

Air quality

This factsheet outlines how it is expected that the potential air quality impacts of the Proposed Scheme would be managed.

1 Introduction

- 1.1.1 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. The Western Leg of Phase 2b comprises an extension of the network to Manchester and a connection to the West Coast Main Line at Golborne, and is referred to as the Western Leg hybrid Bill. The Eastern Leg of Phase 2b currently comprises an extension of the network from the West Midlands through the East Midlands to Leeds.
- 1.1.2 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.
- 1.1.3 The construction and operation of Phase One of HS2 is authorised by the High Speed Rail (London – West Midlands) Act (2017). In July 2017, the Government introduced a hybrid Bill to Parliament to seek powers for the construction and operation of Phase 2a.
- 1.1.1 In February 2020, the Government announced its intention to draw up an Integrated Rail Plan. This will recommend a way forward on scoping, phasing and sequencing the delivery of HS2 Phase 2b, Northern Powerhouse Rail, Midlands Rail Hub and other proposed rail investments across the north. At the same time, the Government asked HS2 Ltd to prepare the Western Leg hybrid Bill, provided it does not prejudice any recommendations or decisions that will be taken in this plan, which will be published by the end of the year.
- 1.1.2 It is intended to deposit a Western Leg hybrid Bill seeking powers to construct and operate this phase in Parliament in early 2022 or sooner if possible (the Proposed Scheme). The work to produce the Bill will include an Environmental Impact Assessment (EIA), the results of which will then be reported in an Environmental Statement (ES). The ES would be submitted alongside the Bill when it is introduced to Parliament. As was the case with Phase One and Phase 2a, when the Bill is introduced to Parliament the Secretary of State will also publish draft Environmental Minimum Requirements (EMRs). The EMRs will set out the environmental and sustainability commitments that will be observed in the construction of the Proposed Scheme.
- 1.1.3 A series of information papers were produced for the Phase One and Phase 2a hybrid Bills, explaining the commitments made in those Bills and EMRs. It is the Secretary of State's intention to follow a similar process for the Western Leg Bill. These information papers will be used to provide information about the Proposed Scheme itself, the powers contained in the Bill and how decisions on

the Proposed Scheme have been reached. It is currently proposed that these information papers for the Western Leg of Phase 2b will be published at the time the Bill is introduced in Parliament.

- 1.1.4 The Secretary of State for Transport will be ‘the Promoter’ of the Western Leg Bill. The Promoter will also eventually appoint a body responsible for delivering the Proposed Scheme under the powers to be granted by the Bill. This body will be known as the ‘nominated undertaker’. There may well be more than one nominated undertaker. However, any and all nominated undertakers will be bound by the obligations contained in the Bill, the policies established in the Western Leg EMRs and any commitments provided in the Western Leg information papers.
- 1.1.5 These Western Leg factsheets have been produced to provide information on the emerging proposals for measures to manage the design process for the Proposed Scheme and to control impacts which may arise from the construction and operation of the Proposed Scheme. These measures may then be applied to the Western Leg as commitments made through the eventual Bill, EMRs or information papers.

2 Overview

- 2.1.1 This factsheet outlines how it is expected that the potential air quality impacts of the Proposed Scheme would be managed.
- 2.1.2 The purpose of the Proposed Scheme is to build a high speed railway network running trains powered by electric motors, supplied by electricity from the national distribution grid via overhead lines. The trains would have no significant emissions to air at the point of travel. Electric trains are ‘cleaner’ than the competing modes of car travel and domestic aviation which rely primarily on the combustion of fossil fuels. The Proposed Scheme can thus off-set the environmental impacts of the increase in travel associated with economic growth.

3 Objectives

- 3.1.1 This document sets out the approach the nominated undertaker is expected to follow to try to avoid emissions to air causing significant adverse effects on communities and to prevent air pollution. The measures set out are intended to maintain good air quality for those people living and working close to the Proposed Scheme as far as is reasonably practicable. For the most part, these measures would reduce emissions which have harmful impacts on human health and would also reduce emissions which have an effect on climate change (carbon).

- 3.1.2 HS2 Ltd's Environmental Policy¹ commits to developing an exemplar project and commits to protecting the environment through the avoidance and prevention of pollution, and by meeting all compliance obligations. The policy also states that HS2 will manage the impact of HS2 construction and operation on people and the environment including effects from air pollution.
- 3.1.3 The nominated undertaker will have the following objectives for air quality relating to its construction and operation of the Proposed Scheme:
- avoid pollutant emissions to air;
 - avoid causing public and workforce exposure to air pollutants where emissions cannot be avoided;
 - reduce pollutant emissions where emissions cannot be avoided;
 - minimise public and workforce exposure to pollutant emissions where exposure cannot be avoided;
 - work with the relevant authorities to maintain air quality, especially where construction or operations may have significant air quality effects in locations where those authorities have management areas or zones with plans or measures directed at compliance with national air quality standards; and
 - provide mitigation for dust soiling, where it cannot be prevented.
- 3.1.4 The Proposed Scheme itself is in keeping with these objectives. As a mode of transport being powered by electricity it avoids causing public and workforce exposure to air pollutants.

4 Potential air quality effects

- 4.1.1 The quality of the air in the UK is regulated by law, to limit the concentration of air pollutants which cause adverse effects on human health and the environment.
- 4.1.2 The main pollutants of concern in the UK are nitrogen dioxide and fine particulate matter (PM₁₀ and PM_{2.5}). These are known to cause harm to humans.
- 4.1.3 The construction of the Proposed Scheme would have impacts on air quality through the use of on-road and off-road machines using conventional engines, and through the emissions of dust from demolition and construction.
- 4.1.4 The operation of the Proposed Scheme would have impacts on air quality through changing the location and nature of road traffic emissions. The

¹ The HS2 Environmental Policy is available here: <https://www.gov.uk/government/publications/hs2-environmental-policy>

passenger trains themselves are powered electrically and would have no significant emissions to air.

- 4.1.5 Guidance published by the Institute of Air Quality Management sets out thresholds of change in air pollutant concentrations, which are compared against the existing situation. Where the existing air quality is poor, a relatively smaller change in pollution concentration is considered to be a more significant effect, than a change of the same magnitude in an area where the existing air quality is good.
- 4.1.6 Where an effect on air quality is described as significant at a particular location, this is with respect to the air quality legislation, as determined by the Institute of Air Quality Management guidance and does not denote a significant effect on human health. Much larger changes in air quality than are predicted as a consequence of the scheme would be needed to cause significant impacts on health at the level of an individual person.

Dust from construction and mineral sites

- 4.1.7 Dust from construction and mineral sites will be assessed in the Environmental Impact Assessment to determine if there would be any effect on any receptors (residential, property-based or ecological) along the route of the Proposed Scheme from dust-generating activities during construction and mineral works, after the provisions of the Code of Construction Practice (CoCP) have been applied. The CoCP will form part of the EMRs, so it will be a requirement under the EMRs that dust emissions during construction and mineral activities should be minimised as far as reasonably practicable and with the objective that there is no significant effect. For further details please see the Phase 2b Factsheet: draft Code of Construction Practice.

Highway vehicle emissions

- 4.1.8 Road vehicles with conventional engines burn diesel or petrol which emit the greenhouse gas carbon dioxide and water vapour with trace quantities of pollutants which include nitrogen oxides, PM₁₀ and PM_{2.5} particulate matter.
- 4.1.9 During construction, highway construction traffic has the potential to cause temporary significant effects for local air quality. This would be limited through the adoption of control measures on the Proposed Scheme.

5 Control measures

- 5.1.1 If the EIA identifies significant adverse air quality effects, control measures would be adopted where necessary and practicable to meet the objectives set out in Section 3.
- 5.1.2 HS2 Ltd has set a new standard for construction projects in its management of air quality effects on the highways. If there are any areas identified in the EIA where there are predicted temporary significant air quality effects around highways as a result of construction, these are likely to be managed through the CoCP. The management process is based on the Local Air Quality Management provisions of Part IV of the Environment Act 1995, and requires measurements of air quality, periodic reviews of those measurements, and if necessary the development of action plans to address any significant effects, with the objective of removing them as soon as, and as far as, practicable.
- 5.1.3 The management process described above would be undertaken by working with the relevant local authorities. They would be consulted on the monitoring, reviews, assessments and action plans.
- 5.1.4 The likely main impacts from the Proposed Scheme on air quality result from vehicles and machinery required for construction. The CoCP will set out measures to mitigate impacts on local air quality which would include a requirement for all construction vehicles and non-road mobile machinery to comply with minimum emission standards.
- 5.1.5 Engine emissions are regulated in Europe by a series of standards ('Euro standards'), first introduced in 1992. These are limits on the emissions of nitrogen oxides (NO_x) and particulate matter (amongst others) and they are different for light and heavy vehicles. The Euro standards legislation also dictate the use of specific technologies for use in the engines in order to reduce the emission of specific pollutants; for example, catalysts, absorbers and filters.
- 5.1.6 Since their introduction, each new standard has been set at a stricter level to the previous ones, therefore aiming to reduce the contribution of road transport to air pollution. The current, and therefore the cleanest, standard for heavy vehicles (trucks and buses) is Euro VI.
- 5.1.7 It is expected that the nominated undertaker would set route wide emission requirements and targets for the engines of contractor heavy goods vehicles, vans and cars used during the construction of the Proposed Scheme. Requirements and targets would also be set for the use of Ultra Low Emission Vehicles. Appendix A sets out the proposed route wide emission requirements and targets. Appendix A also shows for information the emission requirements and targets for vehicles used within any clean air zones that may be designated by local authorities on the route of the Proposed Scheme. Certain exemptions to

these construction vehicle emission standards would be permitted for specialist vehicles, unforeseen circumstances and triviality.

- 5.1.8 Appendix B sets out HS2 Ltd's emissions requirements for the engines of Non-Road Mobile Machinery (e.g. large cranes and piling machines).

6 More information

- 6.1.1 Further factsheets and details on the Proposed Scheme can be found at:
www.hs2.org.uk/phase2b

Appendix A

Construction vehicle emission standards

Vehicle class & minimum vehicle emission standard	Local authority designated clean air zones	Rest of route
HGVs – EURO VI	Target - 100% from start of works	Target - 100% from start of works
	Requirement – 100% from implementation	Requirement – as far as reasonably practicable; 100% from 2020
HGVs – from 2020 - %age 'cleaner' than EURO VI (e.g. lower PM emission through alternative fuel)	Target - 25%	Target - 10%
	Requirement - None	Requirement - None
LDVs – EURO 6 diesel, EURO 4 petrol	Target - 100% from start of works	Target - 80% from start of works; 100% from 2020
	Requirement – 100% from implementation	Requirement – 100% from 2020
ULEV* cars	Target – 100%	Target – 100%
	Requirement - produce a plan to work towards achieving target percentages	Requirement - produce a plan to work towards achieving target percentages
ULEV* Vans (Medium Vans, 2,000 to 2,600 kgs)	Target - 75%	Target - 75%
	Requirement - produce a plan to work towards achieving target percentages	Requirement - produce a plan to work towards achieving target percentages
Fleet average gCO ₂ /km cars	Target - 75gCO ₂ /km from start of works, decreasing by 5gCO ₂ /km every 3 years	

Vehicle class & minimum vehicle emission standard	Local authority designated clean air zones	Rest of route
Fleet Average gCO ₂ /km vans	Target - 160gCO ₂ /km from start of works, decreasing by 20gCO ₂ /km every 3 years	

Table notes

1. <https://www.gov.uk/government/publications/air-quality-plan-for-reducing-nitrogen-dioxide-no2-in-greater-london-urban-area-uk0001> and <https://www.gov.uk/government/publications/air-quality-plan-for-reducing-nitrogen-dioxide-no2-in-west-midlands-urban-area-uk0002>. Emissions assumptions are set out in the Evidence Annex. It is expected that new clean air zones will be set up and run by boroughs/local authorities.
2. ULEV* 'Ultra Low Emission Vehicle' current definition for the purposes of obtaining an OLEV grant = 'emissions lower than 75gCO₂/km and zero-emission range greater than 10 miles or for an all-electric vehicle, range greater than 60 miles' – eligible for grant from April 2015. Previous definition from 2011 to 2015 was 'emissions lower than 75gCO₂/km'. The definition of ULEV cars and vans for the purposes of HS2 Ltd will be 'emissions lower than 75gCO₂/km and zero-emission range greater than 10 miles, or for an all-electric vehicle, range greater than 60 miles'. As of 1st March 2016, there will be three categories for plug-in car grants:
 - Category 1: CO₂ emissions of less than 50g/km and a zero emission range of at least 70 miles
 - Category 2: CO₂ emissions of less than 50g/km and a zero emission range of between 10 and 69 miles
 - Category 3: CO₂ emissions of between 50 and 75g/km and a zero emission range of at least 20 miles
3. It is expected that contractor performance will be assessed by using data from the vehicle monitoring system and matching it with data from the DVLA and VCA databases. Retrospective reports will be shared with contractors to assist them in managing their performance. In optimising the emissions reduction potential of plug-in hybrid electric vehicles, the duty cycle will need to include sufficient opportunity for vehicles to be charged and operate in electric mode, and fleet and site management will be expected to take this into account. Vehicle fuel use will be required to be recorded by contractors as part of carbon management.
4. It is expected that 'requirements' in the table will be a contractual requirement. 'Targets' in the table are HS2 Ltd.'s aspiration but, it is expected that these will form part of the contract tendering process for the Proposed Scheme.

Appendix B

Non-Road Mobile Machinery emissions standards

The engine emissions of Non-Road Mobile Machinery (NRMM) are controlled by EU Regulation in a similar way to on-highway Euro standards. The Greater London Authority (GLA) Supplementary Planning Guidance (SPG) on the control of dust and emissions during construction and demolition² sets requirements for NRMM emissions based upon the EU emission stages. It is anticipated that requirements for the Proposed Scheme will be based on those of the SPG, but will be more stringent, requiring the earlier up-take of cleaner engines.

NRMM Engine Emission Stage Requirements (of engine power between 37kW and 560kW)

Area	HS2 Requirements	
	From 2017	From 2020
Rest of country	IIIB ⁽²⁾	IV ^(1, 2)

Notes: (1) IIIB for $37 \leq P < 56$ kW, as there is no corresponding Stage IV at EU level

(2) IIIB for constant speed engines of any power, as there is no corresponding Stage IIIB or IV at EU level

The Greater London Authority exemptions policy set out in the SPG will apply route wide to HS2. It can be viewed at: <http://nrmm.london/content/nrmm-exemption-policy>

In certain cases, retrofit emission control devices (REC) applied to the previous stage of engine may be permitted. In this case, the REC shall be approved to (United Nations Economic Commission for Europe) UNECE Regulation R132. HS2 Ltd shall set and periodically review best practice R132 class approvals for its contractors. When setting best practice class approvals, preference will be given to particulate matter retrofit REC with zero permitted absolute increase nitrogen dioxide emission classes.

HS2 contractors shall register compliant NRMM (including where necessary with HS2 Ltd approved REC) with the nominated undertaker prior to the machinery entering a HS2 construction site.

HS2 contractors shall submit, where necessary, applications for an NRMM exemption to the nominated undertaker for approval. It is acknowledged that from 2020 not all NRMM equipment types will see a full set of Stage V products in the market place. In these cases, contractors can apply for an exemption, in line with the GLA Exemptions Policy.

² Greater London Authority (2014): The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance.

