

HS2 Northolt Tunnel East

Frequently Asked Questions

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

Skanska Costain STRABAG (SCS) Railways are the main works civils contractor working on behalf of HS2 Ltd. SCS are responsible for the design and construction of bridges, embankments, and tunnels for the Greater London section of the new railway.

SCS will be tunnelling for approximately 16.4 miles (26.4km) of HS2's journey to its southern terminus in Euston. SCS will build approximately 13 miles (21.4km) of twin-tunnels beneath London, from West Ruislip in the west to Euston in the east.

Where is the tunnel?

The Northolt Tunnel East consists of two bored tunnels – an upline and a downline – that will run for approximately 3.4 miles (5.6km) between the Victoria Road Crossover Box site in Old Oak and Park Royal and the Green Park Way Vent Shaft in Greenford.

Green Park Way is one of three ventilation (vent) shafts on this stretch of the route, the others being Westgate Vent Shaft (near Hanger Lane Underground Station) and 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 Beatty VINCI Systra joint venture (BBVS).

SCS 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 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?

The Northolt Tunnel East will be built using two Tunnel Boring Machines (TBMs), which are specialist pieces of equipment used for tunnelling. Twin tunnels will be bored: one for trains travelling from the West Midlands to London, known as the London tunnel (or “upline”) and one for trains travelling from London to the West Midlands known as the Birmingham tunnel (or “downline”).

The TBMs were launched from the Victoria Road Crossover Box site in February 2024 for the downline tunnel and March 2024 for the upline tunnel and will complete their journey at the Green Park Way ventilation shaft in May 2025 for the downline and June 2025 for the upline.

Excavated earth is removed via a conveyor belt from the TBMs to the Victoria Crossover Box site, which will be transported east via conveyor to the storage and treatment site located at the Willesden Euroterminal.

You can watch a video about our tunnel boring machines at this link:

www.hs2.org.uk/building-hs2/tunnels/meet-our-giant-tunnel-boring-machines/

How deep will the tunnels be?

The depth of the Northolt Tunnel East between Old Oak Common and Greenford (from the ground surface to the crown of the tunnel) will vary between 12 metres and 40 metres (approximately the height of three and nine double decker buses stacked on top of each other respectively).

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

Tunnel construction update

Works for the Northolt Tunnels East between Old Oak Common and Greenford started in February 2024. They are due to finish in mid-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](#)

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 for the NTE tunnel. Segments for the Northolt Tunnel East are being delivered from a factory in Hartlepool.

We will receive the concrete segments the Old Oak and Park Royal area by 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 Tunnels East.

What is a Cross Passage?

Cross passages will be built approximately 500 metres apart along the route, and are short tunnels which connect two parallel running tunnels. While invisible to the travelling public, cross passages will have a key role in providing a safe operational railway by providing an evacuation route for trains and passengers in an emergency.

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 method 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.

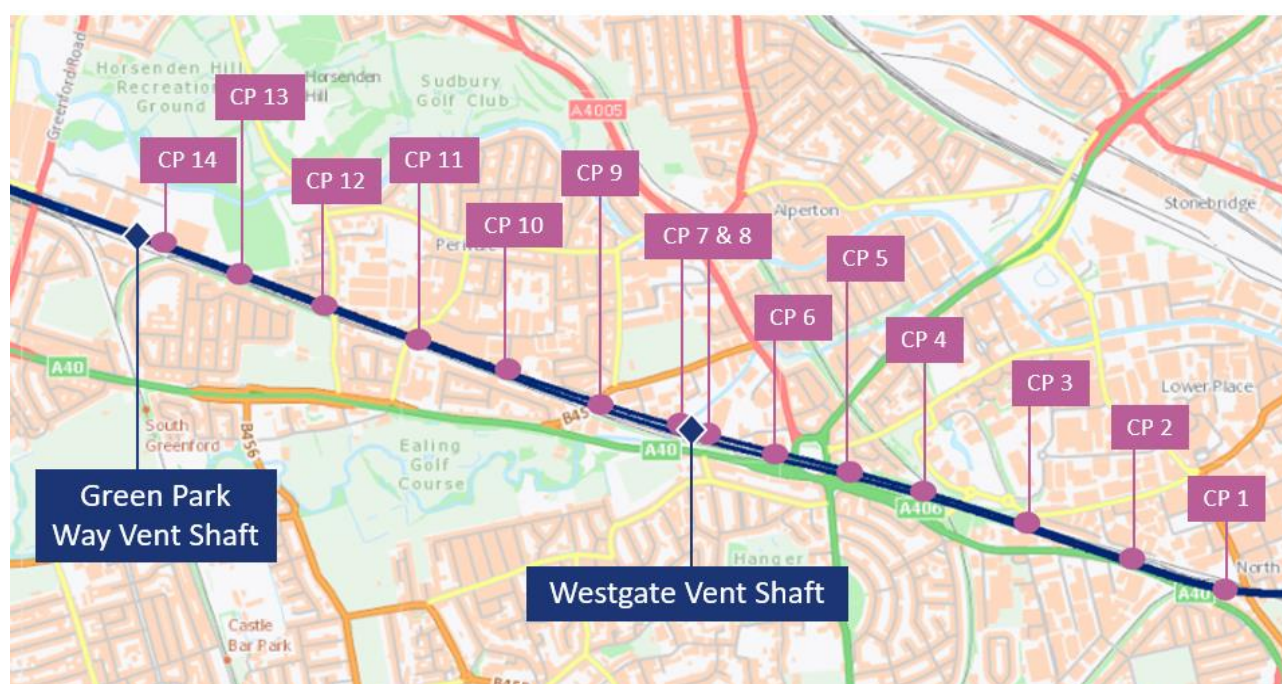
Cross passages will be constructed using two methods, the different methods have been chosen as they are proven the safest ways to control the ground during cross passage construction:

1. Where the ground above the tunnel is mostly clay and approximately 16m (52 feet) thick with a sand channel running through the tunnel's crown a ground freezing method is used. The side of the completed upline tunnel will be broken out and then a remote controlled robotic digger will be used to dig out the frozen ground and a sprayed concrete lining will form the interconnecting tunnel. This phase generates some ground-borne noise and vibration but because of the clay layer and the ground conditions it will be less noticeable.
2. Where the ground has less clay a dewatering method is utilised. During this process, water is pumped out of the ground to allow for the ground to be excavated in relatively dry conditions.

Our community engagement team will be carrying out targeted engagement to make people aware of when the tunnel boring machines are likely to pass nearby, the duration of which should be no more than two to three days. We will also inform up to four weeks in advance those residential properties near where the cross passages will be constructed.

When will the Cross Passages be constructed?

The cross passages will be constructed once the TBMs have passed. Construction of cross passage 1 and 2 sprayed concrete lining (SCL) primary lining has been completed and their secondary lining and waterproofing works are ongoing, cross passage 3 SCL works are ongoing with cross passage 4 to follow in November 2024.

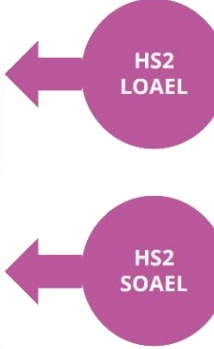


Will you hear the cross passages being constructed?

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](#).

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.

Impact classification	Ground-borne sound level dB L _{pA5max}	Description ^a	Existing example (where there are similar levels of ground-borne noise) ^b
Negligible	< 35	The passage of trains may be audible to particularly sensitive people during quiet periods of the day in rooms with low background noise. Very unlikely to cause complaint.	Recent rail tunnels such as Jubilee Line Extension and HS1.
Low	35-39	The passage of trains may be audible particularly during quieter periods of the day such as evening or early morning. Level of annoyance is likely to be low with few complaints.	Ground floor room 20-70 metres from London Underground Limited tunnel. Levels dependent on tunnel depth, ground-type and train speed. ³
Medium	40-44	The passage of trains is likely to be audible regardless of the time of day. Levels likely to give rise to some annoyance during quieter periods of the day. There may be some complaints.	Ground floor room 10-40 metres from London Underground Limited tunnel. Levels dependent on tunnel depth and ground-type. ³
High	45-49	Noise from the passage of trains will tend to be prominent and give rise to annoyance regardless of time of day. It is likely that there will be some complaints.	Directly above some atypical existing London Underground Limited lines (e.g. shallow tunnel with poor quality jointed rails).
Very high	>49	During the passage of trains ground-borne noise will probably dominate above noise from other sources (road traffic etc). Considerable annoyance likely throughout the day and night. There may be some sleep disturbance. Complaints very likely.	Directly above some exceptional sections of existing London Underground lines (e.g. extremely shallow tunnel with very poor quality jointed rails).



Our predictive assessments of ground borne noise and vibration conclude there is a low risk of vibration or ground-borne noise levels being in excess of the LOAEL for residential buildings in Camden. Experience on other tunnelling projects suggests that occupants of buildings located in close proximity to the tunnelling may hear or feel some ground-borne noise and vibration. Advance notice of when the tunnel boring machines are likely to be nearby has proven very effective on projects like Crossrail and the Northern Line Extension.

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

What are the working hours?

The TBMs operate 24 hours a day, 7 days a week until the construction of the tunnel is complete. A crew of operatives 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 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 Tunnels 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.

TBMs are the best method for safely excavating tunnels through a variety of soil and rock in dense urban areas. Each machine operates as a self-contained underground factory, which as well as digging the tunnel, will also line it with concrete wall segments and grout them into place as it moves forward at a speed of around 15 metres a day.

This reduces the risk of settlement (the way ground moves around a hole after it has been dug) which means we can manage any potential impacts from tunnelling on nearby buildings. As it is also the quickest method of tunnelling, any effects during tunnel construction are limited to a couple of days as the TBM passes.

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 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

- [HS2 in your area map](#) – Here you can view our latest works notifications for your local area
- [Join our mailing list](#) – here you can join our mailing list to receive our latest updates via email
- [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.