

HS2

Tunnel boring machine power supply route

Version 3 - August 2019 | www.hs2.org.uk

High Speed Two (HS2) is the new high speed railway for Britain. As part of the railway's construction we're continuing with our preparatory works in the Hillingdon area. This is to ensure that the area is ready for us to start building the railway.

A high capacity 33 kilovolt (kV) 20 mega volt amp (MVA) cable power supply is needed at West Ruislip for the tunnel boring machines (TBMs) that will run between Ruislip and Old Oak Common creating the two HS2 tunnels.

Once the tunnelling is complete, the power supply will be used to power operational equipment within the tunnels.

UK Power Networks (UKPN) will be undertaking the work to lay the cable. The cable will remain the property of UKPN and they will maintain the cable.

We have produced this document to try and answer the most commonly asked questions we have had from members of the community about the tunnel boring machine power supply route.

1. Is the route confirmed yet?

The route is largely confirmed. Once we have the survey data from the trail holes that will be used to confirm the route. We will update www.hs2inhilligdon.co.uk with more information as it becomes available.

2. What is the capacity / voltage rating of the cable?

The power needed for the TBM's is 20 mega volt amps (MVA), and will be provided at 33 kilovolts (kV).

3. What hours will you be working?

We will be working from 8am to 6pm Monday to Friday (With periods of up to one hour before and up to one hour after the core hours to set up and close down the site).

No weekend works are planned. However if it would mean leaving an area where works caused large scale traffic disruption sooner, and if the council requested weekend working it would be considered.

Questions and Answers



Upcoming drop-ins

Friday 30 August 2019
4pm-7pm

Harefield Library, Park Lane, Harefield UB9 6BJ

Thursday 5 September
2pm-5pm

Committee Room at St Lawrence Church, 2A Bridle Road, Eastcote, Pinner HA5 2SJ

Monday 16 September
2019
2pm-5pm

Cannon Lane Methodist Church, Cannon Lane, Pinner HA5 1JD

Contact our HS2 Helpdesk team on **08081 434 434**

4. Is it safe to have this type of cable in residential streets?

Yes, such cables are often found around grid supply points such as Harrow and through central London, there are already 33kV cables in streets in this area. The **UK limit** for safe levels of an electromagnetic field is 360 μT (microteslas), the cable is likely to have a range of $1\mu\text{T}$, well within the Code of Practice guidelines. These are based on the advice of a group set up by Government including academics and the charity Children with Cancer as well as the relevant industries. Additionally, the underground cable will not produce any external electric fields as they are shielded. For more information please see Question 24.

5. What are the test trial holes?

UK Power Networks plan to complete approximately 15-20 trial holes across the whole route. Trial holes will typically be 1m x 1m size excavations, see an example picture below of a typical trial hole. These will identify what is in the ground to ensure more efficient delivery. These are planned to be completed around the end of the school summer holidays from September 2019.



A picture of a typical trial hole site.

6. Do you know where the trial holes will be?

Yes, trial holes are currently planned for the following roads. More may be required based on the information they provide.

**Ickenham Road
Midcroft
Manor Way
Westholme Gardens
The Uplands**

**Myrtle Avenue
Hawthorne Avenue
Meadow Way
Dean Croft Road
Cannonbury Avenue**

**Cannon Lane
St Michaels Crescent
Whittington Way
Rayners Lane
Farm Avenue**

7. What will happen outside my house if I am on the route?

We will inform each street of the dates for the work in that street at least two weeks in advance. Each 50 metre stretch will take around 4 days to complete. The worksite will be surrounded by safety fencing. Trenches across driveways can be plated over outside of the core working hours to allow access and egress to resident's properties where safe to do so. During working hours we cannot provide vehicle access across the trench. Residents will need to make alternative parking arrangements. There will be traffic controls around the worksite, allowing traffic to use the other lane in both directions safely. If residents have concerns regarding accessing their property they will be able to speak to UK Power Networks directly once they receive the dates for their street.



A typical UK Power Network worksite.

8. Will you be closing roads?

We hope to be able to lay the cable to one side of the road for most of the length of the route, allowing access along the other lane via traffic control measures. We will work with local councils to plan our works to minimise disruption as much as possible. For example we hope to undertake work around schools during school holidays.

9. How will the impacts on local traffic and buses be managed?

UK Power Networks will be completing the work in line with the New Roads and Street Works Act Code of Practice. Both Hillingdon and Harrow councils will review a Local Traffic Management Plan (LTMP) that will be produced before any work starts. The LTMP sets out how any traffic and transport related impacts of their works will be managed. It will also consider any impacts on TfL services and routes. UKPN will develop a Local Traffic Management Plan.

The LTMP will be a live document and will be updated as necessary, in consultation with the local highway authority, to address any specific TM impacts of the work proposals. The work will be

typical of what UKPN do in their normal day to day business and they along with HS2 will be keen to make sure any impacts from the work are minimised as far as possible.

10. How many works vehicles will there be? Where will they park?

We are expecting significantly less than 12 lorries / HGVs in and out of the worksites in any one day. More than this is the number that we believe would start to cause a possible impact in the local area. As part of the work we will agree a traffic management plan with the Local Authority, and this may include specific times when lorry movements will be restricted to minimise any localised impacts. Vehicles will park within the works area.

11. What about other utilities such as gas and power?

There will be no impact to your gas, water or electricity supply from these works. UK Power Networks work every day across London and south and east England and regularly manage works in streets with other utilities. As well as having detailed drawings of the locations of other services, UKPN work with other utilities to ensure any works do not clash.

12. Will you need to access any neighbouring properties to use equipment? Do you need to go through people's gardens to bend a cable around a corner?

All of our machinery will be self-sufficient, and we will not require any access to neighbouring properties. The cable will be laid in the highway and we won't be passing through people's gardens.

13. Will the works be noisy?

As we have to cut the road surface using disc saws, and excavate the road there will be some noise. We will use noise barriers wherever possible to mitigate the impact of the noise.

14. Where will excavated material go? How will you prevent mud on roads or dust?

Spoil will be removed and not stored locally on site. Mud on roads will be managed through the use of road sweepers as required. Dust will be controlled with damping down measures. These details will be defined in the Section 61 submission which will be agreed with the Local Authority.

15. How will the road surface be reinstated and made good after the work?

All road surfaces will be reinstated as per the Highway Authority and Utility Committee Code and can be inspected by the local authority. If a defect occurs in a road that has been re-surfaced within 2 years, then UK Power Networks will be required to resurface the affected area by the Local Authority.

16. Will you be working in London Clay? Is there a risk of subsidence?

UK Power Networks regularly work in London Clay which is present in the area. All trenches are partially backfilled with cement bound sand which is a stable material and then reinstated to the HAUC (Highway Authority and Utility Committee) Code and can be inspected by the Local Authority.

17. While working in the alley between Hawthorne Avenue and Lime Grove, what will be done to protect the property from damage?

Before carrying out the works, we will consider supporting the ground using ground support techniques on either side of the footpath/trench. We will be excavating the trench by hand as we would not be able to get machinery down the footpath safely and will ensure the safe removal and storage of excavated spoil when working in order to cause minimal disruption. We will also only be able to install a length of duct and then backfill this section at any one time, which will result in not having the whole footpath excavated at one time (despite the fact that the footpath will be closed to pedestrians for the duration of our works in this area). In the unlikely event that any damage may be caused, damaged caused will be made good.

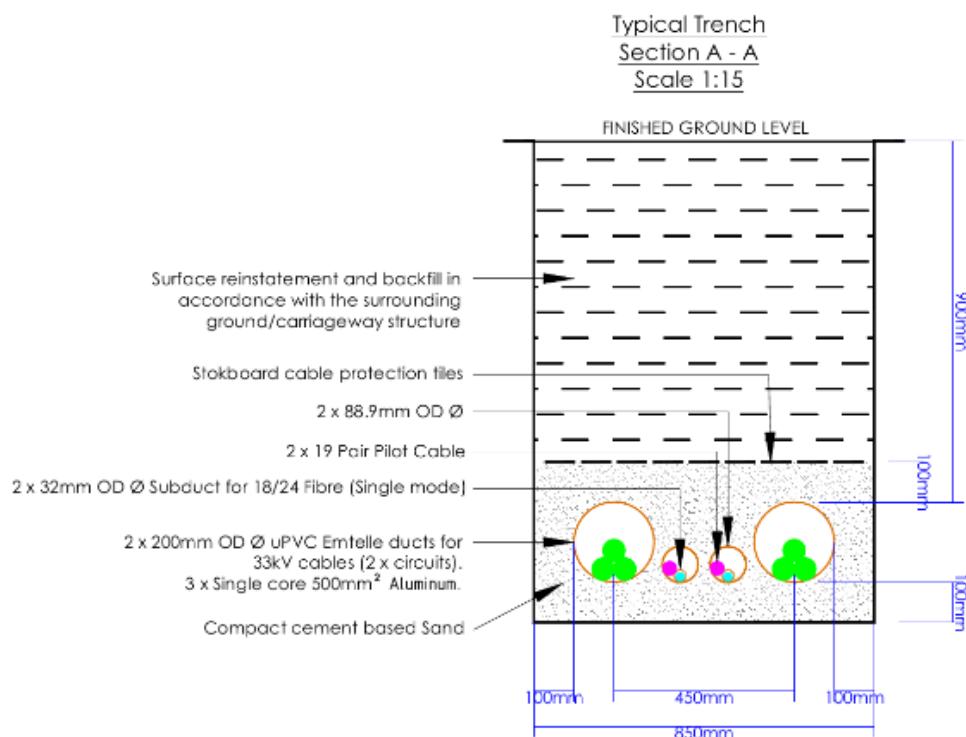
18. In this area the water table very high, will that impact the cable?

Based on initial desktop surveys, UK Power Networks are not expecting any water table issues, but if necessary they will manage any local dewatering of the trenches they dig. Once jointed the plastic sheathed cable is not affected by water.

19. What is the depth of ducts and what are the cables made of?

The centre of the duct will be approximately one metre below ground, but the actual depth may vary depending on other obstructions in the road (see below for a typical section). A typical trench will be 50m long x 1.5m wide x 1.65m deep, but may be wider in specific areas where for example UKPN have their cable pulling pits.

The individual cables will be 500mm² single core XLP insulated aluminium cables. There will be two circuits, each consisting of three individual cables (see below for typical section).



20. Why will it take a year to lay cable?

The current programme is indicative and will be subject to the next detail design stage and the findings from the trial holes which will be undertaken to check areas of engineering difficulty (for example where services cross at busy junctions). It is also based on a number of assumptions that will be discussed with the local authorities. For example, UK Power Networks will be working under the HS2 Code of Construction Practice (CoCP) which stipulates set working hours (see Question 3). These could be extended by agreement with the local authority if there was deemed to be a benefit in doing so.

21. Will the cable be used after the tunnel boring machines have finished?

Yes, once the tunnelling is completed, then the power supply will then be used to provide power to equipment within the tunnels between West Ruislip and Old Oak Common when the HS2 trains are running.

22. Why wasn't a power supply route secured when the HS2 Hybrid Bill passed through Parliament?

HS2 included a 33kV power supply within the Hybrid Bill based on a connection with Scottish & Southern Energy (SSE) in Ickenham. However, this could not be procured until Royal Assent was granted on 23 February 2017.

In the meantime another customer applied for and then secured the available power from the SSEN supply meaning that this was no longer a viable option for HS2 without significant infrastructure works further upstream of the connection.

Fortunately an alternative supply was available in the area via UKPN and this is the one that has since been progressed.

23. What are the alternatives that were considered to the UKPN North Harrow supply and why have they been discounted?

The TBM requires a high capacity 20MVA power supply, which is only available from larger primary substations. There are only two options available in the local West Ruislip area, see map on page 9. Any other option would require even longer and more disruptive routes from primary substations much further afield.

The original option proposed in the HS2 Hybrid Bill was a SSE supply located approximately 4km south west of West Ruislip station. This option was based on tapping onto a nearby high voltage power line and would have required a new large transformer substation located within a nature reserve to change the voltage down from 66kV to 33kV.

Various options were being considered for the cable route from this location to West Ruislip station, but they would all have required some element of routing along main or residential roads. The most direct route would have been an approximately 4.5km route crossing the A40 onto Swakeleys Road and High Road Ickenham before turning back into the Golf Club off Ickenham Road.

However, HS2 was not able to formally secure this supply and develop the scheme further until granted Royal Assent in 2017, in the meantime the available electrical power capacity from this location was secured by another customer. This meant that an alternative supply was required with the only viable one being the UKPN supply via the North Harrow substation which has subsequently been progressed by the HS2 project.

The diagram also shows another grid supply point at Ickenham (Harefield). This is a new facility that is being created on behalf of HS2, but as this is not due to be completed and operational until much later in the programme (after 2023), and is not an option for the West Ruislip TBM power supply which is required in 2020.

24. Why it is not possible to utilise a railway based route along the Piccadilly and Metropolitan lines instead of residential roads?

UK Power Networks have assessed a number of potential cable routes between their North Harrow substation and West Ruislip. This has included a route along the Piccadilly and Metropolitan railway corridor.

However any cable route alongside a railway line needs to be easily accessible to UKPN for inspections and emergency repairs 24 hours a day, seven days a week. This would only be possible along the railway if the route was either behind a physical barrier, or over two metres away from the tracks along its entire length – otherwise UKPN operatives would need specialist training to access the area, and underground trains would have to be stopped to enable UKPN to reach, and then work on the cables.

Any cable route onto the railway would also need to be via existing public rights of way to avoid third party land where access rights would be unlikely to be obtained. Based on the above constraints and because of the many bridges and other narrow pinch points found along the railway, a route running the full length of the line is not practical.

Using London Underground's existing cable hangers along the route was also considered, but is not feasible as they are already full with any visible spare space already allocated for other London Underground projects. There would also be a risk that the new UKPN power supply could interfere with other London Underground equipment such as the signalling system also running along these routes.

UK Power Networks did consider a route that utilised a short section of railway land between Ruislip and Eastcote stations that was more accessible. However, this would require diverting the cable route away from the current proposed residential areas, onto sections of heavily congested main roads just to reach this relatively short section. This was considered to be more disruptive to the local community than simply continuing along the currently proposed "residential" route.

25. Can you tell me more on power cables and health?

Some people have expressed concern about the safety of the cable and electromagnetic fields. Safety is of prime concern to HS2 which we take it very seriously; further information about this can be seen on our [web page here](#).

Following concerns raised over Electric and Magnetic Fields (EMF) from 1979 onwards, an independent Stakeholder Advisory Group on Extremely Low Frequency (ELF) EMFs, "SAGE", was formed in 2004. The group was made up from stakeholders representing a broad spectrum of views, including campaign groups and the cancer charity Children with Leukaemia (now known as Children with Cancer UK), as well as relevant industries, independent professional groups, academics, and the Government. It brought together many areas of expertise, including those with significant expertise in scientific and policy-making disciplines, as well as voices representing sections of the public.

SAGE was funded equally by Government, the electricity industry, and the charity Children with Leukaemia. Their remit was to investigate practical precautionary measures to address the possibility of health effects, and to give advice to Government.

As a result of an [initial interim assessment](#) that SAGE produced in 2007, a written [Ministerial Statement](#) was produced in 2009. This sets out UK policy on EMFs. It established the quantitative exposure limits that will be applied, and also endorsed a number of SAGE's recommendations including:

- One precautionary measure applied to high-voltage power lines, called "optimum phasing"
- Some other precautionary measures relating to house wiring and domestic appliances.

A [second Interim assessment](#) by SAGE in 2010 extended the first interim assessment to look at lower voltage distribution.

The UK policy of compliance with exposure limits, set out in the Written Ministerial Statement, was given practical effect through the [Code of Practice](#) entitled, "Power Lines: Demonstrating compliance with EMF public exposure guidelines - a voluntary code of practice" (published by the Department of Energy & Climate Change, DECC, in March 2012).

This has been adopted by the industry and sets a magnetic field limit for public exposure of 360µT based on the [ICNIRP 1998 guidance](#).

The code of practice requires the electricity supply industry to keep records of all equipment that is known to be compliant and this is done on the [emf.info website](#).

The [details on the website](#) relating to a 33kV underground cable, which is the type proposed for the HS2 power supply, indicate that the magnetic field produced directly above it will be in the order of 1µT which is significantly lower than the 360µT limit given in the Code of Practice. Additionally, the underground cable will not produce any external electric fields.

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:

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 Us

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.HS2inHillingdon.co.uk**

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