

High Speed Two is the Government's planned new, high speed railway. HS2 Ltd is the company responsible for designing and building the railway, and for making recommendations to the Government.

This factsheet explains our initial appraisal of airborne railway noise for Phase 2b.

What are noise effects?

Noise effects are unwanted or undesirable sounds that interfere with normal activities such as sleep or recreation.

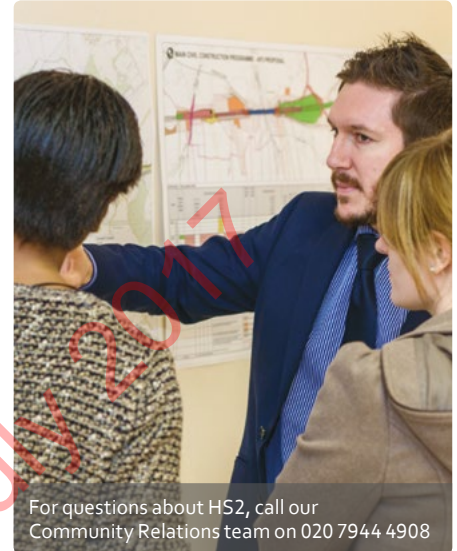
What causes railway noise?

The noise generated as a high speed train passes along a track comes from a number of sources:

- *mechanical noise* from motors, fans and ancillary equipment on the train, which tends to be the dominant source at low speeds;
- *rolling noise* from wheels passing along the rails, which is predominant at higher speeds; and
- *aerodynamic noise* from general air flow around the train body and the air flow around the wheels and the pantograph (the electrical contact wire on top of the train) – this becomes prevalent at the highest speeds, over 186mph (300kph).

At this stage we have used computer based noise models to predict potential airborne noise impact as described within the Sustainability Statement. A more detailed noise and vibration assessment will take place as part of the environmental impact assessment (EIA) which will include:

- a programme of noise surveys;
- working with local authorities and communities; and
- consultation on environmental mitigation.



For questions about HS2, call our Community Relations team on 020 7944 4908

Between July 2013 and January 2014

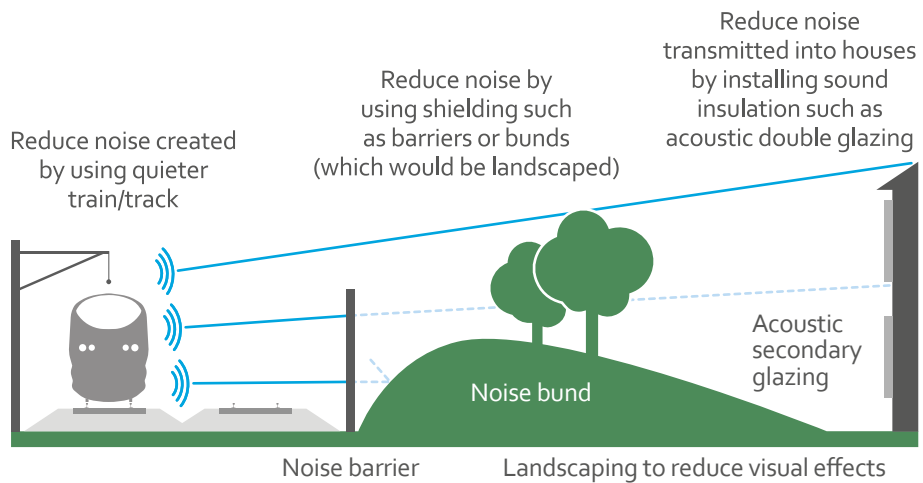
HS2 Ltd consulted the public on the proposed route and stations for Phase Two of HS2, from the West Midlands to Manchester, Leeds and beyond.

In November 2015

The Government announced its intention to bring forward the delivery of the Phase Two route between the West Midlands and Crewe, known as Phase 2a.

In November 2016

The Government announced proposals for the remainder of the Phase Two route, known as Phase 2b.



■ Types of noise barrier

Source: HS2 Ltd.

Reducing noise effects

Throughout the development of the preferred route, we have used a number of methods to reduce airborne noise effects, including:

- locating the route away from areas of population, where reasonably practicable;
- locating the route close to existing transport corridors, where possible; and
- lowering the route alignment by placing it in cuttings or tunnels*, where reasonably practicable.

Further opportunities for airborne noise mitigation will be explored as the design of the scheme develops and through the EIA process, which includes further engagement on the preferred route.

The three main ways in which airborne noise can be reduced further are:

- **reducing** noise generated by the railway. By the time HS2 opens, we expect improvements to have been made in noise control for the next generation of trains, in line with recommendations in current European standards. We would expect to include improvements in the procurement of any rolling stock purchased for HS2;
- **integrating** noise barriers and earth mounds into the design. Different types of barrier – including noise fence barriers and earth bunds (embankments), or a combination of the two – are shown in the diagram above. Our approach to integrating noise barriers into the design is further discussed in our Landscape Design Approach report (www.gov.uk/hs2). Noise barriers can be very effective in reducing railway noise; and
- **reducing** noise entering properties. The Noise Insulation Regulations provide for insulation, such as acoustic secondary glazing, to be installed if noise levels exceed established thresholds.

*About 22% of the western leg is proposed to be in cuttings and about 21% in tunnels. On the eastern leg, about 36% is proposed to be in cuttings and about 3% in tunnels.

As the scheme is developed, we will be working with local authorities, communities and stakeholders to develop the engineering design in a way which minimises potential noise impacts as well as discussing proposals for mitigation. During the next stage of design and the EIA, we will be able to identify exactly where noise barriers and earth mounds would be used. Plans for HS2 include using high speed trains that are quieter than those currently used in Europe.

How have we predicted noise for Phase 2b?

Noise is conventionally measured using the Equivalent Continuous Sound Level or LAeq indicator. The equivalent continuous sound level is defined as the constant level of sound which, over a period of time, has the same total sound energy as the actual varying sound over the same time period. The LAeq indicator is not the 'average sound level', as it is biased towards the highest sound levels, such as a train passing by, during its measurement period.

Our initial airborne noise appraisal incorporates noise predictions using methods set out in the Department for Transport's Technical Memorandum for the Calculation of Railway Noise. This method assumed noise levels of high speed trains, based on the noise levels of those currently operating, together with European specifications on noise level requirements for new trains. It then builds in:

- the proposed number and length of HS2 trains;
- their maximum operating speeds, based on speed profiles for different sections of the proposed routes;
- existing rail noise levels, based on the current Government noise maps;
- details of the proposed route alignment, including embankments, cuttings, tunnels and viaducts within the context of the surrounding landscape; and
- the screening effects of buildings along the route, based on past results.

Who are HS2 Ltd?

We are the company set up by the Government to deal with the design, engineering and technical requirements of building the railway.

We also have an important role in making sure that if you're affected by the Government's plans, you understand what to expect (and when), and how we can help.

Out of date as of 17 July 2017

The proposed western leg would be about 51 miles (82 km) of new railway, with approximately 18.1km in cutting and 16.8km in tunnel.

The proposed eastern leg would be about 123 miles (198 km) of new railway, with approximately 71.3km in cutting and 4.9km in tunnel.

Our initial noise appraisal

Our initial airborne noise appraisal for this early stage of the design process has predicted levels of railway noise on groups of dwellings during an 18-hour daytime period. Three different appraisal criteria have been used to indicate the potential noise impact on dwellings:

- **High noise levels** – groups of dwellings potentially exposed to 'high HS2 noise levels' (i.e. greater than or equal to 73dB* LAeq,18hr);
- **Noise Insulation Regulations** – groups of dwellings that could qualify for noise insulation based on the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996; and
- **Noticeable noise increase** – groups of dwellings that could have a noticeable (although not necessarily significant) increase in railway noise levels, defined as having a noise level of 50dB LAeq,18hr or more and a change in existing rail noise levels of 3dB LAeq,18hr or more.

The tables below summarise the early-stage noise appraisal for the eastern and western legs of Phase 2b as detailed in the Sustainability Statement published in November 2016. The Sustainability Statement can be found on our website at www.gov.uk/hs2

Western leg (Crewe to Manchester): Estimated numbers of dwellings with airborne noise impacts

| | High Noise Levels | Noise Insulation Regulations | Noticeable Noise Increase |
|---------------------------------------|-------------------|------------------------------|---------------------------|
| Without Additional Mitigation | <15 | 150 | 4,400 |
| With Additional Indicative Mitigation | <5 | <50 | 1,100 |

Source: TempleRSK

Eastern leg (West Midlands to Leeds): Estimated numbers of dwellings with airborne noise impacts

| | High Noise Levels | Noise Insulation Regulations | Noticeable Noise Increase |
|---------------------------------------|-------------------|------------------------------|---------------------------|
| Without Additional Mitigation | <30 | 200 | 26,800 |
| With Additional Indicative Mitigation | <5 | <30 | 4,500 |

Source: TempleRSK

Contact us at HS2

If you have any questions about this leaflet, please get in touch. You can contact our helpdesk on:

T: 020 7944 4908

E: hszenquiries@hs2.org.uk

For the latest documents including route plans and profile maps visit:

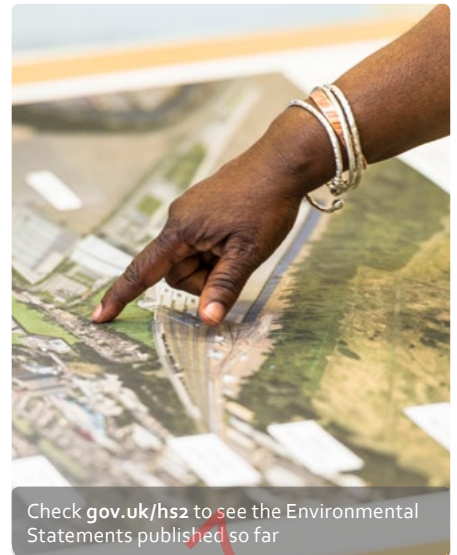
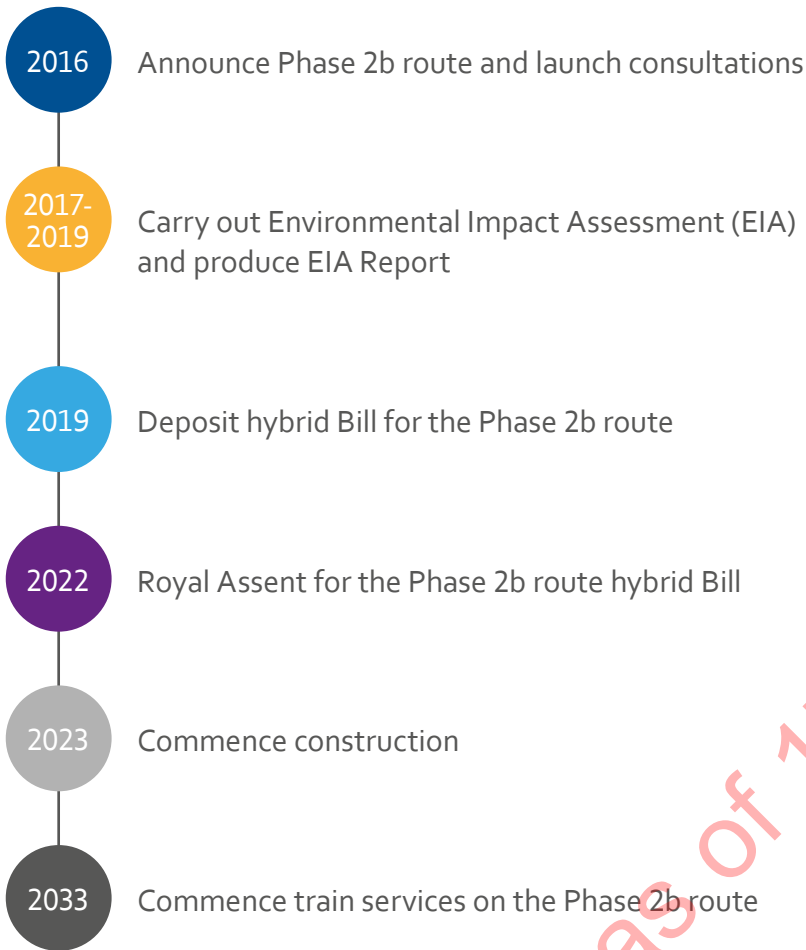
www.gov.uk/hs2

*The decibel (dB) scale is used in sound measurement. It is a level scale based on a logarithmic scale and ranges from approximately 0-140dB.

This indicates the benefit of mitigation equivalent to 3m high noise barriers and quieter high speed trains compared to those currently used in Europe.

Next steps

This graphic shows what would happen between now and when trains start running on Phase Two.



Presenting a hybrid Bill to Parliament is how the Government gets permission to build the railway, and provides the opportunity for everyone's comments to be heard. Construction can only begin with Parliament's approval.

We will also carry out an Environmental Impact Assessment (EIA) to understand how the project would affect the environment and local communities, and what we can do about it. Further work will be done to mitigate the impact of the railway as the design develops.

To find out more about the documents mentioned in this factsheet, visit www.gov.uk/hs2

Keeping you informed

We are committed to keeping you informed via various channels



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. You can read it by visiting:

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. The first of the Residents' Commissioner's reports is published at:

www.gov.uk/government/publications/hs2-residents-commissioner-report-1-may-2015

You can contact the Commissioner at:

residentscommissioner@hs2.org.uk

Project updates

For more information about Phase Two, visit

www.gov.uk/government/collections/hs2-phase-two-from-the-west-midlands-to-leeds-and-manchester

And for details of events in your area, visit

www.gov.uk/government/collections/hs2-events

Contact us

HS2 Helpdesk

Tel: 020 7944 4908

Email: hs2enquiries@hs2.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

You can also find out if you're eligible for compensation at:

www.gov.uk/claim-compensation-if-affected-by-hs2

Jobs and skills

To see what jobs are available on HS2 at the moment, check our careers page:

<http://careers.hs2.org.uk>

If you're a student wondering what careers in STEM subjects are like, check out articles and have a look around our Plotr World:

www.plotr.co.uk/careers/worlds/hs2

And if you're a business wondering how to get involved with HS2, have a look at our guides and updates on:

www.gov.uk/hs2 – search for *HS2 business*

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