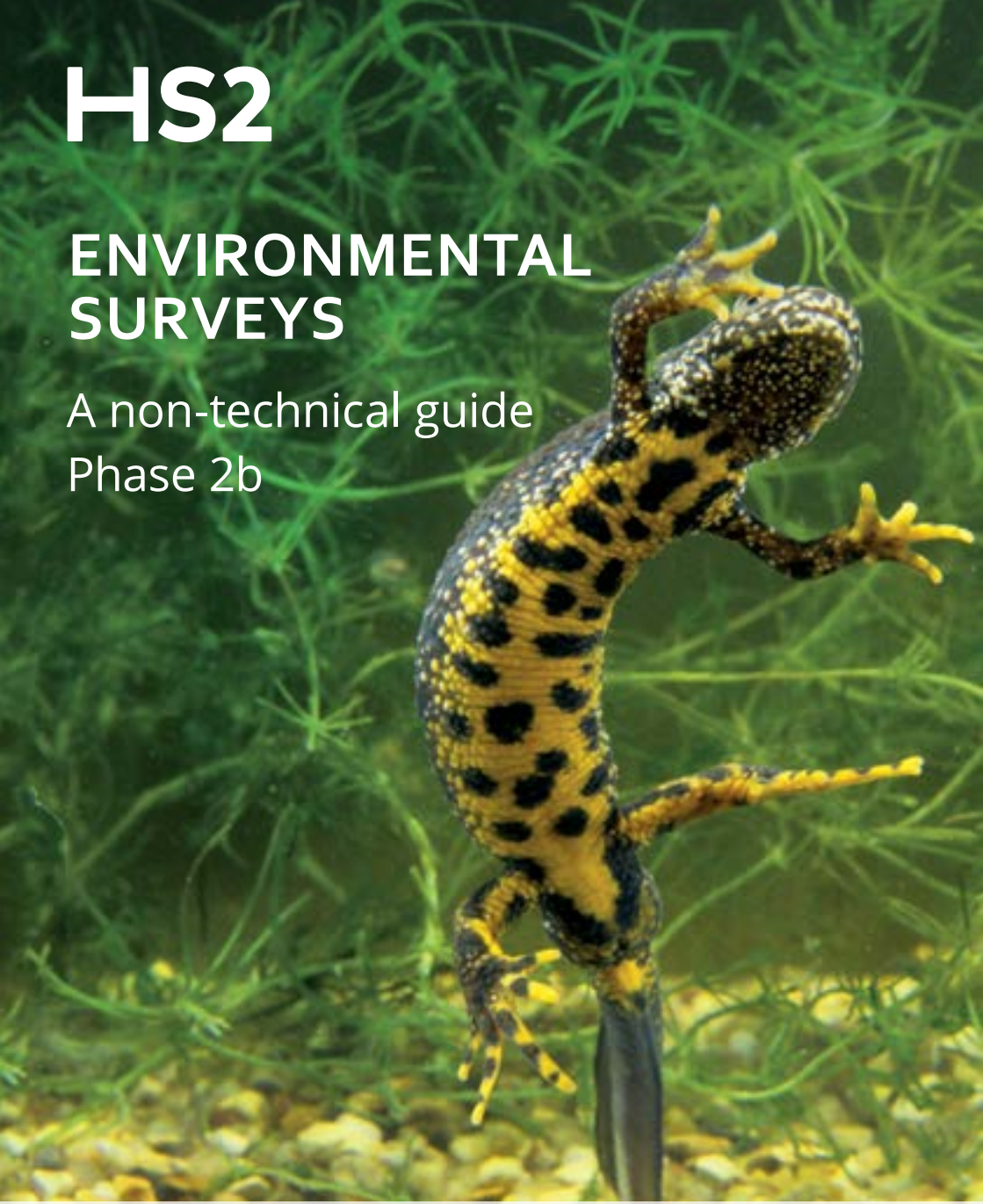
HS2

ENVIRONMENTAL SURVEYS

A non-technical guide
Phase 2b



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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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Introduction

As we develop the plans for the HS2 railway, we need to build up a clear picture of the local environment. This will help us to create a design for HS2 that limits its environmental effects.

Surveys are an important part of this: they provide a baseline of the current environmental conditions.

Where possible, we work on publicly accessible land, including footpaths and rights of way. However, some surveys involve accessing private land. For this, we need the agreement and cooperation of landowners and property occupiers.

We may require your cooperation for surveys on your land. This guide provides short descriptions of the different kinds of survey in our programme, including the methods we use and how long they take.

- We're unlikely to need to carry out all these surveys on your land. If we need to do more than one survey, we will try to combine our visits.
- We may need an initial visit to have a look at the survey area. This is also an opportunity to consult with you on any fieldwork required. For example, if we would need to bring a vehicle onto your land, we will discuss this at this stage.
- All the non-intrusive surveys are undertaken under initial HS2 access agreements. If we need to do more detailed or intrusive surveys, these will require additional consents and approvals – we will answer your questions and help to explain what they involve.

Non-intrusive and intrusive surveys

Most HS2 surveys are 'non-intrusive':

- We observe, measure, and take notes and photographs.
- We may need to take surface samples.

These surveys don't cause any significant disturbance to the environment or to land or property. However, they typically require access to a particular location or habitat, such as:

- woodlands;
- rivers or streams;
- buildings (for ecological species surveys);
- agricultural land and soil classification validation (ground sampling); or
- other assets, like archaeological or heritage sites.

Intrusive investigations are survey activities which penetrate the ground. We won't carry out these surveys unless we really need to. This would involve additional pre-planning, including further consultation and a separate formal licence agreement with you.

Surveyor teams and health & safety

All HS2 surveys are carried out by experienced, specialist consultants. This should minimise any safety issues, environmental disruption and inconvenience. All fieldwork is undertaken under formal safe operating procedures.

Ecology surveys

These include surveys for protected wildlife species. They involve one or more initial, 'scoping' surveys. A two-person team will look at natural habitats and buildings, to see whether they are likely to support protected and notable species of plants and animals.

In most cases, there will also be a more detailed habitat and species ecological survey.

If your site contains **ponds or lakes**, further surveys may include:

- Pond surveys
- Amphibians/great crested newts
- Water invertebrates
- Water plants

If your site includes **hedges, woodland, scrubland, grassland, heathland or bog**, further surveys may include:

- Habitats and vegetation
- Hedgerows
- Bats
- Dormice
- Badgers
- Breeding and winter birds
- Reptiles
- Invertebrates

If your site contains **flowing water, rivers or ditches**, further surveys may include:

- Crayfish
- Otters
- Fish
- Water voles
- River corridors and habitats
- Water plants
- Kingfishers

If your site contains **buildings or man-made structures**, further surveys may include:

- Bats
- Barn Owls

Where possible, our targeted field surveys will use biological records gathered from local records centres and recognised conservation groups, so we're aware of the data that's already available.

Many of these surveys require only a single visit. However, in some cases we need to make repeat visits, at particular times of year, to gather enough information.

Great crested newts

Ponds and other standing water will be assessed by at least two people, to determine whether the habitat might support great crested newts. If the water bodies are considered suitable, we will visit again to record whether there are newts – and, if so, to estimate how many.

We can use different surveys to determine the presence and size of great crested newt populations. They include netting the newts by hand, night-time torchlight inspections and small bottle traps left overnight in the ponds. We may also take water samples to check for newt DNA.

Surveys require at least two people. They need to take place between March and June, when the newts may be in the ponds. We only need one initial visit to collect water for DNA analysis, but we may need up to six repeat surveys to reliably determine the population size.

- Up to six repeat visits.
- Potential night visits to complete a torchlight survey.
- Small bottle traps may be left in the pond overnight and collected the next morning.
- March – June.

Badgers

A two-person team will carry out a walkover survey in February or March to record the location and status of badger setts and the presence of other field signs, including latrines, paths and crossing points.

This helps us to work out whether we need to determine the territory of the groups of badgers near the proposed railway. We do this with 'bait marking', where badgers are fed a harmless food mix containing very small coloured pellets.

The distribution of these pellets within the boundary latrines is then used to calculate the badgers' territorial range.

- Up to 21 repeat visits (recording setts and other field signs, and conducting territorial analysis).
- Food bait containing coloured markers left by main setts.
- February – April.

Dormice

A two-person team will assess whether woodland is suitable to support dormice. If so, we will look for hazelnuts that bear the characteristic signs of dormice feeding. This survey is usually in October or November.

We may make another visit to install temporary nest tubes or boxes in woodland and connecting hedgerows. These are made of wood or plastic, and are fixed to trees and hedges. Two surveyors will make several visits between April and November to check for evidence of dormouse activity. We may need to leave the tubes/boxes in position over winter. However, if the nut search provides conclusive evidence, the tube/box survey will be halted and the structures removed.

- Several visits.
- Temporary installation of nest tubes or boxes in hedges and woodland; may be left over winter.
- April – November (August and September key months).

Bats

A two-person team will assess the potential for buildings and trees to support roosting bats. We can do this at any time, but it's easier to inspect trees in winter and early spring.

The initial survey of buildings or other structures will involve inspections externally and internally – for example, in loft spaces. We record features that could support bats, and record signs of current or past bat activity. The surveyors create an annotated plan of the building and take photos of features or evidence of bat activity. Surveyors may use ladders and other equipment, such as high-powered torches and endoscopes.

Surveyors will use binoculars to examine trees from ground level, looking for rot-holes or cracks in which bats could roost. In some cases, qualified climbers may inspect individual features, to confirm their potential and record any evidence.

If buildings, structures and trees have moderate to high potential to support roosting bats, or where it is unsafe to complete an initial inspection, we may need to visit two or three times in summer to watch bats emerging or returning. At least two surveyors will be at viewing points outside, to count bats emerging in the evening. This will be followed by a dawn survey of bats returning to their roosts.

Surveyors will use handheld detectors to identify specific species. They may also use a small automated recording device, which is placed in a loft or barn overnight.

If buildings or structures have features likely to support hibernating bats, we may need to inspect them at least twice in January or February.

- A single external and internal inspection (loft space of residential buildings and barns).
- Up to three summer observation surveys outdoors to record potential bat breeding activity (sometimes with several surveyors, depending on size of buildings).
- Small automated activity recorders may be left in buildings overnight.
- Dusk emergence and dawn return surveys; potentially evening transect surveys.
- May – August (potentially April and September) for summer activity surveys.
- Two repeat hibernation surveys (involving internal inspections of suitable buildings) – mid-January to mid-February.

Breeding birds

We will make five visits between mid-March and late June/early July, ideally with at least ten days in between – these visits should be spread as evenly as possible. The surveys will focus initially on woodland habitats.

Surveys are completed by at least two ecological surveyors, using binoculars and telescopes to record bird species and note them on site maps and recording forms. These surveys ideally start one hour after sunrise, but no later than 9am; they are normally completed by 11am, and no later than 12 noon. If an evening survey is useful, this will be between 5pm and sunset.

We may need to reschedule if there is heavy rain, strong wind or fog. If possible, we will carry out the survey later that same day.

- Five repeat visits.
- Dawn surveys (and potentially a single evening survey) of woodland sites.
- March – June (early July).

Invertebrates

Scoping surveys may identify habitats which could support notable invertebrate species or collection of species. Marshy grassland, botanically rich grassland or diverse woodland and scrub are more likely to support interesting butterflies, moths and terrestrial invertebrates. Ponds, streams and rivers may support aquatic species of conservation value, and notable terrestrial species may be present along their margins.

Habitats with high potential to support invertebrates will be subject to surveys by at least two people between May and September. Three survey visits may be required for surveys of terrestrial sites and two repeat visits to ponds.

Survey methods include hand-held sweep nets and searches by hand. We may also install small pitfall traps – the size of a coffee cup – to be checked three times before removing. Some habitats may warrant targeted moth surveys, which would involve placing a small light-trap on the site overnight.

- Up to three repeat visits.
- Possible night-time moth surveys, using light traps, and temporary installation of small pitfall traps.
- May – September.

Otters

Searches for evidence of otter activity will be conducted by two people along sections of suitable watercourse, 300m either side of the assessed construction corridor. These searches will record signs, such as holts or resting places (couches), otter droppings (spraints), footprints and slides, at least four times in a single year.

- Up to four repeat visits.
- Every three months across a single year.

Water voles

These surveys will be informed by the same initial surveys and desk-based appraisals as the otter surveys. Only two water vole survey visits are needed: one between April and June and a second between July and September. Two people will search the banks of ditches, streams and rivers and record signs of water vole activity.

- At least two visits to inspect ditches, streams and rivers.
- One visit April – June; one visit July – September.

Reptiles

A scoping survey will assess the suitability of habitats to support reptiles: notably lizards, grass snakes, slow-worms and adders.

The habitats, typically field margins, will be categorised as 'poor', 'good' or 'exceptional', based on the presence of suitable features likely to attract and support reptiles. A grassy bank below a hedge or woodland with an open southerly aspect, which catches a high daily proportion of warming sunshine, may be considered a good habitat.

If habitats are categorised 'good' or 'exceptional', we will temporarily install artificial resting sites (called 'refugia'). These attract reptiles to bask on them or hide under them. The refugia are made of small squares of corrugated metal sheet and roofing felt.

They are placed at regular intervals along field margins where they will not interfere with or be disturbed by regular agricultural activities, such as silage or cereal harvesting.

A two-person team will install the refugia and inspect them for reptiles at least seven times over a 30-day period during April, May, June or September. After the final inspection, the refugia will be removed. Each inspection visit will be conducted under strict set of suitable weather conditions. If the weather isn't suitable, we may need to delay or reschedule a visit.

- Seven repeat visits.
- Small pieces (50cm x 50cm) of felt and/or corrugated tin left temporarily along suitable field boundaries for several weeks.
- April – September.

Additional environmental surveys

In exceptional cases, additional ecological surveys not listed above could be required. If it becomes clear that we need to do additional work, we will notify you as soon as possible and discuss the best way to carry out the survey.

Surface and groundwater surveys

The proposed route crosses and passes close to a number of surface water bodies such as rivers and lakes, and bodies of groundwater.

We need to study the water's current ecology and chemistry to understand how it is now – in the EU Water Framework Directive (WFD), this is called its 'baseline status'.

This involves:

- a topographic assessment;
- a surface water WFD baseline assessment; and
- a groundwater baseline assessment.

If we can, we will combine these surveys, or combine them with ecological surveys, so we need fewer and shorter visits.

Topographic assessment

We need to understand any existing flood risk, so that bridges and other structures can be sized appropriately to reduce flood risk impacts. The data can be used to design any further flood prevention measures.

We will visit the watercourse twice. First, we identify the scope of the assessment: two or three surveyors will walk along the river identifying its physical characteristics and locations where measurements are required. This visit takes around two or three hours for a 2km stretch of river. The second visit, by a team of two to four people, takes longer (one to three days for a 2km stretch). They take the physical survey measurements of the river channel, typically 10m or 20m either side of the watercourse. They would also take survey levels across the channel with a staff and level, although other techniques may also be used.

Surface water baseline survey

These include:

- a detailed hydro-morphology survey - this looks at the physical form and function of a water body; and
- an ecological walkover survey covering a 200m reach (located 1km up and downstream of the scheme crossing) – this helps us to decide whether we need any further WFD biological surveys for fish, aquatic flora and aquatic invertebrates.

In addition, we will carry out a wider walkover survey, up to 2km upstream and downstream of where the route crosses a water body, to collect information and compare it against published data.

The surface water baseline survey will generally be undertaken by two surveyors (a hydro-morphologist and an ecologist) so that both sets of information are collected in the same visit. Additional site visits could be required for fish and aquatic flora surveys.

Groundwater baseline assessment

This assessment covers groundwater and surface water interactions.

The fieldwork is only carried out where required and where land access allows. It includes estimates of spring flows and basic groundwater quality (such as its temperature and pH) near the proposed route (typically within 1km). We will identify whether further surveys are needed, including any suitable locations for long-term monitoring methods like boreholes, sensors or weirs.

If we need to install long-term monitoring installations and equipment, we would consult with you and a separate access licence agreement would be required.

Water body type	Survey type	Description
Surface waters	Topographic fieldwork	Consists of two visits to a watercourse by a team of two to three people. An initial visit would usually take in the order of two to three hours for a 2km stretch of river. The second visit, by a team of two to four people, would take one to three days for a 2km stretch of river either side of the watercourse.
Surface water (WFD baseline summary)	Ecology, hydromorphology walkover fieldwork	The surveys assess the local hydromorphological features, processes and existing man-made alterations or structures.
	Aquatic invertebrates	Sampling of aquatic insect species
	Fish	Electro-fishing to assess fish population diversity and abundance. Requires three or four people.
	Aquatic flora	Survey to record aquatic plant species present and abundance.
Groundwater (baseline summary)	Groundwater walkover fieldwork	Focus on areas of potential groundwater emergence, including springs and wetland areas. Identify future suitable monitoring locations.

Traffic and pedestrian surveys

We need to assess current and projected traffic flows on public roads and pedestrian usage of urban and rural footpaths. Traffic counts use automated equipment and do not normally require access to private land. Similarly, 'footfall' usage of pavements and footpaths is normally assessed from public rights of way. Exceptionally, we may need to undertake counts on private roads. However, we are unlikely to need to access private land for traffic assessments, unless we are securing traffic monitoring equipment, or as a surveyor observation point. HS2 would consult with land and property owners to gain access.

- Securing automated monitors and video equipment and attended surveyor locations on public rights of way (e.g. footpaths and bridleways). Exceptionally, there may be a requirement to locate and secure equipment on private land.
- Duration/frequency – automated monitoring during a weekday and weekend, period, including peak dates/times.
- Two-person surveyor team; one to two hours for automated equipment set-up and three to four hours per monitored footpath location.

Cultural heritage and archaeology surveys

Fieldwork for a cultural heritage and archaeology assessment involves an initial site visit to view and photograph the external features and setting of historical buildings or assets. This is to confirm existing public records.

For significant historical features and assets, we may need to carry out field walking and geophysical surveys, which use non-intrusive hand-held equipment to detect buried features and structures. Any intrusive archaeological investigations – like digging excavation trenches – would involve additional pre-planning, including further consultation and separate formal licence agreements.

- Initial visit to view historic buildings and landscapes.
- Ploughed field walks – including surface sampling of any artefacts and geophysical surveys.
- Initial visit: one day per location. Field walks and geophysical surveys: one to three days, depending on location.
- Field work will be undertaken by two surveyors.

Visual impact surveys and landscape character assessment surveys

Where possible, these surveys would be combined with cultural heritage and archaeology. The fieldwork is non-intrusive and generally from publicly accessible land, public rights of way and highways. Exceptionally, we may need to access private land.

We carry out a landscape survey to understand the character of the landscape and take photographs. A visual survey looks at particular views in the landscape from properties, registered parks and gardens, scheduled monuments, listed buildings and notable public open spaces, as a way of understanding people's view and amenity. The fieldwork will comprise photomontages: technical photographs from important viewpoints, agreed with the local authority.

- Up to one day per location by two surveyors.
- Landscape character surveys will involve two separate visits in summer and winter.

Noise and vibration surveys

Noise monitoring will be undertaken at locations representative of sensitive noise receptors along the route, including residential properties, commercial premises and public amenities. We will consult the environmental health departments of the relevant local authorities on the monitoring locations. No internal noise monitoring in houses or other buildings will be required.

This will combine automated, continuous measurements (for periods of one to five days) and shorter measurements taken in person. We will use standard techniques and equipment: battery-powered noise meters, data loggers and, at select locations, audio recorders. Access to private land will be required to set up and remove noise monitoring equipment and for measurements by a surveyor (no more than two hours per location). For vibration, monitoring locations would be less numerous and at known sensitive locations and existing vibration sources, including near existing railway lines.

For both noise and vibration monitoring, survey equipment may need to be secured on private land and residential property, and repeat measurements may be needed to ensure they are accurate and representative.

- Medium (one to five days) and short-term (up to two hours) noise and vibration monitoring at representative sensitive receptors. Local authorities are consulted on locations.
- For medium-term monitoring, automated battery-operated monitoring equipment will be secured on private land and outside buildings.
- Generally, two visits (up to two hours) per medium-term monitoring location for set-up and removal of equipment. Short-term monitoring might consist of two or three repeat measurements over one hour.
- Noise measures are weather dependent, so we need to be flexible on timing, duration and the need for repeat checks.

Soil surveys

These surveys are to:

- classify agricultural land into grades according to the Agricultural Land Classification system; and
- acquire information on topsoil and subsoil volumes which will be used to plan how we handle, store and reinstate soil in areas where we will return the land to agriculture, forestry, landscape planting or habitat creation.

These combined surveys require access to privately owned land, with the agreement of landowners under standard licence agreements.

Soil surveys do not involve the assessment of contamination or ground instability – these are normally carried out by ground investigation (GI) or geotechnical surveys, which involve deeper excavations and boreholes under a separate formal licence agreement.

In comparison, soil and ALC surveys are largely non-intrusive, apart from digging soil pits.

At each location we will use a 5cm diameter hand-held auger to observe the soil at depths down to 1.2m, and to take samples for laboratory analysis (e.g. for pH, soil nutrients).

The auger sample points cover the survey area at a density of one per hectare, supplemented by further samples where necessary. The surveyors are looking to describe and record the soil's depth, texture, stone content, colour and structure.

The samples are used to identify the main soil types in the area. Then, small pits are dug with a spade in selected locations to describe representative soil profiles for each soil type. Generally, only one pit is needed for every 20-25 hectares; each pit is about 50cm square and 50cm deep. It is open for less than one hour, after which the subsoil, topsoil and turf are replaced. Soil pits will not be dug in fields containing livestock, and pits will not be left open or unattended.

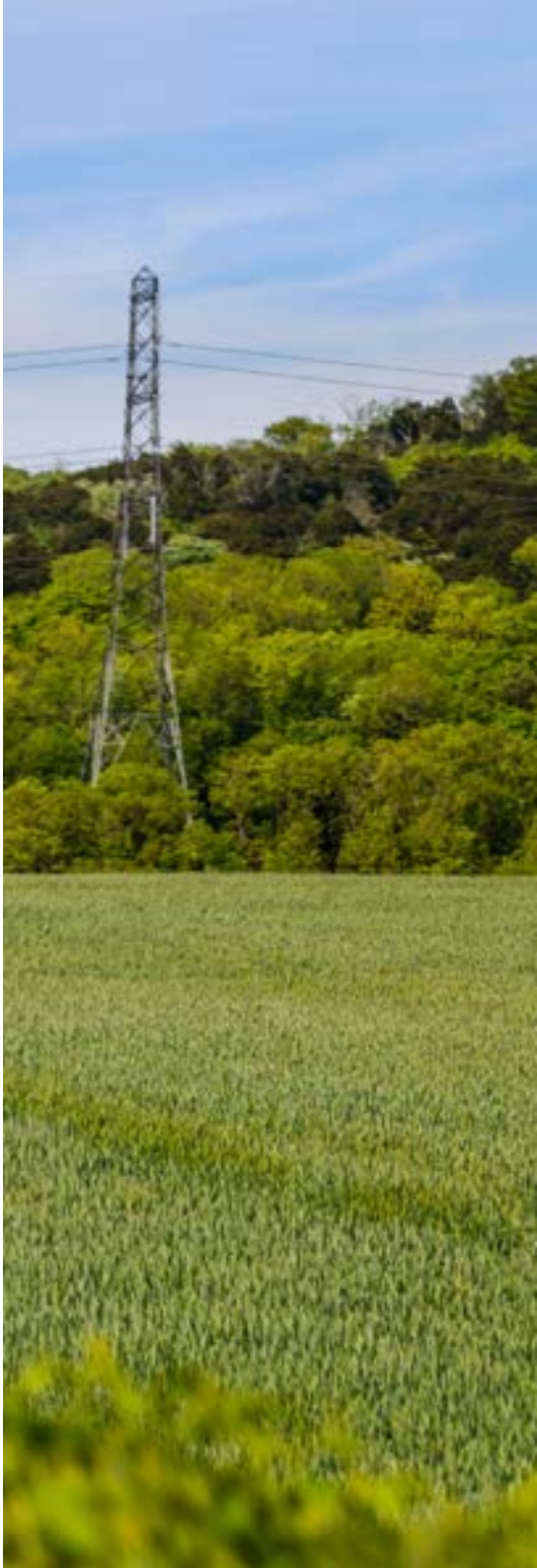
- Hand-held auger (5cm diameter) to observe soils up to 1.2m deep, at a frequency of one sample per hectare. Small soil samples are taken for laboratory analysis.
- Soil pits (about 0.5m^3 volume), one per 20-25 hectares.
- Duration of survey depends on size of survey area. Specialist consultants work in two-person teams, taking 15-20 auger samples per day.

Utility services

We will visually inspect above-ground installations, pylons, support structures and associated plant rooms, chambers and substation enclosures. This is to confirm existing utility services process and instrumentation diagrams.

Where non-intrusive surveys are required on private land, we will consult the owners before any proposed visits. Any intrusive ground investigation surveys would be subject to further consultation and separate formal licence agreement.

- Walkover surveys to identify the diversion routes for utilities.
- Visual inspection of all above-ground installations, pylons, support structures and associated plant rooms, chambers and substation enclosures.
- Lifting manholes and opening above-ground cabinets.
- Visual inspection of pipe routes and valve locations.
- Lifting manhole lids to confirm pipework condition, depths and flows.
- Visualisation of new utility diversion and supply corridors.
- Survey work would be completed by a two- or three-person team. The duration and frequency of the surveys will vary.



FAQs

What is the purpose of the surveys?

To obtain information on the current environmental conditions in the vicinity of the proposals in order to establish a baseline against which the environmental effects of the HS2 are assessed and reported in the Environmental Impact Assessment Report. The Environmental Impact Assessment Report will accompany the HS2 hybrid Bill through the Parliamentary process.

In advance of any survey work HS2 will consult with land and property owners/occupiers regarding access, the survey programme and scheduling the field work.

What types of surveys and how many visits are required?

A number of survey types are required, including ecology, noise, soils, landscape and heritage. Not all public or private land and property will be subject to each type of survey. Surveys may require an initial fact finding visit to establish the details of the fieldwork including the number of repeat visits required.

Where possible, landowners will be advised of the range and frequency of repeat surveys at the earliest opportunity.

What is access required for?

Typically, access is required for a team of two surveyors who will be conducting non-intrusive fieldwork on foot. In some instances, vehicular access may be required to a particular location on private land e.g. a river.

Where vehicle access is necessary, landowners will be given prior notice of the need for vehicle use and the agreed route required across their land.

When will surveys be conducted?

The timing and duration of the surveys will depend on the baseline data requirements, seasonal requirements (e.g. ecology) and prevailing weather conditions (e.g. noise). Typically, surveys are conducted in the day time at specific times of the year/seasons. Occasionally, for ecological species surveys evening and night time surveys will need to be conducted.

Will internal access to property and buildings be required?

Most survey work comprises external fieldwork with no internal access to property or buildings required. However, for some ecological species surveys, notably bats, access to buildings may be necessary.

What activities are involved in the surveys?

The type of activity is dependent of the type of survey, however, the majority of HS2 surveys are non-intrusive involving visual observations and the taking of photographs, physical measurements and surface samples. Some involve the temporary placement of sampling equipment or the location of automated monitoring equipment over a few days and evening and night time observation work.

Will there be any disturbance and disruption?

The majority of survey work comprises fieldwork i.e. recording presence of habitats and animal and plant species, the taking of measurements, readings and samples. Surveys will be conducted to minimise any physical disturbance or disruption. Where field work may involve specific requirements e.g. vehicular access, work adjacent to water courses, pre-removal of vegetation, evening/night-time observation, the placement and securing of survey and monitoring equipment etc. a fact finding visit will be undertaken to establish and consult on specific requirements.

Who will undertake the surveys?

In all cases, HS2 surveys would be undertaken under strict protocols by specialist consultants experienced in carrying out such surveys so as to minimise any environmental disruption and inconvenience. All HS2 survey consultants will carry formal identification.

Will the survey data be made available?

HS2 would look at requests on an individual basis. In principle, the data is available to landowners and the public, assuming that data protection rules are observed and maintained.

What safety precautions and insurance protection cover is there for field work activities?

All HS2 surveys and fieldwork would be undertaken by HS2 approved contractors under formal safe operating procedures. All HS2 approved contractors hold suitable and sufficient Public Liability (PL) insurance cover (underwritten by Lloyds of London) to indemnify private land and property owners in the event of any damage caused to private or public land and property as a result of their activities.

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Contact us

If you have any questions about this document, please get in touch.

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