. Curzon Street's proximity to New Street and Moor Street stations means that onward rail connections are also within 10 minutes of the arriving HS2 services and there will be parking spaces for more than 500 bicycles to promote sustainable city centre travel. The station's environmental impact is enhanced by eco-friendly technologies that will help it achieve BREEAM excellent certification. The station will also redefine its immediate surroundings. New public spaces including open spaces and landscaping will feature parkland lawns, rain gardens to capture water, a wildflower grassland, new trees and an area of new woodland to provide a natural habitat for wildlife.

The station is key to the regeneration of the city centre, and is augmented by the Curzon Street Masterplan, which should provide over £700 million in investment into the surrounding area. The plan envisages the creation of 36,000 new jobs, 4,000 new homes and 600,000m<sup>2</sup> of commercial development.

### Interchange

HS2's Interchange station in Solihull has been dubbed the best-connected station on the line of route. Links to rail, road and air include providing its forecast 21,000 passengers a day (rising to 38,000 with Phase Two) with high speed services to Euston in just 38 minutes. An automated people mover (APM) will move passengers between the new HS2 Interchange station, the NEC, Birmingham International Station and Birmingham Airport in around six minutes, offering direct access to over 150 international destinations and a further 490 global connections. Onward rail connections will also run to Birmingham, Leeds, Liverpool and Manchester.

Interchange station's connectivity status is matched only by its environmental performance. In May 2020, it became the first railway station in the world to achieve the BREEAM Outstanding certification for sustainability, perfectly complementing the greenfield status of the surrounding land.

The station will be made up of two 415-metre long island platforms, offering four platform faces, as well as two high speed through lines in the middle for non-stopping services. When operational, up to five 400m-long high speed trains will serve Interchange station each hour, in both directions.

The wider economic footprint of the station's development will also be transformative. The station forms a central part of the major regeneration plans around the site, which are forecast to support 70,000 new and existing jobs, 5,000 new homes and 650,000m<sup>2</sup> of commercial space. New developments like these will boost Interchange's connecting appeal even further, bringing 1.3 million people to within a 45-minute journey of the station.

Enabling Works are continuing around the station site. Following these works, and when construction begins, we are also aiming to reuse at least 90% of construction waste, demolition waste and excavated material. We expect to appoint a design/build contractor in June 2022.



Visualisations of HS2 Old Oak Common and Euston stations, 2020.



# Phase One

## Stations continued

### Old Oak Common

Old Oak Common will be a completely new-build super hub, combining the largest sub-surface high speed station in the UK with an integrated, ground-level conventional station on the same site, providing unrivalled interchange opportunities. The now cleared site has a rich railway heritage dating back to 1906 when the now decommissioned Great Western Railway locomotive depot first went into operation. The station received planning approval in May 2020 and, like much of the Phase One route, the scale of the engineering challenge is immense.

Construction will deliver an 850m-long station box, with a volume equivalent to 6,300 Routemaster buses, requiring 800,000m<sup>3</sup> of soil to be excavated and removed from the site. Access is constrained by operational railways in three directions meaning the movement of materials, including the tunnel boring machines that will depart the site for Euston in late 2023, will be a considerable challenge.

When complete, however, access will be the station's most significant asset. Used by an estimated 250,000 passengers each day when fully operational, Old Oak Common will combine a six-platform through station for high speed trains, 13m below ground, with a further eight conventional platforms, connecting HS2 with the Elizabeth Line, Heathrow Express and the Great Western Main Line.

The station will be covered by a sequence of interlocking roof forms, whose thickness and profiles have been adapted during the detailed design stage to allow for 27% less material to be used. This has had a massive impact on the station's carbon footprint, reducing the steel content by over 1,000 tonnes – equivalent to a 2,700-tonne reduction in carbon – and saving £7 million.

The station will be a gateway for Old Oak and Park Royal, one of the largest regeneration sites in the UK supporting tens of thousands of homes and jobs.

### London Euston

Developing Euston station, the sixth-busiest in the UK, is one of the most complicated and challenging aspects of the HS2 Programme. The approach to redevelopment was revisited during the Phase One hybrid Bill process to minimise disruption and boost regeneration in line with the London Borough of Camden and the Euston Area Plan.

The station will now see a series of new high speed platforms, constructed in two phases, built partially in the footprint of the existing station. The first phase of construction (Stage A) will deliver an initial set of new high speed platforms and a concourse to the west of the station, supporting Phase One operations to and from the Midlands and moving inter-city passengers for the Midlands and the western cities in the North (such as Manchester, Liverpool and Glasgow) onto HS2 services.

A further series of HS2 platforms and concourse would then be built (Stage B1) to support the later opening of Phase Two, extending services to the North and enabling trains to run from Euston to the East Midlands and North East for the first time. HS2 will eventually increase the number of peak-time seats out of Euston from 12,100 to 31,200, on services departing from a vast new HS2 section of the station, covering over 21,000m<sup>2</sup>.

We are also working closely with Network Rail and Lendlease, the Master Development Partner for the Euston site, to minimise disruption to existing operations and maximise the benefits that a revitalised station can offer to the 54-hectare regeneration site. Plans for development in the area are expected to support 14,000 new jobs and the construction of 4,000 new homes, shops, cafés and open spaces around site, as well as vastly improved connections to the Underground stations at Euston and Euston Square.



## Case study

# The world's first station with outstanding sustainability

HS2's Interchange station has been awarded BREEAM outstanding certification for sustainable buildings – a first for any railway station in the world, putting it in the top 1% of eco-friendly buildings in the UK.

BREEAM is the Building Research Establishment's Environmental Assessment Method, setting the standard for best practice in sustainable design. This landmark award recognises Interchange station's eco-friendly features, including maximising natural daylight and ventilation to minimise demand for carbon, energy efficient technologies

such as air source heat pumps, and features to enable net-zero carbon emissions from day-to-day energy consumption – for instance, over 2,000m<sup>2</sup> of solar panels generating zero-carbon electricity. In addition, the station roof design can capture and reuse rainwater to reduce the mains water demand for the station.

The landscaping features sustainable drainage systems to reduce the burden on surface water drainage, whilst naturally irrigating planted areas. New natural habitats will be created around the station, leaving a legacy of biodiversity and an enhancement of native species.



Outside the station, there will be 222 electric vehicle charging points in the car park and cycle storage for 176 bicycles, with further room for expansion. There will also be dedicated pedestrian access into the station from the east of the railway, along with cycle access to the new station from the north, west and south-east.

As part of our commitment to managing our carbon footprint, HS2 has set ambitious targets to minimise the whole-life carbon emissions of our assets. HS2 will be the green option for long-distance travel in the UK.



**Our aim is to design, construct and operate HS2 to reduce carbon.”**

**Peter Miller**

Environment and Town Planning Director, HS2

“

**If we're to cope with rocketing rail demand that comes with the kind of economy we want to see, we need more capacity, faster services and more reliable journeys.”**

**Robert Nisbet**

Director of Nations and Regions,  
Rail Delivery Group, 2019



Visualisation of the Wendover Dean and Small Dean viaduct.

# Phase One

## Preparing for railway systems and trains

Running at speeds of up to 360km/h, it's no secret that HS2 trains will be the fastest in the country. They will also be the most reliable, regular services available to passengers, with up to 48 trains an hour running the length of the country at the peak of operations.

It is this combination of high speed and high frequencies, not to mention the fact that trains will run on to the UK's existing railways as well, that mark HS2 out as unique. The train service specification for Phase 2b calls for 18 trains an hour to depart from London, and a further six per hour to run north having originated at Birmingham.

Providing this unparalleled level of service will mean that our trains will operate at intervals as close as every three minutes. In turn, HS2 services will need to keep their station calls to just two minutes to maintain their journey times and the balance of the services. At peak times, Old Oak Common, which will be HS2's busiest station, will see up to 36 trains calling every hour, as the network smoothly transports well over the initially projected 300,000 people each day.

### An iconic way to travel

There is a vast amount of work to do before the first HS2 trains depart their stations. Our focus at the time of writing is on concluding the detailed procurement process for the 'train manufacturer and maintainer', or 'TMM' – the company or joint venture that will build and service the first 54 state-of-the-art trains needed to operate the Phase One and 2a services. This is a huge responsibility – along with our new stations and major pieces of civil engineering, our trains will be the new symbols of rail travel in this country.

That means we must reflect our values as an inclusive, welcoming organisation in the public-facing aspects of the scheme that we procure. First and foremost, we are setting the industry a design challenge the like of which they have not seen before. Prospective suppliers are having to



**Only HS2 can shift many more people out of cars and planes by the 2030s, without causing a decade of disruption to our existing train services."**

**Ralph Smyth**

Head of Infrastructure and Legal,  
Campaign to Protect Rural England, 2019

demonstrate that they are aligning their design proposals inside the trains with the needs of people who will be using them – travel on HS2 has to be enjoyable, inclusive for all and allow people to make valuable use of their time. We will be finding ways to overcome the barriers that rail travel currently presents to many individuals.

### Trail-blazers, record-breakers, innovators

The level of technical operation we aspire to on HS2 will push the UK's railways into uncharted territory as well. The length and weight of the trains – a single 200m unit without passengers will weigh 440 tonnes – requires demanding acceleration and braking performance. HS2 trains will achieve their UK record-breaking maximum speed in no more than 535 seconds on a straight, level track, during which time they will have covered 25 miles. HS2 will also introduce automatic train operation to high speed rail, one of the first networks to do so in the world. Coloured trackside lights for signalling will be replaced by digital displays in the driver's cab, forming a key part of the safe, seamless, intuitive systems we need to use to run the network to the highest standards.

# Phase One

## Preparing for railway systems and trains continued

These are bold specifications for a completely new railway, but we are also setting significant challenges by running trains onto the existing network. By specifying that trains are compatible, we need them to be smaller than most high speed trains elsewhere in the world in order to fit through our Victorian bridges and tunnels. And despite having to match these track gauge specifications with trains currently operating in the UK, we have stipulated that HS2 trains must nevertheless be high performance – reliable, quiet and capable of delivering a step change in customer experience.

### Delivering the ambition

The design of HS2 trains will involve extensive levels of collaboration, innovation and testing, and we are preparing for that process in earnest. We expect to appoint our TMM in the financial year 2020–21 and the first two to three years of the contract will focus on the development of the train designs that made up the winning bid.

The designs will go through three phases of increasing detail: concept, preliminary and detailed design. DfT has appointed First Trenitalia West Coast Rail as our West Coast Partner (WCP) – we will work with them as our shadow operator



Catapult conference to discuss best practice in technologies and design for the railway. Think Tank, Birmingham, 2019.



## HS2 predicts that its first phase alone could free up rail freight capacity equivalent to around 1,500 lorries every day.”

**Alex Veitch**

Head of Multimodal Policy,  
Freight Trade Association, 2019

focusing on essential customer-facing aspects of the trains, including their accessibility from the station platform, interior layout, seating, toilets, catering and technology.

As well as working towards world-leading design, we will ensure that we integrate our approach to rolling stock into the emerging design for the railway and its infrastructure, the capabilities of the existing network as it develops, and the ‘service vision’ – the operating plans for the railway, in particular the requirements of future customers that we will be identifying together with the WCP.

The WCP is the current operator on the West Coast Main Line and will help us understand how the line will be operated in future, as well as providing a range of design, development and mobilisation services to help with producing the trains. The WCP will also help us set out requirements for the development of train simulators, which will be used to train the drivers of the future, and the design of the rolling stock’s home depot at Washwood Heath, about two miles north-east of Birmingham, which will be fitted out by the TMM later in the Project.



## Long-term development

While the plans for bringing the railway into operational use are at an earlier level of maturity than those for building the railway itself, there is a lot of activity taking place over the next few years. Our work will continue in the two broad disciplines of train design and network integration, but we will also be bringing on new partners to deliver the systems requirements (signalling and control systems, traffic management) for operating the trains when in service.

## Rolling stock

Once we have a physical prototype train to work with, we'll begin carrying out extensive off-network testing to prove the capability and reliability of the design before we take it onto the new high speed network or our conventional network for real. We will also need the TMM and their suppliers to work with us and help us test the new high speed infrastructure being built. This will require extensive collaboration from the early supply of systems for integration with the design, to the final testing of the trains at higher speeds. Trial operations are expected to commence in 2029, before the first paying customers board any HS2 train on the high speed network.

## Network integration

A package of 'Wider Network Works' (WNW) will be procured in late 2021. The WNW contractor will be responsible for ensuring that HS2 trains can connect with the current railway. We're also partnering with Network Rail on these works, ensuring that our services are effectively introduced on the existing network. These works are vital to help us meet our objective of running trains off the HS2 network to further destinations, delivering substantial benefits in capacity and reliability even for rail users who do not travel directly on HS2 high speed lines. In the even longer term, integrating HS2 with Network Rail infrastructure, will help us ensure better value for money and the punctual delivery of the whole HS2 Programme.

## Developing supporting systems

Similarly, we expect the integration of track, power, command and control systems between our trains, the high speed railway and the Washwood Heath depot to ramp up once our rolling stock design and manufacturing efforts are bearing fruit. As we design the rolling stock, our objective will be to make their technical characteristics marry with the emerging requirements of the railway systems. A new systems delivery team will manage these designs and the development of the railway systems packages.

Simply acquiring the requisite £3 billion of rail systems is an endeavour in itself. The necessary systems to operate HS2 range from the track itself to high voltage power and mechanical equipment. Initial requests for suppliers are steadily being released to the industry and we are evaluating bids for the first two systems contracts, for the supply of the slab track and for access doors and passageways across tunnels.

Procurement for the principal track and command, control and communication systems contracts has entered the 'prequalification' phase. These prequalifications, in which we assess interested parties' capabilities against various criteria will be quickly followed by those for mechanical and electrical equipment, high voltage power, overhead catenary systems, and operational communications, with a contract for supplying an integrated control centre at Washwood Heath depot to follow. We expect to carry out these assessments, work through the tenders of shortlisted bidders and award contracts on the majority of systems by 2022.

We are only at the start of the process, readying ourselves to design, develop and test our new trains and build our new digital systems around them. Nevertheless, we will establish a new global benchmark for high speed rail travel, capable of carrying over 100 million passengers every year on trains which are unrecognisable from the majority of trains running on our network today.



# 28km

cuttings

Leeds

# Leeds



# 42

structures (overbridges and underbridges)

Manchester Piccadilly

# Manchester

Manchester Airport

Phase 2b



# 2.2km

bored tunnel

# Crewe

Phase 2a

Our plans for Phase 2a consist of 57km (35 miles) of new railway, which will run from the West Midlands to Crewe, passing through parts of Staffordshire and Cheshire. Services will travel onward to destinations including Manchester, Glasgow, Liverpool, Preston and Wigan.

We are currently seeking permission from Parliament to build and operate Phase 2a. You can view the Phase 2a hybrid Bill documents on the [gov.uk](https://www.gov.uk) website.

Our community websites inform local people in detail about our proposals for the Phase 2a route, how it is being constructed and what we are doing to minimise disruption. The sites host local area plans, engagement plans, contractor liaison plans and local event information. Our community websites can be found at <https://hs2.commonplace.is/>

# Phase 2a

We are planning the railway

Phase 2b

Nottingham



**5.5km**

viaducts

East Midlands Hub



**22.2km**

embankments



**1**

combined infrastructure  
maintenance depot/railhead

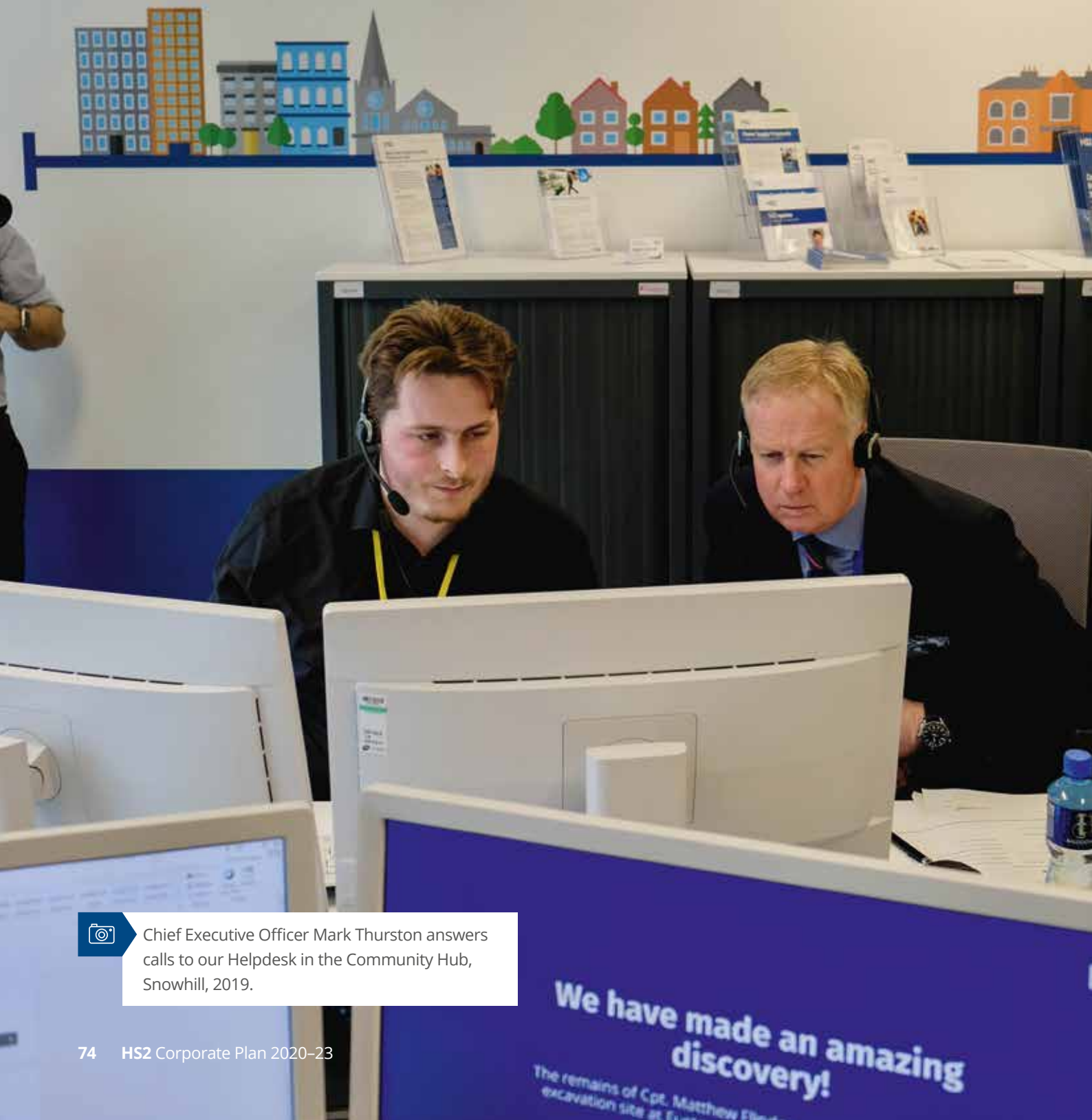
Phase One

Birmingham  
Interchange

Birmingham

Birmingham Curzon Street

# HS2 Community



Chief Executive Officer Mark Thurston answers calls to our Helpdesk in the Community Hub, Snowhill, 2019.

**We have made an amazing discovery!**  
The remains of Cpt. Matthew Flinders excavation site at Exmouth

# Phase 2a

## Planning the railway

### Hybrid Bill nears Royal Assent

The Phase 2a hybrid Bill – the High Speed Rail (West Midlands – Crewe) Bill – started its journey through Parliament in July 2017 and is nearing Royal Assent. The Bill and its two Additional Provisions received 302 petitions, of which 145 were heard before the House of Commons Select Committee published its final report in June 2019.

From there, the Bill received its Third Reading in the House of Commons and was approved by 263 votes to 17. It passed to the House of Lords for scrutiny where it received its First Reading in July 2019. The Bill received a further 36 petitions and the Lords Second Reading took place in September 2019, but the appointed committee was subsequently unable to start hearing petitions due to the dissolution of Parliament, the Oakervee Review of HS2 and then the General Election at the end of 2019.

Revived in the new Parliament following the Government's decision to proceed with HS2 in February 2020, the Bill was again committed to the Lords Select Committee to consider the petitions against it. The Committee began its hearings in March, but they were quickly paused due to the COVID-19 restrictions.

The House of Lords Select Committee resumed sitting in July, and the hearings and process leading to the Third Reading are expected to take place between then and November. We expect to receive Royal Assent to the Phase 2a hybrid Bill sometime in January 2021.

Royal Assent will provide us with the legal powers to award contracts to our main civil engineering contractors, who will design and build the railway between Fradley and Crewe. We expect to gain approval from the Department for Transport in Summer 2020.



### Preparing for construction to begin

With the necessary permissions in place, an extensive period of preparatory work will kick off in earnest. Phase 2a is significantly smaller than Phase One of HS2, but the work that goes in to preparing to build even 57km (35 miles) of new railway and associated infrastructure still requires huge efforts on the part of all our teams.

Preparations are underway to commence the final work package of HS2's Phase 2a ground investigations programme, with field activities expected to commence late 2020. This investigation work will further confirm our understanding of ground conditions along the line of route as we prepare for construction.

The next tranche of environmental surveys will also take place this autumn. The survey results will complement the extensive environmental impact assessments carried out in the development of the hybrid Bill and Additional Provisions. They will inform the shape and size of our environmental programme during the construction of Phase 2a and beyond.

# Phase 2a

## Planning the railway continued

### Design and Early Works contracts

This preparatory work will pave the way for the detailed design and construction of the railway to Crewe. We will focus on procuring a range of contracts for Early Works covering both design development, environmental works and preparatory civil engineering works between now and 2024.

HS2's design work is ongoing and is focusing on optimising the route alignment and the concept design.

The Early Works contracts will be awarded towards the end of 2021, comprising:

- Early environmental works – to start on the first habitat creation sites so that they are established in time for the safe and secure relocation of wildlife when the Main Works begin.
- Early civils works – initial works along the line of route that will begin with the creation of 'route highways'. These need to be in place to provide space for the movement of lorries and site traffic required by the scheme when construction begins. These dedicated route highways will reduce congestion on the local road network and the impact of construction on communities.

### Delivering the physical railway

At the same time as getting the Early Works underway, we will start the planning and procurement of suppliers that will manage the delivery, site readiness and construction of the railway.

In 2020 we will finalise how we will access the expert engineering and construction management capability required to support the main civil engineering activities for Phase 2a.

Additionally, we will commence the procurement of the advanced civils works that will prepare the way for the Main Works by undertaking translocations, site clearance and other preparatory activities. We aim to award the contract for this work in spring 2022.

The final major contract awards planned during 2023 and 2024 are the Phase 2a Main Works Civils (MWC) contracts. These MWC contracts will deliver the main construction aspects of the scheme.



## Keeping people informed between Birmingham and Crewe (Phase 2a)

As the legislation moves through Parliament for the next stage of the railway between Fradley, Staffordshire and Crewe, we have set up long-term information points in 14 local venues.

We recognised that these largely rural communities can find it harder to get to larger events and drop-in sessions. So, we are bringing information to them so they can get the latest news in places they already visit regularly, including seven libraries, five council offices and two conference centres.

## Early information ahead of ground investigations

Taking on board people's concerns about future ground investigations between Birmingham and Crewe (Phase 2a), we organised a workshop with land agents representing landowners along the line of the new railway. As works could impact landowners and rural businesses, we were keen to listen to feedback and learn from our earlier ground investigations.

We were able to explain why the work needs to be carried out, what it involves, and what we might do better. By engaging with potentially impacted people in this way, we improved our ways of working, tailoring the information we provide to specifically address local concerns.

## Funding for community and business initiatives on the Phase 2a line of route

The Phase 2a Community and Environment Fund (CEF) and the Business and Local Economy Fund (BLEF) funding pot of £5 million will be launched after Royal Assent is granted to the Phase 2a hybrid Bill.



Community Engagement Information Points have been installed across Phase 2a.



**HS2 is not just about speed or getting to London more quickly, it is about bringing the Northern Powerhouse closer to the great cities of the Midlands.”**

**Henri Murison**

Director, Northern Powerhouse Partnership, 2019



## Case study

# Engaging with our communities in new and innovative ways

Our ability to communicate with residents and stakeholders faced an unexpected challenge in 2020, but the health, safety and wellbeing of the communities along the route of the new railway remains our absolute priority.

With the postponement of all face-to-face events and meetings during the period of lockdown, we notified local residents and put in place alternative ways of communicating with us so questions could still be answered and concerns still addressed. Our Helpdesk remained open 24/7 to respond to the increased level of queries.

As we prepared to restart work on sites in May, we published a newsletter that was sent directly to 17,500 residents of Staffordshire and Cheshire, including details of the measures we are taking to comply with the advice of the Government and Public Health England. The update was also published online and sent to the community information points established along the line of route in 2019.

Engagement on the Phase 2a hybrid Bill has continued throughout the COVID-19 pandemic, as we prepare ourselves and our stakeholders for the restart of the Parliamentary process. The team has continued to provide information to affected parties when it becomes available, working directly with petitioners to reach solutions ahead of the





Members of the public chat with HS2 staff during a community engagement event at Crewe Alexandra.

House of Lords Committee stage and holding virtual briefings for parish councils and other key stakeholders as we prepare to resume.

As lockdown restrictions are lifted, we are steadily starting to rebuild a presence in the communities and continue with the engagement programmes that have had to be paused. This includes holding meetings and briefings for subjects of local interest, such as our tunnelling session in Newcastle-under-Lyme in February. Work is beginning on our sites again and we will be supporting communities as this happens. The next significant package of ground investigation works, which began in early 2020, will restart and ultimately cover around 780 field locations, affecting 100 landowners.

Following a constructive workshop with land agents and our teams, we have started to foster an open dialogue and reassured them of our commitment to the ongoing engagement that is vital to our role. We have also developed good working relationships with parish councils and local authorities, including arranging visits for councillors to our ground investigation sites prior to lockdown.

We are looking forward to returning to communities and continuing our efforts to engage in a fair and transparent way as the Project develops. Royal Assent to the hybrid Bill, when it arrives, will enable us to release further community funding, which we have already seen utilised to great effect on Phase One.



Leeds

Leeds

Manchester Piccadilly

Manchester

Manchester Airport

Phase 2b

Phase 2b

The western leg of Phase 2b is currently planned to have a total length of 53 miles/85km.

Crewe

Phase 2a

The Phase 2b route will service the North in a Y shape, split into an eastern and a western leg. The western leg will connect to the high speed lines at Crewe and run through to Manchester. The eastern leg will connect to high speed lines in the West Midlands and run through to Leeds. Services will also travel onward to destinations including Glasgow, Liverpool, Preston and Wigan.

The HS2 Full Business Case, published in April 2020, revealed £7.7 billion of newly-reported Phase 2b benefits that were not included in the July 2017 business case. Currently, the Government is drawing up its Integrated Rail Plan for the North and Midlands to identify how best to integrate HS2, Northern Powerhouse Rail and other rail investments.

# Phase 2b

We are developing the legislation

Phase 2b

Phase 2b

The eastern leg of Phase 2b is currently planned to have a total length of 123 miles/198km.

Nottingham

East Midlands Hub

Phase One

Birmingham Interchange

Birmingham

Birmingham Curzon Street



**Manchester is a city built on Victorian grand schemes. Nothing since has had the potential that HS2 delivers.”**

**Chris Fletcher**

Campaigns Director,  
Greater Manchester Chamber of Commerce



Millennium Bridge, Salford Quays, Manchester.

# Phase 2b

## Developing the legislation

In February 2020, the Government confirmed its commitment to Phase 2b of the Project, extending high speed rail from the West Midlands to the North of England.

Faster, more frequent, more reliable and less crowded rail connections within and between the Midlands and North will be vital to the future prosperity of those regions, as well as playing an indispensable role in the UK's low-carbon future.

### Delivering prosperity and economic benefits across the country

Phase 2b will complete the network, connecting Crewe to Manchester (with trains running on to Glasgow and Edinburgh) and the West Midlands to Leeds (with trains running on to York and Newcastle).

### Recent developments

Though still in the early stages of design, Phase 2b will play an essential role in delivering Northern Powerhouse Rail (NPR) and the Midlands Engine. Over the last year, plans for rail integration have been advanced, driven by a number of developments.

In August 2019, the HS2 Chairman's Stocktake Report called for a strategic review of the coordination between HS2 Ltd, the Department for Transport (DfT), Transport for the North, NPR and Network Rail. In response, in February 2020, the Government announced that Phase 2b would be considered as part of an Integrated Rail Plan (IRP) for the Midlands and the North.

The IRP includes proposals for Northern Powerhouse Rail, Midlands Rail Hub and other major Network Rail schemes, and will ensure that these are scoped, designed, delivered and can be operated as an integrated network. Work with other local leaders and the Government to draw up the IRP by the end of 2020 will continue, bringing forward transformational, cohesive rail improvements along the proposed HS2 route.

Shortly after its announcement, the Government published the terms of reference for the IRP, setting out its purpose, scope and timings. The IRP will be informed by an assessment from the National Infrastructure Commission (NIC), considering the rail needs of the Midlands and the North while assessing the cost-benefit analysis of other national rail projects.

In addition, one proposed part of Phase 2b will be delivered to Parliament as a hybrid Bill. We have been instructed to continue the development of a Bill for the western leg of Phase 2b, extending the line from Crewe to HS2's north-west terminus in Manchester. Work will continue with the DfT to establish a programme of activity and we aim to deposit a Bill for the final stage of the western leg by early 2022.

Once the IRP has been published and a clear direction is provided regarding Phase 2b, a revised programme of future activity for developments along the eastern leg, connecting the West Midlands and Yorkshire will be established.

**We will**

# leave a positive legacy

HS2 represents a significant investment by the UK taxpayer, which is why the HS2 Programme has always been about building more than a railway. Our strategic goals provide seven areas of focus:



**We will be a catalyst for economic growth.**



**We will create a step change for rail capacity and connectivity.**



**We will be good neighbours and protect the natural environment.**



**We will foster skills and create and sustain employment opportunities.**



**We will set new standards for health, safety and security for the construction and operation of the railway.**



**We will deliver value for money to the taxpayer.**



**We will set new standards for customer experience.**

# Building Britain's future



HS2 Ltd visit to inspire Chesterfield school children, 2019.

# Building Britain's future

## Sustainability and corporate social responsibility

With responsibility for the largest infrastructure project in a generation, HS2 Ltd is dedicated to operating as an organisation that delivers meaningful social, economic and environmental benefits to the UK.

### Decarbonising transport

We aim to build the most sustainable high speed railway in the world. HS2 is being designed to play a vital role in the journey to net-zero carbon emissions by 2050. Getting people out of their cars onto trains, moving freight to rail and cutting domestic air travel are key to achieving these goals.

Rail journeys on HS2 will provide a low-carbon alternative to cars and planes, with rail being the most carbon-efficient mass transport system available. Our trains will be highly energy efficient and powered by electricity from an increasingly decarbonised electricity grid. Once operational, HS2 will be one of the most effective low-carbon transport solutions for travel between London and Scotland.

HS2 will offer more reliable, more frequent rail services, with dedicated intercity services now running solely on the new network and releasing more space on the existing main lines for local

and regional trains. Increased connectivity and faster journeys over long distances will also take passengers out of their cars and off flights.

HS2 will also release more freight pathways on the existing network, taking lorries off our roads. HGVs account for 17% of all carbon emissions from road transport and every extra freight train can carry the load of up to 76 lorries, meaning HS2 can support a huge reduction in emissions caused by road transport.

If we are serious about reducing transport's carbon emissions, we have to be serious about HS2. Rail is by far the most carbon-efficient mode of transport available, and with the transport sector overtaking the energy sector to become the UK's largest carbon emitter for the first time in 2017, there has never been a more urgent time to act.

### Environment

HS2 will contribute significantly to decarbonisation within the transport sector once operational. But we know that it's not just about what we build, but also how we build it. HS2 will leave a footprint on the British countryside, but it is something that we can carefully manage. In many cases, we'll be able to leave behind bigger and better habitats, environments and public spaces than those that were used previously.

To create HS2's green corridor, we will be planting seven million trees and shrubs along the line of route. Between London and the West Midlands, we aim to create over 9km<sup>2</sup> of new native woodland, featuring over 40 different species of trees, all of which are brought grown for us here in the UK – including species native to each area we cover.

Along with our community initiatives, they are the first step towards our ambition to generate a positive legacy for communities, protecting and enhancing wildlife habitats while integrating the railway into the landscape.

We have already awarded £1.6 million to projects along the HS2 route, helping landowners to fund



Freight at DB Cargo UK, Britain's UK's largest rail freight company, 2019.



the creation of sites around new woodland and to restore plantations on ancient woodland sites. Managed by The Forestry Commission, the funding available will create approximately 110 hectares of new woodland and an additional 160 hectares of restored ancient woodland.

We also have a team of expert ecologists within HS2, helping us to make positive changes for biodiversity along the route and ensuring that the HS2 legacy of creating bigger, better, more joined up spaces for wildlife and people becomes a reality.

Having received permission to issue Notice to Proceed, it is now more important than ever for HS2 to lead the way in sustainability within the construction industry. Minimising our carbon footprint across all stages of delivering the railway is extremely important and we are dedicated to protecting the environment wherever possible, while supporting our communities and local economies.

Furthermore, as our construction activities increase, we are reviewing the scope of our environmental sustainability reporting and options for more comprehensive reporting of Project data are actively being considered for 2020/21, including the introduction of a new, standalone Environmental Sustainability Report.

## Corporate social responsibility

Our Responsible Business Strategy outlines what we stand for and the four key areas of responsible business that are important to us and our communities. We are committed to supporting these crucial areas of social mobility; skills, education and employment; environment; and communities through employee fundraising, charity partnerships and by embedding them in our own policies and procedures.

We are supporting social mobility by helping our employees and communities to gain knowledge and achieve new goals. At one of our charity partnerships, the Social Mobility Foundation (SMF),

employees can volunteer or mentor students on its 'Aspiring Professionals' Programme. We also invite SMF students to take part in work experience weeks at HS2, hosting a range of interactive workshops.

HS2 is already creating thousands of new jobs, including opportunities for under-represented and vulnerable groups. Our Skills, Employment and Education (SEE) team's inspirational outreach and workplace support activities help people achieve their full potential, leaving a legacy of highly skilled and diverse employees able to deliver future infrastructure projects across a variety of disciplines.

Working with the charity Groundwork and our contractors, we encourage employees to take part in environmental improvement projects in communities along the HS2 route. All volunteering work is aligned to our 'green corridor' concept, which ensures the design of the railway respects its surroundings, provides a net gain to the environment and benefits local communities.

Our employees also volunteer for local charities and groups that deliver services and support in our communities. Since January 2019, staff have been using their paid volunteering day to help our chosen charity, Rethink Mental Illness, make sure that everyone affected by severe mental illness has a good quality of life.



Phase 2b engagement team volunteering day in Leeds.



**HS2 workforce exceeded industry benchmarks at the end of 19/20 with 36% women, 19% BAME and 18% of staff having moderate or substantive workplace adjustments.”**

**Source:**  
EDI Annual Report 19/20



Preet Kaur Gill MP (second left) meets HS2 and LM engineers at Curzon Street.

# Building Britain's future

## Skills, Employment and Education (SEE)

A lasting skills, employment and education legacy is critical to achieving our vision for HS2 – being a catalyst for growth across Britain and creating opportunities for people and businesses across the UK. In September 2018, we set out our SEE strategy, to maximise the benefits of increased skills and employment across the rail and wider engineering and infrastructure sectors.

### Skills legacy

It is important that we create an engaged and highly skilled workforce, leaving behind a skills legacy that raises standards across the transport sector. We are proud to continue working with the National College for Advanced Technology and Infrastructure (NCATI) and our collaboration with our supply chain on skills and apprenticeship programmes are continuing to deliver results – we welcomed our 350th apprentice onto the Project in 2019.

Through our Future Talent Strategy we have shown an award-winning commitment to equality, diversity and inclusion (EDI), and we will continue to embed EDI principles into our workforce, design and operations, community engagement and supply chain. The representation of women and BAME individuals at HS2 Ltd was above the industry average in 2019 and we were awarded a 'Most Engaged Employer' award by Women into Construction, two Disability Confident awards, two awards from Recruitment Industry Disability Initiative (RIDI) and two from the Employers Network for Equality & Inclusion (ENEI) in 2019.

Our targets through to 2021 aim to improve the gender balance of the HS2 workforce to 40% female, and improve BAME representation to 21%.

### Opportunities in the supply chain

We will be creating 2,000 apprenticeships in the rail and construction sectors over the lifetime of the Project and we are launching a job brokerage service later this year to ensure that those

opportunities are visible to as wide a pool of talent as possible. SEE is integral to all our major contracts, with measurable 'SEE outputs' in over 30 contracts along the HS2 route. A supplier community forum has also been launched, where our supply chain SEE and EDI co-ordinators can share best practice.

### Interest in STEAM and talent pipeline

We understand the importance of the education of young people in Science, Technology, Engineering Arts and Maths (STEAM) subjects and we have rolled out a series of primary and secondary school programmes designed to inspire and engage children in these areas. We delivered over 100 STEAM workshops in 2019/20, engaging with over 5,000 students. We have also created 65 work experience opportunities that were awarded to students – 72% identifying as BAME, 35% as female and 12% as having a disability.

### Economic and regeneration benefits

Our skills managers are working closely with major local and regional stakeholders to maximise the economic and regeneration benefits of the HS2 Programme in local communities, as well as along the line of route and across the UK. We are on track to deliver our skills requirements in accordance with our SEE Undertakings and Assurances, and continue to broker meaningful engagement between our supply chain and stakeholders.

### Supporting the economic response to COVID-19

The impact of the COVID-19 pandemic on jobs and studying has been immense, but we are making sure that our programme aids recovery in the years ahead. With a sharper focus on job brokerage, we will continue to help individuals from disadvantaged backgrounds and under-represented groups access job opportunities, along with younger employees who are more likely to have lost work due to pay cuts or furloughing. Our partnerships with commissioners and delivery bodies will be even more critical and we will push forward with supporting procurement and educational programmes to ensure that the right skills are developed, at the right time, to make HS2 the best it can be.



Emma Head  
Safety and As

HS2 Together 2020



HS2 Together Health and Safety supply chain conference, March 2020.

# Building Britain's future

## Health and Safety – transforming Safe at heart

At the beginning of the Programme we set a strategic goal to establish a better standard for Health and Safety in the delivery of a major programme. If we settle for current best practice, our legacy might be three deaths, more than 700 non-fatal injuries and more than 5,000 illnesses caused or worsened through work. This is not a legacy we want. We are determined to raise the bar higher than any other mega-project. We have the power to deliver a project with the best health, safety and wellbeing the UK has ever seen.

Early in 2020, leaders across the Programme committed to a real step change that will not only underpin exceptional performance on the HS2 Programme, but will change the face of our industry for the better. The COVID-19 crisis has also brought the need to care for our people into sharper focus and gives even greater significance to being Safe at heart.

### Creating shared accountability

We have created a refreshed Safe at heart approach that makes clear our priorities as individuals, as teams and organisations, and as a collective. Safe at heart has been brought to life with three simple statements: I care. You count. We matter.

**I care** is about having individual accountability. It means caring about ourselves, our colleagues and everyone affected by HS2. Creating a Safe at heart environment starts with the individual.

**You count** refers to accountability at a team and organisational level. In practice this means making sure that every decision and action we take counts.

**We matter** embraces the power of collective accountability, achieved by recognising that what we do matters to the future of our industry and country. By learning, sharing and innovating together, we have the power to create a history-making legacy for our industry, country and health, safety and wellbeing.

### The Safe at heart journey

Transforming our delivery is a five-stage journey which will take place in 2020 and 2021.

#### 1. Planning and aligning (January to February 2020)

Aligning and unifying senior leaders around the Safe at heart transformation vision, wherein we aspire to the possible rather than settle for the predictable.

#### 2. Developing (March 2020)

Sharing the vision with around 300 leaders at the HS2 Together 2020 conference and identifying what is required of leaders to make the Safe at heart commitment a reality. Developing personal commitments within leadership teams and tiers.

#### 3. Cascading and refining (April to Sept 2020)

Creating programme-wide alignment and final development of the Safe at heart transformation plan through commitment workshops with leadership teams.

#### 4. Engaging and embedding (Sept to March 2021)

Rolling out the commitments and transformation plans to embed a Safe at heart mindset and culture, delivered by leaders with the capability to engage, inspire and embed Safe at heart to every team across the project workforce.

#### 5. Measuring and improving (March 2021 onwards)

**I care** – Each person at HS2 will have a plan for actively looking after their wellbeing, as well as being aware of the wellbeing of others. They will be encouraged to develop and explore more ideas for improving team wellbeing and considering it in their work.

**You count** – Teams across HS2 Ltd will connect, share ideas, seek feedback and involve each other in ways to improve health, safety and wellbeing.

**We matter** – Sharing case studies and stories emerging from across the Programme showcasing Safe at heart innovation, best practice and learning. Our staff, contractors and supply chain will be aware of the importance of, and proud to make, legacy contributions – the development of bar-raising initiatives that will change the face of the industry.



“

**The industry estimates it will need an extra 50,000 trained construction workers.”**

**Chris Luty**

Group CEO for BCTG Group, 2020



HS2, partners and stakeholders hold a seminar to improve mental health practices across the industry, 2019.

# Building Britain's future

## Learning Legacy

The HS2 Learning Legacy aims to raise standards within the construction industry by collating and sharing professional knowledge, good practice and lessons learned. It builds on the learning legacies of London 2012, Crossrail and Thameslink, adding to the existing body of knowledge on major construction projects while improving UK productivity and showcasing UK plc.

### Why are we doing it?

The Learning Legacy aims to capture insight into the Project and allow us to reflect on what went well and what went wrong, along with providing supporting data and documentation to enable future projects to adapt their approach. It also connects people – those who have the knowledge with those that need the knowledge – sharing expertise within the industry.

### What are we doing?

Having launched internally in March 2020, great progress is already being made in developing this learning legacy within HS2. An initial 50 papers from industry journals and conferences have been identified and we aim to publish these on the HS2 Learning Legacy website, taking the first steps towards building a complete HS2 professional portfolio.

Our Technical Papers Competition is an area of learning legacy that focuses specifically on technical content and is run as an annual competition. Launched through our Innovation Hub in April 2020, the competition received 120 abstracts from across HS2. The full papers are to be drafted by August 2020, with the winners announced later this year. All papers will be published in the first of a series of industry-published books.

A Learning Legacy Development Hub has been established to provide guidance and support to the supply chain. In addition, we are in the process of setting up a 'Learning Legacy Oversight Panel', which will provide oversight and guidance to the development and dissemination of the learning legacy. It will include representation from industry associations including the Department for Transport, the HS2 supply chain, HS2 Ltd Board and wider HS2 members.

We are currently designing the HS2 Learning Legacy website, where our full learning legacy will be published. Once launched, we will actively share this information widely with industry. To do so, we are developing partnerships with industry bodies and setting up a Learning Legacy Ambassador Programme to support HS2 Ltd staff and encourage them to share their experience and expertise with others at industry events.

### Future plans

Over the next three years, we will continue with the Annual Technical Papers Competition, as well as routinely publishing content on the HS2 Learning Legacy website every six months. This content will also be shared in its entirety with the Major Projects Knowledge Hub. In addition, six-monthly schedules of events, in partnership with industry, will be put in place to facilitate conversations and allow for greater sharing of knowledge between bodies.

Despite hitting its 10-year milestone in 2019/2020, HS2 is implementing a learning legacy at an early stage in its lifecycle, and is the first major project to do so. We are dedicated to creating a valuable learning legacy and will work closely with contractors, industry partners, government bodies and the wider industry to capture the lessons learned and document best-practice examples and innovations for the benefit of future projects.



## Case study

# Creating opportunities where it matters most

Five people have landed new jobs to escape the downward spiral of homelessness and unemployment, thanks to a training programme funded by the West Midlands Combined Authority (WMCA).

The WMCA has joined forces with homelessness charity Crisis, training provider RMF Construction and employer L Lynch Plant Hire & Haulage (Lynch) in a pilot scheme to help some of the most vulnerable people in society.

All the learners, who are being supported in temporary accommodation in Birmingham, were referred by Crisis to the WMCA's innovative Construction Gateway programme.

After a six-week course, covering topics such as site safety and how to operate a range of machinery, the group have secured new jobs and are working on major projects across the region, a large part of which is the HS2 station site at Curzon Street.

Andy Street, the Mayor of the West Midlands, said: "The construction industry in the West Midlands will need 50,000 more trained staff by 2030, and so we must make sure local people have the skills to fill these jobs."





One of the learners on the scheme, Robert Long, said: "I've never been given an opportunity to have long-term, secure and steady work like this before."

The Construction Gateway provides learners with an introduction to construction skills and guarantees them a job interview on completion of the course.

After completing the course, they are supported on their journey to work through the National Careers Service for as long as they need, regardless of whether their first interview is a success.

So far, 1,403 people have been through Construction Gateway training since summer 2018, with 627 people having successfully moved into employment after completing the course.



**I'm delighted that we've been able to take five people out of the vicious circle of homelessness and unemployment."**

**Andy Street**  
Mayor of the West Midlands



Glasgow  
Motherwell

Edinburgh

### Scotland

HS2 is part of a coordinated plan to improve Scotland's rail network and economic potential. The Scottish Government is working with Transport Scotland and HS2 to take advantage of the extra capacity and connectivity that HS2 will bring.

Lockerbie

Newcastle

Carlisle

Durham

Penrith

Darlington

Oxenholme

### Headland Archaeology, Edinburgh

Headland Archaeology is working in partnership with MOLA as MOLA Headland Infrastructure (MHI) and is delivering packages of archaeological work across the Phase One route.

Lancaster

Leeds

### Cumbria

In Carlisle, the Station Gateway Plan to make the station an integrated hub with HS2 could add an additional £40 million a year to the local economy.

Preston

Manchester  
Piccadilly

Wigan

Manchester  
Airport

Warrington

Macclesfield

Liverpool

Runcorn

Crewe

Stoke

### Palmers Scaffolding, Flintshire

Palmers Scaffolding is one of 20 companies based in Wales that has won work on the HS2 Project. They built the encapsulation structure at St James's Gardens that was required for the archaeological excavation of a historic burial ground.

### West Midlands

Deutsche Bank, Jacobs Engineering and the retail banking arm of HSBC have relocated to Birmingham, with PwC significantly expanding its presence on the promise of HS2. The West Midlands Combined Authority HS2 Growth Strategy has the potential to add £14 billion to the regional economy.

Stafford

## We are

# levelling up Britain

HS2 is the only shovel-ready project that has been specifically designed to drive investment into the heart of the country. Cities across the country are already developing their urban strategies, and receiving private investment, on the assumption of HS2 being completed in full.

HS2 is the most important economic regeneration project for decades.

### CA Blackwell Ltd, Durham

Specialist earthmoving contractor, CA Blackwell (Contracts) Ltd is working with HS2 Main Works Civils Contractor EKFB to carry out specialist earth movements in Buckinghamshire. The company plans to create 500 new jobs.

### Key

- HS2 Phase One
- HS2 Phase 2a
- HS2 Phase 2b
- HS2 services on existing network
- ○ ○ Destinations served by HS2

### Cleveland Bridge UK Ltd, Darlington

Cleveland Bridge has supplied huge steel beams for a 67-metre bridge over the M42 motorway and over 1,000 tonnes of steel girders for the first of four modular bridges being built at the Interchange site.

### Yorkshire

Leeds City Region predicts its HS2 Growth Strategy will create around 40,000 new jobs and a £54 billion boost to the regional economy by 2050. HS2's development alone will double the size of Leeds city centre.

### 3Squared, Sheffield

This technology company is working with SCS JV to supply its RailSmart software, providing a supply chain management system to show live performance, cost management information and operational control data.

### Bridgeway Engineering, Nottingham

Bridgeway Engineering is working on the HS2 Project between London and Birmingham, providing engineering surveys and ground investigation work. The HS2 contract has enabled the company to create training opportunities for over 60 employees.

### Crowders & Sons, Lincolnshire

Crowders Nurseries is a family-owned grower of native and ornamental trees, shrubs and plants. It was awarded the contract to provide 7 million trees and shrubs for the HS2 Phase One route. It is the largest contract in its history.

### Littlewood Fencing, Sussex

Littlewood Fencing Ltd is an SME with its head office at Battle, East Sussex. It provides high-security fencing, acoustic barriers and vehicle safety barriers as well as the associated civil and ground works.

York

Sheffield

Chesterfield

East Midlands Hub

Birmingham Interchange

Birmingham Curzon Street

Old Oak Common

London Euston



We are

# bringing Britain closer together

With faster journey times, HS2 will transform how we think about travelling around Britain.



## Travel times from Birmingham Curzon Street

Destination	Current time	HS2 time	Saving
Manchester Airport	98 mins	32 mins	66 mins
Manchester Piccadilly	87 mins	41 mins	46 mins
Glasgow	240 mins	200 mins	40 mins
Preston	96 mins	50 mins	46 mins
Carlisle	164 mins	120 mins	44 mins
East Midlands Hub	N/A	20 mins	N/A
London	82 mins	45 mins	37 mins
Leeds	118 mins	49 mins	69 mins
Newcastle	166 mins	117 mins	49 mins

**Key**

- HS2 Phase One
- HS2 Phase 2a
- HS2 Phase 2b
- HS2 services on existing network
- Destinations served by HS2



**Travel times from London Euston**

Destination	Current time	HS2 time	Saving
Manchester Piccadilly	125 mins	71 mins	54 mins
Glasgow	269 mins	226 mins	43 mins
Preston	128 mins	78 mins	50 mins
Carlisle	197 mins	143 mins	54 mins
East Midlands Hub	N/A	52 mins	N/A
Birmingham Curzon Street	82 mins	45 mins	37 mins
Leeds	133 mins	81 mins	52 mins
Newcastle	169 mins	137 mins	32 mins
Sheffield Midland	119 mins	87 mins	32 mins
Liverpool	132 mins	94 mins	38 mins
Stoke-on-Trent	84 mins	70 mins	14 mins





## Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

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

Telephone: 08081 434 434

General email enquiries: [HS2enquiries@hs2.org.uk](mailto:HS2enquiries@hs2.org.uk)

Website: [www.hs2.org.uk](http://www.hs2.org.uk)

High Speed Two (HS2) Limited has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the HS2 website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact High Speed Two (HS2) Limited.

© High Speed Two (HS2) Limited, 2020, except where otherwise stated.

Copyright in the typographical arrangement rests with High Speed Two (HS2) Limited.

This information is licensed under the Open Government Licence v2.0. To view this licence, visit [www.nationalarchives.gov.uk/doc/open-government-licence/version/2](http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2) **OGL** or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or e-mail: [psi@nationalarchives.gsi.gov.uk](mailto:psi@nationalarchives.gsi.gov.uk). Where we have identified any third-party copyright information you will need to obtain permission from the copyright holders concerned.



Printed in Great Britain on paper  
containing at least 75% recycled fibre.



I care. You count. We matter.



