



# HIGH SPEED TWO

## PHASE 2a INFORMATION PAPER

### E26: CLIMATE CHANGE: ADAPTATION AND RESILIENCE

This paper outlines how the combined impact of the Proposed Scheme and potential climate change on the receiving environment and community has been assessed. It also outlines how the Proposed Scheme's resilience and capacity to cope with potential climate change impacts has been assessed.

It will be of particular interest to those potentially affected by the Government's proposals for high speed rail.

This paper was prepared in relation to the promotion of the High Speed Rail (West Midlands-Crewe) Bill which is now enacted. It was finalised at Royal Assent and no further changes will be made.

If you have any queries about this paper or about how it might apply to you, please contact the HS2 Helpdesk in the first instance.

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# E26: CLIMATE CHANGE: ADAPTATION AND RESILIENCE

## 1. Introduction

- 1.1. High Speed Two (HS2) is the Government's proposal for a new, high speed north-south railway. The proposal is being taken forward in phases: Phase One will connect London with Birmingham and the West Midlands. Phase 2a will extend the route to Crewe. Phase 2b will extend the route to Manchester, Leeds and beyond. The construction and operation of Phase One of HS2 is authorised by the High Speed Rail (London – West Midlands) Act 2017.
- 1.2. HS2 Ltd is the non-departmental public body responsible for developing and promoting these proposals. The company works to a Development Agreement made with the Secretary of State for Transport.
- 1.3. In July 2017, the Government introduced a hybrid Bill<sup>1</sup> to Parliament to seek powers for the construction and operation of Phase 2a of HS2 (the Proposed Scheme). The Proposed Scheme is a railway starting at Fradley at its southern end. At the northern end it connects with the West Coast Main Line (WCML) south of Crewe to allow HS2 services to join the WCML and call at Crewe Station. North of this junction with the WCML, the Proposed Scheme continues to a tunnel portal south of Crewe.
- 1.4. The work to produce the Bill includes an Environmental Impact Assessment (EIA), the results of which are reported in an Environmental Statement (ES) submitted alongside the Bill. The Secretary of State has also published draft Environmental Minimum Requirements (EMRs)<sup>2</sup>, which set out the environmental and sustainability commitments that will be observed in the construction of the Proposed Scheme.
- 1.5. The Secretary of State for Transport is the Promoter of the Bill through Parliament. The Promoter will also appoint a body responsible for delivering the Proposed Scheme under the powers granted by the Bill. This body is known as the 'nominated undertaker'. The nominated undertaker will be bound by the obligations contained in the Bill and the policies established in the EMRs. There may be more than one nominated undertaker.
- 1.6. These information papers have been produced to explain the commitments made in the Bill and the EMRs and how they will be applied to the design and construction of the Proposed Scheme. They also provide information about the Proposed Scheme itself, the powers contained in the Bill and how particular decisions about the Proposed Scheme have been reached.

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<sup>1</sup> The High Speed Rail (West Midlands – Crewe) Bill, hereafter 'the Bill'.

<sup>2</sup> For more information on the EMRs, please see Information Paper E1: Control of Environmental Impacts.

## 2. Overview

- 2.1. This information paper outlines how the impact of climate change has been considered within the ES for the Proposed Scheme.

## 3. The Proposed Scheme and Climate Change

- 3.1. The ES has assessed the impact of climate change and the Proposed Scheme in two ways:
  - The in-combination climate change impacts assessment, which considers the combined effect of the Proposed Scheme and potential climate change impacts on the receiving environment during construction and operation<sup>3</sup>.
  - The climate change resilience assessment, which considers potential climate change impacts on the design, construction and operation of the Proposed Scheme's infrastructure and assets over their lifetime.
- 3.2. The greenhouse gas assessment for the Proposed Scheme is covered in Information Paper E27: Carbon.

## 4. Policy Background

- 4.1. European Directive 2014/52/EU on the assessment of environmental effects sets out the requirement for a climate change adaptation assessment in the ES for the Proposed Scheme.
- 4.2. UK climate change policy is set out in the Climate Change Act 2008, supported by the national Climate Change Risk Assessments (2012<sup>4</sup>, 2017<sup>5</sup>) and National Adaptation Programme (2013)<sup>6</sup>. The Government has identified the resilience of UK infrastructure to climate change as a major 21st century challenge that needs to be addressed.
- 4.3. Guidance on climate change allowances to be used in flood risk assessments was produced by the Environment Agency in 2016 and is set out in the National Planning Policy Framework (NPPF)<sup>7</sup> ;

## 5. HS2 Ltd Policy

- 5.1. HS2 Ltd's Environmental Policy<sup>8</sup> sets out the aim to "build a network which is climate resilient for the long term". HS2 Ltd's Environmental Policy sets out the aim to "minimise the combined effect of the project and climate change on the

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<sup>3</sup> The term in-combination climate change impacts refers to the combined effect of the impacts of the Proposed Scheme and potential climate change impacts on the receiving environment.

<sup>4</sup> Department for Environment, Food and Rural Affairs, (2012), The UK Climate Change Risk Assessment 2012 Evidence Report.

<sup>5</sup> Department for Environment, Food and Rural Affairs (2017), the UK Climate Change Risk Assessment 2017

<sup>6</sup> Her Majesty's Government (2013), The National Adaptation Programme, Making the country resilient to a changing climate, Her Majesty's Stationery Office.

<sup>7</sup> <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

<sup>8</sup> <https://www.gov.uk/government/publications/hs2-environmental-policy>

environment". These policy statements are reinforced within the National Adaptation Programme.

## 6. Climate Change In-combination Impact Assessments

- 6.1. HS2 Ltd has considered how climate change, in combination with the impacts of the Proposed Scheme, may affect communities, businesses and the natural, historic and built environment along the Phase 2a route.
- 6.2. Each environmental topic has considered changes to long-term, seasonal averages and extreme weather events as projected by the UK Climate Projections 2009 (UKCP09)<sup>9</sup>, in order to undertake preliminary qualitative consideration of the combined effects of climate change and the Proposed Scheme for both the construction and operational phases of the railway. The methodology is described in the ES Scope and Methodology Report and Scope and Methodology Report Addendum<sup>10</sup>.
- 6.3. The assessment found one significant effect. Drier and wetter conditions in the future as a result of climate change have been found to potentially affect the ability of 'dry' and 'wet' soils both to retain and drain moisture. This effect is relevant to both the agricultural, forestry and soils and the landscape and visual topics considered in the ES, due to the relationship between the resilience of soils and the resilience of planted vegetation.
- 6.4. This effect is mitigated by:
  - the creation of deeper, more moisture retentive soil profiles to mitigate longer term drought effects; and
  - the creation of better draining soil profiles to mitigate longer term flood effects on restored and reinstated soils where reasonably practicable.
- 6.5. Permanently displaced soils will be used to reinstate soils with deeper profiles than the original where reasonably practicable. In these situations, 'wet' soils could be better drained and so more resilient to intense rainfall and 'dry' soils could be thicker and more moisture retentive to better retain water in the profile. In both cases, higher total organic matter content (in the thicker topsoil) would make them more resilient.
- 6.6. A number of mitigation measures have also been incorporated within the design of the Proposed Scheme. Examples include:
  - ecological mitigation measures which will enable habitats to adapt to climate change by maintaining and enhancing ecological conditions and creating and restoring habitats to increase species' resilience to changes in climate;

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<sup>9</sup> <http://ukclimateprojections.metoffice.gov.uk/>

<sup>10</sup> These are available here: <https://www.gov.uk/government/collections/hs2-phase-2a-environmental-statement>

- trees which will be selected from a range of latitudes and climate zones to increase species' resilience to hotter, drier and/or wetter conditions, and landscape planting palettes which will be designed to increase species' resilience and adaptability; and
- the performance of the Proposed Scheme has been assessed against a range of design floods up to and including the 1% (1 in 100) annual probability event, including the addition of the relevant future climate change allowances in line with the latest guidance from the Environment Agency.

## 7. Climate Change resilience

- 7.1. A high level climate change resilience assessment, reported in Volume 3 of the ES, has been undertaken to identify the potential risks of climate change on the Proposed Scheme and to assess the Proposed Scheme's resilience and capacity to cope with these potential risks. The assessment has considered risks posed by climate related hazards such as extreme hot and cold weather, heavy rain, high winds and storms to the infrastructure and assets associated with the railway including tracks, tunnels, overhead line equipment, rolling stock, stations and earthworks. The likelihood and consequences of climate hazards have been considered based upon the trends within the UK climate projections.
- 7.2. No significant climate change resilience effects have been found for construction or operation. This is due to a range of mitigation measures that are either already embedded within the design; or to be included in the development of maintenance and monitoring procedures; or to be developed during future design stages.
- 7.3. Examples of such mitigation measures are:
  - the Proposed Scheme is designed to the 1 in 100 year plus climate change allowance (which is dependent on river basin and flood zone) peak river flow event. In addition, the railway infrastructure will be protected from the 1 in 1000 year peak river flow event, ensuring that the Proposed Scheme can return to operation without undue delay;
  - drainage is designed to the 1 in 100 year plus climate change allowance (40% increase) peak rainfall event;
  - lineside vegetation and landscape planting areas will be managed to minimise the likelihood of windborne debris blocking watercourses and drainage systems, obstructing the tracks or causing damage to overhead line equipment; and
  - measures to mitigate the potential risk of increased lightning strikes to structures and systems will be addressed during further design stages

- 7.4. Risks relating to the impact of extreme weather events and related conditions during the construction stage will be addressed in the Code of Construction Practice<sup>11</sup>.
- 7.5. Work during further design stages will assess the impacts of climate change on interdependencies between the Proposed Scheme and other organisations such as rail, road, power and telecoms infrastructure operators. This will use the assessments carried out for Phase One of HS2 as its basis.
- 7.6. Climate change resilience assessments will continue to take place throughout the design, construction and operation stages of the Proposed Scheme.

## **8. More information**

- 8.1. More detail on the Bill and related documents can be found at: [www.gov.uk/HS2](http://www.gov.uk/HS2)

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<sup>11</sup> Please see Information Paper D3: Code of Construction Practice