HIGH SPEED TWO PHASE ONE INFORMATION PAPER

E9: CLIMATE CHANGE: ADAPTATION AND RESILIENCE

This paper outlines how the combined impact of Phase One of the HS2 project and potential climate change, on the receiving environment and community, has been assessed. It also outlines how the 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 Bill for Phase One of the scheme which is now enacted. Although the contents were maintained and updated as considered appropriate during the passage of the Bill (including shortly prior to the enactment of the Bill in February 2017) the contents are now historic and are no longer maintained.

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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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 two phases: Phase One will connect London with Birmingham and the West Midlands and Phase Two will extend the route to Manchester, Leeds and beyond.

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 November 2013, HS2 Ltd deposited a hybrid Bill[1] with Parliament to seek powers for the construction and operation of Phase One of HS2 (sometimes referred to as 'the Proposed Scheme'). The Bill is the culmination of nearly six years of work, including an Environmental Impact Assessment (EIA), the results of which were reported in an Environmental Statement (ES) submitted alongside the Bill. The Secretary of State has also published draft Environmental Minimum Requirements (EMRs), which set out the environmental and sustainability commitments that will be observed in the construction of the Proposed Scheme.

1.4. The Bill is being promoted through Parliament by the Secretary of State for Transport (the 'Promoter'). The Secretary of State will also appoint a body responsible for delivering the Proposed Scheme under the powers granted by the Bill.

1.5. This body is known as the 'nominated undertaker'. There may well be more than one nominated undertaker – for example, HS2 Ltd could become the nominated undertaker for the main railway works, while Network Rail could become the nominated undertaker for works to an existing station such as Euston. But whoever they are, all nominated undertakers will be bound by the obligations contained in the Bill and the policies established in the EMRs.

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 project have been reached.

[1] The High Speed Rail (London – West Midlands) Bill, hereafter 'the Bill'.

2. HS2 and Climate Change

2.1. This information paper outlines how the combined impact of Phase One of the HS2 project and potential climate change, on the receiving environment and community, has been assessed. It also outlines how the scheme's resilience and capacity to cope with potential climate change impacts has been assessed.

2.2. The Environmental Statement has assessed climate change adaptation and resilience in two ways:

- a climate change adaptation impacts assessment, which includes consideration of the combined impacts of the Proposed Scheme and potential climate change on the receiving environment and community, based on trends within the UK climate projections[2]; and
- a high level climate change resilience assessment, which uses climate change risk assessment techniques to assess the resilience of the Proposed Scheme.

2.3. The greenhouse gas assessment for the Proposed Scheme is covered in Information Paper E10: Carbon.

3. Policy Background

3.1. UK climate change policy is set out in the Climate Change Act 2008, supported by a national Climate Change Risk Assessment (2012)[3] and National Adaptation Programme (2013)[4]. The Government has identified the resilience of UK infrastructure to climate change as a major 21st century challenge that needs to be addressed.

4. HS2 Ltd Policy

4.1. The HS2 Ltd Sustainability Policy[5] sets out the aim to "build a network which is resilient for the long term and seek to minimise the combined effect of the project and climate change on the environment". This policy statement is reinforced within the National Adaptation Programme.

5. Climate Change Adaptation Impact Assessments

5.1. HS2 Ltd has considered how climate change, in combination with the impacts of the Proposed Scheme, may affect communities, business and the natural, historic and built environment.

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[2] UKCP09 (2009), UKCP09 Climate Change Projections Report, http://ukclimateprojections.defra.gov.uk/22566, Accessed: 1 July 2013

[3] Department for Environment, Food and Rural Affairs, (2012), The UK Climate Change Risk Assessment 2012 Evidence Report.

[4] Her Majesty's Government (2013), The National Adaptation Programme, Making the country resilient to a changing climate, Her Majesty's Stationery Office.

[5] Environmental Statement, Volume 1, figure 2.

5.2. Each environmental topic has used broad descriptions of changes to long-term, seasonal averages and extreme weather events described within the UK climate projections to undertake preliminary qualitative consideration of the combined effects of climate change and the Proposed Scheme for both the construction and operation phase of the railway. The methodology is described in the Environmental Statement[6].

5.3. The overall approach to the climate change assessment and mitigation of impacts is reported in Volume 1, sections 7.5 and 9.6 respectively, of the Environmental Statement. Where possible, each Environmental Statement topic area has identified appropriate mitigation based on the likely impacts of the Proposed Scheme in combination with a changing climate. Examples include:

- a 'green infrastructure' approach to address the landscape and visual assessment effects associated with the Proposed Scheme. This approach will result in a landscape that is designed to perform several different functions – such as visual screening, flood defence, ecological habitat and noise barrier - and so will contribute to reduced vulnerability and increased resilience to climate change;
- the creation of 'stepping stones' (i.e. areas of land that link ecological habitats sufficiently closely together to allow movement of species), buffer areas and transitional habitats around existing habitat to increase landscape connectivity and to provide wildlife with the opportunity for autonomous adaptation - for example, allowing for changes in species distribution as average temperatures increase; and
- measures to ensure that there will be no increased risk of flooding and embankment/cutting erosion by creating suitable landforms/gradients, designing drainage, and creating replacement storage areas (which are described in Information Paper E4: Water Resources and Flood Risk).

6. Climate Change risk and resilience

6.1. A high level climate change risk and resilience assessment, reported in Volume 5 of the Environmental Statement[7], 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

[6] Section 6(A) of the SMR Addendum (ES, Volume 5: Appendix CT-001-000/2).
[7] ES Volume 5, Appendix CL-003-000

and consequences of climate hazards have been considered based upon the trends within the UK climate projections.

6.2. In addition, a comprehensive flood risk assessment has been carried out, in consultation with the Environment Agency, for each community forum area to assess the vulnerability of infrastructure and assets associated with the Proposed Scheme to all possible types of flooding. A route-wide flood risk assessment has also been carried out. The assessments followed technical guidance within the National Planning Policy Framework and examined flood risks at the existing baseline level and at the future baseline for the lifetime of the development, taking into account projected climate change impacts for all sources of flooding.

6.3. In order to adapt to the potential increase in flood risk, the top of rail level associated with the Proposed Scheme will be set one metre above the estimated 1 in 1,000 year (0.1%) annual probability of flooding. Where other environmental or engineering constraints mean this is not possible, flood defences will be provided in order to protect the railway line from flooding to the estimated 1 in 1,000 year standard, with a minimum of 300mm freeboard above this level.

6.4. Resilience measures for tunnel cooling include the provision of adequate space within tunnels and ventilation shafts for anticipated future cooling and ventilation requirements.

6.5. Climate risks relating to the impact of extreme weather events and related conditions on construction will be addressed in the Code of Construction Practice[8]. This assumes that all avoidance and mitigation measures are in place before construction.

6.6. Climate risks relating to operation and maintenance of the Proposed Scheme will be addressed by future operation and maintenance plans. Work during further design stages will clarify the interfaces and interdependencies between HS2 Ltd and other organisations with regards to climate change resilience across the lifetime of the Proposed Scheme.

6.7. Further review and evaluation of the climate change related risks and resilience measures identified in the assessment will continue to take place throughout the lifetime of the Proposed Scheme.

7. More information

7.1. More detail on the Bill and related documents can be found at: www.gov.uk/HS2

[8] ES, Volume 5, Appendix CT-003-000