HS2 tunnelling between Old Oak Common and Greenford

Frequently Asked Questions

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

Skanska Costain STRABAG joint venture (SCSJV) is responsible for the design and construction of the final 26.4km of HS2's journey to its southern terminus in Euston. SCSJV will build approximately 21.4 km (13 miles) of twin-tunnels beneath London, from West Ruislip in the west to the Euston in the east.

This set of Frequently Asked Questions (FAQs) relates to the Northolt Tunnel East between the Victoria Road Crossover Box in Old Oak and Park Royal and the Greenpark Way ventilation shaft near Greenford station, both in the London Borough of Ealing

Where is the tunnel?

The Northolt Tunnel East will be approximately 5.5 km (3.4 miles) between the Victoria Road Crossover Box site in Old Oak and Park Royal and the Greenpark Way Vent Shaft located in Greenford.

SCSJV will build the Victoria Road Crossover Box which is an underground structure allowing HS2 trains to switch tracks when approaching or departing Old Oak Common Station. Old Oak Common Station is being built by Balfour Beaty VINCI Systra joint venture (BBVS).

There are three ventilation (vent) Shafts and headhouses being built on this section of the route:

- Victoria Road (located in the Victoria Road Crossover Box site in Old Oak and Park Royal)
- Westgate (located on West Gate near Hanger Lane roundabout)
- Greenpark Way (located in Greenford adjacent to Rockware Avenue and opposite the Royal Mail distribution centre)

SCSJV will also construct 14 cross passages (CP) which will connect the two tunnels which form the Northolt Tunnel East. These will be approximately every 500 metres along the tunnel route.

What is a vent shaft?

A vent (or ventilation) shaft is a vertical opening that connects the tunnels to the surface and open air. It uses fans located in a fan house to regulate air quality and temperature in the tunnels, allows smoke to be extracted in the event of a fire and is used as an evacuation point.

How will the tunnels be dug?

We will launch two Tunnel Boring Machines (TBMs), which are specialist pieces of equipment used for tunnelling, to build the Northolt Tunnel East. The TBMs will launch from the Victoria Road Crossover Box site and will complete their journey at the Greenpark Way ventilation shaft.

Twin tunnels will be bored for the Northolt East Tunnel: one for trains travelling from the West Midlands to London, known as the London Tunnel (or "up line") and one for trains travelling from London to the West Midlands known as the Birmingham Tunnel (or "down line").

A small section of the Northolt Tunnel East (360 metres), between the Victoria Road Crossover Box and Old Oak Common Station Box will be constructed using a cyclic excavation and support method.

This is also called the sprayed concrete lining method. Sprayed concrete lining (SCL) tunneling is a technique commonly used to construct tunnels. This technique involves rapidly spraying the excavated ground with concrete to stabilize it and form the permanent tunnel lining.

This tunnelling construction method is summarised below:

- Excavation using road headers or excavators
- Installation of primary sprayed concrete lining
- Installation of waterproofing
- Installation sprayed concrete lining to support the tunnel

You can find out more about the sprayed concrete lining method under Section 9: Mined Tunnels in HS2 Information Paper D7: Tunnel Construction and Methodology, including an image which illustrates this construction method.

What are the working hours?

Once the TBMs are launched, they will operate 24 hours a day, 7 days a week until the construction of the tunnel is complete. A crew of operatives will control each TBM, working in shifts to keep the machines running 24/7. They will be supported by people on the surface, managing the logistics and maintaining the smooth progress of the tunnelling operation.

The TBMs will stop periodically for maintenance and to provide respite for the tunnelling crews.

How deep and wide will the tunnels be?

The depth of the Northolt Tunnel East between Old Oak Common and Greenford will vary between 12 metres and 40 metres. Each tunnel will have an inner diameter of 8.7 metres.

If you would like specific tunnelling depth information, please get in touch by contacting the HS2 Helpdesk on 08081 434 434 or email HS2enquiries@hs2.org.uk

When will you start constructing the tunnels?

Our current programme indicates tunnelling works for the Northolt Tunnel East between Old Oak Common and Greenford will commence from February 2024 and finish early 2025.

These dates remain subject to change. We will provide more information to local communities in advance of our tunnelling works.. Information on the tunnelling progress can be found on the HS2 in your area map

What is a Tunnel Boring Machine?

Tunnel boring machines or TBMs are used to excavate tunnels. Depending on the geology of the concerned area, different types of TBMs can be used. By building tunnels with TBMs, the effect and measurements of the surface settlement can be kept as low as possible and in cities and towns minimal disruption above ground. The type of TBM used at this project is called EPB TBM, where EPB stands for "Earth Pressure Balance". EPB TBMs are commonly used in soils with high clay and silt contents which have potential to flow or collapse and create settlements.

The machines are built out of many parts, helping the TBM carry out its two main functions of digging and building the tunnel. The most important components include:

- A cutterhead – cutting knives and disc cutters remove the soil from the tunnel face through a rotating cutterhead
- An excavation chamber – where the excavated soil transfers the necessary support pressure at the tunnel face right behind the cutter head to maintain ground stability
- A Screw Conveyor – where the material is removed from the excavation chamber
- Belt Conveyor System – whereby the excavated material is transported from the screw conveyor out of the tunnel
- A tunnel segment erector – a vacuum manipulator to position the lining segments during ring building
- A Shield – to protect the front part of the machine until the lining segments are installed

You can watch a video about TBMs here. This video shows another type of machine called a Variable Density TBM. Compared to the EPB TBM, they are quite similar except an EPB Shield transports the material via belt conveyor system the Variable Density TBM uses a slurry pipe for transport where the soil must be liquified first.

How will the TBMs be delivered?

The TBMs will be delivered by road and assembled at the Victoria Road Crossover Box site and Old Oak Common Station site in Old Oak and Park Royal. Because of their size, special arrangements will be made to deliver at times such as overnight or early morning so that we do not impact on local traffic.

How are the tunnel segments being delivered to the TBMs?

The TBMs need to be fed a constant supply of segments. Six pre-cast concrete segments comprise a tunnel ring. Segments for the Northolt Tunnel East and Atlas Road Logistics tunnel are being delivered by a factory in Hartlepool.

We will receive the concrete segments to the Old Oak and Park Royal area via rail to the Willesden Euroterminal site. The concrete segments will then be transported to the Atlas Road

site via a logistics bridge over the Grand Union Canal. From the Atlas Road site, we will transport segments via road to the Flat Iron site to the Northolt Tunnel East.

What is a Cross Passage?

Cross passages are short tunnels which connect two parallel running tunnels and provide a safe evacuation of trains in an emergency.

Where are the Cross Passages located?

Cross passages will be located approximately every 500 metres along the tunnel route and will be between 12 to 40 metres below ground. Map one shows the approximate locations for the 14 cross passages related to the Northolt Tunnel East.

How are cross passages constructed?

Cross passage construction involves breaking into the side of the completed tunnel. The ground is dug out in short lengths and a sprayed concrete lining is used to form the interconnecting tunnel. After each section is mined and lined, a temporary concrete face forms the end of the cross passage. This methodology is a proven, safe way to create cross passages between the tunnels. The temporary face will then be removed, and the above cycle is repeated until the cross passage is completed. This process will take around 1 week per cross passage.

Will you here the cross passages being constructed?

This main phase of construction generates ground-borne noise which may be heard by properties over 100 metres away from the cross-passage location depending on the type of ground and possibly the structure and foundation of a building

Our engagement team will contact residents closest to the cross passages prior to their construction.

When will the Cross Passages to be constructed?

The cross passages will be constructed once the TBMs have passed. We are currently expecting to begin construction of cross passage one in April 2024*.

What will happen to the excavated material (spoil)?

Excavated materials from the TBMs will be removed by conveyor to the Willesden Euroterminal site in the Old Oak and Park Royal area. You can view more information about the conveyor system at www.hs2inoldoak.co.uk.

The excavated materials will be removed from the Willesden Euroterminal site by rail and will be transported to locations in Cambridge, Kent, and Bedfordshire.

How will you manage the impact of tunnelling?

We recognise that residents may be concerned about tunnelling and related activities, and we will aim to reduce the impacts as much as possible. The measures we will use to do that include:

- Selecting a construction methodology that reduces settlement and noise and is significantly quicker than other tunnelling techniques
- Using best-in-class machinery that has been bespoke manufactured for the purposes of digging the Northolt Tunnel East.
- Noise and vibration monitoring will be completed along the alignment to ensure we keep within agreed limits, outlined in the Code of Construction Practice (CoCP) and Information Paper E23: Control of construction noise and vibration
- HS2 completed an Environmental Impact Assessment in 2013 which set out the impacts and effects of tunnelling
- Assess and adopt construction methods which reduce the impact to the community (such as the conveyor system in Old Oak and Park Royal)

How will you manage settlement?

Settlement is the technical term given to the way the ground moves around an excavation, such as a tunnel after it has been dug. Some ground movement occurs naturally at anything up to 10 millimetres a year.

For example, the clay under most of London swells slightly during long wet, cool periods, and contracts slightly during very long dry hot periods. Buildings generally withstand seasonal movement, but construction of the tunnels may cause some additional ground movement. The effects of settlement, as well as noise and vibration, have been minimised at the design of the tunnels. In the majority of cases, settlement does not cause damage to properties. In some cases, there may be small cracks in plaster, and in a few cases doors or windows may stick. In very rare instances, settlement can affect the structure of the building.

A number of major tunnelling projects have been or are being undertaken in London in recent years, including Crossrail, the London Water Ring Main, Heathrow Express, Jubilee Line Extension, extensions to the Docklands Light Railway, the Channel Tunnel Rail Link and the Heathrow Express and Piccadilly Line extensions to Heathrow Terminal 5. As a result, there is extensive experience of how the ground behaves when tunnels are constructed and how to minimise settlement affecting buildings above.

For information about HS2's approach to ground settlement, refer to HS2 Information Paper C3: Ground Settlement or HS2 Guide to Ground Settlement – Phase One.

How can you be sure people won't hear or feel the tunnelling or the trains?

We are taking all reasonable steps to control ground-borne noise and vibration so that it does not exceed the Lowest Observed Adverse Effect Levels (LOAEL) set out in Information Paper E21: Control of ground-borne noise and vibration from the operation of temporary and permanent railways. Based on experience from London Underground, ground-borne noise or vibration below the LOAEL may still be perceptible to some people some of the time depending on the person's sensitivity to noise and how much sound there already is in the environment. But noise exposure below LOAEL is unlikely to have adverse effects on health or quality of life.

In our Environmental Statement (ES), and as a result of the envisaged mitigation in the tunnels, the majority of properties in the vicinity of the tunnels were forecast to experience ground-borne noise and vibration levels below LOAEL. We are in the process of specifying the track so there is no significant change to the effects set out in the ES. Ground-borne noise and vibration control is achieved by engineering the track in the tunnels to stop the vibration generated by the train from being transmitted into the tunnels and surrounding ground. There are a number of different types of tracks available that will achieve this that are already used on high-speed lines in the UK and abroad.

How are residents protected from the effects of settlement?

HS2 is responsible for any damage caused to your house as a result of the construction or operation of the railway.

HS2 has a well-established settlement policy that involves the principles of assessing, monitoring, recording, protecting, and repairing. Further information can be found HS2 Guide to ground settlement.

What is a settlement deed?

This is a legal agreement between HS2 Ltd and owners of properties within 30 metres of an excavation. HS2 will be responsible for paying for any property repairs related to its works, whether the property owner holds a deed or not. However, some people find them useful if selling or borrowing, for example.

You can find out more about settlement and settlement deeds, including a set of FAQs, here

If your property is eligible for a settlement deed, you will be contacted by post. If you have any questions on settlement deeds, please get in touch with our dedicated Property team by email at property@scsrailways.co.uk or contact the HS2 Helpdesk on 08081 434 434.

What is a pre-condition survey?

Pre-condition surveys are visual inspections by an independent accredited surveyor to capture the existing condition of a property. They are required for all properties along the HS2 route within the zone for predicted ground movement of more than 1mm for listed buildings and more than 10mm for non-listed buildings.

If your property is eligible for a pre-condition survey, you will be contacted by post. If you have any questions on about pre-condition surveys, please get in touch with our dedicated Property team by email at property@scsrailways.co.uk or contact the HS2 Helpdesk on 08081 434 434.

What is a subsoil notice?

The term subsoil is used to refer to the part of the land which is below its natural surface. English property law recognises that, unless specified otherwise, freehold ownership of land includes the ground below the surface of the land to an unlimited depth. In some cases, leaseholders may share these rights, which may include the subsoil beneath adjacent public roads or streets. The HS2 tunnels will be constructed in a stratum of subsoil generally more

than nine metres below ground level. This stratum of subsoil will be compulsorily acquired using powers within the HS2 Act 2017 and, if you have an interest in the subsoil, you will be entitled to receive fixed value compensation. Subsoil notices will be sent to owners of properties directly above the tunnels to confirm that your subsoil rights will be obtained by HS2.

For further information please refer to Using subsoil for HS2

Will there be any noise from vents shafts when the trains are running?

Vent shafts regulate air quality and temperature in the tunnel, allows smoke to be extracted in the event of a fire and is used as an evacuation point.

Our vent shafts are being designed according to the commitments set out in Information paper – E22: Control of noise from operation of stationary systems

The design of the vent shafts along the route are still in progress. SCSJV are carefully designing the shafts and headhouses to deliver our noise commitments by providing sufficient sound insulating, construction of the walls, ceilings, doors, and access hatches. Further on SCSJV are allowing for sufficient space within the headhouses to provide attenuators for the fans, optimising the orientation of the outlets to direct sound away from dwellings and allowing sufficient space to provide a sound absorbing lining within the shaft's chimneys.

The primary aim of E22 is to deliver noise levels from ventilation which is lower than the existing background sound level at sensitive properties in the vicinity of the shaft.

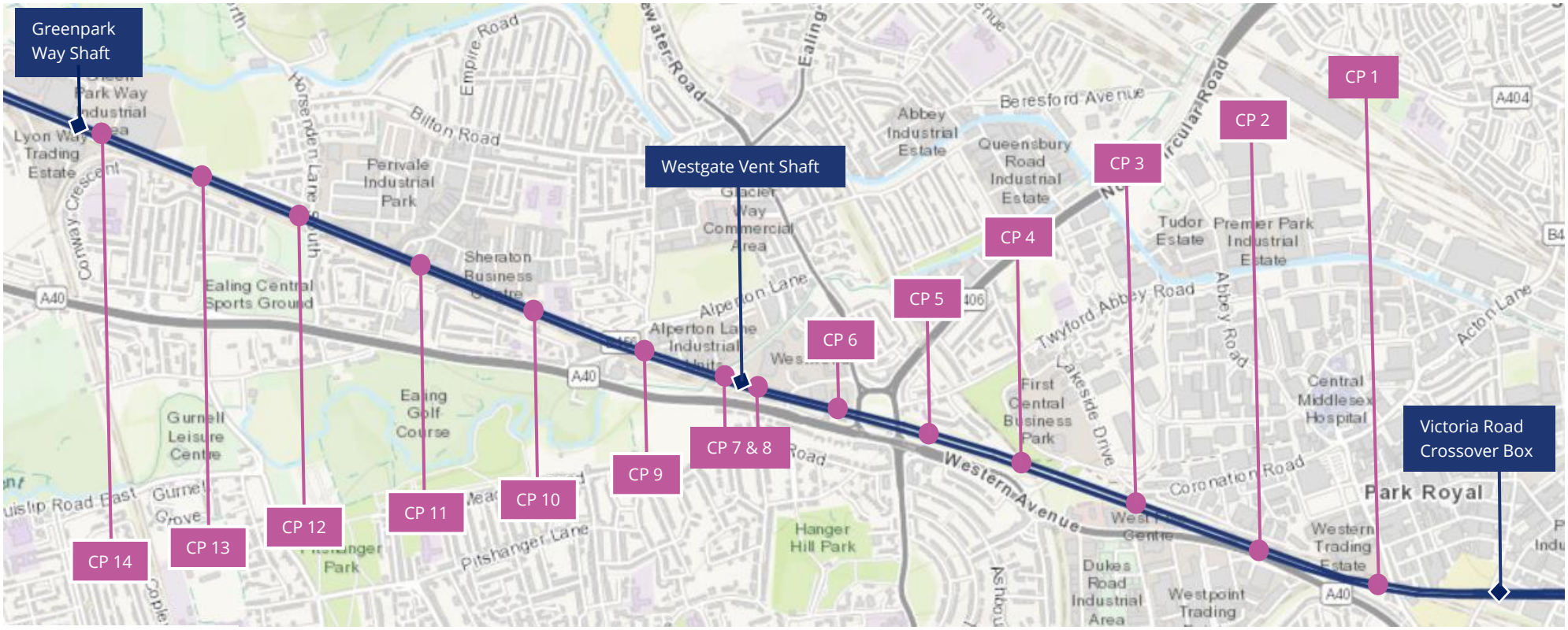
I would like to sell my property, what support do you offer?

HS2 have a 'Need to Sell Scheme' available to residents who need to sell their property but cannot because of HS2. Further information about scheme is available at www.hs2.org.uk/documents/collections/need-to-sell/ or by contacting the HS2 Helpdesk on 08081 434 434 or email HS2enquiries@hs2.org.uk

Appendix

- In your area map – High Speed 2 (hs2.org.uk) – Here you can view our latest works notifications for your local area
- https://engagement.hs2.org.uk/join-mailing-list/ - Here you can sign up to receive HS2 updates for your local area
- Need to sell scheme – Here you will find information about a scheme available to owner-occupiers who can show that they have a 'compelling reason' to sell their property but have been unable to do so (other than at a greatly reduced price) as a direct result of the announcement of the route of HS2.
- Using subsoil for HS2 – Here you will find information which will explain:
    - how and why, we obtain and use subsoil that is beneath land and properties;
    - the legal permission we need and your rights to compensation;
    - how we will build the tunnels; and
      how we will keep you informed.
- HS2 Guide to ground settlement – This guide tells you about settlement on HS2 and provides information on:
    - how your property might be affected;
    - what we will do to protect your property or pay for repairs;
    - how we will keep you informed; and
    - how to apply for a settlement deed.
- Environmental Statement (ES) - Further information about the environmental minimum requirements for HS2 Phase One.
- Information Paper E21 - Further information about the control of ground-borne noise and vibration from the operation of temporary and permanent railways.
- Information paper - E22 – Further information about the control of noise from the operation of stationary systems.
- Information Paper E23 - Further information about the control of construction noise and vibration
- Code of Construction Practice (CoCP) - The CoCP contains control measures and the standards to be implemented throughout Phase One of HS2.

Map one: Approximate locations of Cross Passages and Vent Shafts



Cross Passage (CP)

Keeping you informed

We are committed to keeping you informed about work on HS2. This includes ensuring you know what to expect and when to expect it, as well as how we can help.

Residents' Charter and Commissioner

The Residents' Charter is our promise to communicate as clearly as we possibly can with people who live along or near the HS2 route. www.gov.uk/government/publications/hs2-residents-charter
We also have an independent Residents' Commissioner whose job is to make sure we keep to the promises we make in the Charter and to keep it under constant review. Find reports at: http://www.gov.uk/government/collections/hs2-ltd-residents-commissioner

You can contact the Commissioner at: residentscommissioner@hs2.org.uk

Construction Commissioner

The Construction Commissioner's role is to mediate and monitor the way in which HS2 Ltd manages and responds to construction complaints. You can contact the Construction Commissioner by emailing: complaints@hs2-cc.org.uk

Property and compensation

You can find out all about HS2 and properties along the line of route by visiting: www.gov.uk/government/collections/hs2-property

Find out if you're eligible for compensation at: www.gov.uk/claim-compensation-if-affected-by-hs2

Holding us to account

If you are unhappy for any reason, you can make a complaint by contacting our HS2 Helpdesk team. For more details on our complaints process, please visit our website: www.hs2.org.uk/how-to-complain

Contact our HS2 Helpdesk team all day, every day of the year on:

Freephone **08081 434 434**

Minicom **08081 456 472**

Email **hs2enquiries@hs2.org.uk**

Write to:

FREEPOST
HS2 Community Engagement

Website **www.hs2.org.uk**

To keep up to date with what is happening in your local area, visit: **www.hs2inyourarea.co.uk**

Please contact us if you'd like a free copy of this document in large print, Braille, audio or easy read. You can also contact us for help and information in a different language.

HS2 Ltd is committed to protecting personal information. If you wish to know more about how we use your personal information, please see our Privacy Notice

https://www.gov.uk/government/publications/high-speed-two-ltd-privacy-notice

Reference number: HS2-EW-SCS-Ph1-Ar-So-S2-Tun-1-30/01/2024
High Speed Two (HS2) Limited, registered in England and Wales.
Registered office: Two Snowhill, Snow Hill Queensway, Birmingham B4 6GA.
Company registration number: 06791686. VAT registration number: 888 8512 56.