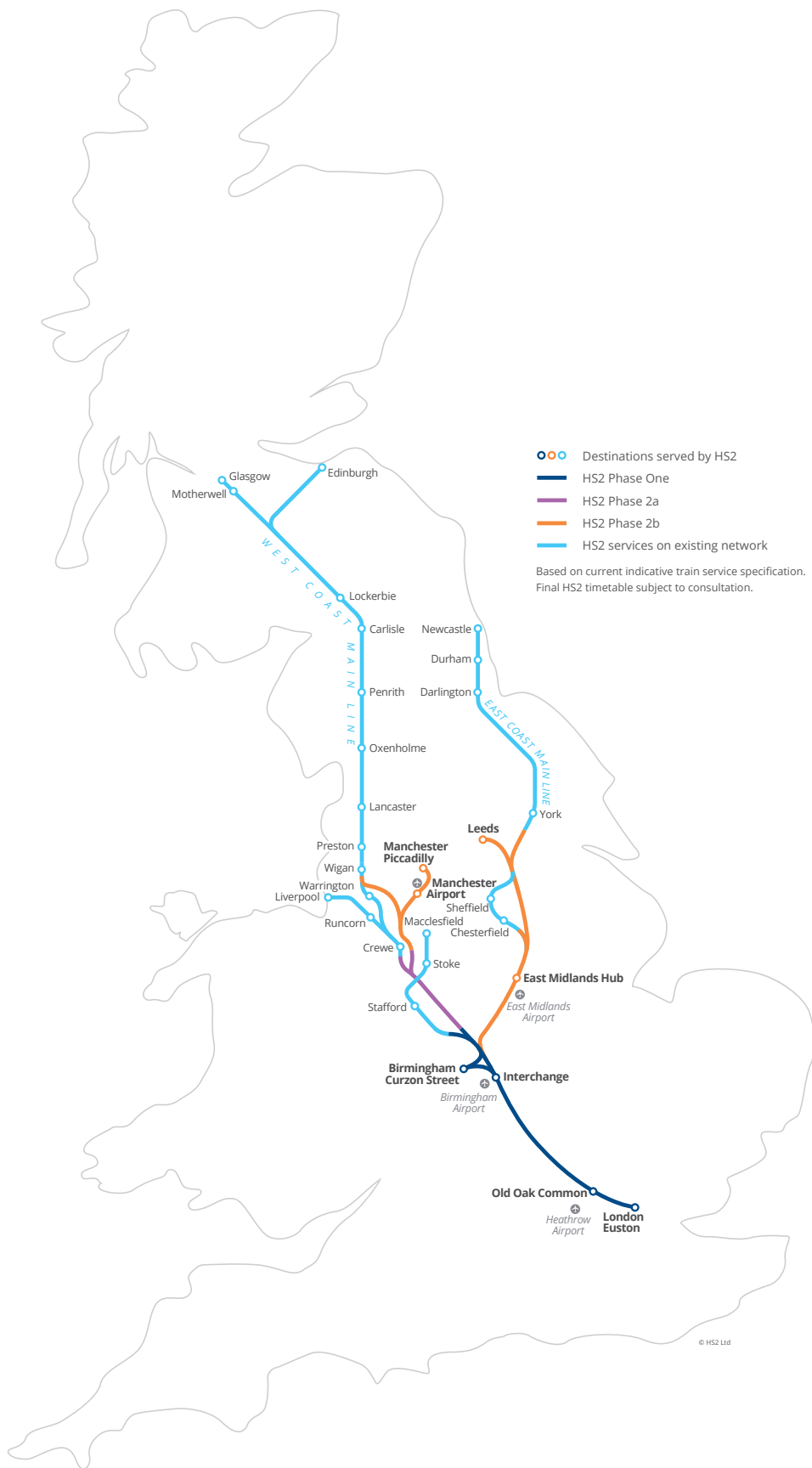


# HS2

# Corporate Plan

2021 – 2024





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## Chair's foreword



The Covid-19 pandemic is set to leave an indelible mark on the country. As we cautiously and carefully come out of lockdown, we all have a new appreciation of the benefits of social contact and new possibilities for the working environment. The UK economy faces some serious challenges. Not just adjusting to the impact of the pandemic, but also to the impact of Brexit on our economy and Britain's new path in the international markets. In this context, the importance of building a transformational railway has never been more critical.

HS2 remains at the forefront of the Government's plans to level up the economy, creating the low-carbon infrastructure of a national transport system that will support new jobs, new careers and new opportunities. HS2 will underpin the construction industry for generations, improving standards, fuelling new innovation, products and processes that will help Britain to 'build back better'. We have already created new jobs and new careers. Our workforce across the programme continues to grow – by more than 6,000 in this last year – to more than 16,000 now. This includes 650 apprentices starting their careers with us.

**“HS2 will underpin the construction industry for generations, improving standards, fuelling new innovation, products and processes that will help Britain to 'build back better'.”**

Critically, we are delivering a core asset for Britain's zero-carbon future – low-carbon rail that will take planes out of the sky and vehicles from our congested road system. It's not just the HS2 infrastructure – HS2 creates space for more local, regional, commuter and freight trains, making rail more attractive across the country as a whole and encouraging a shift from more polluting forms of transport. Our ambition is to build the most sustainable railway of its kind in the world. We are helping to move Britain to a cleaner, greener future. This includes our Green Corridor programme which will run alongside the railway, creating a network of bigger, better-connected, climate-resilient habitats and new green spaces for the community. We have already started planting new woodlands and we are creating new ponds, grasslands and meadows, with many new habitats flourishing.

During the last year, we have achieved many of our major delivery milestones. Inevitably, Covid-19 has had an impact on schedule, cost and productivity but the programme remains on schedule.

Pressures and risk remain but the stability of the programme has been hard-earned and over the next decade we intend to meet our targeted commitments. The construction of Phase One is gathering momentum. With about a third of the route between Birmingham and London underground, the start of tunnelling marks a major step forward. We have awarded the construction contract for Curzon Street station and this will be followed by Interchange next year. We are also preparing to welcome our rolling stock partners on board. Phase 2a has been approved by Parliament and the first contracts already awarded. This marks the beginning of HS2's journey from the Midlands to the North, followed closely with the deposit of our next hybrid Bill to Parliament, to take the route into Manchester, expected early in 2022.

**“During the last year, we have achieved many of our major delivery milestones.”**

As construction of Phase One progresses, we appreciate, now more than ever, the impact our work has on people's lives, businesses and local communities. We must deliver our railway respectfully and work closely with communities and our partners to build in a responsible manner. Our performance has not always met our expectations and therefore we must strive to improve, whether it is cutting the time it takes to settle compensation claims, or the support we offer to families and businesses. I expect the new specialist teams organised along the Phase One route to help to improve our performance, making sure that we listen and act effectively in the future.

**“It has been an absolute privilege to serve as Chairman of HS2 since 2018.”**

I step down as Chairman at the end of July 2021, but HS2's journey is just beginning. As the route progresses to the North, I will continue to follow the success of the programme in the coming years. It has been an absolute privilege to serve as Chairman of HS2 Ltd since 2018.

**Allan Cook**  
Chair

# Chief Executive Officer's introduction



The nation has endured an incredibly challenging year, in which almost every part of daily life has been affected. Despite the challenges presented by the pandemic, we have accelerated construction of HS2 between the West Midlands and London and received Parliament's support to extend the route north to Crewe.

The safety of our workforce and our communities is at the heart of everything we do and I want to pay tribute to the 16,000 staff across the Project for the huge accomplishments they have achieved this year, adapting to new ways of working and keeping HS2 on track.

It is vital that HS2 continues to play its part in the nation's economic recovery as we 'build back better'. In April 2020, we issued Notice to Proceed, where we signed £12 billion of contracts with our main civils contractors. That investment is now flowing through the supply chain to every corner of the UK to a diverse range of businesses, small and large, supporting jobs and creating opportunity.

Following the formal start of construction in September, we now look ahead to launching a fleet of tunnel boring machines that will create 32 miles of tunnels between London and the West Midlands; starting construction at stations in Birmingham and London that will be catalysts for new local jobs and regeneration; and will welcome new colleagues to the Project as we grow to our peak workforce of more than 30,000 people.

**“ Investment is now flowing through the supply chain to every corner of the UK to a diverse range of businesses, small and large, supporting jobs and creating opportunity.”**

This was the year when, for many of us, HS2 firmly moved from concept to reality as we ramped up delivery on the ground. As we look forward, our commitments to safety and the environment, mitigating cost pressures, better community relations and pushing our supply chain to deliver to schedule will inform everything we do.

## Scale and progress

Momentum is building around the Project.

Our early works programme is nearing completion now, with the majority of demolitions and site clearance completed. This has helped pave the way for our main works contractors to mobilise at an unprecedented scale. We are now working to deliver HS2 at more than 300 sites. Recognising our commitments to biodiversity, we have already planted more than 700,000 trees and shrubs along the Phase One route. We will plant a total of seven million as part of the Green Corridor we are creating between London and Birmingham.

The first of the 10 tunnel boring machines (TBMs) we will use on Phase One have arrived in Buckinghamshire and Warwickshire and our first TBM, Florence, has started to tunnel under the Chilterns. Over the three years covered by this Corporate Plan, we will tunnel continuously, 24 hours a day, seven days a week, to complete the 10-mile Chilterns tunnel, the longest on the network.

In addition, piling work has started on one of our largest overground structures – the two-mile (3.4km) Colne Valley viaduct. Over the next year, we will construct 292 piles, some as deep as 55 metres into the ground, to support the viaduct piers.

We also have planning approvals in place for our station designs at Curzon Street, Interchange and Old Oak Common. Delivery at these key station sites will act as a further magnet for investment, new jobs and regeneration in the surrounding areas.

Similarly, our rolling stock tenders for Phase One are entering the final stages, with the contract award later this summer. This £2.75 billion contract will support the design, manufacture and maintenance of HS2 trains here in the UK through the next decade and beyond, further boosting jobs and skills nationally.

HS2 will play a vital role in levelling up the country by better connecting our towns and cities in the Midlands and the North, bringing with it new jobs, regeneration and cleaner transport. Parliament's support for the Phase 2a hybrid Bill at the beginning of the year sent a clear signal of the commitment to deliver the benefits of HS2 to the North as soon as possible. Over the year ahead, we will start to stand up our delivery model to support the construction of the route to Crewe, learning from our experiences of Phase One to ensure maximum value for money for the taxpayer.

**“HS2 will play a vital role in levelling up the country by better connecting our towns and cities in the Midlands and the North, bringing with it new jobs, regeneration and cleaner transport.”**

Following closely behind Phase 2a will be the deposit of our next hybrid Bill for the route into Manchester expected in early 2022.

### Supporting communities

As momentum builds in construction, we are of course aware that HS2 is becoming an ever-increasing reality to our communities. Reflecting on the challenges of Covid-19, it is important to recognise that communities will have found it doubly hard spending more time at home, where the noise or disruption from construction may be acute. It has also presented engagement challenges as we have had to move away from face-to-face to online community meetings.

# Chief Executive Officer's introduction continued

We recognise that there will always be areas where we could do more to support residents, and we are committed to improved sensitivity and responsiveness to concerns and complaints. Given the national significance, scale and complexity of HS2, the standards to which we hold ourselves and our delivery partners need to continue to be the very highest.

As we aspire to meet this ambition in the year ahead, we will be strengthening our approach to engagement. New area-based delivery unit managers will help to join up construction contractors and communities, to prevent and resolve local issues. As these new delivery units start to mobilise, we will continue to engage, listen and learn from our communities to ensure they feel supported and heard.

## Set up for success

As the Project has matured over the past year, so has our organisation. It has been one of my priorities as CEO to ensure our delivery body is fit for purpose, with the right capabilities in place to succeed. A condition of us giving Notice to Proceed last year was demonstrating to the Government the capabilities of the organisation. We have continued to strengthen our systems and processes. This will be a continuing process of adapting the organisation as the programme requirements change through the years ahead.

Key to our capability as an organisation is the talent of the people who work here. The global pandemic and remote working have been difficult for many. We have worked hard to ensure we support the wellbeing of our people. They have shown remarkable resilience, with an ability to innovate and adapt as circumstances change.

Looking ahead, it is our ambition to continue to cement our position as an employer of choice. We have made a commitment to put inclusivity at the heart of our work, becoming the only organisation in the UK to have achieved the Clear Assured Platinum Standard accreditation for equality and diversity. Over the lifetime of the Project, we will keep striving to address the ethnic and gender imbalances inherent across the construction and rail engineering sectors, as well as actively aiming to recruit more disabled workers into roles right across the programme.

**“The only organisation in the UK to have achieved the Clear Assured Platinum Standard accreditation for equality and diversity.”**

We have also renewed our commitment to sustainability and carbon reduction this year by establishing a new Environmental Sustainability Committee to strengthen oversight and reporting. The committee will publish its first Environmental Sustainability report in the autumn.

## Acknowledgements

It is important to acknowledge the part others have played in the programme's success. Since his appointment at the start of 2020, the HS2 Minister, Andrew Stephenson MP, has played a key role in supporting and challenging us, for which I am grateful. As we continue implementing the recommendations from the Minister's Land and Property Review 2020, we will improve how we interact with and support residents whose homes are affected by HS2. The Minister's six-monthly reports are ensuring Parliament has clear visibility of the progress we are making and our performance against cost and schedule.



The two Independent Commissioners, Sir Mark Worthington and Debbie Fazan, have also played an important part to ensure we live up to our obligations to deliver the railway in a sensitive manner and minimise impacts on the community.

Ahead of his departure later in the year, I also want to recognise the crucial role the Chairman, Allan Cook, has played in supporting me, my Executive team, and the programme over the past three years. His leadership has brought stability to the organisation during a time of transition, not only through his work on the Chairman's Stocktake, but in expanding the Board's expertise and oversight role and in challenging the company to go further on its environmental and diversity commitments.

### **Delivering benefits now**

With HS2 services due to start in a decade, construction means the Project's benefits are being realised today. Whether it is steel from Darlington, modular buildings from Port Talbot or software engineers from Glasgow, you can be sure businesses from all over England, Scotland, Wales and Northern Ireland are benefiting from HS2 with local jobs and investment.

“

**You can be sure businesses from all over England, Scotland, Wales and Northern Ireland are benefiting from HS2 with local jobs and investment.”**

HS2 is a national endeavour, supporting our nation's recovery and backing a long-term investment in new, low-carbon public transport for the country. This year we have seen an increase in protester activities, though even with some notable disruption around Euston, our ability to manage these situations safely and effectively has meant we have not seen any significant delays to the construction programme. Our approach to innovation, in supporting a digital, low-carbon construction sector, is seeing tangible benefits that will create a lasting legacy for future infrastructure programmes.

“

**Supporting our nation's recovery and backing a long-term investment in new, low-carbon public transport for the country.”**

Through our community funds we have already contributed more than £9 million to 161 local projects. With Phase 2a Royal Assent, a further £5 million of community funds will become available, making a total fund of £45 million for local communities to access.

Our ambition is to continue to do more to support the environment. HS2's Green Corridor will create a positive, long-term legacy for the natural and historic environment of this country and our programme of habitat creation is well underway.

Whilst the scale of HS2 will continue to present challenges in its delivery, we are determined to meet those challenges and balance the complexity of the construction programme with the needs of local communities and the impact on the environment.

**Mark Thurston**

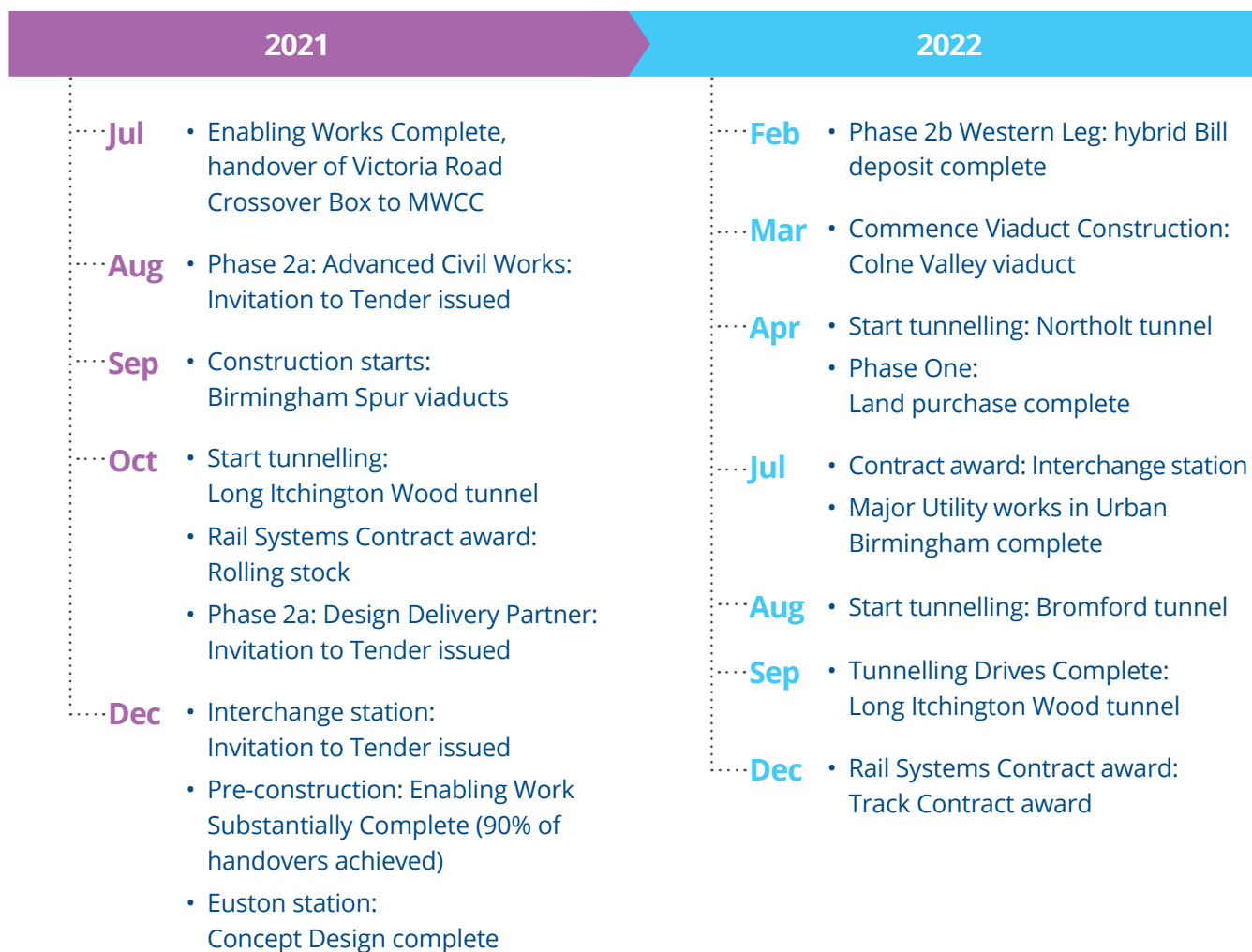
Chief Executive Officer

# Project milestones

We are hitting major Project milestones at regular intervals as the pace of construction steps up along the Phase One railway between the West Midlands and London.

At the same time, we are looking to put in place the early civils work package to clear the ground between Crewe and the West Midlands for Phase 2a, delivering the benefits of HS2 further north faster, and preparing the legislative programme for the Phase 2b western leg, extending HS2 to Manchester.

In the last 12 months, our milestones have included gaining Royal Assent for Phase 2a, the start of tunnelling operations under the Chilterns and

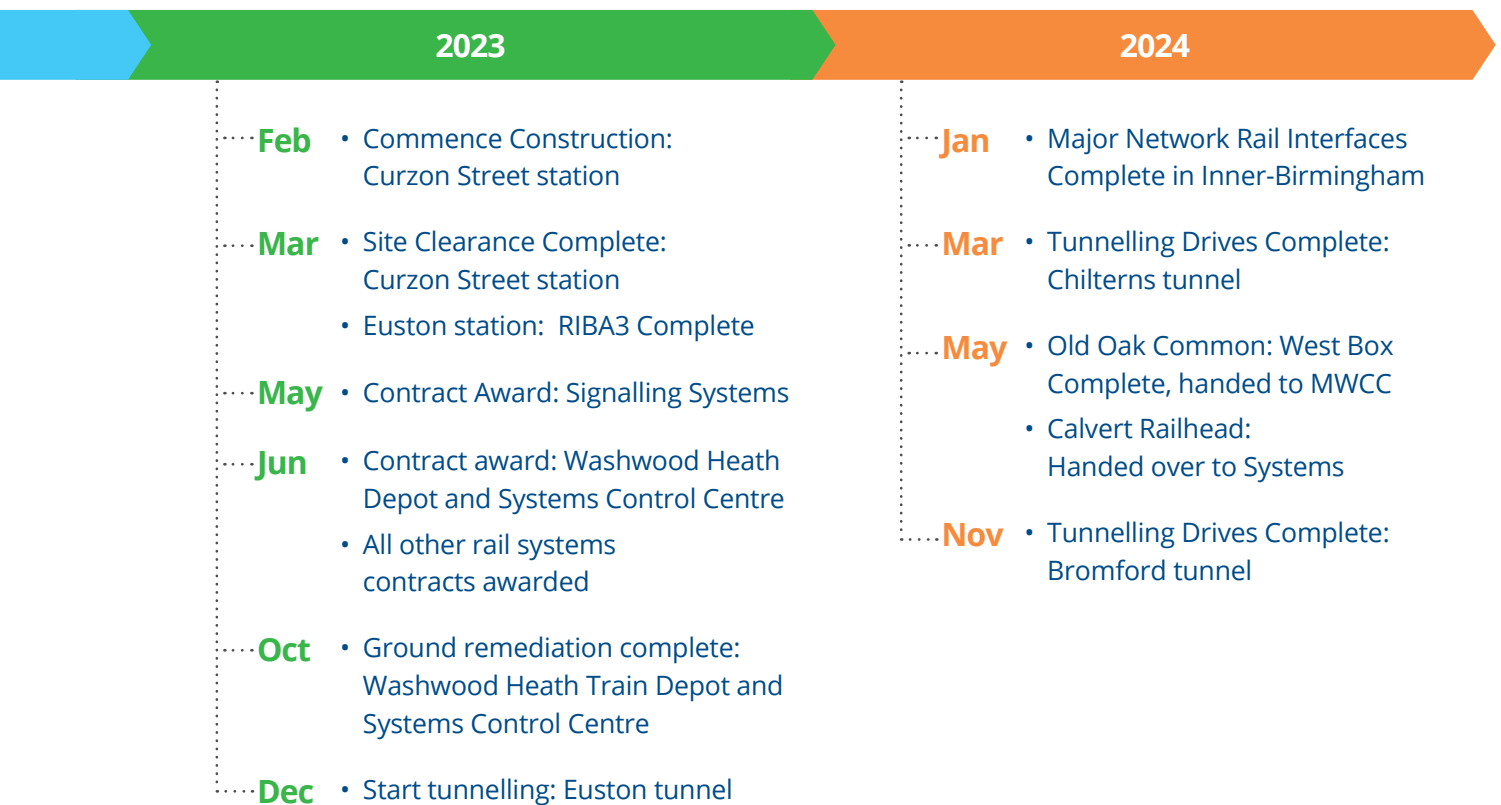


awarding the contract to build Curzon Street station in Birmingham, a move that will create more than 1,000 jobs. We are on target to begin construction of Curzon Street next summer.

Over the next three years, we will see significant 'on the ground' progress in our Main Works Civils Contracts on Phase One as we embark on some of the most complex civil engineering schemes of the high-speed rail network. We will start building the tunnels at Long Itchington Wood (Warwickshire),

Northolt (London), Bromford (Birmingham) and Euston (London) in a phased programme throughout 2021 to 2024.

We will complete one of the biggest land acquisitions ever undertaken in the UK when we conclude the land purchases for Phase One in April 2022. We will also prepare the way for the next stage of our land assembly programme when we deposit the hybrid Bill for the Phase 2b western leg, expected early next year.





Tunnel boring machines  
at HS2 South Portal



## Review 2020 – 2021



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# Our strategic goals

Our seven strategic goals inform our daily work and long-term planning as we design and build Britain's new high-speed rail network.

They highlight the benefits HS2 will bring to people and places throughout the UK: rebalancing the economy, boosting rail capacity and connections, providing new jobs and combatting climate change.

Our goals also underline our responsibilities – to taxpayers, the Government and the people most directly affected by our works – as we build HS2.



**Strategic goal 1:**

We will be a catalyst for economic growth.



**Strategic goal 2:**

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



**Strategic goal 3:**

We will be good neighbours and protect the natural environment.



**Strategic goal 4:**

We will foster skills and create and sustain employment opportunities.



**Strategic goal 5:**

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



**Strategic goal 6:**

We will deliver value for money to the taxpayer.



**Strategic goal 7:**

We will set new standards for customer experience.

## Review 2020 – 2021

Major challenges are to be expected on a project of the ambition and scale of HS2 and yet 2020 was a year like no other. The Covid-19 pandemic fundamentally changed the way we live and work; and it put Britain's high-speed rail programme at the heart of our national economic recovery.

In April, we issued Notice to Proceed (NtP) to the four Main Works Civils Contract Joint Ventures (MWCC JVs) and moved from scheme design and site preparation to full detailed design and construction of the Phase One route between London and the West Midlands. As we ramped up construction we embraced new ways of working in the face of Covid-19, redoubling our efforts to deliver the benefits of the Project. Safeguarding the physical and mental wellbeing of thousands of contractors, supply chain workers and office-based teams remains a priority.

We have awarded contracts valued at £17 billion since 2016 including 54 high-value contracts worth more than £5 million. We remain focused on delivering value for money for taxpayers. In 2020, we awarded 12 contracts including pre-cast slab track, commercial delivery and controls framework, and cross passage doors totalling more than £400 million. Dismissing a claim by Bechtel, the High Court confirmed we acted in accordance with the rules of the tender process for Old Oak Common station and we will imminently start formal construction of our west London super-hub station. There are 17 contracts at pre-qualification questionnaire (PQQ) or invitation to tender (ITT) stage, totalling nearly £7 billion, and 39 contracts are in our pipeline pending the start of procurement. We expect 26 of these contracts to be awarded in 2021 and six in 2022 as we invest in Britain's economic recovery and creating jobs.

### Improving our service to communities

We rolled out new ways of communicating with our communities and stakeholders to make sure they were kept informed throughout the pandemic. We remained available at all times: the HS2 Helpdesk, our 24/7 point of contact for the public, suffered no break in service despite a 21% increase in calls from 35,358 in 2019 to 42,888 in 2020. The highest number of queries was about land and property – representing 44% of contacts between July and December 2020.

**“We rolled out new ways of communicating with our communities and stakeholders to make sure they were kept informed throughout the pandemic.”**

Online engagement became the norm after face-to-face meetings were put on hold. We have run virtual key design events and exhibitions, community drop-in sessions and webinars on topics ranging from archaeology to business opportunities. More than 1,500 online engagements were held in connection with HS2 between April 2020 and March 2021 and more than 9,300 people took part. The number of visits to our 14 local community websites increased by 33% to 198,172.

We are striving to improve the experience of people directly affected by HS2, working with stakeholders including the independent HS2 Commissioners, the HS2 Minister and local government to develop our approach. We have not always got things right and we are working hard to improve how we communicate with people, settle compensation claims and support businesses to relocate. Our construction teams are increasingly visible along the Phase One route and construction-related traffic, the operation of heavy equipment and road diversions are unwanted intrusions into daily life.

## Review 2020 – 2021 continued

As a consequence, we have seen complaints rise by 170%, increasing from 627 in 2019 to 1,694 in 2020. During 2020, the vast majority of complaints (90%) related to Phase One. Of total complaints, the majority (1,585) related to construction, in particular traffic and transport issues (38%), site operations (28%) and noise and vibration (16%). We closed 92% of these complaints in 20 working days despite the rising number.

Mitigating disruption, improving the way we engage with residents and putting things right is a priority. Concerns have been raised about planning and engagement for road closures, notably in Burton Green and Southam, Warwickshire and we are talking regularly to communities, councils, MPs and other stakeholders to understand their concerns.

**“Mitigating disruption, improving the way we engage with residents and putting things right is a priority.”**

We have organised the Phase One route into geographical areas, in which the work of HS2's specialist teams and contractors is being coordinated and assured by 13 local integrated delivery units. These units will make sure delivery is as effective as possible and improve accountability so complaints are addressed quickly. The new DfT Construction Inspectors will also provide oversight.

Alongside Covid-19, safety was our overriding concern as we dealt with increased protester activity and a rising number of violent crimes. In 2020, we responded to 406 reports of protest and trespass on Phase One compared with 161 in 2019 – an increase of more than 150%. During the six-month period from 1 September 2020 to 28 February 2021, criminal damage and trespass increased 226% and 300% respectively compared with the same period in 2019 – 2020. Physical assaults on staff tripled. In the year's most high-profile operation against illegal activity, it took 31 days to safely remove protesters at Euston Gardens. We evicted nine people from a network of dangerous tunnels with our staff, agents and emergency service personnel taking considerable steps to protect the activists. We have set up a protester management group to take ownership of our safety-led response to protester activity, working with the police, local authorities, the Department for Transport (DfT) and other government departments. We accept the right of people to protest peacefully, but condemn illegal activity that endangers public safety.

### **HS2's role in national economic recovery**

HS2 was conceived as a transformational economic project and its role in levelling up is vital to the pandemic recovery. A spirit of shared endeavour ran through the Project as we moved into main works construction with a renewed focus on delivery, cost and creating jobs. The Government's faith in HS2 provided a vote of confidence in the construction sector and the UK supply chain. In the next few years, Phase One, Phase 2a to Crewe and the Phase 2b western leg to Manchester are set to support more than more than 30,000 jobs at peak construction. Phase One alone is set to create 400,000 supply chain opportunities, supporting thousands of jobs. More than 2,000 companies have already won work on the Project with 70% of them being SMEs and over 95% are UK-based.



As the spine of the country's rail network, HS2 will bring our regions and cities closer together, connecting 30 million people and acting as a catalyst for growth. HS2 will also help Britain meet its 2050 net-zero carbon target as HS2 provides a better alternative to regional air and road travel.

**“As the spine of the country's rail network, HS2 will bring our regions and cities closer together, connecting 30 million people.”**

### **Industry-leading for inclusivity**

We have opened more roles to female, disabled, BAME and LGBTQ+ candidates with our recruitment and talent management policies. Our work in inclusive best practice was recognised with Clear Assured Platinum Standard accreditation, a first for a UK organisation. Our diverse talent pool is included in all aspects of operational performance and accreditation underlines our efforts to put inclusivity at the heart of our work.

### **Legislative milestone**

The Phase 2a hybrid Bill, introduced into Parliament in July 2017, received Royal Assent on 11 February 2021. The 36-mile route will take HS2 from Fradley in Staffordshire to Crewe and unlock a £180 million investment package in the historic railway town. Phase 2a will extend HS2's benefits to the North, north Wales and Scotland and support more than 5,000 jobs at peak construction.

We are preparing our third hybrid Bill, for the Phase 2b western leg, to extend HS2 to Manchester. We hope to deposit the hybrid Bill in early 2022.

### **Phase One construction progress**

The majority of the Phase One Enabling Works Contracts, awarded in 2016, are being wound down. The formal start of construction work was signalled on 4 September 2020 and the Project and its Tier 1 contractors are now set to recruit for about 22,000 jobs during Phase One.

We will build 32 miles of tunnels and more than 500 bridging structures along the 140-mile route. The four MWCCs – SCS Railways JV, Align JV, EKFB JV and BBV JV – are embedded in our integrated project teams (IPTs), the new operating model for HS2. They are pushing ahead with projects valued at £12 billion. We have also stood up IPTs for Old Oak Common station in west London and Euston, where piling of the station's basement wall by Mace Dragados became the first permanent works at HS2's southern terminus.

Construction milestones include the arrival of the first of 10 giant tunnel boring machines (TBMs) for Phase One. Work on the 10-mile Chilterns tunnel, the longest on the network, is underway and the two 558ft (170m) TBMs will work 24/7 for three years.

Curzon Street in Birmingham became the first HS2 station to receive planning permission in April 2020, followed by Old Oak Common, the largest newly built railway station in the UK. Interchange was given the go-ahead by Solihull Council in August 2020. Interchange also scooped a 'world's first' accolade as the first railway station to win BREEAM (Building Research Establishment's Environmental Assessment Method) 'outstanding' certification.

A 65-metre road bridge, built over the M42 near Interchange, became HS2's first permanent structure – a 'can-do' example of the Project's role in creating better connections and regional economic growth. Interchange will be at the heart of the UK Central Hub growth area supporting 70,000 jobs.

## Review 2020 – 2021 continued

### “ Interchange will be at the heart of the UK Central Hub growth area, creating 70,000 new and safeguarded jobs.”

As construction gathers pace, we must minimise impacts on the natural world, boost biodiversity benefits and cut carbon. The removal of trees is a sensitive issue and we are doing everything to keep the number as low as possible. Of the 52,000 ancient woodlands in England, 43 will be affected between London and Crewe – and 80% of their area will be untouched. We have already planted more than 700,000 of seven million trees and shrubs for HS2’s Green Corridor between Birmingham and London. The Green Corridor along the railway is the UK’s largest environmental project and involves planting 33 square kilometres of new woodlands and hedgerow on Phase One alone. Our first Green Corridor Prospectus detailed some of the schemes to benefit to date from more than £9 million from our Community and Environment Fund and the Business and Local Economy Fund. We look forward to the publication of our new Environmental Sustainability Committee’s first report in the autumn.

### Putting people at the heart of HS2

The HS2 Minister has provided two Project updates to Parliament as part of the Prime Minister’s drive to increase oversight, accountability and the transparency of our work. This process includes monthly meetings of the Ministerial Task Force for Phase One and Phase 2a, chaired by the Secretary of State for Transport. The Minister’s first update included a fresh look at our land and acquisition programme to make sure we focus on the people directly affected by HS2. The subsequent HS2 Land and Property Review, published in November last year, produced 36 proposals, highlighting the need for courteous, respectful and clear communications as well as more flexible compensation policies. Critical proposals included setting up a user-friendly online portal to allow residents and landowners to view the progress of their cases and this is underway.

Working with the DfT, the Residents’ Commissioner and other government departments, we have already introduced more than a quarter of the review’s proposals and a new public consultation will inform the way we proceed with other proposals to ensure the maximum benefit for local people.

As noted in the second Ministerial update in March this year, we have launched a new HS2 Supplier Relationship Management system to provide a single system of complaints handling and community engagement across our operations and the supply chain. We will be shortening the response times of the HS2 Helpdesk so complaints about construction are resolved as quickly as possible at a local level. A new interactive map allows people to find out about works in their area. We plan to build on this ‘real-time’ digital engagement with features that map the progress of our TBMs and highlight local events.

## “ Our evolved approach will allow us to better inform people affected by HS2.”

We are grateful to the Residents' Commissioner and the Construction Commissioner for challenging us to improve the customer experience in areas ranging from property schemes to concerns about road closures, mud and debris, and the speed we engage with people. Our evolved approach will allow us to better inform people affected by HS2.

### Managing cost and investing in Britain's future

Robust financial scrutiny of the programme by HS2 Ltd, the DfT and HM Treasury was integral to the improved governance of cost and schedule in the wake of NtP. The estimated cost for completing the full network was revised to a range of £72 billion to £98 billion. About £11 billion has been spent to date. The new funding envelope for Phase One remains at £44.6 billion (2019 prices) and includes additional government-retained contingency of £4.3 billion. The funding envelope also includes £5.6 billion of contingency delegated to HS2 Ltd for managing the risk and uncertainties inherent in major infrastructure projects.

Cost pressures include increases to the scope and duration of enabling works including safely removing more asbestos than anticipated. The £0.4 billion cost will be funded through surplus provision in our core budget. We face cost pressures of £0.4 billion arising from delays to approvals of designs, planning consents, protester action and some Covid-19 impacts; and £0.4 billion for Euston, which we will revise once the design and delivery strategy for the station has been confirmed. Covid-19 has cost £0.3 to £0.4 billion due to difficulties accessing land.

As we build towards the opening of Phase One and Phase 2a, we will use the lessons we have learned to better serve all our communities as we build a low-carbon railway to transform Britain.

## 🔍 Case study 1 | Connecting with our communities safely during Covid-19



**“ We maintained contacts and conversations with residents, businesses and stakeholders, and posted regular updates on the progress of the Project using a range of new and improved digital channels.”**

Our Helpdesk team is the first point of contact for the public

We moved swiftly to reassure the public and launched a ‘virtual’ engagement strategy to keep our communities updated – and safe – in the wake of Covid-19.

All face-to-face events and meetings were postponed at the start of the March 2020 lockdown. Despite the disruption, we maintained contacts and conversations with residents, businesses and stakeholders, and posted regular updates on the progress of the Project using a range of new and improved digital channels.

The Helpdesk team, visited by HS2 Minister Andrew Stephenson MP before the pandemic, is the first point of contact for members of the public and stakeholders who need advice or information about HS2.

As construction work becomes more visible to communities, and as awareness of our Helpdesk grows, we have seen a steady increase in the volume of enquiries. In the first two-and-a-half years of our community engagement reporting, we dealt with 80,378 Helpdesk enquiries.

Despite this rising demand and Covid-19, we have remained available to the public every day and every night, with no reduction in service at any time.

Our HS2 community websites and the regular alerts we send to more than 11,000 subscribers proved to be effective tools for keeping people up-to-date with developments in their neighbourhood. Postal mail drops, newsletters and web-based platforms allowed us to stay connected and reach out to new people.

Since the first lockdown, we have staged online public events stretching the length of Phase One, from a surgery-style drop-in at Curzon Street, Birmingham, to one-to-one virtual events to explain HS2 works in Hillingdon. Virtual meetings allowed us to keep in touch with local organisations including the Euston Community Representatives Group and the Drummond Street Group in Camden.

Through heritage ‘open day’ webinars, we showcased our work, revealing HS2’s treasure trove of archaeological discoveries to people in the comfort of their own homes. We also used webinars to speak to local businesses about the benefits of high-speed rail and the commercial opportunities.

## 🔍 Case study 2 | Building bridges better – using new technology



“  
The work was finished in two days, slashing the on-site build time and cutting the need for several weeks of disruptive motorway lane closures.”

M42 first bridge installation,  
August 2020

Review 2020 – 2021

The construction of a 65-metre bridge over the M42 near the new Interchange station highlighted our commitment to innovation and ‘on-time’ project delivery.

The 2,750-tonne bridge, the first permanent structure for the high-speed railway, was completed ahead of schedule, minimising disruption to road users. It was followed by the completion of a second bridge over the A446. Two more bridges will be built along the HS2 line, adjacent to Interchange.

The so-called M42 modular bridge was built off site under safe conditions before being transported to Solihull to be assembled. The final steps involved moving the bridge span into position, carried by a giant transporter, and fixing it to a composite concrete deck. The work was finished in two days, slashing the on-site build time and cutting the need for several weeks of disruptive motorway lane closures, followed by further weekend and overnight lane closures.

Specialist engineering contractor Expanded and our enabling works contractor LMJV (Laing O’Rourke and J Murphy & Sons Joint Venture) led the work.

A design joint venture involving WSP and Ramboll provided engineering and environmental services to support the construction of the A446 road bridge. All elements of the structure were designed ‘virtually’ using advanced digital capabilities.

The team used 3D modelling techniques to align highways, earthworks, structures and utilities with the existing infrastructure. Innovative off-site manufacturing and Design for Manufacturing and Assembly techniques helped to safely deliver the ground-breaking project. Like the motorway bridge, the road bridge was completed ahead of schedule and illustrates how we are maximising innovative construction methods to bring greater efficiency and safety to major infrastructure projects.

The new bridges are part of the remodelling of the road system which will improve traffic flows around HS2 and integrate the existing network with Interchange. The construction site supporting the bridge-building work employs more than 200 people.

## Case study 3 | HS2 champions British innovation to support ‘green recovery’



“**EasyCabin EcoSmart ZERO cabins, using technology developed by Loughborough University, are helping to eliminate carbon emissions at our works sites.**”

HS2 Ltd and Skanska Costain STRABAG are trialling the UK’s first electric forklift at West Ruislip site

We are supporting the UK’s green economic recovery with our unprecedented carbon management programme for Britain’s new high-speed railway.

Innovation drives our approach to design and construction as we look to help the UK fulfil its commitment to reach net-zero carbon emissions by 2050.

The world’s first solar and hydrogen-powered welfare cabins have been trialled at construction sites run by CSJV (Costain, Skanska) and SCSJV (Skanska Costain STRABAG) at Camden, West Ruislip and Uxbridge.

The British-made EasyCabin EcoSmart ZERO cabins, using technology developed by Loughborough University, are helping to eliminate carbon emissions at our work sites and are set to be rolled out across the Project.

During a 21-week period, 16 EcoSmart ZERO units, designed and manufactured by AJC Trailers Ltd and supplied by GAP Group, allowed us to ‘save’ 112 tonnes of carbon at the three sites – the equivalent of what would be absorbed by more than 3,300 trees in a year.

Power for the heating and workers’ appliances, such as kettles, is provided by a battery bank which is fed by hydrogen fuel and solar panels. As well as cutting the carbon footprint at our sites, the eco-pods, which are virtually silent and only emit pure water vapour, improve the environment for local people.

HS2 is also leading trials of ‘clean air’ gas engine technology, developed by Lancashire-based SME OakTec Power, at our site near Euston. The project, funded by Innovate UK, involves replacing diesel with LPG to produce low-carbon energy for welfare cabins, cutting exhaust gas emissions.

For building equipment, we are looking to roll out a new generation of zero-pollution electric forklifts following a successful trial in West Ruislip by SCSJV.

Manufactured by Faresin and supplied by plant hire company Flannery, the Eco Telehandler’s electric drive unit provides identical performance to an equivalent conventional model without the noise and emissions of a combustion engine. Additional benefits include reduced charging times and maintenance savings.

## Case study 4 | Kickstarting careers with HS2's new jobs brokerage service



“  
Launched in January 2021,  
the jobs brokerage is part  
of our commitment to  
levelling up Britain.”

Kevin Williams,  
Skanska Costain STRABAG

We have made it easier for people to find out about the thousands of new roles being created by high-speed rail with our new HS2 jobs brokerage.

The new service uses a digital jobs board to bring together all vacancies in the supply chain for Phase One and Phase 2a. Over the next few years, the jobs board will promote an estimated 20,000 roles and allow job-seekers to develop their career aspirations.

Launched in January 2021, the jobs brokerage is part of our commitment to levelling up Britain. Working with job brokerage partners, such as local authorities, enterprise partnerships and charities with employment support services, we are helping individuals from local communities and disadvantaged and under-represented groups to take advantage of diverse work opportunities.

We have simplified the process to let candidates search for jobs by region or specialism and quickly find roles that suit them best. The platform is hosted on the HS2 website – at [hs2.org.uk/supply-chain-jobs](https://hs2.org.uk/supply-chain-jobs) – and reflects the huge range of employment

opportunities we're creating, from health and safety, engineering and surveying to logistics, design and catering.

British businesses are set to bid for contracts worth £12 billion and the number of job opportunities will increase as our Tier 1 contractors start to procure the suppliers and services they will need to deliver their work packages.

HS2 is already supporting 16,000 jobs. Recruits include Kevin Williams, who was formerly homeless and joined HS2's contractor Skanska Costain STRABAG Joint Venture as a labourer. Kevin is now helping us to tunnel 13 miles under London.

The jobs board is in line with the objectives of the HS2 Skills, Employment and Education Strategy to create a lasting skills legacy for Britain.

## Case study 5 | NHS healing garden supported by HS2 as awards top £9 million



“**HS2’s Community and Business Funds have awarded £9.68 million to initiatives to boost physical and mental wellbeing, the arts, culture, sport and community spirit in rural and urban settings.**”

Funding given to construct inner city community garden

An NHS healing and peace garden for hospital patients, visitors and staff is among the projects to benefit from our community and environment funds as HS2’s awards exceeded £9 million this year.

The NHS has been at the forefront of our thoughts during Covid-19 and a £74,380 grant will support a new gardens project at Harefield Hospital in west London. The green space will allow patients, families, medical teams and support staff to find comfort and tranquillity in times of anxiety and distress.

Royal Brompton & Harefield NHS Foundation Trust is the largest specialist heart and lung centre in the UK and the new Harefield Healing and Peace Gardens will create an accessible area bursting with flowers, plants and wildlife within the hospital grounds. A sun therapy area near the intensive care unit will allow patients to be taken out in their beds or chairs for short periods.

The project is one of 161 community initiatives along the Phase One route to receive grants from our two funds since they were launched in 2017. HS2’s Community and Environment Fund (CEF) and the

Business and Local Economy Fund (BLEF), which are independently managed by Groundwork UK, have awarded a total of £9.68 million to boost physical and mental wellbeing, the arts, culture, sport and community spirit in rural and urban settings.

We stepped in to help when the clubhouse at Brackley Town Football Club, founded in 1890, was destroyed by fire. A £75,000 award will help the National League North team build a new facility for staff, players, fans and visitors.

Amersham Museum will use an award of £16,080 towards a travelling exhibition in a vintage vehicle, using oral history, film and photographs to tell the story of life in the town in the 20th century.

In the arts, we contributed £250,000 to the redevelopment of Warwick Arts Centre to promote community participation and broaden access to the work of international, national and regional artists. Meriden Adventure Playground Association will use £75,000 towards an ‘all-weather’ playground facility including two converted shipping containers.

Communities along the Phase 2a route will be the next to benefit now we have launched an additional £5 million fund.



## Case study 6 | Meet the Contractor links the UK supply chain to HS2 opportunities



“

**The high-speed railway is creating thousands of supply chain opportunities across a huge range of works, goods and services.”**

Casting factory for tunnel boring machines at South Portal

Review 2020 – 2021

More than 1,700 delegates from England, Scotland, Wales and Northern Ireland took part in our biggest ever supply chain event to learn about the multi-billion pound contract opportunities being created by HS2.

The third annual Meet the Contractor event, delivered with our Tier 1 Main Works Civils Contractors and station construction partners, was held virtually for the first time due to restrictions imposed by Covid-19. The event underlined the importance of HS2 in building confidence in the construction sector and laying the foundations for the UK's economic recovery.

The high-speed railway is creating thousands of supply chain opportunities across a huge range of works, goods and services. We will need businesses of all sizes over the next two years – and beyond – to help with contracts including water and drainage systems, building habitats and on-site catering as well as construction and engineering. More than 400,000 contract opportunities are set to be available throughout the HS2 supply chain.

Meet the Contractor in November 2020 gave prospective Tier 2 suppliers an opportunity to find out more about HS2, its objectives and economic reach, and meet our key contractors on a one-to-one basis in a safe, virtual environment.

We hosted 24 webinars, delivered by more than 70 presenters, to showcase the work that is already taking place to build the high-speed railway. We filled the equivalent of 6,200 seats compared with 533 for the presentation workshops at our first Meet the Contractor event in 2018. It is another example of the growing scale of the Project and the commercial interest being generated by HS2.

More than 800 one-to-one meetings took place over the four-day event and 3,000 virtual business cards were exchanged to set up further discussions about HS2. Digital channels proved to be effective in engaging with new and diverse audiences across the UK and our event hashtag, #MeetTheContractor, received more than 430,000 impressions on social media.

# Levelling up Britain

## 1. 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.

## 2. 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.

## 3. Booth Industries, Lancashire

Booth Industries secured a £36 million contract for tunnel safety doors as a Tier 1 supplier. It will supply more than 300 high-pressure doors on tunnels between London and Crewe.

## 4. Palmers Scaffolding, Flintshire

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

## 5. Wernick Group, Port Talbot

The family business manufactured and installed office and welfare accommodation for Align's main construction site near the M25. About 90% of Wernick's supply chain is within a 50-mile radius of its factory.

## 6. Five Rivers Environmental Contracting, Wiltshire

Five Rivers won more than £4 million of work developing new aquatic areas, natural grasslands and moving habitats on the Northern and Central sections of Phase One. The work has involved protecting reptiles, insects, bats and badgers.

## 7. Cleveland Bridge UK Ltd, Darlington

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

## 8. 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 seven million trees and shrubs for the HS2 Phase One route. It is the largest contract in its history.

## 9. 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.

## 10. Expanded, Nottinghamshire

Expanded used its modular manufacturing technology for bridge building for HS2 at the Interchange site. The bridge now installed over the M42 was manufactured at its plant in Worksop and assembled on site.

## 11. HW Martin

For HW Martin Group, securing work on Phase One of the Project, clearing overgrown sites and managing construction traffic, has allowed the company to bring more people into the business, including a number of apprentices and graduates.

## 12. CLM, West Midlands

Founded in 1867, Oldbury-based CLM poured the first structural concrete for HS2 – to build a bat house that provides new roosts for flying mammals.

## 13. Littlewood Fencing Ltd, East Sussex

Littlewood has worked on HS2 since 2017, providing high-security fencing, acoustic barriers, vehicle safety barriers and associated civil and ground works in more than £2 million worth of contracts.

## 14. Titan Installations, Warwickshire

Subcontractor Titan is installing commercial audio and video systems, digital signage and room booking systems at Main Works Civils Contractor EKFB's new offices in Brackley. Titan will also set up new offices in Milton Keynes.

HS2 will play a vital role in levelling up the country by better connecting our towns and cities in the Midlands and the North, supporting new jobs as businesses are engaged to help deliver the most important economic regeneration project for decades.



**Key**

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



Proposed Colne Valley viaduct



## Look ahead 2021 – 2024



Look ahead 2021 - 2024

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# Phase One delivery update

## Introduction

Following a decade of design, development and preparatory works, we are now seeing significant ‘on-the-ground’ construction progress as we build the Phase One route between London and the West Midlands.

We are shifting millions of cubic metres of soil, getting the ground ready for four flagship stations and starting to build the tunnels under the Chilterns and Long Itchington Wood, Warwickshire. Our tools for the most ambitious engineering project since the Victorian era include high-tech tunnel boring machines, zero-emission forklifts, robots, low-carbon concrete and drones. Solar power is being harnessed for some of our contractors’ eco-cabins.

As we build the infrastructure for Britain’s high-speed rail network, we are committed to the task of building back better, and greener, and leaving a low-carbon legacy for 22<sup>nd</sup> century travel. Our work starts with the Phase One railway that runs between London Euston and Birmingham Curzon Street, and extends to Fradley in Staffordshire – a 140-mile route that will support more than 22,000 jobs.

We have now received planning permission for three of our four Phase One stations at Curzon Street, Interchange and Old Oak Common and we are moving towards the main construction stages of these landmark regional developments. HS2’s stations will be our customers’ first experience of the new service and we are building sustainable stations that inspire passengers and visitors and create a sense of place.

Together with Euston, our rail super-hubs are exemplars of modern, green infrastructure and catalysts for transformative economic growth.

We are cutting the ‘whole life’ carbon footprint of our stations during construction and operation, and targeting net-zero carbon in service for regulated emissions. Our quartet of stations will provide focal points for regeneration in Birmingham, Solihull and the wider West Midlands; in Old Oak Common and Royal Park, in west London; and in central London. Building the stations is already supporting hundreds of new jobs in the UK construction sector and the development areas they anchor are expected to create more than 170,000 new jobs.

We are building a total of 27 platforms for HS2 trains, which will deliver major time savings for passengers. Birmingham to Euston will take just 45 minutes – 37 minutes faster than today.

The success of the route-building programme, delivered by four integrated project teams, and the stations programme are integral to our commitments to increase capacity on Britain’s congested rail network, boost connections throughout the country and bring new economic opportunities to the Midlands and the North.

As we build, we are renewing, economically and environmentally. UK-based businesses are set to win more than 95% of HS2’s contract opportunities and we are mitigating HS2’s impact on the natural world along Phase One. We will leave 30% more wildlife habitats than existed before we put our first shovels into the ground as we strive to deliver the single largest environmental project in the UK and support Britain’s transition to net-zero by 2050.



HS2 Phase One route

Birmingham  
Curzon Street

Interchange

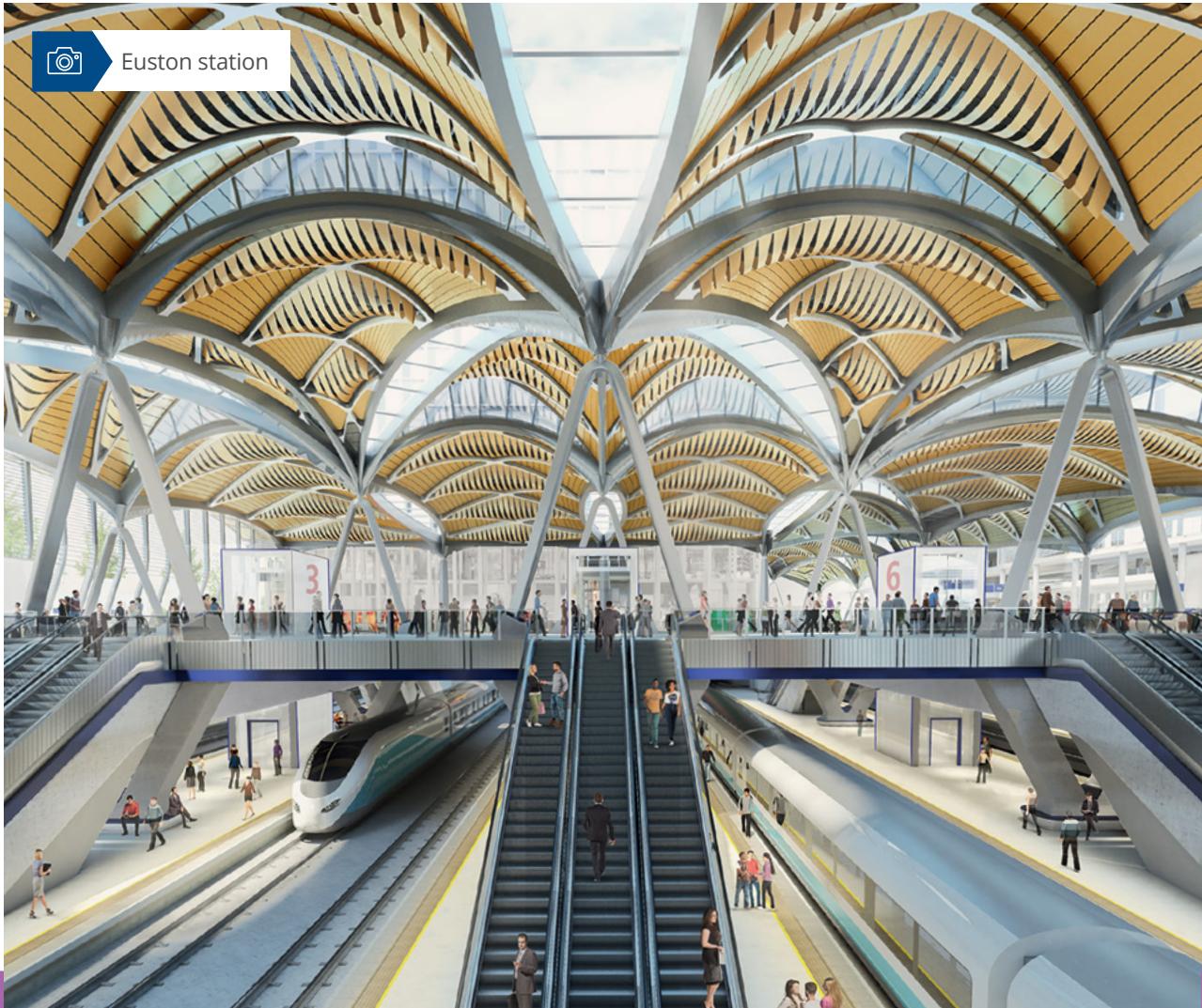
Old Oak  
Common

London Euston

Look ahead 2021 - 2024

# Phase One delivery update

## Euston station



Trains per hour  
in each direction:  
**10**  
full Phase One and  
Phase 2a opening

Up to **18**  
full Phase Two

Passengers per day:  
**98,000**  
full Phase One and  
Phase 2a

**166,000**  
full Phase Two

Regeneration jobs:  
**14,000**

Cutting carbon:  
Saving  
**199,134**  
tonnes of CO<sub>2</sub>  
equivalent over  
Euston's design  
life through  
passive design,  
energy efficiency  
and changing  
construction methods



Building HS2’s flagship London terminus at Euston while we minimise disruption to rail passengers and local people remains one of the most complex challenges of the entire Project. As a major stand-alone scheme within Britain’s high-speed rail network, Euston will support 3,000 jobs at peak construction – and involves a multitude of work packages in a hugely constrained site.

Changes to programme delivery and governance will enhance collaborative working across the wider Euston campus of 22 hectares (54 acres). We have been looking at alternative designs to simplify the design and build programme and allow our partners to maximise opportunities for oversight development. This new approach is in line with the recommendations of the Oakervee Review and instructions from the Department for Transport.

**“Changes to programme delivery and governance will enhance collaborative working across the wider Euston campus of 22 hectares.”**

We stood up our integrated project team (IPT) for Euston in February 2021, bringing together HS2 Ltd, station construction partner Mace Dragados JV (MDJV), design partner Arup and architect Grimshaw Architects LLP. The operating model allows us to drive delivery, improve cost and schedule performance, and promotes agile decision-making.

The Euston Partnership and its dedicated Oversight Board is currently overseeing the entire development of Euston to cover HS2, master development partner Lendlease, Network Rail, Transport for London and the wider development of the station’s urban environment. This single governance body provides integration and shared purpose.

Old Oak Common station in west London will serve as the temporary London terminus for HS2 while we develop an optimal solution for Euston.



Proposed exterior of Euston station

Look ahead 2021 – 2024

# Phase One delivery update

## Euston station **continued**

### Optimising the delivery strategy

HS2's station at Euston is to the west of the conventional rail station and covers about nine hectares. It is key to boosting capacity on the national rail network and improving low-carbon connections throughout Britain. We will more than double the number of seats at Euston during peak hours, free up space on the West Coast Main Line (WCML) for more local and regional commuter services and link regional economies with London and the South East more effectively.

Following the DfT's instructions in November 2020, we have been exploring design options to reduce cost and speed up delivery by building the station in a single construction stage. This includes considering options to reduce the number of platforms at Euston from 11 to 10 while maintaining 17 trains per hour (tph) operations for the full Phase Two service. If this design option is adopted, the station construction programme will become a single-stage build, reducing the impact of our works on local communities.



Euston station platform area

**“The station construction programme becomes a single-stage build, reducing the impact of our works on local communities.”**

The HS2 platforms – for trains to the Midlands, the North and Scotland – are 8 metres (about 26ft) below ground, located in a concrete ‘box’ measuring about 90 metres wide by 500 metres long. MDJV will work with us to develop the design and agree the target price and delivery schedule for the revised Euston scheme.



Proposed Euston station concourse area

We have now cleared most of the buildings to the west of the station. We have demolished the two Euston office towers and the Ibis hotel, and sensitively excavated 18<sup>th</sup> and 19<sup>th</sup> century burial grounds, to the west of Euston station in St James’s Gardens. Work has also involved demolition of the western ramp and canopy of the existing Network Rail station. Given the extensive impact of the work, it is our priority to keep local communities and organisations informed regarding developments.

MDJV has started work on-site preparing for early works and has completed installing the first 161 piles for the station's west wall. Enabling works will continue to the end of 2023. Network Rail will undertake demolition works on the Euston conventional rail station through to the end of 2025. This will allow the construction of the east side of the HS2 station. Following the enabling works and design, the main station construction will start in spring 2023 with piling and excavations works.

**“ We have now cleared most of the buildings to the west of the station. We have demolished the two Euston office towers and the Ibis hotel, and sensitively excavated 18<sup>th</sup> and 19<sup>th</sup> century burial grounds.”**

Our progress at Euston will kickstart the search for suppliers for more than £400 million worth of work over the next two years. Future suppliers will range from water treatment systems to lifts and escalator systems.




Proposed Euston station escalators

# Phase One delivery update

## Euston to West Ruislip: Skanska Costain STRABAG



 Construction of the bridge linking the Willesden Logistics Hub to the rail terminal

Route length:  
**16.4 miles**  
(26.4km)

Tunnels:  
**3**  
includes one logistics tunnel

**13 miles**  
(21km) in total

Construction jobs:  
**4,800**

Other major structures:  
**Victoria Road Crossover Box**  
a 130m long underground structure allowing trains to change tracks, and tunnel portals at Euston and West Ruislip

Green legacy:  
Material excavated from the London tunnels will be moved by rail, saving  
**44,100 tonnes**  
equivalent of CO<sub>2</sub>

Building a high-speed railway through central London presents a unique set of challenges for our construction teams. The capital's population density is more than 10 times the next most densely populated English region and we are building nearly 13 miles, or 95%, of this section underground. Old Oak Common station is located between the new Euston and Northolt tunnels and we are using innovative construction methods to do our best to minimise disruption to local residents and businesses.

Major works are taking place at highly constrained urban sites and we are adopting cutting-edge engineering methods to overcome space restrictions. This includes assembling two 2,000 tonne tunnel boring machines (TBMs) below ground to excavate the 3.4 mile east section of the Northolt tunnel.

Skanska Costain STRABAG joint venture (SCS JV) is building the civils structures from Euston to West Ruislip as part of our London-based IPT. SCS JV has increased its workforce from 200 to 1,000 and expects to recruit a further 300 permanent staff and 67 apprentices as construction ramps up in 2021. It will conduct 7,000 inductions this year, including those for supply chain workers.

**“The Willesden Logistics Hub, the nerve centre for HS2 in London, is now complete.”**

The Willesden Logistics Hub, the nerve centre for HS2 in London, is now complete and has received its first delivery of excavated material. The vast majority of the spoil from the London tunnels will be moved through the site by rail and conveyor belt to keep construction traffic to a minimum.

After a successful trial financed by the HS2 Innovation Fund, SCS JV is now using NPlan technology to manage its construction. This artificial intelligence system draws on past project data to evaluate risks to programme delivery, allowing us to have greater confidence in the project schedule.

Innovative ways to reduce carbon are also being found. The UK's first electric forklift was trialled at West Ruislip and we are using 'earth-friendly concrete', a cement-free product that will create a saving of 185,000 tonnes of CO<sub>2</sub>. A New Zero Trim Pile Technique, using a vacuum excavator, has also been successfully tested on HS2. The technique involves sucking out excess concrete while it is still wet using a new vacuum excavator method. This reduces health and safety risks involved with piling, as well as significantly reducing carbon emissions, cost and noise.

### **Euston approaches**

Works in the Euston approaches have focused on laying foundations. More than 1,000 piles, some up to 50 metres deep, will support structures in this area. Sheet piling works were carried out over Christmas 2020 to avoid disrupting rail passengers. To reduce disturbance to residents, we used the GIKEN 'silent piler' method which works by 'sitting' on top of the steel piles and presses them in with hydraulics, virtually eliminating noise and vibration. The track was handed back four hours ahead of schedule, with no community complaints.

SCS JV worked with Network Rail to use a six-week 'blockade' of Line E, starting on Easter weekend, to install 45 piles and an associated capping beam between Granby Terrace bridge and Mornington Street bridge. A similar six-week blockade of Line X will allow us to carry out further significant works to Bridges 6 and 7 over the summer. As piling continues, the next phase of work will be the move towards sprayed concrete-lined tunnelling works, due to begin in early 2022.

# Phase One delivery update

## Skanska Costain STRABAG continued

At the start of 2021, the Euston cavern was handed over by early works contractor Central Rail Systems Alliance, ready for the main works that will transform it into one of three ventilation and access shafts in the Euston area. The headhouse, which sits over the top, is located next to the West Coast Main Line. The three-storey building will be clad in traditional blue-grey engineering brick, in keeping with the area's Victorian railway architecture. The design features a 'green' roof and stone-paved courtyard and extra planting at street level.

Work on the 4.5 mile Euston tunnel, which will be built up to 50 metres underground, is scheduled to begin in early 2024 and be completed in mid-2025.

**“SCS JV is also working with a local school, St Mary's Catholic Primary, on opportunities for a 'pocket park' area beside its building.”**

The headhouse for the 40-metre-deep Canterbury Works vent shaft in Kilburn will be surrounded by planting, with a mixture of tree and shrub species creating an enhanced biodiverse habitat for wildlife. The 'green' roof will contain biodiverse planting to improve sustainability. SCS JV is also working with a local school, St Mary's Catholic Primary, on opportunities for a 'pocket park' area beside its building.

### London's logistics hub

Willesden Euro Terminal has been transformed into a logistics hub for works on the London tunnels, as well as Old Oak Common station. It is the base for a team of up to 120, who at peak construction will oversee up to 11 trains a day carrying excavated material, concrete tunnel segments and other freight.

The site's storage area for tunnelling spoil, completed in six months, has a capacity of 52,000 cubic metres, enough for 81 trainloads. It is large enough to keep works running in the event of major disruptions to the onward trains that take the spoil to disposal sites around the country. Up to six million tonnes of excavated material will be transferred and processed between 2021 and 2025. Much of it will arrive via three conveyors, each over a kilometre in length, that are being built between Willesden and the Old Oak Common and Victoria Road sites. The first of these is due to start operating in December 2021.

The concrete segments that will line the tunnels will also be delivered to the site by rail, before being transferred to the neighbouring Atlas Road facility by Multi Service Vehicle. Moving materials by rail will keep about 700,000 lorries off the road while HS2 is being built in London.

When road movements are necessary, SCS JV has commissioned a fleet of high direct vision (HDV) trucks. Unlike traditional tipper trucks, which have significant blind spots, HDV vehicles give drivers a 360-degree view. Mud from the wheels of construction vehicles can cause a hazard on the roads, so Willesden will use an innovative system, known as Mud Cam, and vehicles will not be able to leave the site unless their wheels are clean.

### First permanent works

The first permanent works for HS2 in London were carried out in February 2021 when a 160 cubic metre concrete collar was poured around the Victoria Road ancillary shaft in North Acton. The work was the first step towards the launch of the tunnel boring machines (TBMs) that will be launched from the 25-metre-deep shaft and excavate the eastern end of the Northolt tunnels.

With the collar in place, the team will install 11 rings of precast concrete segments to line the bulk of the shaft. The final 14m of the shaft is built using a sprayed concrete lining technique, where small areas are excavated and surfaces are sprayed progressively with concrete to reinforce them.

On their expected arrival in 2023, the TBMs will be assembled and launched here before digging 3.4 miles west to Green Park Way.

We are now building the Victoria Road Crossover Box on the same site, following the completion of 200 metres of sheet piling. The underground box, 130 metres long and 24 metres deep, will house a mechanism that allows trains to switch tracks as they approach and depart from Old Oak Common station.

Works at the site began early due to the complexity of building the crossover box, and to allow time for the team to manage the risks involved in tunnelling. To minimise the impact on the environment and the public, almost 80,000 cubic metres of material produced by demolition works has been reused on-site in piling mats and haul roads.

Once the TBMs have launched, a team will work on a platform above them to create the core of the shaft, which will ventilate the Northolt tunnels. A headhouse and landscaping works will eventually complete the project.

### Preparing for launch in West Ruislip

West Ruislip will be the first site to launch tunnel boring machines (TBMs) in London. The machines will be assembled at the end of 2021 and launched in 2022, travelling five miles east to create the western section of the Northolt tunnel. Piling works at the site have been progressing well, with the second piling rig installed in April this year. A base slab for the TBM launch will be created in the autumn and the launch portal is due to be complete by the end of 2021.

As in all other locations, every effort is being made in West Ruislip to ensure we cause as little disruption as possible to communities during construction and the operation of HS2. A bespoke noise barrier will shield residents from trains coming out of the London tunnels. The angled crank noise barrier is designed to be slender enough to fit into a constrained area of track that runs alongside the Chiltern line and will be erected from late 2021.

**“As in all other locations, every effort is being made in West Ruislip to ensure we cause as little disruption as possible to communities during construction and the operation of HS2.”**

To keep construction traffic off local roads, a 1.8 mile (3km) internal haul road has been built between West Ruislip and Harvil Road. From here, excavated material can be transferred via conveyor belt to the Willesden logistics site.

Further down the line, the South Ruislip vent shaft has been excavated and workers began to install panels for the diaphragm wall (D wall) in May 2021.

Excavated material will be reused to create an 800-metre 'green' tunnel at the western end of this route section, concealing the railway from view. Landscape designs are also complete for an 8.5 hectare sustainable planting area at West Ruislip comprising woodland, grassland, hedgerow, scrub and seasonal pond habitats. The two projects will help to deliver our commitment to no net loss of biodiversity as a result of HS2.

# Phase One delivery update

## Old Oak Common station



### HS2 Platforms:

**6**

+ 8 conventional platforms

### Trains per hour in each direction:

**3**

first stage Phase One opening – Old Oak Common as temporary London terminus

**10**

full Phase One – Euston is London terminus

Up to **18** Phase Two open

### Passengers per day:

**130,000**

Phase One

**250,000**

Phase Two

### Regeneration jobs:

**65,000**

### Cutting carbon:

More than

**144,000**

tonnes of CO<sub>2</sub> equivalent



**Main works construction is now underway at Old Oak Common in west London as it is transformed into the UK's largest new-build, low-carbon station.**

Old Oak Common will be the temporary London terminus for HS2 while we complete the remodelling of Euston. This will allow us to start running high-speed rail services without delay as we press ahead to deliver the best development solution for Euston.

The new station will be a modern super-hub for both high-speed services and conventional trains. Comprising two distinct yet integrated platform areas, Old Oak Common will eventually serve 250,000 passengers each day. It will provide unrivalled transport connections for HS2, the Elizabeth Line (Crossrail), Great Western Main Line and the Heathrow Express. There will also be bus, taxi, cycle and walking connections.

**“The new station will be a modern super-hub for both high-speed services and conventional trains.”**

In many ways, our progress at Old Oak Common demonstrates how the HS2 Project is maturing and the pace of construction accelerating following Notice to Proceed in April 2020. Having gained planning approval in May last year, our station construction partner Balfour Beatty VINCI SYSTRA (BBVS) took possession of the site in July 2020. The handover to BBVS followed extensive enabling works led by Costain Skanska joint venture (CS JV) which began in 2017 and involved clearing 32,000 cubic metres of former rail depot sheds and outbuildings and the safe removal of contaminated land.

As with Euston, the development of Old Oak Common is now being driven by an integrated project team, established in November 2020 and including Network Rail, which will boost collaborative working and efficient decision-making at this strategic national transport intersection.

**Creating new jobs and cutting carbon**

BBVS will employ about 1,400 people to build the station, creating £350 million of work in the next few years for BBVS and its subcontractors. However, Old Oak Common will also be a catalyst for wider and sustained economic growth in the local area, with 65,000 new jobs and 25,000 new homes forecast as part of the Old Oak and Park Royal Development Company (OPDC) masterplan.

**“BBVS will employ about 1,400 people to build the station, creating £350 million of work in the short-term for BBVS and its subcontractors.”**



Old Oak Common station concourse area

# Phase One delivery update

## Old Oak Common station **continued**

High-speed trains will access Old Oak Common via new twin-bore tunnels to both the east and west of the station and passengers will board, or alight, HS2 services at six platforms about 13 metres below ground. Alternatively, they will remain in their seats for onward travel to Euston, just five minutes away, or stay onboard for the 38-minute journey to Birmingham.

In addition to the HS2 platforms, each 415 metres long, there will be eight platforms at ground level for conventional services, connected by a single overbridge. We will need to build a total of 44 escalators and 53 lifts to manage passenger flows.

Passenger flows between the two parts of the station – for high-speed and conventional trains – will be integrated and unified under a vast arched roof creating a single customer experience and a sense of space and calm within the bustling station. The roof covers an area larger than three football pitches and will be mounted with 3000m<sup>2</sup> of solar panels to generate green energy for the station.



Old Oak Common station exterior

**“A new public space to the west of the station is three times the size of Trafalgar Square.”**

Together with a number of sustainable design and construction innovations, the solar panels will allow us to cut the station’s emissions by more than 144,000 tonnes of CO<sub>2</sub> equivalent across its 120-year design life compared with the original designs.

A new public space, for passengers and the community to the west of the station, is three times the size of Trafalgar Square and will also feature local art and retail. This space is designed to integrate with future developments at the station to ensure customer and community benefits are not compromised.



Old Oak Common exterior

## Cost and schedule

BBVS has developed a comprehensive cost and schedule baseline for Old Oak Common, which was approved by HS2 Ltd and the Department for Transport in March 2021. The agreement represents another significant milestone for HS2 as it releases the funding to build the station in full.

It is the first such agreement to be reached for any station in the HS2 programme. Integrated ways of working with Network Rail and the On-Network Works teams have been essential to the efficient, staged handover of the site.

“

**The agreement represents another significant milestone for HS2 as it releases the funding to build the station in full.”**

Design and construction activities are progressing at pace. BBVS has completed depot decommissioning and site preparation for permanent construction works, starting with the installation of a 1.8km underground wall that forms the perimeter of the 850 metre long station ‘box’ for HS2.

The box will also act as the site of the tunnel boring machine launch for the Euston tunnels, creating significant logistical and technical interfaces to manage within the constrained site boundaries.

BBVS has been working with design partners WSP and Wilkinson Eyre to complete the detailed design of the station to support critical procurement milestones. The detailed design of the main civil engineering packages was completed in late 2020, with the remaining station detailed design due to be completed by the end of 2021.



Old Oak Common concourse

# Phase One delivery update

## West Ruislip to South Heath: Align



Tunnel boring machine, Florence



Route length:  
**13.4 miles**  
(21.6km)

Tunnels:  
**Chilterns tunnel**  
**10 miles**  
(16km) in total

Construction jobs:  
**1,200**

Other major structures:  
**Colne Valley viaduct**  
2.1 miles (3.4km)

Green legacy:  
**127 hectares**  
of chalk grassland, woodland,  
wood pasture and wetland  
habitats being created in the  
Colne Valley

## A year of intense activity in Buckinghamshire, centred on the Chalfont Lane south portal site, culminated in the launch of HS2's first tunnel boring machines (TBMs) and the start of construction on the UK's longest viaduct in the Colne Valley.

The TBM Florence started her three-year journey under the Chilterns in May and will be followed by her 'sister' Cecilia. These self-contained mobile factories are building the 10-mile (16km) twin-bore tunnels that will carry high-speed trains under an Area of Outstanding Natural Beauty. Florence is boring the upline tunnel for our Birmingham-bound trains and Cecilia will excavate the downline tunnel for trains heading south. The TBMs will cut through chalk and flint at an average of 15 metres each day and will tunnel to a depth of up to 90 metres as they build the longest tunnels on the HS2 network.

The machines will work round the clock, seven days a week, as they carve out the 9.1-metre-diameter tunnels. The work is being undertaken by Align JV, who have also started to build the spectacular 2.1 mile (3.4km) viaduct across lakes and waterways in the Colne Valley.

### South portal progress

We completed earthworks at the Chilterns tunnel south portal in July 2020, with a total of 480,000 cubic metres of material moved. The 136-acre site, equivalent in size to 80 football pitches and HS2's largest, was then prepared to support the construction of the twin-bore tunnel and the viaduct. It took seven months to create a level surface for Florence and Cecilia's launch. More than 600 'soil nails' were used to stabilise the earth at the tunnel entrance, and a 17-metre-high headwall was built. Launching seals were added in November 2020.

A purpose-built power supply was built by early works contractor Fusion, working in partnership with Scottish & Southern Electricity Networks (SSEN). The 44MVA substation is able to deliver all the electricity for the TBMs and the entire south portal site – enough to power about 22,000 homes. All the energy will come from zero-carbon sources.

Offices and welfare facilities have been built for staff, whose number will rise to 1,200 at peak construction. Dedicated motorway slip roads to the M25 have been created, taking construction traffic off local roads. Works have also been underway on building the factories that make the concrete segments for the tunnel and the viaduct.

All parts for the TBMs were delivered by December 2020, in more than 300 shipments from German manufacturer Herrenknecht. The shields and cutter heads were reassembled and welded, with the gantries that form the main body built by crane and moved into place on trailers. The process was completed on schedule, with Florence fully assembled in April 2021 and Cecilia in June.

## “A number of innovations will support the continuous tunnel boring.”

A number of innovations will support the continuous tunnel boring, with concrete segments put in place as the TBMs progress. A robot called Krokodyl, which sits on the back of the TBMs, carries out simple, repetitive tasks such as removing wooden spacers from between the concrete tunnel segments and installing dowels. This improves efficiency and the safety of tunnelling teams. Grout is mixed on the machines.

# Phase One delivery update

## Align continued

Excavated material is mixed with water, creating slurry that can be pumped back down the tunnel, treated and reused for landscaping on-site. The slurry treatment plant was built between September 2020 and May 2021. Given the length of the project and the challenging terrain, Align is using a special feature known as MOBYDIC to monitor ground conditions, as well as wear and tear on the machines. A first for the UK, the tool is mounted on the cutter heads to give the TBM team real-time information.

A viewing platform and interactive visitor centre have recently opened to allow key stakeholders to learn more about our civil engineering work.

Align and its subcontractors have also been working sensitively to support wildlife since the early works stage, and an innovative idea to search for ground-nesting skylarks using thermal drones scooped a Green Apple award. Bird boxes, reptile basking banks, an egg-laying heap for grass snakes and a winter shelter for hibernating animals are being created at the south portal.

### **Barn-style ‘headhouses’ blend into landscape**

Due to its length, the Chilterns tunnel will need five separate ventilation and emergency access shafts. The 40 to 80 metre vent shafts are sited at Chalfont St Peter, Chalfont St Giles, Amersham, Little Missenden and Chesham Road. All five sites have been handed over by early works contractor Fusion and main works have started. Planning permission for the Chalfont St Peter headhouse was obtained in January 2021, with a diaphragm wall (D wall) now completed. A temporary access road was built to keep construction traffic out of the centre of the village.

**“To help the headhouses blend into the landscape where appropriate, Align and its design partners came up with a barn design inspired by local agricultural buildings.”**

During 2021, we will complete the D walls at Chalfont St Giles, Amersham and Little Missenden, and start works on the Chesham Road shaft. The latter is above the groundwater table and can be built by the faster method of caisson sinking, which involves digging and concreting the shaft in stages.

To help the headhouses blend into the landscape where appropriate, Align and its design partners came up with a barn design inspired by local agricultural buildings. The local community was consulted on plans for the single-storey structures, four of which will sit on a brick base with a zinc roof and dark bronze doors and vent openings. The proposed design for the Amersham headhouse, which will sit on a roundabout, has a conical shape, crowned by anodised aluminium fins.

All sites will be landscaped, with mature trees retained wherever possible and new trees and hedgerows planted to further reduce the visual impact.

### **On-site production for precast concrete**

We finished work on the first of two precast concrete factories in February 2021 and it is now manufacturing the 8.5-tonne segments to line the Chilterns tunnel. Each ring comprises seven segments, with the factories making 14 rings, or 98 segments, a day. A total of 112,000 segments will be needed for the ‘up’ and ‘down’ tunnels. They are being manufactured on site to keep HGVs off local roads, reducing the impact on local people and the environment.

Concrete segments will also be needed for the main body of the Colne Valley viaduct and these will be cast at another factory on site, which is set to start production from the end of 2021.

When the works are complete, the factories will be dismantled and the site landscaped. The area will be planted with trees to help it blend in with the surrounding countryside.

### Work underway on UK's longest viaduct

We started piling work for the Colne Valley viaduct in March 2021. Set low in the landscape, the viaduct will be almost a kilometre longer than the Forth Rail Bridge and carry high-speed trains across the Grand Union Canal and surrounding lakes at speeds up to 200mph. The viaduct will rest on 56 piers, supported by almost 300 piles. The design concept resembles a stone skipping across the water and will feature spans of up to 80 metres long.

We completed an extensive programme of ground investigations in which engineers sank 12 piles at two locations and used the geological and structural data to refine the design of the viaduct. This has allowed us to reduce the depth of piles by 10% to 15%, saving time and money.

The design team chose concrete for the main structure, with a noise barrier made of galvanised steel. These durable, low-maintenance materials will assist to achieve the viaduct's 120-year design life. To reduce the carbon impact, the concrete segments will be hollow and a 1.4-metre-high acoustic barrier will run the length of the viaduct. In areas where the risk of noise is higher, a parapet barrier will be added to reduce noise further. Where possible these will be transparent, an innovative solution that will help to reduce the apparent scale of the viaduct and allow passengers to enjoy the view.

Despite the pandemic, all key dates for the viaduct enabling works were hit by the end of 2020, as works began on access roads to support construction. Piling began in March 2021 at the north embankment. Construction of the viaduct itself is expected to start in the second half of 2022, with the superstructure complete in late 2024.

**“Despite the pandemic, all key dates for the viaduct enabling works were hit by the end of 2020.”**

A significant effort is underway to mitigate HS2's environmental impact. Align will create 127 hectares of new chalk grassland, woodland, wood pasture and wetland habitats on the western valley slopes. This will involve planting 65,000 trees and shrubs, and more than two miles (3.5km) of new hedgerows. The project will create 90 hectares of calcareous grassland, which has been in decline on the valley slopes. The area will reuse about three million cubic metres of chalk taken from the tunnel excavation, as well as concrete and limestone aggregate materials used during construction. After planting and seeding, it will offer a habitat for hundreds of species including invertebrates, birds, mammals, reptiles and amphibians, bringing greater biodiversity to the Colne Valley western slopes as a result of HS2.

# Phase One delivery update

## Chilterns tunnel to Long Itchington Wood: EKFB



Dump truck and excavator handling aggregate at Calvert



Route length:  
**50 miles**  
(80km)

Tunnels:  
**3**  
'green' tunnels  
totalling 4.3 miles (6.9km)

Construction jobs:  
**4,000**

Other major structures:  
**81**  
bridges

**15**  
viaducts

Green legacy:  
Creating more than  
**90 habitats**  
including grasslands,  
wetlands, woodlands

Planting more than  
**4.7 million**  
trees and shrubs and building  
a special structure to protect  
rare Bechstein's bats



We completed the transfer of land from enabling works contractor Fusion to EKFB Joint Venture in April 2021. The early and main works teams will continue to work closely to meet the delivery programme for HS2's 50-mile (80km) rural section between Buckinghamshire and Warwickshire. As EKFB started to mobilise, the number of employees rose to 770 and is set to increase further.

This part of the route extends from the north portal of the Chilterns tunnel, near South Heath, to Long Itchington Wood, passing through Buckinghamshire, Oxfordshire and Northamptonshire before heading into Warwickshire. The line will run through 'green' tunnels near Wendover and the villages of Greatworth and Chipping Warden to minimise the railway's environmental impact on local communities. There are 2,699 permanent assets on this section including bridges and viaducts, and highways and habitats.

**“The line will run through 'green' tunnels near Wendover and the villages of Greatworth and Chipping Warden to minimise the railway's environmental impact on local communities.”**

### **Building the internal access road**

As this stretch of HS2 mainly runs through the countryside, the closest existing access to the route is often via minor roads through villages. Our construction team developed the concept of building a temporary access road to join up the whole 50-mile (80km) section. We are building a hard-surfaced road, with standard road signs and traffic lights, instead of a traditional earthworks haul road to reduce dust and noise and take traffic off local roads.

**“We are building a hard-surfaced road, with standard road signs and traffic lights, instead of a traditional earthworks haul road to reduce dust and noise and take traffic off local roads.”**

The internal access road will be used to move people and materials and provide more efficient vehicle movements, cutting emissions, energy use, dust suppression measures and maintenance costs.

Some sections of the internal access road will be removed when the site footprint is reduced but others could be retained for rail maintenance, farm access, or as a cycleway.

As well as the site compounds, five concrete batching plants will be stationed along the route. The batching plant for Calvert started to arrive in the UK in April 2021 with five of the eight containers offloaded ready for set up.

# Phase One delivery update

## EKFB continued

### Earthworks efficiencies

Earthworks are one of the major challenges along this section of the route. We will need to excavate a massive 30 million cubic metres – nearly four times the spoil that was removed during construction of the Channel Tunnel. The innovative DIGGER platform (Digital Graphical Earthworks Reporting), developed with our subcontractor Finning, houses all our earthworks data requirements from design to delivery and demobilisation. It combines all system and data inputs on to one platform, which allows us to proactively use data to drive efficiencies on site quickly.

Earthworks were stepped up in May 2021 and DIGGER highlights how HS2 is inspiring the supply chain to lead digital innovation in the civil engineering and construction sectors.

### Rail freight deliveries to Calvert railhead

We are backing the UK's rail freight industry in a move which is cutting our carbon footprint as we build HS2. Between December 2020 and March 2021, 100 trains delivered 150,000 tonnes of aggregate for use around the Calvert railhead in Buckinghamshire. Transporting the material by rail instead of road took the equivalent of 7,500 HGVs off local roads and cut over 24,000 tonnes of carbon emissions. An average of 15 trains per week continue to bring materials to the 26,200 square metre site.

**“**  
**We are backing the UK's rail freight industry in a move which is cutting our carbon footprint as we build HS2.”**

Calvert is one of the main construction and logistics hubs for work on HS2's EKFB section and more than 650 people will work here at peak construction. Once the railway is built, the railhead and temporary access roads will be removed and the site landscaped, leaving an infrastructure maintenance depot.

We started building a key bridge in Buckinghamshire where East West Rail will cross the HS2 railway in April 2021. The East West Rail project, which is being delivered by Network Rail, will see local trains run from Oxford to Cambridge for the first time in 50 years. To minimise the visual impact, the HS2 line will be in a 2.5 mile (4km) cutting where it crosses under the East West line near Calvert.

### Designing the Oxford Canal viaduct

The 15 viaducts we are building along this route section will comply with HS2's Design Principles, including the need to be designed sustainably, minimising maintenance and materials, and being considerate to the local area. The three-span Oxford Canal viaduct, which will be nearly 200ft long (about 60 metres), is designed as an 'open structure' to allow views across the landscape and the horizon, and we are working to improve the environment for boaters and walkers.



Proposed Oxford Canal viaduct

The viaduct's landscape design supports our efforts to create a Green Corridor along the HS2 route through woodland, linear tree belts, hedgerows, watercourse vegetation and wetland habitats.

We are also introducing a new native tree and shrub planting area including willow, blackthorn, dog rose, birch and the wayfaring tree.

We shared our plans with the local community via a virtual exhibition and we will be considering people's feedback, including the preferred finish for piers, as we move to the next stage of review for the viaduct.

**“  
The viaduct's landscape design supports our efforts to create a Green Corridor along the HS2 route through woodland, linear tree belts, hedgerows, watercourse vegetation and wetland habitats.”**

We are continuing to carry out the largest archaeological investigation ever undertaken in the UK and finds in the Wormleighton parish, near the Oxford Canal viaduct, include the discovery of a so-called banjo enclosure, dating back to the late Bronze Age/early Iron Age, which was used for containing livestock. Other discoveries, including a rare Bronze Age arrow or spearhead, suggest humans have been in this area for several millennia.

Community engagement innovations include new traffic guides showing in detail our HGV routes and estimated numbers of vehicles.

## Jobs and training

Since 2018, EKFB has trained 519 people who were previously not working in the construction industry. All training has been delivered by local providers, resulting in investment in the area in excess of £300,000. EKFB is actively involved with the Bucks Skills Hub and has already delivered virtual engagements for the Bucks Skills Show to 150 plus pupils.

We are working with Transitions UK in Wendover and Aylesbury to offer mentoring for young people who are involved in criminal activity or are at risk of criminal exploitation.

EKFB launched an industry-leading intranet platform, the smartHUB, making information and important links available across the IPT. The platform allows the team to share information, collaborate and keep in touch across all areas. Hosted on the smartHUB, the Business Management System (BMS) gives all team members access to the processes, guides and templates they need.

# Phase One delivery update

## Interchange station



HS2 Platforms:

**4**

Trains per hour  
in each direction:

**3**

full Phase  
One opening

**5**

Phase Two opening

Passengers per day:

**21,000**

Phase One

**38,000**

Phase Two

Regeneration jobs:

**30,000**

Cutting carbon:

At least

**90%**

of construction and  
demolition waste, and  
excavated material  
will be reused

## HS2's Interchange station in Solihull is an exemplar of cutting-edge, 'green' construction and a beacon for regional economic growth.

Arup's design won gold in the World Architecture News (WAN) awards 'Future Transport' category in 2020 for "sustainable design for the future". This followed Interchange being named the world's first railway station to achieve the BREEAM 'Outstanding' interim design stage certification for sustainability. Interchange will maximise natural ventilation, daylight, harvested rainwater and solar energy to cut carbon emissions. Taken together, Interchange's 'lean' design and the recycling of building waste underlines our commitment to the Government's drive to build back greener.

The station will be a strategic staging point for high-speed train services between the North and South, just 38 minutes from London and 37 minutes from Manchester. Situated in the historic Forest of Arden landscape, Interchange will be the first point on the Phase One route where trains from London will arrive at open-air, above ground, platforms.

Up to 21,000 passengers a day are expected to use Interchange initially, rising to 38,000 when Phase Two is fully operational. The station will have four platforms, located on two 415-metre-long 'islands' with two central tracks for non-stopping high-speed services.

**“Up to 21,000 passengers a day are expected to use Interchange initially, rising to 38,000 when Phase Two is fully operational.”**

Escalators will take arriving passengers up to the 130 metre concourse, which will have a glue laminated timber structural frame and will be covered by a roof comprising a series of interlocked, diamond-shaped 'petals'. North-facing rooflights will be positioned to provide as much natural light as possible for the concourse and an integrated latticework of drainage channels will collect rainwater for later use.

Interchange will have three plazas, designed to make passengers and visitors feel safe and want to spend time with family and friends. The west plaza will provide station access to people arriving by bus and on the new automated people mover (APM). The east plaza will be a hub for passengers arriving from the short stay car park and drop off areas, and a south terrace, accessible from the station concourse, will offer elevated views of the unique, landscaped surroundings.



Overhead visual of Interchange station

# Phase One delivery update

## Interchange station **continued**

### Gateway for global travel

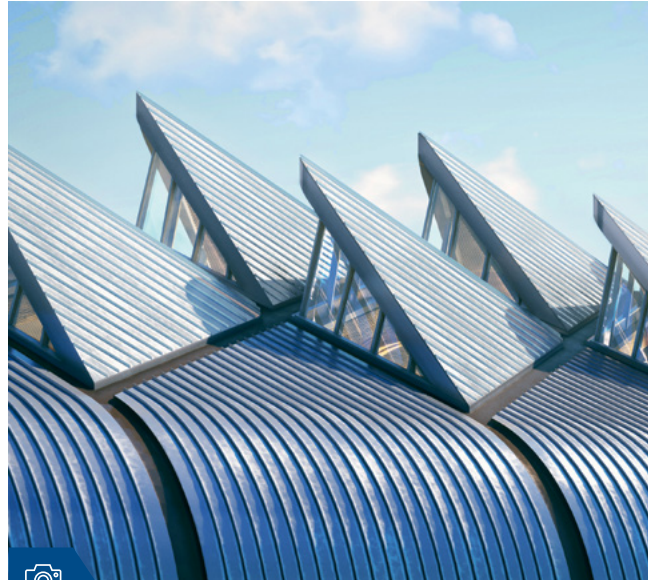
But HS2 Interchange is much more than a ‘dropping off’ and ‘picking up’ point – it will also be a gateway for international travel due to its links to Birmingham Airport and be a catalyst for economic growth in the West Midlands. The station will be part of a major transport super-hub comprising the airport and Birmingham International station and serve visitors to the NEC. The growth area around Interchange, which is part of a wider area of planned regional growth known as UK Central Hub, covers 150 hectares. It will support 70,000 jobs and up to 5,000 homes, boosting the economy by £6.2 billion Gross Value Added each year.



**The growth area around Interchange, which is part of a wider area of planned regional growth known as UK Central Hub, covers 150 hectares.”**



Interchange station concourse area



Interchange station roof

Preparatory work for the station is almost complete and up to 250 people will be working on site with our early works contractor LM.

In August 2020, we received planning permission from Solihull Council and will be continuing with the procurement of the two-stage design and build contract this year. Our focus next year will be the contract award and the start of stage 1 with the station delivery partner. In 2023, we will agree the target price and start the detailed design for Interchange before moving to site works to build the station in 2024.

In his 2021 Budget, the Chancellor announced £50 million of funding to develop transport proposals around Interchange. Working with our strategic partners – Urban Growth Company, Solihull Council and Arden Cross – we are supporting plans to build a multi-storey car park at Interchange.

An APM will move passengers and visitors between HS2 Interchange, the NEC, Birmingham International rail station and Birmingham Airport. The APM will run on an elevated viaduct some 1.4 miles (2.3km) in length and range in height from 6 metres to 14 metres. All the platforms will be covered with canopies and have 'step-free' access.

Spanning both the M42 and the West Coast Main Line, the APM will carry up to 2,100 passengers per hour in each direction, with a service every three minutes. It will take just six minutes to get from HS2 to Birmingham Airport. A passenger boarding a HS2 train at Euston could be at airport 'departures' in Birmingham in about 45 minutes.

**“  
A passenger boarding an HS2  
train at Euston could be at airport  
'departures' in Birmingham in  
about 45 minutes.”**

The APM will be complete in time for the start of services at HS2 Interchange.

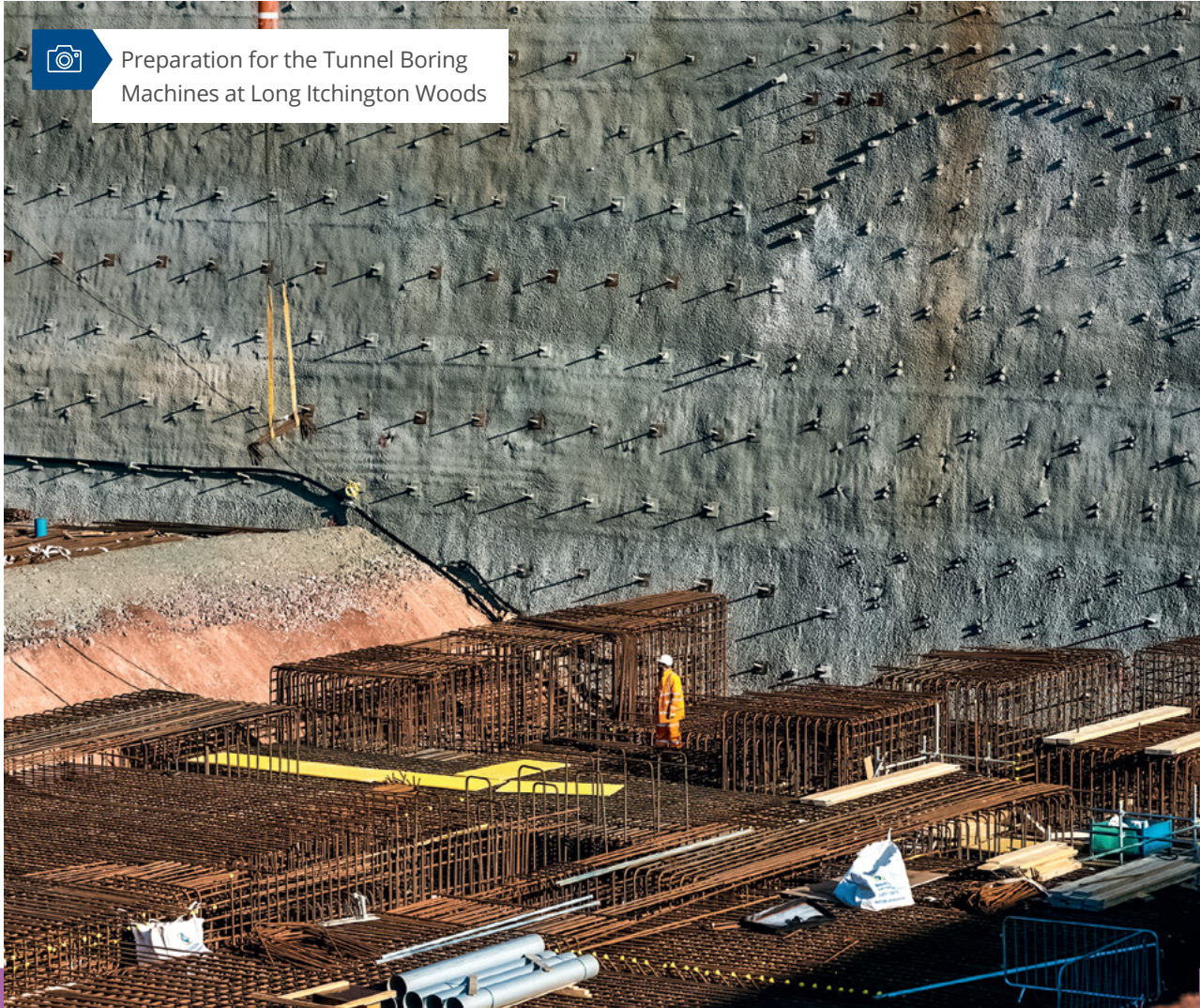
Despite being situated close to the M42, the WCML, Birmingham Airport and the NEC, Interchange's triangle site – bordered by the motorway, the A45 and the A452 – is predominantly rural. We will retain trees and hedgerows where possible and new tree planting will screen the site. We will minimise our impact on the natural environment including Hollywell Brook.



Proposed APM over the lake at Interchange station

# Phase One delivery update

## Long Itchington Wood to Fradley: Balfour Beatty VINCI



Preparation for the Tunnel Boring Machines at Long Itchington Woods

Route length:  
**56 miles**  
(90km)

Tunnels:  
**2**  
twin-bore tunnels

**2**  
'green' tunnels

**5.2 miles**  
(8.49km) of tunnels in total

Construction jobs:  
**7,000**

Other major structures:  
**72**  
bridges

**37**  
viaducts

Green legacy:  
The revised  
**Canley Brook**  
realignment, near Kenilworth,  
cuts the river diversion from  
700m to 80m, protecting  
otters and bats and reducing  
construction traffic



## The HS2 route from rural Warwickshire into the urban heart of Birmingham completes the link between the West Midlands and London.

Euston and Curzon Street stations will once again be connected by rail as Phase One’s most northerly IPT, featuring joint venture BBV, extends the route into Birmingham and onwards to the tie-in with the West Coast Main Line (WCML) at Handsacre, Staffordshire. At 56 miles (90km), this is the longest section of the route. We need to build 72 bridges, 63 embankments, 37 viaducts and 34 cuttings – and we will recruit and train about 7,000 skilled workers to complete the task.

We have now completed advance works to allow tunnelling to start under Long Itchington Wood, Warwickshire, in autumn 2021. The one-mile twin-bore tunnel will allow us to preserve ancient woodland as we endeavour to mitigate the environmental impact of the railway. We have also focused on preparing for main civils with a major package of utilities work involving 1,300 utility interfaces. Demolition of existing buildings and structures has taken place and we have installed temporary works for road and plant crossings, haul roads, fencing and pre-earthworks drainage.

The IPT’s 10 major construction compounds will be set up by the autumn, providing offices and welfare facilities for contractors. The largest site, at Kingsbury near the M42, is also the location of BBV’s training facility. Our compound at the A46, Kenilworth bypass, supports 157 office staff and 180 construction workers, who moved to the site in May 2021. A number of the construction sites will also accommodate concrete batching plants, slurry treatment plants, material storage and earthworks stockpiling.

Since April 2020, we have recruited about 75 staff a month with more than 1,000 people now working on this section of the route.

### Preparing for tunnelling at Long Itchington Wood

We are preparing to launch the Project’s third TBM at Long Itchington Wood. Work on the one kilometre square north portal site involved a large excavation by Midlands-based firm Collins Earthworks. It cleared 300,000 cubic metres of soil – the top soil and sub-soils are stored and separated with straw material so they can be put back in the same way when the tunnel is built. Material will be reused for environmental embankments and landscaping.

Earthworks along the BBV section involve moving a total of 30 million cubic metres of material. We started the works in spring 2021 and will excavate about five million cubic metres this year alone, using a strategy to best transport large volumes up and down the route. Earthworks and ground improvements for the Grand Union embankment near Long Itchington Wood and the Beechwood embankment at Balsall Common are due to start in June 2021.



Preparation for tunnel boring machines at Long Itchington

# Phase One delivery update

## Balfour Beatty VINCI continued

We started excavating the TBM launch portal at Long Itchington in April 2020. This involved 120 people and was completed in February 2021. During the busiest period, a total of 35 machines were on site, all using new technology to lower emissions. The construction fleet uses fuel-efficient engines fitted with exhaust systems that break down nitrogen oxide gases into harmless elements before they are expelled.

**“We started excavating the TBM launch portal at Long Itchington in April 2020. This involved 120 people and was completed in February 2021. During the busiest period, a total of 35 machines were on site all using new technology to lower emissions.”**

The first components of the 2,000-tonne variable density slurry TBM arrived in December 2020. We cast a concrete slab on which to assemble the machine's 400 parts. The TBM is set to launch from the north portal in the autumn and is planned to break through about six months later. It will be extracted at the south portal 'reception' box, which is under construction, before being transported by road back to the north portal for the second bore. We plan to complete tunnelling in summer 2022.

The north portal is also the site of the slurry treatment plant, which was built in six months. It will be used for processing the spoil excavated by the TBM so it can be reused for landscaping for HS2. At the south portal, we have started building the diaphragm walls for the 'green' tunnel which will be about 160 metres long and forms the final section of the Area North scope before linking into the works by EKFB. The 'green' tunnel will blend into the landscape and be completed next year.

It is proposed that a second twin-bore tunnel, the Bromford tunnel, near Birmingham, be extended by 1.4 miles (2.2km) to 3.6 miles (5.8km) to run next to the M6 between Water Orton and Washwood Heath. Extending the tunnel has ecological benefits as it will reduce disturbance to Park Hall Nature Reserve. It will also take up to 250,000 lorries off roads in Birmingham city centre. Earthworks and enabling works started in February 2021 at the east portal, from where the TBM will launch. It is due to start its first 'drive' in August 2022 with the breakthrough expected a little over 12 months later. To overcome constraints at the tunnel's western end, the TBM will then be returned to the east portal for the second tunnel.

We will start setting up piling platforms and the batching plant for the 522-metre Burton Green tunnel in Warwickshire, the shortest on the Phase One route, in October 2021. Piling works are set to begin in early 2022. This 'green' tunnel involves a cutting being created in the ground before a tunnel 'box' is built inside it. The space around the box is then filled to create an area of land on the surface.

We have revised the design of the railway through the Canley Brook area, near Kenilworth, so it will travel in a slightly shallower and longer cutting. A viaduct can be built over the brook, reducing the diversion of the river from 700 metres to just 80 metres. This means we will excavate 600,000 cubic metres less earth and save 28,000 cubic metres of concrete by removing the retaining wall for the Canley Brook realignment. Less excavation and building work will cut the number of lorry movements by 2,500. Avoiding a major realignment of the waterway will help to preserve the home of otters and bats and we plan to create a wetland habitat either side of the realigned section of the brook.



Proposed Canley Brook cutting

## First materials by rail into Washwood Heath

The first rail freight delivery of aggregate arrived at Birmingham's Washwood Heath rolling stock maintenance depot in August 2020, signalling the start of a major programme to take up to 1.5 million lorries off the roads and cut carbon emissions during construction. Over the next decade, up to 15,000 freight trains will haul 10 million tonnes of aggregate to our construction sites. Each freight train replaces about 70 lorries, representing a massive reduction in carbon emissions and marking a significant investment for Britain's rail freight sector.

Washwood Heath, a former railway works, took its first delivery from aggregates supplier Rail Stone Solutions (RSS) and its rail haulage partner GB Railfreight last summer. Over the following months, more than 150 trains brought up to 235,000 tonnes of stone from quarries in the Peak District, equating to keeping an estimated 13,000 lorry movements off the road.

Ten trains per week will each bring about 1,500 tonnes of aggregate to Washwood Heath. The material will be used to build a large piling platform for the Bromford tunnel approaches and railway embankments as well as haul roads around the site. Remediation work is being carried out in preparation for construction of the depot which will create about 500 jobs when operational.

## Innovative bridge building

We are using innovative techniques to build bridges, minimising disruption to local traffic.

North of Birmingham, HS2 will cross the M42 near Kingsbury on a bridge being constructed 'offline' at the side of the motorway. We have started building the launch site for the concrete box which will measure 80 metres by 21 metres and will be slid into place once complete. Adopting this method has avoided about 111 overnight road closures, 18 months of 'narrow' lanes and reduced speed limits. Instead, there will be about 15 months of hard shoulder closures and the motorway will shut for up to 14 days, to be agreed with Highways England, with an expected completion date of winter 2022.

We will use the same method of bridge building for the A46 structure at Kenilworth and work to construct the bridge, which will weigh about 2,000 tonnes, gets underway in July 2021. By autumn of that year, we will start preparatory works for the A45 Eastway overbridge near the Interchange station.

# Phase One delivery update

## Birmingham Curzon Street station



 Birmingham Curzon Street station

HS2 Platforms:

**7**

Trains per hour  
in each direction:

**3**

full Phase  
One opening

**9**

full Phase  
Two opening

Passengers per day:

**25,000**

Phase One

**66,000**

Phase Two

Regeneration jobs:

**36,000**

Cutting carbon:

Saving more than

**87,000**

tonnes of CO<sub>2</sub>  
equivalent carbon  
emissions – equal  
to emissions from  
10,000 homes

We have made good progress at Birmingham Curzon Street – the site of the world’s oldest railway terminus – since it became the first of our stations to gain planning permission in April 2020.

Birmingham’s motto ‘Forward’ was born during a Victorian age characterised by railway expansion and technological innovation, and we are building one of the most environmentally friendly stations on the planet in a redeveloped ‘city of a thousand trades’. The task of improving rail connections and boosting rail capacity goes together with our commitment to supporting economic recovery: the Curzon Street Masterplan predicts 36,000 jobs will be created in the area surrounding Birmingham’s HS2 station.

**“The Curzon Street Masterplan predicts 36,000 jobs will be created in the area surrounding Birmingham’s HS2 station.”**

The two stage design and build contract, worth up to £570 million, was awarded to the Mace Dragados joint venture in May 2021. The joint venture will collaboratively develop a Stage 1 target price and delivery schedule before we commit to going ahead to Stage 2’s detailed design and construction. The procurement programme, which we revised to minimise risk to the contractor, will allow us to meet the HS2 key dates for the construction as we build momentum towards a scheduled opening between 2029 – 2033 for Phase One services.

It will be the first time regular passenger services have used the historic station site, now operating from a new terminus, for about 175 years. The journey to the capital, which took about five hours when the original London and Birmingham Railway opened in 1838, will now take 45 minutes. Journey times between Birmingham and Manchester will be more than halved, to 41 minutes, when Phase Two opens.

Initially there will be at least three trains per hour between Curzon Street and Old Oak Common, which will act as the temporary London terminus for HS2 pending the completion of Euston. We are working with the DfT to assess whether a maximum of up to six trains per hour could be operated from Old Oak Common. The new intercity rail link, crucial to releasing capacity on the West Coast Main Line, will dovetail with the local transport network in Birmingham. The Midland Metro will call at Curzon Street as part of the Birmingham Eastside extension, which will take the line to the Creative Quarter in Digbeth. We are working with the West Midlands Combined Authority to make sure the utility diversions, essential to the site’s preparation, are ‘future-proofed’ for the tram extension.



Birmingham Curzon Street station

# Phase One delivery update

## Birmingham Curzon Street station *continued*

In addition to the new tram service, accessible pedestrian routes will take HS2 passengers to local bus services, Sprint rapid bus services and local train services at nearby Moor Street station. There will also be space for more than 550 bicycles at the station.

The design for Curzon Street, developed with WSP, Grimshaw Architects LLP and Grants Associates, features four new public spaces, which will support new shops, leisure and travel. The station's design harks back to the sweeping arched roofs built by Victorian railway architects. We will build on the design vision as we work with Mace Dragados to agree a target price and we expect notification of Stage 2 in mid-2022, signalling the start of the detailed design and construction of the station. Construction activity will step up from summer 2022 to 2024 as we set up a site compound and start extensive works including excavation and piling.



Birmingham Curzon Street station concourse

We will need to hit the key dates for the delivery of Curzon Street to make sure other contracts for the high-speed railway remain on schedule. Elements of the station building need to be completed by the end of 2025 to allow the Rail Systems team to access the station from January 2026. The station is currently scheduled for completion in 2028.

We are using new technology in construction to minimise risk, improve safety and cut disruption. HS2 enabling works contractor LMJV is using innovative augmented reality technology for the utilities programme to map existing underground services and plot where planned pipes and cables will go.

Every action is interrogated from a sustainability perspective. Revisions to the original designs for Curzon Street mean we will reduce carbon emissions by an estimated 55% during the 'whole life' design of the station and we will achieve net-zero carbon emissions from regulated energy consumption. We will cut the station's emissions by more than 87,000 tonnes of CO<sub>2</sub> equivalent – similar to removing the emissions of more than 10,000 houses.



Overhead visual of Birmingham Curzon Street station

Curzon Street will consume less energy by using innovations such as LED lighting; it will generate its own low-carbon energy through 2,855m<sup>2</sup> of solar panels on the platform canopies and use ground source heat pumps to 'harvest' natural heat from underground. We will recycle 50,000m<sup>3</sup> of spoil taken from the site for works at Interchange station to the east of Birmingham.

Open spaces and landscaping will feature parkland lawns, rain gardens to capture water, a wildflower grassland, new trees and an area of new broadleaf woodland to provide a natural habitat for wildlife. There will be 30 insect 'houses' and 50 bird boxes for urban species such as sparrows, blackbirds and starlings.

**“Curzon Street will consume less energy by using innovations such as LED lighting; it will generate its own low-carbon energy through 2,855m<sup>2</sup> of solar panels on the platform canopies.”**

As we excavate and build for the future, we are also preserving Curzon Street's unique heritage and treating the past with dignity and respect. About 10,000 human remains exhumed from Park Street burial ground have been reinterred and we have preserved the world's oldest railway roundhouse, designed by legendary engineer Robert Stephenson. This unique piece of industrial heritage will be incorporated into the station's urban realm.

We have also started to refurbish the station's Grade I listed former Principal Building, which opened in 1838 when the original London and Birmingham Railway launched intercity services to and from the capital. Designed in Greek Revival style by Philip Hardwick, the three-storey building was intended for a general office, boardroom and refreshment saloon and was extended to become a hotel. Working with a conservation expert, LMJV is undertaking a 12-month renovation for a proposed HS2 visitors centre, offices and an exhibition space.



Birmingham Curzon Street platform area

# Phase 2a delivery update



Visual of Crewe station

Our goal to deliver HS2’s national benefits as quickly as possible was boosted by Royal Assent for the Phase 2a hybrid Bill, achieved in February 2021. Activity is now ramping up along the 36-mile (58km) route connecting the West Midlands and Crewe, clearing the path for the railway in readiness for the start of main construction work in 2024. Thousands of UK businesses are in line for contract opportunities as we extend the Project’s benefits to the towns and cities of north-west England, north Wales and Scotland sooner.

The Government unveiled its intention to bring forward the HS2 rail link to Crewe, with connections to the conventional network, in 2015. We now have the powers to acquire land, gain access for environmental surveys and carry out advance works including utility diversions, road realignments and the creation of ecological habitats.

Royal Assent for Phase 2a came a year to the day after the Prime Minister announced HS2 would go ahead and followed three-and-a-half years’ scrutiny in Parliament. We benefited from our Phase One legislative experience and the collaborative working of our hybrid Bill team, the Department for Transport and our legal team. Our settlement rate for petitions in Select Committee for both Houses was 25% higher than we achieved for Phase One, which meant fewer people needed to appear before the committees.

We have given more than 1,500 undertakings and assurances in connection with Phase 2a. They include an agreement to lower the Kings Bromley and River Trent viaducts in Staffordshire by up to three metres. Through an Additional Provision, we moved the southern portal of Whitmore tunnel further south beyond the A53 Newcastle Road, removing the need to realign the road or construct an overbridge. Additional landscape earthworks near the Stone Infrastructure Maintenance Base – Rail (IMB-R) will further screen and integrate the structure into the landscape.

The IMB-R will be open 24 hours a day, seven days a week with up to 100 staff helping to keep our service running at optimum level. The Phase 2a base will work together with the Phase One maintenance depot to provide a ‘maintenance system’ to meet the needs of both sections of the network. A railhead, connected to the conventional railway, will act as the main construction compound for managing the rail systems installation for Phase 2a and will share the same 40-hectare footprint and core infrastructure as the IMB-R, between the Phase 2a line and the M6.

## Railway renaissance to boost jobs

The construction of Phase 2a between Fradley in Staffordshire and the historic railway town of Crewe will support at least 5,000 jobs at peak construction. The railway will also provide immediate opportunities for employment and training as we begin early works across an area covering five borough and district boundaries and four Parliamentary constituencies.



At its northern end, Phase 2a will connect with the West Coast Main Line (WCML) south of Crewe. This will allow HS2 services to join the WCML and call at Crewe station. North of the junction with the WCML, the railway will continue to a tunnel portal south of Crewe. Phase 2a also includes the link to, and the first section of, Phase 2b to the North and Scotland.

Once home to the largest railway-owned works in the world and a pioneer of new technology, Crewe will be at the forefront of Britain's high-speed rail renaissance and be a key destination for regional growth. HS2 is central to a £180 million regeneration plan for the town to create new commercial and job opportunities, and tackle housing supply issues.

Journey times between Crewe and London will be cut to under an hour and HS2 services at Crewe will also better connect north Wales and the Mersey Dee region (which covers the economies of north east Wales, west Cheshire and The Wirral) to London and the South East. North/south connectivity and access to Stoke to the east will also be improved. Combined with an HS2 junction north of Crewe, this could allow up to seven HS2 trains per hour to call at Crewe and improve connectivity on the lines from Crewe to Shrewsbury, Chester and Stoke. The high-speed railway is set to stimulate growth in Cheshire and Staffordshire worth £6.4 billion.

## Ground investigations

Our ground investigation (GI) works, essential for understanding the soils, rocks and groundwater below the surface, are informing the design development of Phase 2a. We started our investigations in April 2018 and we have completed three GI work packages featuring a total of 836 investigation locations using boreholes, trial pits and other methods.

A fourth GI package, significantly larger than the previous three combined, covers about 1,200 locations. The contract, worth £25 million to £30 million, was awarded to Balfour Beatty and off-site testing and reporting should be complete by the end of Q1 2022. Field monitoring will extend

until the end of 2022. Unlike Phase One, where the works were procured as smaller discrete packages, our framework contractor Balfour Beatty is responsible for managing the individual GI contractors for Phase 2a. We have been testing new technology including sonic drilling and a 3D camera for trial pit excavations.

## Early works progress

We are using a new delivery model to accelerate the pace of work for Phase 2a and make sure the railway infrastructure is built and operated in an integrated way with Phase One construction. This will allow Phase 2a to align with the start of Phase One passenger services between Birmingham and Old Oak Common during 2029 – 2033.

As part of this, we are conducting an extensive programme of early environmental works (EEWs) which includes creating hedgerow, woodland and wetland habitats and grasslands, landscape mitigation plans and archaeological investigations.

Our new model also includes two early civils work packages. Early Civils Work package 1 (ECW1) includes two major junction improvements in Staffordshire at M6 Junction 15/A500 (Hanchurch Interchange) and the widening of Wood End Lane/A515 Tewnalls Lane near Lichfield for construction traffic.

Early Civils Work package 2 (ECW2), due to start in Q4 2021 and valued at £50 million, will be awarded via the Government's Construction Works and Associated Services framework. ECW2 includes a range of enabling works such as major highways work, utility diversions and a new bridge over the M6 near to Stone. This work will take place alongside environmental and other surveys. The package represents HS2's first major civils work north of the West Midlands and will help us accelerate delivery as we build towards the handover to main civils construction in 2024.

For Phase 2a, we plan to deliver a programme of Advanced Civils Works (ACW) alongside the appointment of a Design and Delivery Partner (DDP). This will take place before we launch Main Works

## Phase 2a delivery update *continued*

Civils (MWC). ACW will prepare the ground in advance of the main works contracts and include taking possession of land, setting up compounds and haul roads, completing final environmental activities, translocating flora and fauna, and demolitions. The DDP, due to be appointed next year, will develop and integrate the Phase 2a design and manage the delivery of the works by contractors.

The bulk of archaeological survey and mitigation will be implemented from 2022. ACW design for ancient woodland compensation planting will start in 2022 with planting and soil translocation works underway in 2023. ACW design of protected species mitigation, above that provided in EEWs, will start in 2022.

### Planning for Main Work Civils

We will award the MCW contracts for Phase 2a as a series of self-contained packages, split into geographic areas. The current proposal is for six areas which have been identified for localised mass haul, access, compounds and the asset types, or structures, within them. The proposed areas are as follows:

- Fradley to Blithbury – including the River Trent and Kings Bromley viaducts and the connection to Phase One.
- Blithbury to Stafford – the Great Haywood viaduct and Staffordshire Showground.
- Stafford to Yarlet – more than six miles (10km) of cutting and embankments.
- Yarlet to Swynnerton – the maintenance base (IMB-R) and Meaford viaduct.
- Swynnerton to Madeley – two twin-bored tunnels and crossing the WCML.
- Madeley to Crewe – complex connection to the conventional network at Crewe.

The final MCW packaging will undergo further enhancement and market engagement during 2021 and we expect to go out to market in early 2022.

We will start major earthworks in spring 2024, excavating cuttings and building embankments. The main civil engineering works include the IMB-R,

17 viaducts, 26 cuttings, 36 embankments and 65 bridges. We will build two twin-bored tunnels, totalling about 1.2 miles (2km), at Whitmore and Madeley. A short section (about 200 metres) of the southern part of the Whitmore tunnel will be a cut-and-cover or ‘green’ tunnel.

The TBMs are set to be launched in 2025 and will tunnel from south to north. Both tunnels will have porous portals to control noise and make sure there is no adverse effect on the surrounding area as trains exit the tunnels. Both tunnels sit high in their respective hillsides and require significant works to secure access to start the building.

Other significant structures include the River Trent and Kings Bromley viaducts which stretch for about two miles (3.5km) through flood plain and are separated by a large embankment. The Great Haywood viaduct spans the Colwich to Macclesfield line, the River Trent and the Trent and Mersey canal. It requires significant temporary works including a 230 metre temporary access bridge to allow articulated dumper trucks to pass over the rail and waterways to build the viaduct.

The River Lea viaduct sits in a valley between the two tunnels and has to span the WCML and Silverdale branch line. This will require two temporary crossings of the WCML for construction.

The landmark Meaford viaduct will cross the M6 just north of the IMB-R. The three-span structure includes a 130 metre span over the motorway. The viaduct will be built off site before being transported into position and will be one of the most visible structures on the Phase 2a route.

The complex spurs and main line which gives HS2 connection into Crewe station and onto the conventional rail network require major engineering, including a diversion of the WCML. The portal for the Crewe tunnel will need to be constructed at the same time due to space constraints with the tunnel being built as part of Phase 2b, subject to Parliamentary and government approval.

Following the completion of the track bed, we will install the railway systems, including slab track, signalling and the power supply. Testing and commissioning is expected to take place over two years from 2029 to 2031. Testing will start at the southern end of the Phase 2a route to allow us to test the train operating systems at the earliest opportunity. The route does not feature any new stations and the Phase 2a trains are part of the classic compatible fleet that will be shared with Phase One.

The total estimated cost range for Phase 2a is £5 billion to £7 billion and the funding range will be finalised alongside the construction works delivery model.

### **Cutting carbon along the Green Corridor**

We are committed to minimising our carbon footprint both as we build Phase 2a and when we operate the railway. The emissions from HS2 are forecast to contribute less than 1% of the projected total UK construction carbon emissions for 2026; and the UK Emissions Trading Scheme will regulate emissions from the construction and operation of HS2 Phase 2a. This means that, overall, most of Phase 2a's carbon emissions will not contribute to an increase in UK-wide carbon emissions.

The capacity of HS2 trains, carrying up to 1,100 passengers, combined with the railway's ability to draw power from an increasingly decarbonised national grid, makes it an effective low-carbon transport option for journeys between the West Midlands and Crewe. In terms of CO<sub>2</sub> equivalent emissions – expressed in grams per passenger kilometre (gCO<sub>2</sub>/pkm) – HS2 Phase 2a will emit 10 gCO<sub>2</sub>/pkm. This compares with inter-urban cars (67 gCO<sub>2</sub>/pkm); intercity rail (22 gCO<sub>2</sub>/pkm) and UK domestic flights (170 gCO<sub>2</sub>/pkm), based on projected carbon emissions in 2030.

Phase 2a has been designed to avoid or reduce significant adverse effects on habitats, protected species and other features of ecological value. Where this cannot be avoided, we have developed mitigation and compensation schemes including

replacing habitats, sensitively moving species and special measures to allow creatures to move across the route like the Swynnerton Estate North green overbridge, which will protect bats.

We are doing everything we can to minimise the impact of HS2 on ancient woodlands and we will look at opportunities to extend this work. About 9.8 hectares (about 24 acres) of ancient woodland is expected to be lost across 11 woodlands as we build Phase 2a. We plan to partly offset this loss by creating 78 hectares (192 acres) of woodland habitats, translocating up to 9.6 hectares (23 acres) of ancient woodland soils and restoring 13.4 hectares (33 acres) of existing ancient woodland.

We are also urging landowners to create new native broadleaf woodlands and restore existing ancient woodlands through Phase 2a's dedicated £2 million HS2 Woodland Fund. In total, almost £18 million in additional local funds will be available for environmental schemes and projects.

### **Putting people first**

Learning from our experiences of Phase One, we are putting people at the centre of everything we do as we acquire the land we will need to build HS2 to Crewe. We have communicated our new strategy within the HS2 family and to external stakeholders including claimants' agents and national bodies representing land owners such as the National Farmers Union, the Central Association for Agricultural Valuers and the Royal Institution of Chartered Surveyors.

We will continue to collaborate with all stakeholders and strive to provide a better experience to everyone affected by HS2.

A public consultation, promoted through local newspapers and online, was held from 1 February to 26 February this year to seek the views of local people about Phase 2a.

# Phase 2b delivery update



HS2 Phase 2b western leg update and consultation virtual exhibition room

Phase 2b extends HS2 to Manchester and Leeds as part of the classic Y-shaped network and is being considered as part of the Integrated Rail Plan (IRP) for the Midlands and the North. The IRP is looking at the scope, integration and delivery of HS2, Northern Powerhouse Rail (NPR), Midlands Rail Hub and other major Network Rail schemes.

In line with the Government’s instructions, we are continuing to develop a hybrid Bill for the Phase 2b western leg, extending the railway from Crewe to Manchester with a connection to the West Coast Main Line (WCML) south of Wigan. The western leg will allow HS2 trains to serve destinations including Preston, Carlisle, Liverpool, Edinburgh and Glasgow.

The 53-mile (85km) route will further unlock the full benefits of HS2, freeing up space on the WCML north of Birmingham and providing high-speed rail connections to drive regional economic growth. Journey times between Manchester, HS2’s terminus

in the North West, and London will be cut to 71 minutes, a saving of 54 minutes.

Extending HS2 will boost employment as we build the North, supporting thousands of jobs at peak construction.

We are on target to submit a hybrid Bill by early 2022 and sooner if possible. The Phase 2b Environmental Statement (ES) we will submit with the hybrid Bill will look at HS2’s likely significant environmental effects along the route and the way we will manage, reduce and monitor these effects. A non-statutory public consultation on the working draft ES in 2018 prompted comments from nearly 38,000 respondents and we have considered this feedback as we develop the railway’s design and finalise the ES. A team of about 400 environmental specialists is working on the ES, which runs to more than 14,800 pages and includes 2,650 map sheets. The route’s Environmental Impact Assessment (EIA), the results of which will be reported in the ES, is being digitised for the first time to streamline the process.

Together with the DfT, we are investigating options for the western leg to deliver net gains in biodiversity rather than targeting no net loss. HS2 Ltd became the first UK transport client organisation to achieve PAS 2080 accreditation, the gold standard for global carbon management, in November 2020 and we are working hard to make sure Phase 2b contributes to our efforts to leave a green legacy.

## Design Refinement Consultation

A second Design Refinement Consultation (DRC) for Phase 2b western leg ran between October and December 2020. It focused on changes at Crewe, Manchester Airport, Manchester Piccadilly, and Annandale in Dumfries and Galloway. These changes were proposed to help refine the Phase 2b route design to make sure it offers the best value for taxpayers’ money, as well as minimising disruption to residents and reducing HS2’s impact on the environment.

Under the proposals, Manchester Piccadilly will have six 455-metre platforms (an increase of

two platforms), which will be located on viaducts above street level. A new four-platform Metrolink station will be built below the HS2/NPR station with provision for a second two-platform Metrolink stop for possible future expansion of Metrolink. Manchester Airport's HS2 'through' station will also get two additional 415-metre platforms, making a total of four platforms, to meet service growth and use of the infrastructure by NPR. There is provision for a two-platform Metrolink stop on a viaduct above the concourse.

The DRC changes include the addition of the Crewe Northern Connection, which also supports the vision for the Crewe Hub; changes to Crewe North rolling stock depot design; and a new train stabling facility at Annandale.

During the DRC, we held 13 digital engagement events, which 1,077 people registered to attend. Residents, farmers and other business owners directly affected by the proposals were offered the opportunity to book one-to-one appointments. Topic experts supported appointments where technical issues were discussed. In total, we met 572 people over 365 appointments.

We received 326 responses to the consultation – 167 responses were from organisations and 159 responses were from individuals. These responses have been analysed by Ipsos MORI and will form the basis of advice to the Secretary of State on whether to proceed with each of the proposed changes. The DfT will publish a response to the consultation after considering the advice.

We have also updated route safeguarding to make sure HS2 is protected from any conflicting developments.

### Ground investigations

We completed a programme of advanced ground investigations in 2020 that took account of Cheshire's history of salt mining and the effects of this on ground conditions. We used a combination of non-intrusive geophysical tests, such as radar surveys, and 'ground-breaking' intrusive tests, like boreholes and trial pits. Main intrusive work

focused on 15 locations across a 16-mile (26km) section north of Crewe and featured drilling a total depth of 2,835m.

A second package of ground investigations will start this year and be completed in early 2022. We have earmarked 311 individual investigation locations including 89 trial trenches to a depth of five metres, four rotary cored boreholes between 20 metres to 60 metres deep and 76 cable percussion boreholes, ranging from 8 metres to 23 metres deep. The presence of rock salt, or halite, and historical and present day salt dissolution and extraction means there is a legacy of stability issues and the risk of ground movements which we will need to mitigate.

### Network Rail integration and infrastructure

The western leg features two connections with the WCML immediately north of Crewe and south of Wigan. We are working collaboratively with Network Rail at 'touch-points' to de-risk the hybrid Bill process and develop optimal outcomes for both organisations.

We will build more than six miles (10km) of viaducts for Phase 2b, the longest being the 1.1 mile (1.9km) Manchester Ship Canal viaduct. We will also build about 40 bridges that HS2 will need to cross roads, rail lines and watercourses.

In total, we will build 12 miles (19km) of twin-bored tunnels at Crewe and Manchester. We will tunnel for 3.8 miles (6.2km) under Crewe and the eight mile (12.8km) Manchester tunnel will run just north of the airport station site, near Hale, to Ardwick, south of Piccadilly station. We will need to build a total of six vent shafts for the two tunnels.

Other major infrastructure projects include the Crewe North rolling stock depot, south of Winsford. The depot footprint includes the Infrastructure Maintenance Base-Rail (IMB-R) which, alongside the smaller facility near Ashley (on the Manchester spur), work together with the IMB-R at Stone to maintain the western leg during operation.

Proposed opening of the western leg remains in the range 2035 to 2040.

# Backing Britain's green revival

## 1. Forestry England

**Total awarded: £450,000**

The multi-million pound redevelopment of Wendover Woods will update visitor facilities and encourage local people to enjoy the natural environment.

## 2. Road Farm Countryways

**Total awarded: £74,950**

A programme of restoration will allow the Great Missenden farm to promote caring for the countryside alongside physical and mental wellbeing – with benefits for disadvantaged and vulnerable people.

## 3. Chilterns Conservation Board

**Total awarded: £243,103**

Local people will help to conserve orchards, ponds, hedges and churchyards and contribute to historic research and arts events.

## 4. Community Environment Trust

**Total awarded: £74,615**

Castle Vale Conservation Area comprising meadow, mixed grassland, woodland and a wildlife pond will be enhanced by community volunteers.

## 5. Conservation volunteers

**Total awarded: £73,018**

Sixteen sites in Amersham, Coleshill, Chalfont St Peter and Chalfont St Giles will run outdoor 'green gyms' featuring planting trees, sowing meadows and tending wildlife ponds.

## 6. Castlehaven Community Association

**Total awarded: £73,591**

The Greengage project recruits and trains local people to organise community 'clean ups', develop a local nature park and nurture wildlife.

## 7. Thames21 Ltd

**Total awarded: £66,047**

Local communities are helping biodiversity and flood mitigation along the River Pinn and learning about the waterways in west London.

## 8. Staffordshire Wildlife Trust

**Total awarded: £75,000**

Visitor facilities are being upgraded at The Wolseley Centre with a new café, improved accessibility and a boardwalk bridge with lakeside views.

## 9. Birmingham Civic Society

**Total awarded: £44,500**

Communities affected by HS2 are encouraged to plant trees and learn about nature – with lots of children getting involved.

## 10. Woodhouse Farm and Garden

**Total awarded: £23,482**

Woodhouse Farm and Garden, Lichfield, is improving its kitchen facilities and green maintenance equipment – and improving access to green spaces for older and disabled members.

## 11. Quainton Windmill

**Total awarded: £10,000**

Brick-built Quainton Windmill in Buckinghamshire, the third tallest in England and dating from 1832, has been restored to its former glory as a working mill.

## 12. Wildlife Trust Birmingham and Black Country

**Total awarded: £75,000**

The EcoPark environment centre in Small Heath will be upgraded to provide an indoor classroom for schools and local people.

## 13. West Midlands Bird Ringing Group

**Total awarded: £10,000**

Birds such as lapwing, woodcock and skylark will be monitored using thermal imaging and tagged to record migration routes and breeding patterns.

## 14. West Midland Bird Club

**Total awarded: £10,000**

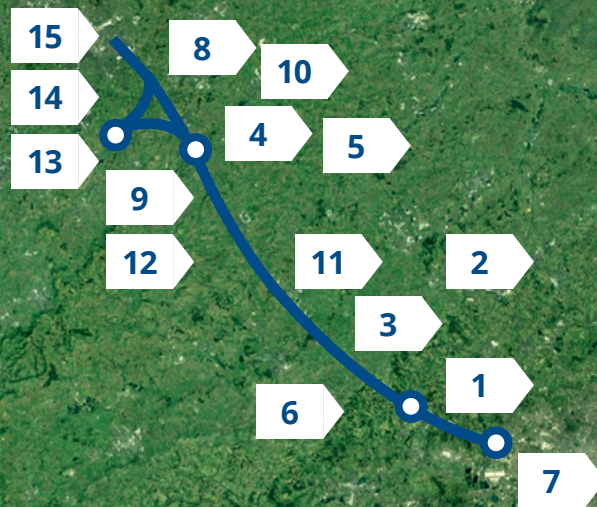
An artificial bank for nesting sand martins at Ladywalk Reserve, Warwickshire, will increase the birds' breeding success.

## 15. Groundwork West Midlands

**Total awarded: £60,323**

Residents living in four tower blocks in Chelmsley Wood, Solihull, are helping biodiversity and boosting their environmental skills.

In 2014, the Government announced the Community and Environment Fund (CEF) and the Business and Local Economy Fund (BLEF) to help mitigate the effects of Phase One of HS2 on local communities and businesses. In 2018, the funds were extended to cover the Phase 2a section of the route from the West Midlands to Crewe. This brings the overall combined funding for projects along the Phase One and Phase 2a route to £45 million. The funds will help to support Britain's green recovery. Here are some examples.



Look ahead 2021 – 2024

## 2021/22 KPIs

The table below presents our Key Performance Indicators for 2021/22, as agreed by the DfT in July 2021. 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. Health and Safety Performance</b>	Improve HSPI score to $\geq 2.20$

### Are we on time?

KPI	Target(s)
<b>2. Phase One Progress</b>	Delivery Into Service (DIS) Target Date maintained Achieve the key Phase One delivery milestones for 2021/22
<b>3. Phase 2a Progress</b>	Achieve the key Phase 2a delivery milestones for 2021/22
<b>4. Phase 2b Progress</b>	Deposit the hybrid Bill for the Phase 2b western leg by end of February 2022

### Are we on budget?

KPI	Target(s)
<b>5. Anticipated Final Cost (AFC) Performance</b>	AFC at or below Target Cost
<b>6. Annual Budget Performance</b>	Year end out-turn to not exceed Supplementary Estimate by more than 1%, and to be no more than 3% below the Supplementary Estimate for capital spend and 1% for resource spend



## Are we a good neighbour?

KPI	Target(s)
<b>7. Environmental Performance: Biodiversity</b>	Realise No Net Loss (0%) in biodiversity across the Phase One Main Works Civils contracts by end of March 2022
<b>8. Community Experience</b>	Resolve 70% of construction queries and complaints within two working days of them being reported to the HS2 Ltd Helpdesk
<b>9. Environmental Performance: Carbon Emissions</b>	Forecast 28% reduction in carbon emissions against the carbon baseline for Phase One by end of March 2022

## Our organisation

KPI	Target(s)
<b>10. Equality, Diversity and Inclusion</b>	Improve the EDI balance for HS2 Ltd employees to 40% women and 23% BAME representation

NB. The ongoing impacts of Covid-19 have not been factored into these KPI targets and will be reflected in future updates as they become clearer



## 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.

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Cover image – Tunnel boring machines at HS2 South Portal site.

Back cover image – Preparation for tunnel boring machines and employee in foreground.



# HS2

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