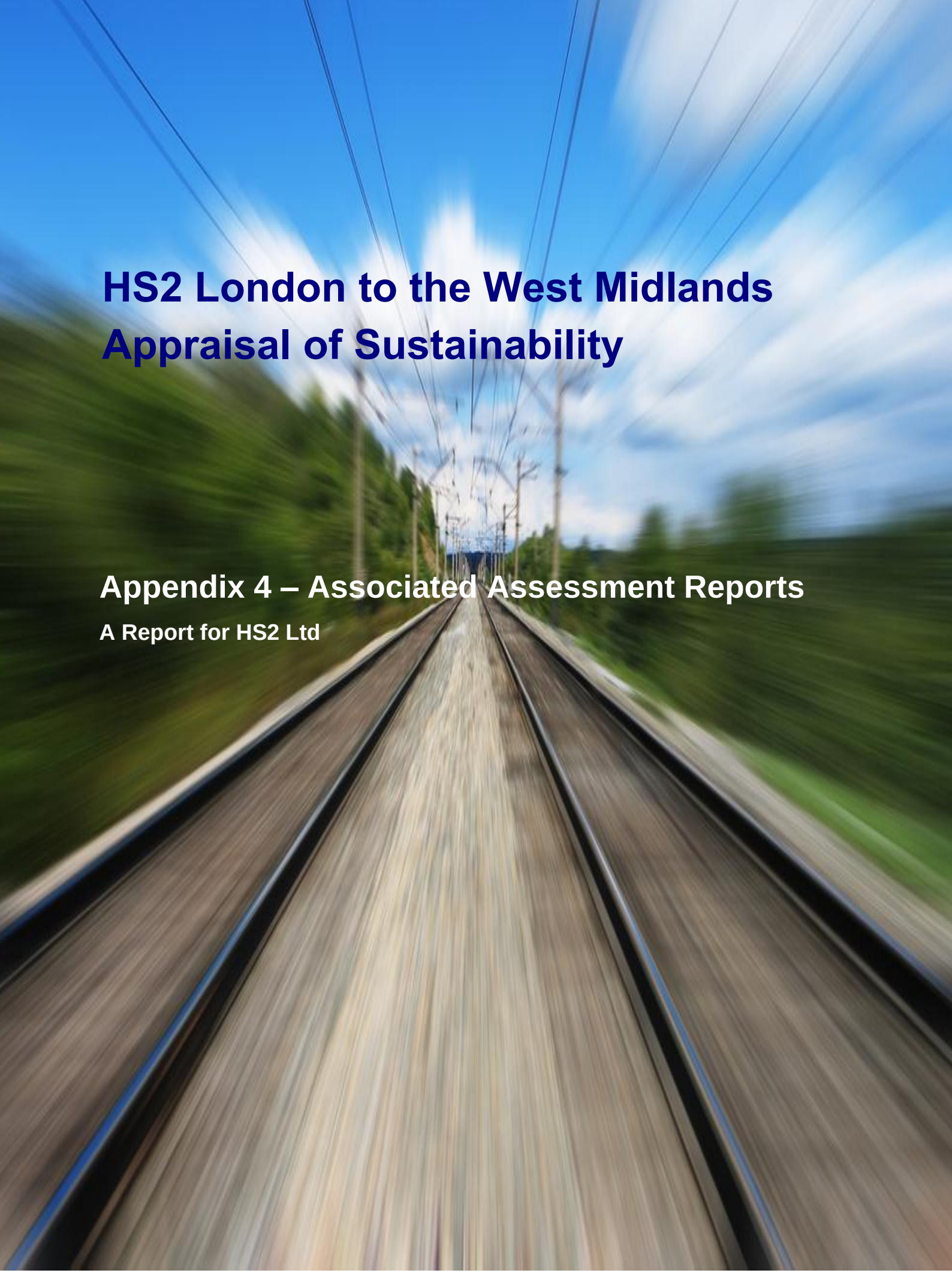

HS2 London to the West Midlands
Appraisal of Sustainability

Appendix 4 – Associated Assessment Reports

A Report for HS2 Ltd

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February 2011

HS2 London to the West Midlands Appraisal of Sustainability

Appendix 4 – Associated Assessment Reports

A Report for HS2 Ltd

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APPENDIX 4.1
Habitats Regulation Assessment: Screening for likely significant effects

1 Introduction

1.1 Context for the study and report

1.1.1 The Ecology Consultancy was commissioned by Temple Group to produce a screening report that could be used to inform the need for an Appropriate Assessment (AA) under regulation 61 of the Conservation of Natural Habitats and Species Regulations 2010 ("Appropriate Assessment") on route options currently proposed for HS2 from London to the West Midlands. The need for a similar assessment of impacts upon Ramsar sites is also required as a matter of policy through PPS9 and Ramsar Sites in England – A policy Statement (2006). The routes considered in this assessment are those proposed for review at Gate 3 of the route selection process. These comprise route sections that link together to form four principal alignments between London and the West Midlands, as well as several variants and connectors. Six route options in and around Birmingham were also considered.

1.1.2 As well as being required as a stand-alone document, this report was drafted in support of the wider AoS report. The Government's proposed route recommended initially by HS2 Ltd has since been refined on the basis of requests made by Government following further appraisal. This refined scheme is now adopted as the Government's recommended scheme and is the subject of public consultation. Any changes in the content of the draft report issued in March 2010 that have resulted from these refinements are highlighted herein, where appropriate. No changes in the report's overall conclusions have resulted, however.

1.2 Natura 2000 Sites and HRA

1.2.1 There are a number of different mechanisms by which impacts can affect the populations or habitats for which European Sites have been designated. These include mechanisms that act indirectly, possibly at some distance from the site boundary, but that still affect its conservation objectives, sometimes affecting a population of a mobile qualifying species beyond the physical boundary of the site. This approach is stated in the European Commission guidance document *Managing Natura 2000 Sites (EC 2000 p34[1]).*

> *'The procedure of Article 6(3) and (4) is triggered not by a certainty but by a likelihood of significant effects, arising not only from plans or projects located within but also outside a protected site.*

1.2.2 Sites of European importance for nature conservation (referred to collectively as Natura 2000 Sites and taken to include Special Areas of Conservation (SACs including candidate SACs), Special Protection Areas (SPAs including potential SPAs) and Ramsar sites) within 10 kilometres of any route segment were identified using Proximity Analysis in ArcGIS. A total of 11 sites were therefore identified of which nine were SACs and two were SPAs, also designated as Ramsar sites. No candidate SACs or potential SPAs were identified.

1.2.3 Natura 2000 Sites are afforded protection under the following directives, which are implemented domestically by the Conservation of Habitats and Species Regulations 2010 (hereafter referred to as the Habitats Regulations):

- SPAs are protected in accordance with Article 4 of the EC Directive on the conservation of wild birds (79/409/EEC and 09/147/EC)). They are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species.
- SACs are protected sites designated under the EC Directive on the Conservation of natural habitats and wild fauna and flora (92/43/EC). Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality

[1] Managing Natura 2000 Sites, The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. European Communities 2000.

conservation sites that would make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended). The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds).

1.2.4 Under Article 6(3) and (4) of the Habitats Directive, assessments are required where a project or plan is likely to give rise to significant effects upon a Natura 2000 site. Article 6, paragraphs (3) and (4) states:

- Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it would not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.
- If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures.

1.2.5 The requirements in respect of Imperative Reasons of Overriding Public Interest (IROPI) are transposed by regulation 62 of the Habitats Regulations. The so called IROPI test provides that the plan or project may be agreed to if there are no alternative solutions and if there are imperative reasons of overriding public interest. Such reasons can generally be of a social or economic nature, but where the site concerned includes a priority habitat (of which there are 22 in the UK) or hosts a priority species (of which there is one in the UK), the imperative reasons must either relate to human health, public safety or beneficial consequences of primary importance to the environment, or any other reasons which the competent authority, having regard to the opinion of the European Commission, considers to be imperative reasons of overriding public interest. Where it can be confirmed that there are imperative reasons of overriding public interest, and there are no feasible alternative options, compensation measures are required to maintain the overall coherence of the Natura 2000 network.

1.2.6 The HRA screening exercise was undertaken initially to inform the option sifting process. Since this time the proposed route and some main alternatives have emerged. The report distinguishes those route elements that form part of the proposed route and alternatives from those that are no longer considered.

2 Methodology

2.1 Main Effects

2.1.1 The screening assessment follows current good practice guidance, especially that included in *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites*[2]. In particular, it draws on the first section of the guidance that defines the screening process as follows:

- Determining whether the project or plan is directly connected with or necessary to the management of the site;
- Describing the project or plan and the description and characterisation of other projects or plans that in combination have the potential for having significant effects on the Natura 2000 site; and
- Identifying the potential effects on the Natura 2000 site.
- Assessing the significance of any effects on the Natura 2000 site.

2.1.2 In respect of the first point it is clear that HS2 does not relate to the necessary management of the Natura 2000 sites it may potentially affect.

2.1.3 With regard to the second point, in the absence of detailed construction methodology, reasonable assumptions have been made about likely construction activities at relevant locations. These are based on experience of other rail projects of a similar scale.

2.2 In-combination Effects

2.2.1 Information on projects or plans that in combination have the potential for having significant effects on the Natura 2000 site have been taken into account even where it is considered that HS2 would have no significant effect on its own.

2.2.2 The main sources of information reviewed were the Appropriate Assessments for the Regional Spatial Strategies (RSS)[3] for the regions through which the routes pass[4]. These are:

- Habitats Regulations Assessment of the Phase 2 Revision of the Regional Spatial Strategy for the West Midlands - October 2007;
- Appropriate Assessment of the Draft South East Plan October 2006;
- East Midlands RSS Partial Review Habitats Regulations Assessment Pre-screening Report October 2008; and
- Draft Replacement London Plan Habitats Regulations Assessments – Screening Report October 2009.

[2] European Commission Environment DG (2001) Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC

[3] Since the initial drafting of this report, the Coalition Government has announced that RSSs are to be abolished. In the absence of any replacement proposals at the time of writing, however, it is assumed that proposals therein remain current.

[4] The screening of draft RSS for the East of England has not been produced. Recommendations are included in 'likely significant effect' on a Natura 2000 site: advice to the Panel prepared jointly by English Nature and Government Office for the East of England (February 2006), but does not contain detailed information.

2.2.3 The RSSs provide sufficient plan-level detail on the likely impacts of projects associated with the implementation of the Strategy for in-combination effects with HS2 to be assessed. They also refer to known projects that are likely to act in combination with the implementation of the Strategy and potentially with HS2. Information from RSSs and LDFs identifying specific growth areas have also been considered in determining any other in-combination effects with other proposals.

2.2.4 In addition proposed transport projects have been considered. Reasonable effort has been applied to the assessment, in particular in regard to in-combination effects, given the nature and stage of the HS2 proposals.

2.3 Identifying Potential Impacts

2.3.1 The following resources were reviewed to identify the potential impacts generated by transport schemes:

- IEEM Guidelines for Ecological Impact Assessment in the United Kingdom[5].
- The Design Manual for Roads and Bridges (Vol 11, 2009)[6].
- Department of Transport, Transport Analysis Guidance[7].
- Accounts for SACs, SPAs and Ramsar sites in the vicinity of proposed routes.
- Common Standards Monitoring reports for SACs.

2.3.2 Impacts have been described in terms of their likely construction and operational phase characteristics, and whether resulting effects would be restricted to the footprint of the works or would include off-site ecological receptors. These include effects caused by both direct impacts such as habitat loss and fragmentation, and potential indirect and off-site impacts such as noise and light disturbance and air and water pollution.

2.3.3 The receptors upon which the proposal may exert an effect were identified through reviewing the accounts for Natura 2000 sites and noting the qualifying species for the designation of SPAs and Ramsars or Annex I or Annex II habitats or species present that lead to the designation of SACs. All features of European importance (both primary and non-primary) were considered, as well as the Conservation Objectives of the site in question. The sensitivity and mobility of the identified features were also considered.

2.3.4 The presence of these features, and the potential for the proposal to impact on them in the various ways identified, were then analysed. Some sites were screened out due to distance, or because the site did not contain any mobile species and no pathways existed potentially to allow off-site impacts to exert an effect on site. For sites which were closer, or where mobile species or effect pathways were present, a further level of analysis was undertaken.

2.3.5 The potential sources of impact from the scheme and the sensitivity and vulnerability of designated features present at nearby Natura 2000 sites were tabulated and the matrix used to identify the possible pathways by which an impact may occur. The potential significance of any effect was reported.

2.3.6 The proximity of proposed routes was considered in order to determine whether the effects were likely to operate on the conservation objectives of the Natura 2000 sites in the ways identified.

2.4 Determining the Potential for Distant Effects

2.4.1 All sites within 10km of the proposed routes were included as a matter of course. The 10km buffer was chosen on the basis of DMRB (2009) advice which recommends a 2km buffer

[5] http://www.ieem.net/ecia/index.html

[6] http://www.standardsforhighways.co.uk/dmrb/vol11/index.htm

[7] http://www.dft.gov.uk/webtag/documents/expert/unit3.3.10.php

for all sites, but indicates that a precautionary approach should be used for routes in the vicinity of designated watercourses. In compliance with this, it is considered that sites dependent on surface and groundwater flows could also be adversely affected at distances greater than 2km. This is based on previous experience on other rail projects, particularly CTRL where inputs to rivers were found to extend to at least 5km downstream from the point of input into a watercourse.

2.4.2 **Table 1** below summarises the buffer distances for various species groups, reproduced from the National Transport Plan Habitats Regulations Assessment Statement to Inform an Appropriate Assessment[8].

Table 1 Summary of Buffer Distances for Various Species Groups

Species Group	Name HRA screening distance	Source of distance
Bats.[9]	30km	DMRB HD44/0915
Otter [10]	20km	DMRB otter advice note HA81/9914 (Range of breeding female)
Great Crested Newt[11]	2km	2km chosen to take a precautionary approach. Great Crested Newt Handbook (Froglife 2001) states that newt during dispersal can move 1,000m or more.

2.4.3 The route options were drawn on plans along with the location and boundaries of those Natura 2000 sites identified as being potentially vulnerable to the HS2 project. 10 km buffer zones were then plotted around each of the Natura 2000 sites using Arc GIS software in order to identify the potential for effects. Where no direct effects were obvious, features such as watercourses, transport infrastructure and urban development were taken into account in order to assess whether any indirect impact pathways may occur.

2.4.4 There is no information recommending a buffer distance between SPAs and projects potentially having an adverse effect on qualifying species. This reflects the wide ranging and unpredictable nature of bird movements even within related species such as wildfowl. Thus where SPAs are present just beyond the10km buffer of the routes considered, they have also been included in the assessment.

[8] Welsh Assembly Government, Department for the Economy and Transport, Transport & Strategic Regeneration Group (Consultation Version November 2009). National Transport Plan Habitats Regulations Assessment Statement to Inform an Appropriate Assessment.

[9] The DMRB guidance recommends a buffer of 30km for sites designated for bats. The assessment of the Welsh Transport Plan adopted 30km for bats. Effects have been considered at this distance for HS2 where appropriate. The Mole Gap to Reigate Escarpment designated for Bechstein`s bat Myotis bechsteinii, has been identified but there are numerous barriers to the dispersal of bats from this SAC and any of the proposed routes and as a consequence it has been judged that no effects would arise.

[10] Sites within a 20km buffer were checked to see if otters were a reason for designation, a single site, the River Mease is present in the search are, but was also included within the 10km buffer.

[11] Not a reason for designation of any site within a 10km buffer.

3 Potential Effects

3.1 Sources of Impact

3.1.1 **Table 2** below summarises the potential impacts arising from the construction and operational phases of the scheme and the geographic range over which impacts are likely to occur.

Table 2 Potential Ecological Impacts of the Scheme

Phase of impact			Possible extent of impact		
Impact	**Construction**	**Operation**	**Onsite**	**Local <2km**	**Distant 2-10km**
Habitat removal	Site clearance for the works, temporary offices and works compounds, storage areas for construction materials, demolition operations.	Maintenance operations, emergency access	Yes	Yes	
Habitat fragmentation	Site clearance for the works, temporary offices and works compounds, storage areas for construction materials, demolition operations.	Land take from the presence of the completed route option	Yes		
Population fragmentation	Land take and disturbance arising from construction	Disruption of territories, flyways, river corridors - otters etc, commuting habitat for bats. Pollution of waterbodies, light and noise pollution.	Yes	Yes	Yes
Killing and injury	Habitat clearance, (not including indirect effects through pollution, hydrological changes etc.)	Train strike – bats, birds, etc. Electrified track killing otters	Yes		
Soil compaction	Works sites, storage compounds	NA	Yes		
Soil erosion/ siltation	Runoff	Runoff	Yes	Yes	Yes
Water pollution	Incursion into contaminated land, construction site run-off	Runoff from railways or maintenance operations.	Yes	Yes	Yes
Air pollution	Generation of dusts at construction sites and haul roads; emissions from construction vehicle exhausts (CO, VOC, NOX, PM, unregulated pollutants)	None significant: trains are electrically powered and result in no emissions to air at point of use. Air pollutants would occur at point of power generation, but such emissions are considered to be part of the existing baseline.	Yes	Yes	No
Groundwater hydrological change	Dewatering, creation of barriers (bentonite walls) etc	Changes to soil and subsurface profiles, sub surface permanent barriers, alteration of surface water flows	Yes	Yes	Yes
Surface water change	Diversion/impoundment of watercourses, bridges, culverts	Permanent bridges, culverts diversions	Yes	Yes	Yes
Noise	Blasting, piling, vehicle movements etc	Operation of trains, maintenance crews	Yes	Yes	
Light	Night time working	Night time maintenance, trackside lighting, train lighting	Yes	Yes	
Vehicle movement, changes in human activity	Works crews, machinery etc	Operation of trains, maintenance crews	Yes	Yes	
Shade	Temporary structures over	Embankments, permanent	Yes	Yes	

Phase of impact			Possible extent of impact		
Impact	**Construction**	**Operation**	**Onsite**	**Local <2km**	**Distant 2-10km**
	watercourses	bridges			

3.2 Key Features

3.2.1 Within the corridor in which the various route options sit and within 10 km of these options 11 Natura 2000 sites were identified. Of these six are known to comprise features that are particularly sensitive to water pollution or groundwater changes or comprise important populations of mobile species.

3.2.2 The information on Natura 2000 sites within 10km of proposed routes is summarised in **Table 3** below:

Table 3 Summary Information on SACs, SPAs and Ramsar sites in Proximity to HS2 Series Routes

SAC/SPA Name	Desig-nation	Annex I habitat designated primarily for:	Annex I habitat designated secondarily for:	Annex II species that are a primary reason for designation	Annex II species present as a qualifying feature
Aston Rowant	SAC	Juniper *Juniperus communis* scrub on heaths or calcareous grasslands	Beech *Fagus sylvatica* woodland	NA	NA
Burnham Beeches	SAC	Beech woodland on acid soils (associated invertebrates and epiphytes)	NA	NA	NA
Cannock Chase	SAC	European dry heaths (invertebrates, nightjar, five species of bats are also mentioned)	Northern Atlantic wet heaths with cross leaved heath *Erica tetralix*	NA	NA
Cannock Extension Canal	SAC	NA	NA	Floating water-plantain *Luronium natans*	NA
Chilterns Beech –woods	SAC	Very extensive tract of beech forests in the centre of the habitat's UK range	Semi-natural dry grasslands and scrubland	Stag beetle *Lucanus cervus* (Bisham wood)	NA
Richmond Park	SAC	NA	NA	Stag beetle Lucanus cervus	NA
River Mease	SAC	NA	Watercourses of plain to montane levels	Spined loach *Cobitis taenia* and bullhead *Cottus gobio*	Otter *Lutra lutra* and white-clawed crayfish
Wimbledon Common	SAC	NA	Northern Atlantic wet heaths with cross leaved heath and European dry heaths	Stag beetle	NA
Pasturefields Salt Marsh	SAC	Inland salt meadows[12]	NA	NA	NA
Lee Valley	SPA/ Ramsar	NA	NA	Internationally important populations of shoveler *Anas clypeata* and gadwall *Anas*	NA

[12] Priority habitat

SAC/SPA Name	Desig-nation	Annex I habitat designated primarily for:	Annex I habitat designated secondarily for:	Annex II species that are a primary reason for designation	Annex II species present as a qualifying feature
				strepera, bittern *Botaurus stellaris*	
South West London Water-bodies	SPA/ Ramsar	NA	NA	Internationally important populations of shoveler and gadwall	NA

4 Assessment of Effects

4.1 Overview

4.1.1 The potential impacts listed in **Table 2** are discussed below for each Natura 2000 site with respect to Annex I and II habitats and species and the conservation objectives for the site. The distance of the nearest route options to the Natura 2000 site is also considered in order to provide an assessment of whether any options could result in a likely significant effect on the conservation objectives and therefore prompt an AA.

4.1.2 In all cases direct removal or fragmentation of the Annex I and II habitats for which a SAC is designated would represent a significant adverse effect on conservation objectives and would therefore necessitate an AA.

4.2 Aston Rowant

Qualifying Features

4.2.1 Aston Rowant SAC is designated for its beech woodland, juniper scrub and calcareous grassland habitats.

Conservation Objectives

4.2.2 Subject to natural change, to maintain in favourable condition the beech forest habitat (*Asperulo-Fagetum*) and lowland juniper scrub.

Assessment of Effects

- Distance of nearest routes: Route section 824 (LoR 1) [no longer considered] is within, but beneath the site, although portals are situated close to the site's boundary. Route sections 816, 823 and 825 are all within 10km of the site but more than 7km away and not likely to result in adverse effects. Route section 829 (LoR 2.5) is 8.6km from the site. The proposed route option is over 10km from the site.
- Habitat removal or fragmentation: Route section 824 [no longer considered] is in tunnel to avoid direct removal or fragmentation of the Annex I and II habitats for which the SAC is designated, although portal construction could affect fringe habitat. Other options are at some distance away.
- Population fragmentation: Not applicable in terms of designated habitats.
- Killing and injury: No qualifying mobile species that would potentially be affected.
- Soil erosion, siltation compaction: Works for Route 824 [no longer considered] could result in soil compaction or erosion, which could have adverse effects on tree roots.
- Air pollution: most works that would potentially generate air pollution are at too great a distance to affect the site, its habitats and species. Tunnelling activity for route section

824 would potentially generate dust impacts, although best practicable means[13] would be employed to control dust and other air quality impacts.

- Water pollution: The potential for water pollution is highest during construction, although best practice measures would be employed to minimise this risk. However, with works all taking place at some distance from the site and at a lower elevation to the habitat, there is no risk of any pollution incident off site affecting the SAC.
- Groundwater hydrological change: The high permeability of the chalk geology would allow groundwater flows and water column pressure to adjust rapidly to the presence of the tunnel, therefore there is negligible potential for changes to groundwater or associated surface waters that might affect the SAC.
- Surface water change: Due to the proximity of the Route 824 portal [no longer considered] to the site it is possible that dewatering operations could have an adverse effect on qualifying habitats. However, the proposed scheme is some 10km away and no effects are predicted.
- Noise, light, vehicle movement and changes in human activity: Not applicable on designated habitats, since there are no qualifying species.
- Shading: Due to the proximity of the route section 824 [no longer considered] to shade sensitive habitats i.e. juniper scrub and calcareous grassland adverse effects could occur. No impacts from the proposed scheme would occur.

Likelihood of HS2 Effects

- Route section 824 [no longer considered] could involve direct removal or fragmentation of small portions of Annex I and II habitats and it is, therefore, likely that the proposal would have a significant effect on the site and would require AA.
- Route section 892 (LoR2.5) is 8.6km from the site. Due to the distance of the route from the SAC, the absence of impacts on the continuity of ground or surface water flows in the vicinity of the SAC, and the absence of mobile qualifying species, it is considered that adoption of route section 892 would not result in any likely significant effects triggering an AA or requiring mitigation or consideration of in-combination effects. All elements of the proposed route are situated further from the site.

Potential In-combination Effects

4.2.3 None identified.

4.3 Burnham Beeches SAC

Qualifying Features

4.3.1 Burnham Beeches SAC is designated for the beech woodland on acid soils and is noted for its nationally important associated invertebrate and epiphyte interest.

Conservation Objectives

4.3.2 Subject to natural change, to maintain in favourable condition, beech forests with *Ilex* and *Taxus* rich in epiphytes.

Assessment of Effects

- Distance of nearest routes: Route sections 817, 824 [LoR1 - no longer considered] are respectively 360m and 295m from the SAC where the routes are on a mixture of embankment and viaduct. Route section 813 [LoR1 - no longer considered] is also 360m away. Remaining routes within 10km are all more than 3.5km away from the

[13] Best practicable means is defined in section 72 of the Control of Pollution Act 1974. However, more definitive measures are set out in Annex 1 to this document.

SAC. Route section 893 (LoR 2.5) is about 3.8km from the site and all elements of the proposed route are situated still further from the site.

- Habitat removal and fragmentation: Not applicable. None of the routes are sufficiently close to the SAC to result in habitat removal or fragmentation.
- Population fragmentation: It is likely that the site is of some value for bats and fragmentation of roosts from foraging areas could occur as there are extensive woodlands to the north of the SAC. However, all elements of the proposed route and alternatives in the vicinity of the site are to the north and on the opposite side of the M40 to the SAC and avoid nearby woodlands, and as such are unlikely to result in adverse effects on bat foraging and commuting. Moreover, since bats are not a qualifying species for the SAC, there is no risk of impact to the site's integrity.
- Killing and injury: Not applicable due to lack of on-site impacts and because the site is not designated for mobile species. Off-site effects on commuting bats are unlikely to arise from the proposed route and alternative routes due to the intervening barrier formed by the M40.
- Soil compaction: Not applicable due to lack of onsite impacts.
- Soil erosion/siltation: Not applicable due to distance from the nearest route.
- Air pollution: Lichens, bryophytes and invertebrates are potentially sensitive to airborne pollution. However, nearest works associated with route section 824 [no longer considered] are at some distance and best practicable means would be employed to control dust and other air quality impacts. There is no risk of impact associated with any option still under consideration, given that route section 893 is 3.8km north of the SAC boundary. There would not be any operational effects. Therefore it is not likely that the scheme would result in significant adverse effects arising from pollution.
- Water pollution: Trees are potentially sensitive to waterborne pollution, but the SAC is at a higher elevation than any existing or discarded route options, so the risk of pollution impacts is low.
- Groundwater hydrological change: Ancient trees on freely draining soils may be sensitive to changes in the water table. Route sections 817, 824 [LoR1 - no longer considered] is sufficiently close to the site for any changes in groundwater levels to have a likely significant adverse effect on qualifying habitats and on the site as a whole. LoR 2.5 is at grade at its closest point to the site and is therefore not likely to affect groundwater flows. All elements of the proposed route are situated still further from the site. No adverse effects on the SAC are predicted due to the distance of the tunnelled section (over 7km away), its valley bottom location, chalk geology and intervening towns and infrastructure that indicate that groundwater connections between the route and the site would not be present.
- Surface water change: Not applicable. It is unlikely that the SAC qualifying habitats are dependent on off-site surface waters other than in terms of any effects on groundwater change.
- Noise, light, vehicle movement and changes in human activity: No impact on designated habitats, but potential for adverse effects on associated species (bats and birds).
- Shading: Not applicable, although old trees are shade-sensitive, the nearest routes are too distant to result in shading effects.

Likelihood of HS2 Effects

4.3.3 Route section 893 (LoR 2.5) is almost 4km from the site and is at-grade at this point. Due to the distance of the route from the site and the absence of mobile qualifying species, it is considered that adoption of route section 893 would not result in any likely significant effects on the SAC and so would not trigger an AA.

4.3.4 All elements of the proposed route are situated still further from the site. For the reason given above they are not likely to have significant adverse effects due to changes in hydrology or airborne emissions during construction and operation.

Potential In-combination Effects

4.3.5 An Appropriate Assessment of the Draft South East Plan October 2006 concluded that Burnham Beeches was vulnerable to increased traffic with localised air quality implications, with potential consequences for epiphytes and heathland vegetation. The site was also considered vulnerable to the effects of recreation including disturbance, erosion and eutrophication, and to urbanisation.

4.3.6 HS2 would not have any impacts likely to exacerbate these named risks. The proposed route is too distant to cause adverse effects on hydrology. Therefore, no in-combination effects would arise.

4.4 Cannock Chase

Qualifying Features

4.4.1 Cannock Chase SAC is designated for its wet and dry heaths. It supports associated invertebrate and bat assemblages, and a strong population of nightjar.

Conservation Objectives

4.4.2 Maintain, in favourable condition, European dry heaths with particular reference to the H8 *Calluna vulgaris-Ulex gallii* and H9 *Calluna vulgaris – Deschampsia flexuosa* communities.

4.4.3 Maintain, in favourable condition, North Atlantic wet heaths with *Erica tetralix*, with particular reference to the M10 *Carex dioica - Pinguicula vulgaris* mire and M16 *Erica tetralix - Sphagnum compactum* wet heath communities.

Assessment of Effects

- Distance of nearest routes: The closest route sections to the site are 868, 886 and 878 [all no longer considered] all at a distance of 4.35km, others within 10km are all more than 8.5km away. Route section 848 of the proposed route is about 8.7km from the site.
- Habitat removal and fragmentation: Not applicable. None of the routes are sufficiently close to the SAC to result in habitat removal or fragmentation.
- Population fragmentation: The site is noted for its importance for bats although they are not a primary reason for site selection. It is possible that fragmentation of roosts from foraging areas could occur as a result of some route options. However, the proposed route is situated to the south-east of the site and does not form a barrier between any constituents of the SAC or adjoining areas of habitat potentially of importance for bats. Therefore, adverse effects on bat populations are not likely to arise.
- Killing and injury: Not applicable due to lack of on-site impacts. For reasons noted above for population fragmentation, off site effects on bats are unlikely to arise.
- Soil compaction: Not applicable due to lack of onsite impacts.
- Soil erosion/siltation: Not applicable due to distance of nearest route.
- Air pollution: all construction works that would potentially generate air pollution are at too great a distance to affect the site, its habitats and species. Moreover, best practicable means would be employed to control dust and other air quality impacts.
- Water pollution: Wet heath is sensitive to waterborne pollution. It is considered that the nearest route is too distant for effects to arise as it is situated over 4km to the east of the site and is at a considerably lower elevation. Adverse effects from surface or groundwater flows would not therefore arise. The proposed route is situated still further from the site, and is in a valley bottom location with no likely hydrological connection between the site and the route. Adverse effects from surface or groundwater flows

would not therefore arise. The construction or operation of the proposed route would not result in an increase of diffuse air pollution that could potentially result in nutrient enrichment or acidification at the site.

- Groundwater hydrological change: Wet heath is highly sensitive to changes in hydrology. As noted above it is considered unlikely that there is a hydrological connection between the route and the site. In addition the citation for Cannock Chase SSSI indicates that the wet heath within the SSSI/SAC comprises valley mires fed by springs within the site itself and therefore not vulnerable to any groundwater changes generated some distance from the site.
- Surface water change: Not applicable, there is not likely to be any effects on surface water flows due to distance and topography as noted in relation to pollution above.
- Noise, light, vehicle movement and changes in human activity: Not applicable due to distance from the route and the lack of sensitive qualifying features.
- Shading: Not applicable. Although heathland vegetation is intolerant of shading, no effects would arise due to distance from the route.

Likelihood of HS2 Effects

4.4.4 It is considered that the closest routes are too distant for them to result in a significant adverse effect on the SAC through changes in hydrology or other means. There is no potential for adverse effects on bats and nightjar through habitat fragmentation and/or killing and injury, and these species are not, in any case, a primary reason or qualifying feature in site selection. Any adverse effects would be considered in a later stage of assessment if the routes were adopted as a preferred option.

4.4.5 Route section 848 of the proposed route is about 8.7km from the site and, for the reasons stated above, it is considered to be at too great a distance to have an adverse effect on hydrology, which would be the only potential means of impact on qualifying species likely to be generated by the proposal. Route section 848 would not result in any effects on integrity triggering an AA or requiring mitigation or consideration of in-combination effects. All main alternatives are further still from the site.

Potential In-combination Effects

4.4.6 The Habitats Regulations Assessment of the Phase 2 Revision of the Regional Spatial Strategy for the West Midlands - October 2007 in regard to Cannock Chase focussed largely on air quality issues to which HS2 would not be a contributory effect. Potentially adverse effects from water abstraction were also noted but it is not considered that HS2 would have any additional effect due to distance, topography and the lack of any significant tunnelled sections in the northern part of the route.

4.5 Cannock Extension Canal SAC

Qualifying Features

4.5.1 The Cannock Extension Canal is designated for its population of floating water plantain.

Conservation Objectives

4.5.2 Maintain in favourable condition the habitat for the internationally important population of floating water-plantain, with particular reference to the standing open water.

Assessment of Effects

- Distance of nearest routes: The nearest route section is 868 [no longer considered] and is approximately 6.8km from the SAC. The proposed route is approximately 12.2km from the site at its closest point.
- Habitat removal and fragmentation: Not applicable. The routes are not sufficiently close to the SAC to result in habitat removal or fragmentation.

- Killing and injury**:** Not applicable due to lack of onsite impacts and absence of qualifying mobile species.
- Soil compaction: Not applicable due to distance from the SAC.
- Soil erosion/siltation: Not applicable. Floating water plantain is susceptible to smothering from siltation. Effects could arise if inputs occurred on any nearby parts of the canal system. However, adverse effects are considered very unlikely due to the distance of the nearest route and the limited flow in canal systems.
- Air pollution: all construction works that would potentially generate air pollution are at too great a distance to affect the site, its habitats and species.
- Water pollution: Floating water plantain is susceptible to deterioration in water quality through pollution or eutrophication and effects could arise if inputs occurred on any nearby parts of the canal system. However, adverse effects are considered not likely due to the distance of the nearest route and the limited flow in canal systems.
- Groundwater hydrological change: Not applicable, due to the distance of the route and absence of hydrological connection between the canal and groundwater.
- Surface water change: Not applicable. Due to the distance of the route it is highly unlikely construction affecting any surface water features would affect the SAC.
- Noise, light, vehicle movement and changes in human activity: Not applicable. Floating water plantain is either not sensitive to these effects or it is considered that HS2 would not contribute to any such adverse effects.
- Shading: This species is highly sensitive to shading but nearest HS2 routes are too distant for effects to occur.

4.5.3 Due to the distance of the nearest route from the SAC, the isolated hydrology of the canal and the lack of sensitivity of the qualifying species to distant sources of disturbance, an AA is not likely to be required for nearby route options.

Likelihood of HS2 Effects

4.5.4 No elements of the proposed route are within 10km of the SAC and adverse impacts on the site are not likely to arise. No works on watercourses linked to the canal are envisaged.

Potential In-combination Effects

4.5.5 The Habitats Regulations Assessment of the Phase 2 Revision of the Regional Spatial Strategy for the West Midlands - October 2007 notes that recreational use of the Cannock Extension Canal is expected to increase as a result of the RSS, the Regional Housing Strategy and Visitor Economic Strategy. Significant effects are predicted if this results in increased boat traffic and physical disturbance. Run-off from the A5 may also increase if traffic levels increase, exacerbating an existing problem. Increased levels of atmospheric pollutants are also likely, but this is not likely to translate into significant changes in water chemistry.

4.5.6 Proposals that may affect the Chasewater Reservoir, which feeds the canal have also been investigated. The Lichfield Core strategies issues and options (which sits with the DPD and LDF) refers to general intentions of improving accessibility and tourism, but does not identify specific proposals. Equally the local water company has identified no specific proposals for the reservoir.

4.5.7 There is no potential for HS2 to exacerbate these potential impacts and no in-combination effects would occur.

4.6 Chilterns Beechwoods SAC

Qualifying Features

4.6.1 The Chilterns Beechwoods are designated as a SAC for the presence of dry calcareous grassland and extensive calcareous beech woodlands.

Conservation Objectives

4.6.2 The Chilterns Beechwoods SAC comprises a composite of nine sites distributed throughout the Chilterns. The conservation objectives for the European interest of various elements of the SAC are as follows:

- Ashridge Commons and Woods, Naphill Common, Tring Woodlands, Hollowhill and Pullingshill Woods and Aston Rowant Woods[14]: subject to natural change, to maintain in favourable condition the beech forest habitat.
- Bisham Woods: subject to natural change, to maintain in favourable condition the beech forest habitat and habitat for the stag beetle, *Lucanus cervus.*
- Bradenham Woods, Park Wood and The Coppice; Ellesborough and Kimble Warrens; and Windsor Hill: subject to natural change, to maintain in favourable condition the beech forest habitat and the lowland calcareous grassland.

Assessment of Effects

- Distance of nearest routes: Route section 824 [LoR1 - no longer considered] is 89m from the SAC in tunnel, portal and viaduct, and route section 816 [LoR 2 - no longer considered] is 231m away on embankment. Route section 823 [no longer considered] is within the SAC, route section 818 [no longer considered] is 313m away, and route section 822 [no longer considered] is 600m away. Route section 819 [LoR 4] is located at surface about 1.13km due west of the SAC (Ashridge Commons and Woods) at its closest point. The nearest part of LoR 2.5 is 1.1km away, but in deep tunnel between Bradenham Woods, Park Wood and The Coppice; and Naphill Common to its south and Windsor Hill to its north. The proposed route is 2.9km from Kimble Warrens at its closest point and in a mixture of cutting and embankment.
- Habitat removal or fragmentation: Route sections 824 and 816 [no longer considered] could involve direct removal or fragmentation of the Annex I and II habitats for which a SAC is designated at Windsor Hill which would therefore represent a likely significant adverse effect on the site and would therefore require an AA. Neither the proposed route, LoR 2.5 nor LoR 4 would result in habitat removal.
- Population fragmentation: The proposed route, LoR 2.5 and LoR 4 are all more than 10km away from Bisham Wood. This is beyond the likely dispersal range of male stag beetle (the maximum distance of a single flight is about 2km[15]) and significant effects on the site from population fragmentation of this species is, therefore, not likely to occur.
- Killing and injury: Routes very close to or within the SAC [but no longer considered] could (depending on the exact habitat distribution) require the loss of key constituent species of the designated habitats. No such effects would arise from the proposed route, LoR 2.5 or LoR 4 which are in deep tunnel or too distant for effects to arise. For the reasons noted above, killing of sufficient numbers stag beetle associated with Bisham Wood to affect the site's conservation objectives is not likely to arise from the operation of the proposed route.
- Soil erosion, siltation and compaction: Works associated with LoR 1 and LoR 2 [no longer considered], could have resulted in soil compaction or erosion, which

[14] Aston Rowant Woods is part of the Chiltern Beechwoods SAC and not part of the adjacent Aston Rowant SAC

[15] M. Rink & U. Sinsch Radio-telemetric monitoring of dispersing stag beetles: implications for conservation Journal of Zoology Volume 272 Issue 3, Pages 235 – 243 Published Online: 19 Jun 2007

consequently could have had adverse effects on vegetation. The proposed route, LoR 4 and LoR 2.5 are either in deep tunnel or too distant for such effects to arise.

- Air pollution: There are risks of impacts from dust and other air pollutants associated with construction of route section 823, but this option is no longer considered. Construction works associated with the proposed route, LoR 2.5 and LoR 4 that would potentially generate air pollution are at too great a distance to affect the site, its habitats and species. Interrogation of the APIS[16] air quality database indicates that, for nitrogen oxides, recorded levels in this area are generally around half the level considered to be critical for beech woods. Moreover, best practicable means would be employed to control dust and other air quality impacts.
- Water pollution: Waterborne pollution could have adverse effects on soils and vegetation and could have been associated with LoR 1 [no longer considered]. LoR 2.5 is in deep tunnel and no effects would arise. LoR 4 follows a river valley alignment at a lower elevation than the woodland compartments to its east and west, so there is no potential for effects.
- Groundwater hydrological change: The high permeability of underlying chalk geology means that any changes to groundwater (or associated surface waters) that might arise from any of the scheme options would be negligible. In addition to the above, at its nearest point LoR 2.5 is in tunnel 100m deep, therefore no adverse effect on the SAC arising from changes to groundwater is predicted. The proposed route comprises a mixture of cut, fill and viaduct at its closest point to the SAC, but it is sufficiently distant and at lower elevation than the SAC, therefore no adverse effects are predicted. Equally, LoR 4, although a little over 1km from the SAC at its nearest point, would be at a lower elevation, therefore no adverse effects are predicted.
- Surface water change: The designated habitats are not dependent on surface water features. Moreover, the proposed route, LoR 2.5 and LoR 4 are in deep tunnel and/or downstream and/or too distant for changes to surface water conditions to arise, therefore no adverse effects are predicted.
- Noise, light, vehicle movement and changes in human activity: The proposed route or LoR 2.5 are either in deep tunnel or too distant for adverse effects of lighting on stag beetle to arise.
- Shading: Chalk grassland and scrub are sensitive to shading and could have been adversely affected by works associated with LoR 1 [no longer considered]. No effects would arise from implementing the proposed route or LoR 2.5.

Likelihood of HS2 Effects

4.6.3 Route sections 824 (LoR 1) and 816 (LoR 2), neither of which were progressed could involve direct removal or fragmentation of the Annex I and II habitats and would therefore be likely to cause significant effects on the site and so require AA.

4.6.4 The nearest part of the proposed route to the site is 2.9km from the SAC ensuring that adverse effects from habitat removal, fragmentation, killing and injury, and air and light pollution are avoided. Offsite effects (such as pollution and groundwater changes) equally would not occur given the distance and the route's alignment at a lower elevation to the SAC habitat. LoR 2.5 is in tunnel, which would be sufficiently deep to avoid changes in hydrology which could have adverse effects on beech woodland, juniper scrub and chalk grassland present at the nearby component of the SAC. LoR 4 is the closest surface route option still under consideration. Its distance from the SAC would avoid direct impacts; indirect impacts are also very unlikely given its distance away and lower elevation to the SAC habitats.

[16] http://www.apis.ac.uk/index.html

Potential In-combination Effects

4.6.5 The Appropriate Assessment of the Draft South East Plan October 2006 notes the need to enhance woodland in the Aylesbury Vale – Milton Keynes sub-region to reduce the effects of increased recreation on the Chilterns Beechwoods. The strategic development area closest to the part of the SAC near the route is the Aylesbury Growth Area, which is approximately 5km to the north-east. The growth area may result in additional recreational pressure on open space in addition to localised land-take for development. It is not considered that the growth area would involve any impacts that act in combination with the proposed route to result in a significant effect on the SAC in combination. There are no predicted adverse effects on the site and no potential for HS2 to have an additional effect with those listed above. Therefore no significant in-combination effects on the site would arise.

4.7 Richmond Park SAC

Qualifying Features

4.7.1 Richmond Park SAC has a large number of ancient trees with decaying timber. It is at the heart of the south London centre of distribution for stag beetle, and is a site of national importance for the conservation of invertebrates associated with the decaying timber of ancient trees.

Conservation Objectives

4.7.2 To maintain in favourable condition the habitats for the population of stag beetle, for which this is one of only four known outstanding localities in the UK.

Assessment of Effects

- Distance of nearest routes: Route section 814 (LoR 4) is 7.4km away from the SAC. Route section 807 (LoRs 1, 2 and the HS2 Preferred Scheme) is also 7.4km away. Route section 802 (LoRs 1-4) is 8.1km away. Route section 808 [not part of current option] is 6.6km from the SAC. The proposed route and LoR 4 are both approximately 7.4km from the site at their closest point and respectively in cut and tunnel.
- Habitat removal or fragmentation: Not applicable. The routes are not sufficiently close to the SAC to result in habitat removal or fragmentation.
- Population fragmentation: Not applicable. Stag beetle is a relatively mobile saproxylic species. However, the nearest route is too distant to represent a barrier to dispersal. Habitat to the north of the SAC and the route options beyond, is predominantly urban and therefore not likely to contain significant supporting habitat for stag beetle. Other less mobile invertebrate species would not be affected as the route does not bisect suitable habitat.
- Killing and injury: Not applicable. Stag beetles may be susceptible through flying into moving trains, but the route is too distant for this to be a significant effect.
- Soil compaction: Not applicable due lack of on-site effects.
- Soil erosion/siltation: Not applicable due to distance from the nearest routes.
- Air pollution: All construction works that would potentially generate air pollution are at too great a distance to affect the site, its habitats and species. Moreover, best practicable means would be employed to control dust and other air quality impacts.
- Water pollution: Not applicable. The routes are too distant for effects to occur.
- Groundwater hydrological change: Not applicable. Ancient trees on freely draining soils may be sensitive to changes in water table but it is considered that the routes are too distant for effects to arise. The Thames is situated between the SAC and the nearest route precluding the possibility of any hydrological connection.

- Surface water change: Not applicable. The habitats present are not dependent on surface water flows.
- Noise, light, vehicle movement and changes in human activity: Not applicable. The Annex II species present is potentially susceptible to night time lighting, but the SAC is too distant from the route for any adverse effects to arise.
- Shading: Not applicable. The route is too distant for effects to occur.

Likelihood of HS2 Effects

4.7.3 Due to the distance of the nearest route, the lack of groundwater or surface water connections between the SAC and the route, and the lack of sensitivity of the qualifying species to distant sources of disturbance, it is not likely that the proposals would have a significant effect on the site.

4.7.4 The elements of the proposed route and LoR 4 are both in excess of 7.5km of the SAC and all are situated to the north of the Thames. Due to distance and the location of the route and the SAC in relation to the Thames, no effects on the site from changes in hydrology would occur. The distance of the route and nature of intervening habitat make it unlikely that habitat fragmentation would be a significant adverse effect on stag beetle.

Potential In-combination Effects

4.7.5 The Draft Replacement London Plan Habitats Regulations Assessments – Screening Report October 2009 notes that Richmond Park could potentially be affected by changes in groundwater levels and water quality, invasive species and scrub encroachment, development pressure, disturbance and vandalism, and deposition of atmospheric pollution. It also notes the potential for in-combination effects with transport schemes that may result in visitor pressure on habitats and species combined with visitor pressure from Opportunity Areas for all Natura 2000 sites. As described above there is no potential for HS2 to exacerbate these impacts.

4.8 River Mease SAC

Qualifying Features

4.8.1 The habitat type illustrated by the River Mease is widespread in the UK, especially on softer and more mineral-rich substrates. However, it is a habitat that has been adversely affected by nutrient enrichment, mainly from sewage inputs and agriculture, and where agriculture has caused serious siltation. It is also vulnerable to reductions in river flows and to unsympathetic channel engineering works. Consequently, the habitat has been reduced or has disappeared from parts of its range in Britain. The River Mease supports two species of fish (spined loach and bullhead) with particular habitat requirements and which have declined for the reasons mentioned above. White-clawed crayfish and otter are also qualifying features.

Conservation Objectives

4.8.2 Maintain the river as a favourable habitat for floating formations of water crowfoot (Ranunculus), populations of bullhead, spined loach and whiteclawed crayfish, and the river and adjoining land as habitat for populations of otter.

Assessment of Effects

- Distance of nearest routes: Route section 848 [no longer considered] is 5.8km from the site. Route sections 876, 877 and 886 [no longer considered] are respectively 4.7km, 5.6km and 8.25km from the site. Route section 878 forms the northwards continuation of the proposed route and is 8.25km from the site. Route section 848 of the proposed route is situated 6.7km from the site at its closest point and is on viaduct.

- Habitat removal: Not applicable. The route is not sufficiently close to the SAC to result in habitat removal or fragmentation.
- Habitat fragmentation: The River Mease SAC flows into the River Trent approximately 350m downstream of the confluence of the River Tame with Trent. The Tame is between the route and the SAC. Thus, the routes would not affect any tributaries flowing directly into the SAC and habitat fragmentation would be avoided. However, the routes may cross tributaries that flow towards the Tame and which may form part of the home ranges of otter associated with the River Mease; this is discussed below.
- Population fragmentation: Investigation of the HS2 crossings of tributaries of the Tame, which may be used by otters whose home range includes the Mease, has identified 17 such crossings within 20km of the Mease, although 11 of these appear to be drains (see **Figure 1**). HS2 Ltd would ensure that crossings over all watercourses potentially forming part of home ranges of otter associated with the Mease, are designed to avoid impacts on otters. Such design measures are contained in relevant DMRB guidance[17], and this forms the basis for the measures proposed by HS2 Ltd to mitigate potential impacts on otters from the design and construction of HS2; see Annex 2. With these measures in place, habitat fragmentation would be avoided.
- Killing and injury: Otter associated with the River Mease SAC could be susceptible to killing and injury if access along tributaries was impaired by poorly designed crossings. For reasons noted above it is highly unlikely that otter depend heavily on any watercourses crossed by the route in the vicinity of the SAC. In order to comply with national legislation, adverse effects would be avoided by ensuring that crossings are designed to allow otters to have continued access along the entire length of tributaries in accordance with best practice referenced above. On this basis, potential impacts would be avoided.
- Soil compaction: Not applicable due to lack of onsite impacts.
- Soil erosion/siltation: Qualifying species and habitats are vulnerable to the effects of siltation. There is no potential for silt to reach the SAC as tributaries crossed by the routes do not enter into it. It is possible that crayfish or qualifying fish species occur in the tributaries crossed by the route. Although outside the SAC, measures to avoid adverse effects on these species would be implemented to ensure compliance with other aspects of EU and national legislation and the objectives of the UK BAP.
- Air pollution: All construction works that would potentially generate air pollution are at too great a distance to affect the site, its habitats and species. Moreover, best practicable means would be employed to control dust and other air quality impacts.
- Water pollution: Qualifying species and habitats and species are vulnerable to the effects of pollution. There is no potential for pollutants to reach the SAC as tributaries crossed by the routes do not enter into it.
- Groundwater hydrological change: Reduction in flow is listed as one of the causes for decline of the Annex I habitat present. However, it is considered that there is no potential for adverse effects due to changes in groundwater flow from HS2 due to the location of the routes in relation to the Tame and the SAC.
- Surface water change: Due to the location of the routes in relation to the Tame and the SAC, there is no potential for off-site impacts on the Mease or its tributaries through impoundment, bridges, culverts and diversions.
- Noise, light, vehicle movement and changes in human activity: Otters are potentially susceptible to unfamiliar disturbance and could be affected during construction. Given the location of the routes in relation to the SAC significant adverse effects are predicted to be unlikely. However, measure to avoid such impacts, including if necessary,

[17] Design Manual for Roads and Bridges, Volume 10 Environmental Design, Section 1 The Good Roads Guide - New Roads. Part 9, HA 81/99, *Nature Conservation Advice in Relation to Otters*.

limitations on night time working, would be used to provide an additional assurance that the Annex II species would not be adversely affected.

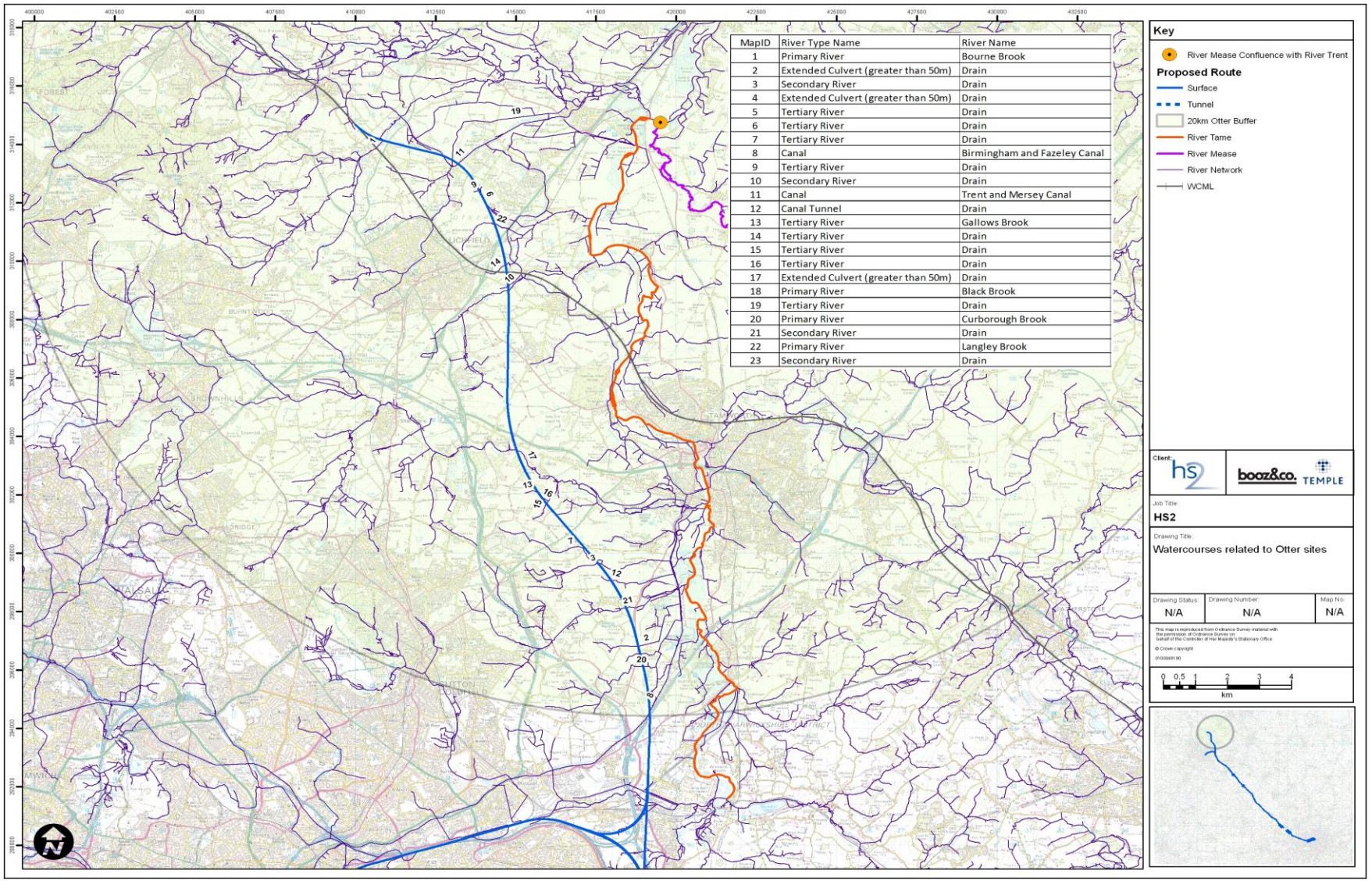
- Shading: Not applicable. No shading effects of the SAC itself would occur.

Likelihood of HS2 Effects

4.8.3 The River Mease SAC is potentially vulnerable to impacts generated by works some distance from the site, principally changes in surface and groundwater flows, siltation and pollution. However, due to the location of the proposed route in relation to the site, there are no pathways that could result in significant effects on the integrity of the SAC. The proposed route would be situated 6.7km from the site and would be on viaduct. No direct effects on the site would arise and significant adverse effects on the otter interest of the SAC are unlikely to occur.

4.8.4 Otters have large home ranges and it is possible that they use watercourses in the vicinity of the route. Due to the location of the route it is very unlikely that significant adverse effects on otters associated with the SAC would arise, but appropriate survey, scheme design and construction practices would be needed to ensure that any small risk is mitigated and that adverse effects on otter do not occur in the vicinity of the routes.

Figure 1 Watercourse crossing locations potentially affecting otter habitat associated with the Mease SAC



In-combination Effects

4.8.5 The Habitats Regulations Assessment of the Phase 2 Revision of the Regional Spatial Strategy for the West Midlands - October 2007 notes that changes in water quality, and land-use change and fragmentation arising from the RSS could have an adverse effect on Natura 2000 sites

4.8.6 There is no potential for adverse effects on the SAC from changes to water quality or groundwater flows. As noted above, there is the potential for adverse effects on otter, but, due to the distance of the route from the SAC, the limited size and small number of watercourses crossed by the route in the Lichfield area, and the best practice mitigation to be used, no significant effects on the species' conservation status are likely.

4.8.7 Proposed housing in Lichfield is likely to involve additional crossings and alterations to watercourses that would be far more extensive than those generated by HS2, although even in combination it is considered that effects would not be significant.

4.9 Wimbledon Common SAC

Qualifying Features

4.9.1 Wimbledon Common is designated for its examples of Northern Atlantic wet heaths with *Erica tetralix* and European dry heaths. It has a large number of old trees and much fallen decaying timber. It is at the heart of the south London centre of distribution for stag beetle. The site supports a number of other scarce invertebrate species associated with decaying timber.

Conservation Objectives

4.9.2 To maintain in favourable condition:

- The European dry heath, for which the area is considered to support a significant presence.
- Northern Atlantic wet heath with *Erica tetralix*, for which the area is considered to support a significant presence.
- Habitats for the population of stag beetle, for which this is one of only four known outstanding localities in the UK.

Assessment of Effects

- Distance of nearest routes: Route section 814 (LoR 4) and route section 807 (LoRs 1, 2 and the proposed route) are all 8.7km away from the SAC. Route section 802 (LoRs 1-4) is 8.8km away. The proposed route and LoR 4 are both approximately 8.7km from the site at their closest point and, respectively, in cut and tunnel.
- Habitat removal or fragmentation: Not applicable. The routes are not sufficiently close to the SAC to result in habitat removal or fragmentation.
- Population fragmentation: Not applicable. Stag beetle is a relatively mobile saproxylic species. However, the nearest route is too distant (8.7km) to represent a barrier to dispersal. Habitat to the north of the SAC, to the routes and beyond, is predominantly urban and therefore not likely to contain significant supporting habitat for stag beetle.
- Killing and injury: Not applicable. Stag beetles may be susceptible though flying into moving trains, but the route is too distant for this to be a significant effect.
- Soil compaction: Not applicable due lack of onsite effects.
- Soil erosion/siltation: Not applicable due to distance and location of the nearest routes.
- Air pollution: All construction works that would potentially generate air pollution are at too great a distance to affect the site, its habitats and species.

- Water pollution: Not applicable. The route is too distant for any surface or groundwater connections between the site and the nearest routes (see below), therefore no effect is predicted.
- Groundwater hydrological change: Wet heath requires specific hydrological conditions to form and is vulnerable to changes in hydrology. The citation for Wimbledon Common SSSI states that the wet heath within the SSSI/SAC is fed by springs arising from the interface of clays and gravels within the site itself. Ancient trees on freely draining soils may also be sensitive to changes in the water table. However, the Thames flows between the SAC and the nearest routes, acting as a barrier for any hydrological connection, and all routes are distant, therefore no adverse effects are predicted.
- Surface water change: Not applicable. The habitats present are not dependent on surface water flows and there is no surface drainage connectivity between the SAC and the nearest routes.
- Noise, light, vehicle movement and changes in human activity: Not applicable. The Annex II species present is potentially susceptible to night time lighting, but the SAC is too distant from the route for any adverse effects to arise.
- Shading: Not applicable. The route is too distant for effects to occur.

Likelihood of HS2 Effects

4.9.3 The elements of the proposed route and LoR 4 are both in excess of 8.7km from the SAC, and all are situated to the north and thus on the opposite side of the Thames. Due to distance and the location of the route and the SAC in relation to the Thames, no effects on the site would arise from changes in hydrology would occur. The distance of the route from the SAC and nature of intervening habitat make it unlikely that habitat fragmentation would be a significant adverse effect on stag beetle.

Potential In-combination Effects

4.9.4 The Draft Replacement London Plan Habitats Regulations Assessments – Screening Report October 2009 notes that the site sensitivities associated with Wimbledon Common are changes in groundwater levels and water quality, invasive species and scrub encroachment, development pressure, disturbance caused by increased recreational use and vandalism, and deposition of atmospheric pollution. As explained above there is no potential HS2 to exacerbate these impacts.

4.10 Pasturefields Salt Marsh SAC

Qualifying Features

4.10.1 Pasturefields Salt Marsh is the only known remaining spring fed inland salt meadow in the UK, the remainder having been destroyed by salt extraction. Inland salt meadows are a priority habitat to which restrictions in the application of the IROPI test apply, as described in Section 1.

Conservation Objectives

4.10.2 Ensure the salt marsh is maintained to a favourable condition.

Assessment of Effects

- Distance of nearest routes: The nearest route sections are 886, 878 and 868, [all no longer considered] are over 9.2km away. The SAC is situated approximately 16km north of the West Midlands terminus of the proposed route.
- Habitat removal and fragmentation: Not applicable. None of the route sections are sufficiently close to the SAC to result in habitat removal or fragmentation.
- Population fragmentation: Not applicable, the site is designated for its habitats only.

- Killing and injury: Not applicable due to lack of onsite impacts
- Soil compaction: Not applicable due to the lack of onsite impacts.
- Soil erosion/siltation: Not applicable due to the distance of the nearest routes.
- Air pollution: All construction works that would potentially generate air pollution are at too great a distance to affect the site, its habitats and species.
- Water pollution: Due to the site's dependence on sub-surface water there is some potential for pollution from inputs to groundwater. However adverse effects would not occur as the SAC is associated with the River Trent and is upstream of HS2's connection at Litchfield. As such indirect inputs to SAC via the Trent or its tributaries would not occur during construction or operation. Furthermore, no inputs would arise due to measures to protect surface waters.
- Groundwater hydrological change: The SAC is vulnerable to hydrological change as it depends on a saline spring that is believed to rely on an ancient groundwater source. There is potential for construction works and particularly tunnelling to result in alteration of groundwater flows. However, the routes are too distant for effects to arise, particularly as the northern end of the nearest significant tunnelled section is part of route section 868 [no longer considered] at Junction 7 of the M6, approximately 29km from the site, with a further very short section close to the A5 at Tamworth approximately 28km away. The SAC is situated approximately 16km north of the West Midlands terminus of the proposed route and is situated on the opposite side of the River Trent. No adverse effects on the integrity of the site would arise from changes to hydrology.
- Surface water change: Not applicable. The SAC is affected by flooding from the Trent adjacent to the site, but the proposed route is sufficiently distant from site and the Trent to have any affects on surface water flows in the vicinity of the SAC.
- Noise, light, vehicle movement and changes in human activity: Not applicable as the site is designated only for its habitats.
- Shading: Not applicable, the nearest route sections are too distant to result in shading effects.

Likelihood of HS2 Effects

4.10.3 The SAC is situated approximately 16km north of the West Midlands terminus site of the proposed route and is situated on the opposite side of the River Trent. No likely significant adverse effects on the site would arise from changes to hydrology or from other impacts.

Potential In-combination Effects

4.10.4 The Habitats Regulations Assessment of the Phase 2 Revision of the Regional Spatial Strategy for the West Midlands - October 2007 notes that the SAC is periodically affected by floodwaters from the River Trent which have high sewage loadings, and additional loadings from surface water runoff. This problem could be exacerbated by water abstraction further upstream. The site is underlain by a minor aquifer not likely to be used for abstraction. Due to the distance and location of the proposed route and main alternatives there is no potential for in-combination effects with the RSS.

4.11 Lee Valley SPA and Ramsar site

Qualifying Features

4.11.1 The Lee Valley SPA and Ramsar site is designated for important numbers of wintering gadwall, shoveler as well as significant numbers of bittern. The Ramsar site is also designated for populations of water milfoil *Myriophyllum verticillatum* and a water boatman *Micronecta minutissima*.

Conservation Objectives

4.11.2 To maintain, in favourable condition, the habitats for the populations of migratory bird species of European importance, with particular reference to:

- Open water and surrounding marginal habitats
- Bittern
- Gadwall
- Shoveler

Assessment of Effects

- Distance of nearest routes: Route section 802 (LoRs 1-4) is 7.2km away and in tunnel. The proposed route and alternatives are also 7.2km distant and in tunnel.
- Habitat removal: Not applicable. No designated habitat is affected, the route is to the west of the Lee Valley in a heavily urbanised and it is unlikely that supporting habitat would be affected during construction.
- Habitat fragmentation: See population fragmentation below.
- Population fragmentation: The routes are to the west of the Lee Valley and it is unlikely that the use of supporting habitat would be affected. The route is in a highly urbanised area and would not result in significant additional fragmentation or disturbance during operation or construction to that generated by existing activities in the area.
- Killing and injury: Not applicable. The route is over 7km from the SPA/Ramsar and in tunnel.
- Soil compaction: Not applicable due to lack of onsite impacts and the nature of intervening habitat and designated habitat.
- Soil erosion/siltation: Not applicable due to distance from the route and nature of intervening habitat.
- Air pollution: All construction works that would potentially generate air pollution are at too great a distance to affect the site, its habitats and species.
- Water pollution: Not applicable due to distance from the route and nature of intervening habitat.

- Groundwater hydrological change: Not applicable due to distance from the route and nature of intervening habitat.
- Surface water change: Not applicable due to distance from the route and nature of intervening habitat.
- Noise, light, vehicle movement and changes in human activity: Not applicable. The routes are too distant for any construction phase effects to arise.
- Shading: Not applicable due to distance from the route and nature of intervening habitat.

Likelihood of HS2 Effects

4.11.3 Due to the distance of routes from the SPA/Ramsar and the highly urbanised nature of intervening habitat it is not considered that significant adverse effects are likely as a result of the proposed route or other LoRs.

Potential In-combination Effects

4.11.4 The Draft Replacement London Plan Habitats Regulations Assessments – Screening Report October 2009 identified various impacts that may affect the Lee valley SPA: changes in water level and quality of water inputs, siltation, tree and scrub encroachment, spread of invasive species, noise and visual disturbance including that caused by increased recreational pressure, development pressure and diffuse deposition of atmospheric pollution. There is no potential for HS2 to have an in-combination effect with these impacts. The RSS also notes the potential for in-combination effects with transport schemes, in terms of the increased visitor pressure as a result of increased public access to the site. Again, HS2 would not interact with the RSS in this respect.

4.12 South West London Waterbodies SPA and Ramsar site

Qualifying Features

4.12.1 The South West London Waterbodies SPA and Ramsar site is designated for important numbers of wintering gadwall and shoveler.

Conservation Objectives

4.12.2 To maintain, in favourable condition, the habitats for the populations of migratory bird species of European importance, with particular reference to gadwall and shoveler.

Assessment of Effects

- Distance of nearest routes: Route sections 808 and 813 [no longer considered] are both within 10km of the SPA[18] both at a distance of approximately 6.1km. They do not form part of any currently proposed corridors. The proposed route and LoR 2.5 are both approximately 12km from the site, the former on viaduct and the latter at grade. Options for loop or spur connections to possible stations at Iver, T5 or T6 extend to within 4.5km, 0.8km and 2.8km respectively, although routes would be below ground, as would the stations at T6 and T5 other than a few surface buildings. Iver station would be a predominantly surface station some 4.5km north of the SPA.
- Habitat removal: The proposed route would not involve habitat removal from the SPA, but it is possible that supporting waterbodies may be affected. The proposed route crosses the Mid Colne Valley SSSI on viaduct. This is some 12km from the SPA but may support wildfowl that also uses the SPA. This would involve placing footings in Korda and Harefield Lakes, and the viaduct would continue to the west of Broadwater Lake. Broadwater Lake has supported internationally important numbers of gadwall,

[18] Taken to include the Ramsar site as well

while Korda Lake is noted as providing supplementary habitat to Broadwater Lake[19]. It cannot be stated with certainty that the SSSI provides supporting habitat to the SPA (although it is not part of the SPA) but, due to the presence of intervening waterbodies there is a possibility that it does so. However, because the route avoids Broadwater Lake, which provides the main habitat for wintering gadwall, a significant adverse effect is not considered likely to arise. LoR 2.5 is on existing line over the Colne Valley and does not involve any habitat loss from the SSSI.

- Habitat fragmentation: See population fragmentation below.
- Population fragmentation: All the routes considered are to the north of the designated waterbodies of the SPA and therefore would not result in disruption to bird movements between the constituent waterbodies. Should flight paths northwards to the Colne Valley SSSI exist, they would involve crossing a number of existing transport corridors including (from south to north) the M4 and the M25, the GWML to Wales and southwest, the A40/M40, and the existing railway to the Chilterns, which is on embankment a short distance to the south of the proposed route. The proposed route would represent potentially an additional feature affecting the movement of birds and would be to the north of all of those mentioned above. However, its impacts are likely to be limited by the height of the structure (15.5m at its greatest) and its distance from Broadwater Lake (approximately 400m at the highest point), and proximity to the existing Chilterns rail embankment to the south. Construction phase effects would result in greater fragmentation than operational effects. Due to the ability of birds to habituate to a predictable event such as that caused by passing trains, the long term effect of fragmentation of any flight-lines is considered unlikely to result in significant adverse effects on the conservation objectives of the SPA.
- Killing and injury: Due to the distance of the route from the SPA, there is no potential for killing and injury through bird strike within the SPA complex itself. There is potential for bird strike to birds flying onto Broadwater Lake from the south, though this would be limited by the presence of other structures to the south, which result in birds being at height over the viaduct. There is a residual risk of bird strike although this is unlikely to significantly affect the conservation status of the populations using the SPA. The use of bird deflectors along the viaduct would provide a greater degree of confidence that significant adverse effects could be avoided.
- Soil compaction: Not applicable due to lack of onsite impacts.
- Soil erosion/siltation: Not applicable due to distance from the nearest route.
- Air pollution: All construction works that would potentially generate air pollution are at too great a distance to affect the site. Moreover, best practicable means would be employed to control dust and other air quality impacts.
- Water pollution: Due to the distance of the proposed route from SPA waterbodies, effects on the SPA are not likely. Pollution of supporting SSSI water-bodies could arise during construction of the viaduct, but could be readily avoided through the implementation of best practicable means. Thus there is no potential for significant adverse effects on the SPA, even if the SSSI provides supporting habitat. Risks of water pollution from the Heathrow options are higher, although best practicable means used during construction would greatly limit this risk.
- Groundwater hydrological change: There is no potential for groundwater changes due to the distance of the proposed route from SPA waterbodies and the limited potential for hydrological connection between gravels in the vicinity of the SPA waterbodies and the chalk geology in the vicinity of the route. It is unlikely that the construction of the viaduct in the vicinity of the Colne Valley SSSI would involve anything other than very small, localised and temporary changes to groundwater level and no effects on possible supporting habitat would arise. Tunnelling in connection with the Heathrow options

[19] http://www.wildlifetrust.org.uk/herts/reserves/broadwater.html accessed 14/12/09

would potentially affect groundwater flows that are potentially of significance to SPA related habitat.

- Surface water change: There is no potential for changes to surface water levels on the SPA due to the distance of the proposed route from SPA waterbodies. It is unlikely that the construction of the viaduct would involve changes to surface water levels and no effects on possible supporting habitat would arise. There is the potential for impacts from flood risk for the Iver station option, which would potentially affect habitat associated with the SPA, but not the SPA itself. There is, however, a greater potential for the Heathrow options to interfere with surface water movements within the Colne Valley that could affect SPA supporting habitat.
- Noise, light, vehicle movement and changes in human activity: Due to the distance of the proposed route from the SPA there is no potential for disturbance at the site. Disturbance may be an issue in relation to supporting habitat. Construction works for the viaduct at the Colne Valley SSSI may result in some noise disturbance which could result in a small and temporary reduction in the numbers of birds at the site during the construction phase. Equally, the construction of Heathrow options could each result in various degrees of disturbance to nearby waterbodies but disturbance to SPA waterbodies is not likely due to distance and the presence of intervening barriers. The operational phase effects would include emissions of noise and light, as well as the movement of trains but these would be less disturbing than the construction phase effects due to their regular occurrence, which would enable birds to habituate to them. Operational effects would also be limited by existing screening along the eastern side of Broadwater Lake and the opportunities to increase screening to the south. It is unlikely that that disturbance at the Colne Valley SSSI would have a significant adverse effect on the conservation objectives of the SPA.
- Shading: Not applicable due to the distance of the nearest route. The viaduct would have a shading effect on Korda Lake in the SSSI, but would not affect Broadwater Lake. It would not therefore result in significant shading of any potential SPA supporting habitat.

Likelihood of HS2 Effects

4.12.3 No elements of the proposed route are within 10km of the SPA. Due to distance and location it is considered unlikely to result in killing and injury, disturbance or population fragmentation within the SPA complex. A number of potential effects on bird numbers at the Colne Valley SSSI have been described above. It is not considered that any of these would have a significant effect on bird numbers at the SSSI in the medium and long-term. While the SSSI is recorded as having supported significant numbers of gadwall, as well as shoveler, it is not known if these birds are part of the same population associated with the SPA. It is considered that effects on the SSSI are unlikely to result in a significant adverse effect on the conservation objectives of the SPA but this is not certain due to lack of available information on the numbers and movements of gadwall in the Thames Valley area, and therefore the relative importance of the population at the SSSI. On this basis, although AA may not be required, some further work would be required to provide a robust assessment of the value of Broadwater Lake for gadwall and shoveler.

4.12.4 A data search including both Natural England and the British Trust for Ornithology has yielded no information on whether the Mid Colne Valley SSSI supports significant numbers of gadwall. If further work should find that the Mid Colne Valley SSSI provides significant supporting habitat, then it is likely that AA would be required.

4.12.5 The various Heathrow options previously considered are not now part of the proposed route. They are almost wholly underground structures so that permanent impacts on the SPA are considered unlikely and related largely to station use, although possible flood risk associated with Iver station could have implications for habitat associated with the SPA, but not the SPA directly. Construction impacts might, result in temporary disturbance to any

supporting habitat and the birds that use it. Were the option to develop the Heathrow link to be progressed, it would require AA.

Potential In-combination Effects

4.12.6 The Draft Replacement London Plan Habitats Regulations Assessments – Screening Report October 2009 identified various impacts that may affect the South West London Water-bodies: changes in water level and quality of water inputs, siltation, tree and scrub encroachment, spread of invasive species, noise and visual disturbance including that caused by increased recreational pressure and development pressure, and diffuse deposition of atmospheric pollution. Those effects that could potentially be associated with HS2 have been considered above and it therefore can be reasonably concluded that there is no potential for HS2 to have an in-combination effect with those identified in the HRA of the Draft London Plan. This document also notes the potential for in-combination effects with transport schemes, in terms of increased visitor pressure as a result of increased public access to the site. Again, HS2 would not have an in-combination effect with the London Plan in this respect.

4.12.7 Airtrack is a proposed rail scheme outwith the remit of the London Plan, although its main works lie partly within Surrey (Spelthorne) and partly within London (Hillingdon). However, it has been the subject of an AA owing to the passage of a new surface railway between two of the designated waterbodies and through the Bedfont Court area, although not directly affecting the SPA. It concludes that there would not be any significant adverse effects on the SPA as a result of the scheme. Habitat at Bedfont Court has not been found to support significant numbers of qualifying species. In-combination effects of Airtrack and the proposed route are not therefore likely to have a significant effect on the SPA. However, any AA of Heathrow options would need to accommodate potential in-combination effects with Airtrack.

5 In-combination Assessment

5.1 Introduction

5.1.1 The preceding section of this assessment addressed the potential for adverse effects on the integrity of Natura 2000 sites from the impacts of HS2 in isolation, and determined that an AA is not necessary for any of the Natura 2000 considered potentially vulnerable to the proposed route, other than the South West London waterbodies SPA and Ramsar site (see section 4.12.3). This conclusion has been reached having considered a range of effects likely to be associated with the implementation of HS2. For the majority of sites these have included indirect effects arising from the implementation of the scheme such as changes in water quality and quantity, and habitat and population fragmentation. In other cases the conclusion of no adverse effects was made on the basis of distance from the route, the absence of effect pathways that could lead to on-site impacts, and the absence of mobile qualifying species that could be adversely affected beyond the Natura 2000 site boundary. It is therefore considered that the conclusion of no significant effect on the site has been established beyond reasonable doubt.

5.1.2 For a small number of sites it has been necessary to propose mitigation to avoid the risk of adverse effects, but in some cases the potential for residual non-significant adverse effects remains. This part of the assessment addresses the potential for significant effects to arise at these sites in combination with proposals contained within the relevant RSS.

5.1.3 An assessment of possible in-combination effects has been made through a review of RSS within the HS2 project area in order to assess whether RSS policies and HS2 could result in a combined adverse effect on integrity.

5.1.4 The following RSSs and related documents were reviewed in order to assess the potential for significant adverse effects in combination with HS2:

- Habitats Regulations Assessment of the Phase 2 Revision of the Regional Spatial Strategy for the West Midlands - October 2007;

- Appropriate Assessment of the draft South East Plan October 2006;
- East Midlands RSS Partial Review Habitats Regulations Assessment Pre-screening Report October 2008; and
- Draft Replacement London Plan Habitats Regulations Assessments – Screening Report October 2009.

5.1.5 The information in each of the strategies was arranged differently, but in each case the information on the following was considered.

- The potentially adverse effects on the site considered in the RSS;
- Natura 2000 sites potentially affected;
- The nature and likelihood of adverse effects; and
- In-combination effects with other plans and projects mentioned with reference to a specific site.

5.1.6 The predicted possible effects of the RSS were then considered in terms of the possible in combination effects with HS2.

5.2 Habitats Regulations Assessment of the Phase 2 Revision of the Regional Spatial Strategy for the West Midlands - October 2007

5.2.1 Potential effects considered in the RSS:

- Changes in Air Quality
- Changes in Water Quality
- Changes in Water Demand and Supply
- Disturbance Caused by Recreation/ Amenity and Tourism
- Land use change and fragmentation
- Spread of Invasive Species

5.2.2 Natura 2000 sites identified at the screening stage that could be affected by alone or in combination.

Cannock Chase SAC

5.2.3 Increased road traffic would result in increased deposition of atmospheric pollution, particularly those parts of the site within 200m of local A roads and more local roads within the site that are likely to be used more heavily as a result of increased visitor pressure. Additional recreational use could result in localised reduction in water quality and eutrophication as well as land-take in areas adjoining the site for tourist infrastructure and facilities. These effects could be exacerbated by proposals in the South Staffordshire Economic Regeneration Strategy and Visitor Economic Strategy. Water abstraction is an existing issue that could be potentially exacerbated by housing development but future adverse effects to be managed by abstraction from alternative sources.

5.2.4 **In combination with HS2:** The effects on Cannock Chase identified in the RSS focus on largely on air quality issues to which HS2 would not have a contributory impact. Potentially adverse effects from water abstraction are also noted but it is not considered that HS2 would have any additional effect due to distance, topography and the lack of tunnel sections in the northern part of the route.

Cannock Extension Canal SAC

5.2.5 Recreational use of the Cannock Extension Canal is expected to go up as a result of the RSS, the Regional Housing Strategy and Visitor Economic Strategy. Significant effects are predicted if this results in increased boat traffic and physical disturbance. Run-off from the A5 may also increase if traffic levels go up, exacerbating an existing problem. Increased

levels of atmospheric pollutants are also likely, but this is not likely to translate into significant changes in water chemistry.

5.2.6 **In combination with HS2:** Due to the nature of the HS2 proposal and distance from the site there is no potential for in-combination effects with the RSS.

Pasturefields Saltmarsh SAC

5.2.7 The site is periodically affected by floodwaters from the River Trent which has high sewage loadings, and additional loadings from surface water runoff. This problem could be exacerbated by water abstraction further upstream. There could be possible effects from water abstraction if further water is taken from the River Trent as the site is dependent on occasional inundation from the Trent. The site is underlain by a minor aquifer not likely to be used for abstraction.

5.2.8 **In combination with HS2:** Due to the distance and location of the proposed route and alternatives there is no potential for in-combination effects with the RSS.

River Mease SAC

5.2.9 Water quantity and quality are vital to maintaining the site's qualifying features. As competition for water resources are high in the region, high predicted growth in demand could result in a likely significant effect. The site currently suffers from diffuse pollution and sedimentation from agricultural land and from current developments. There is potential for additional adverse effects from changes in water quality and runoff, and possible increase in otter mortality from increased road traffic. The proposed expansion of Lichfield with 8000 additional homes may have adverse effects on otter habitat outside of the SAC.

5.2.10 **In combination with HS2:** Due to the location of the route in relation to the SAC, which flows into the River Trent there is no potential for adverse effects on the SAC from changes to water quality or groundwater flows. There is the potential for adverse effects on otter, through impacts on supporting habitat outside the SAC, but, due to the distance of the route from the SAC, the limited size and number of watercourses crossed by the route in the Lichfield area and the measures described above and in Annex 2 that would be implemented to ensure protection of otters, would not result in a significant effect. Proposed housing in Lichfield is likely to involve crossings and alterations to watercourses that would potentially be far more extensive than those generated by HS2. The contribution by HS2 to any cumulative effect would be negligible.

5.3 Appropriate Assessment of the Draft South East Plan October 2006

5.3.1 Potential effects considered in the RSS:

- Water resources - South West London Water-bodies
- Water quality - no sites considered by HS2 are listed
- Air quality - Burnham Beeches
- Recreation - Burnham Beeches, South West London Water-bodies
- Other urban issues (land-take, light pollution, increased background noise, increased predation, increased fire risk, disruption to conservation management) - Burnham Beeches
- Coastal squeeze - NA
- Protecting species outside Natura 2000 site boundaries - no sites considered by HS2 are listed
- Mineral extraction - no sites considered by HS2 are listed

5.3.2 Natura 2000 sites for which it was not possible to conclude no adverse effects from policies of the Southeast Plan either alone or in combination with other projects or plans.

South-West London Water-Bodies SPA/Ramsar

5.3.3 The site was considered potentially vulnerable to changes in water abstraction. This could arise from additional abstraction from gravels within which a number of former gravel pits are designated as part of the SPA or from important non-designated supporting habitat. The SPA was also considered vulnerable to the additional recreational pressure. A number of constituent waterbodies are accessible by the public and an increase in population could result in an increase in water based activities such as sailing and jet skiing, as well as an increase in disturbance from people and dogs walking along the banks. Despite the mobility of the SPA qualifying species, the site is not listed among those considered vulnerable to effects occurring outside the Natura 2000 site boundaries.

5.3.4 **In combination with HS2**: the proposed route would not exacerbate any of the impacts considered likely to result in significant effects. No adverse effects on the SPA are anticipated from the proposed route and no in-combination effects would arise. However, the potential for works associated with the Heathrow connections to exacerbate other impacts on the SPA cannot be discounted at this stage, and would need to be considered within the scope of an AA.

Burnham Beeches SAC

5.3.5 The site was considered vulnerable to increased traffic with localised air quality implications. This could have an adverse effect on epiphytes (lichen and bryophytes associated with ancient trees) and also potentially on heathland vegetation. It was also considered vulnerable to the effects of recreation including disturbance, erosion and eutrophication. The site was also noted as being vulnerable to the effects of urbanisation as defined in the RSS but it is not clear how these would operate in ways that differ from impacts associated with recreation.

5.3.6 **In combination with HS2:** HS2 would not have an additional effect to those listed above and the proposed route is too distant to cause adverse effects on hydrology. Therefore no significant effects on the site would arise.

Chilterns Beechwoods SAC

5.3.7 The RSS notes the need to enhance woodland in the Aylesbury Vale – Milton Keynes sub-region to reduce the effects of increased recreation on the Chilterns Beechwoods. The strategic development area closest to the part of the SAC near the route is the South East Aylesbury Growth Area, which is approximately 5km to the northeast. The growth area may result in additional recreational pressure on open space in addition to localised land-take for development.

5.3.8 **In combination with HS2:** It is not considered that the growth area would involve any impacts that act in combination with the proposed route to result in a significant effect on the SAC in combination. There are no predicted adverse effects on the site and no potential for HS2 to have an additional effect with those listed above. Therefore no significant effects on the site would arise.

5.4 East Midlands RSS Partial Review Habitats Regulations Assessment Pre-screening Report October 2008

5.4.1 Potential effects considered in the RSS:

- Water abstraction
- Water quality
- Coastal flood protection
- Recreation and tourism

- Air pollution

River Mease SAC

5.4.2 River Mease CAMS (Catchment Abstraction Management Strategy) assessment status is 'No Water Available' and groundwater in the area is 'Over-licensed'. Abstractions to meet water demand for further development in the catchment would increase this pressure on the SAC. Additional housing and economic development in the catchment of the River Mease pose a risk to the high water quality required for the SAC's designated features. Potential mechanisms include increased sewage discharges, increased urban run-off and increased abstraction (reduced dilution effect). Hard flood defence work may be required to protect future development in this area. This would constrain natural river processes and may impact on river bed morphology, which is important for spined loach, bullhead and white-clawed crayfish. There was insufficient data on air pollution to assess the potential for effects but the site was considered susceptible.

5.4.3 Development planned in the Lichfield district of the West Midlands risks in-combination effects in respect of water quality and quantity.

5.4.4 **In combination with HS2:** HS2 would not have any direct effects on the River Mease, nor would it result in the type of impacts on the Mease that would exacerbate any impacts predicted from regional planning in the East Midlands.

5.5 Draft Replacement London Plan Habitats Regulations Assessments – Screening Report October 2009

5.5.1 Potential effects considered in the RSS:

- Drainage and Water Pollution;
- Waste Facilities: air pollution, disturbance. In-combination effects associated with waste focus on air quality issues;
- Aggregates: air pollution from vehicle emissions and dust. In-combination effects associated with aggregates focus on air quality issues;
- Renewable Energy: bird disturbance and habitat fragmentation;
- Visitor Pressure: increased access resulting in disturbance, erosion and trampling; and
- Air Pollution: localised or diffuse, originating from waste facilities and increased traffic on nearby roads.

5.5.2 There may also be in-combination effects with other proposals for transport. Transport proposals include a number (e.g. Crossrail and proposed extensions to it, the Olympics development and Thameslink extensions) which are being progressed and may interact with proposals being bought forward by the London Plan. The in-combination effects associated with transport proposals are mainly visitor pressure on habitats and species combined with visitor pressure from Opportunity Areas for all Natura 2000 sites. Increased visitor pressure from the Thameslink extensions is considered a particular issue for the Lee Valley SPA and Ramsar, Epping Forest SAC and Southwest London Waterbodies SPA/Ramsar.

Richmond Park SAC

5.5.3 The site sensitivities associated with Richmond Park are changes in groundwater levels and water quality, invasive species and scrub encroachment, development pressure, disturbance and vandalism, and deposition of atmospheric pollution.

5.5.4 **In combination with HS2:** There is no potential for HS2 to exacerbate these impacts.

Wimbledon Common SAC

5.5.5 The site sensitivities associated with Wimbledon Common are changes in groundwater levels and water quality, invasive species and scrub encroachment, development pressure,

disturbance caused by increased recreational use and vandalism, and deposition of atmospheric pollution.

5.5.6 **In combination with HS2:** There is no potential for HS2 to exacerbate these impacts.

Lee Valley SPA/Ramsar

5.5.7 The site sensitivities associated with the Lee Valley are changes in water level and quality of water inputs, siltation, tree and scrub encroachment, spread of invasive species, noise and visual disturbance including that caused by increased recreational pressure, development pressure and diffuse deposition of atmospheric pollution.

5.5.8 **In combination with HS2:** There is no potential for HS2 to exacerbate most of these impacts. No significant noise or visual impacts are predicted at this site. No significant in-combination effects are therefore predicted with the London Plan.

South-west London Water-bodies SPA/Ramsar

5.5.9 The site sensitivities associated with the South-west London Water-bodies are changes in water level and quality of water inputs, siltation, tree and scrub encroachment, spread of invasive species, noise and visual disturbance including that caused by increased recreational pressure, development pressure and diffuse deposition of atmospheric pollution.

5.5.10 **In combination with HS2:** There is no potential for the proposed route to exacerbate most of these impacts. No significant noise or visual impacts are predicted at this site. No significant in-combination effects are therefore predicted between the proposed route and the London Plan. The potential for such effects in respect of the Heathrow options cannot, however, be discounted at this stage.

Burnham Beeches SAC

5.5.11 The site sensitivities associated with Burnham Beeches are changes in groundwater levels and water quality, invasive species and scrub encroachment, development pressure, disturbance caused by increased recreational use and vandalism, and deposition of atmospheric pollution.

5.5.12 **In combination with HS2**: It is not considered that the proposed route would result in adverse effects on hydrology or water quality due to the distance and location of the route. HS2 would not therefore exacerbate any potential impacts noted in the RSS and no adverse effects would arise.

5.6 Cumulative Effects with Growth Areas

5.6.1 **Table 4** summarises information on the key sites potentially vulnerable to the proposed route. It also identifies further potential cumulative effects generated from designated proposals named within relevant planning documents for which information is available. One SPA within about 12km distance has also been considered, which is the South West London Waterbodies SPA.

5.6.2 Information on potential cumulative effects has been drawn from mapped data on Key Growth Area Locations, Growth Points, Additional Growth Points, Locally Identified Areas for Growth, Growth Areas and Eco Towns. It is concluded that the proposed route does not require an AA for any Natura 2000 site either in isolation or in combination with any known plans and projects.

Table 4 Potential for In-combination Effects on Natura 2000 sites within 10km of the HS2 Preferred Scheme.

Natura 2000 site	Distance to proposed route	Key risks	Potential cumulative effects	Conclusion
Cannock Chase SAC	7,600m	The site is potentially vulnerable to groundwater change and water borne pollution but due to the distance of the route from the site no adverse effects are considered likely from the proposed route.	No strategic development areas have been identified that are sufficiently close to the SAC to result in the proposed route having a significant in-combination effect on the SAC.	No effects
River Mease SAC	5,900m	Fragmentation of non SAC otter habitat could occur, but due to distance and the use of appropriately designed crossings over water-courses no adverse effects are considered likely from the proposed route.	No strategic development areas have been identified that are sufficiently close to the SAC to result in the proposed route having a significant in-combination effect on the SAC.	No effects
Burnham Beeches SAC	7,715m	Potential effects on wet heath community from disruption of groundwater flows but due to the distance of the route from the site no adverse effects are considered likely from the proposed route.	No strategic development areas have been identified that are sufficiently close to the SAC to result in the proposed route having a significant in-combination effect on the SAC.	No effects
Chilterns Beechwoods SAC	3,000m	Due to distance and geology the site is not considered vulnerable to changes in groundwater flows, dewatering or pollution potentially generated by the route. No adverse effects are considered likely from the proposed route.	The strategic development area closest to the part of the SAC near the route is the South East Aylesbury Growth Area, which is approximately 5km to the northeast. The growth area may result in additional recreational pressure on open space in addition to localised landtake for development. However, it is not considered that the growth area would involve any impacts that act in combination with the proposed route to result in a significant effect on the SAC.	No effects
Richmond Park SAC	7,434m	There is some potential for adverse effects of groundwater change on ancient trees but due to distance and the lack of hydrological connection between the route and the SAC no adverse effects are considered likely from the proposed route.	No strategic development areas have been identified that are sufficiently close to the SAC to result in the proposed route having a significant in-combination effect on the SAC.	No effects
Wimbledon Common SAC	8,695m	There is some potential for adverse effects of groundwater change on wet heath but due to distance and the lack of hydrological connection between the route and the SAC no adverse effects are considered likely from the proposed route.	No strategic development areas have been identified that are sufficiently close to the SAC to result in the proposed route having a significant in-combination effect on the SAC.	No effects
South West London Waterbodies SPA	12,274m	The qualifying species are vulnerable to disturbance when utilising SPA and non-SPA supporting waterbodies, but due to distance from the site and the nature of intervening land use no adverse effects are considered likely from the proposed route.	No strategic development areas have been identified that are sufficiently close to the SPA to result in the proposed route having a significant in-combination effect on the SPA. This may not be the case for the HS2 Heathrow options however. The AA for Airtrack, a proposed new rail link to Heathrow, finds no likelihood of impact on the SPA	No effects

Natura 2000 site	Distance to proposed route	Key risks	Potential cumulative effects	Conclusion
			and no potential for in-combination effects.	
Lee Valley SPA	7,280m	The qualifying species are vulnerable to disturbance when utilising SPA and non-SPA supporting waterbodies, but due to distance from the site and the nature of intervening land use no adverse effects are considered likely from the proposed route.	The route is in tunnel from its start at Euston west to Old Oak Common, a distance of approximately 10km. Due to distance and the nature of intervening habitat, there is no potential for the proposed route to have a significant in-combination effect on the SPA.	No effects

6 Summary and Conclusions

6.1.1 This HRA screening report was produced following published guidance. An analysis of possible in-combination effects has been carried out focusing in particular on the relevant RSS which provide an overview of the likely impacts on Natura 2000 sites arising within the regions through which the proposed route passes. In addition, current or proposed projects noted in RSSs have also been considered.

6.1.2 An AA is not considered necessary for any of the Natura 2000 sites considered potentially vulnerable to (i.e. within 10km of) the proposed route or the main alternatives. The potential for impacts on wintering gadwall (and possibly shoveler) using lakes within the Mid Colne Valley SSSI is considered to be low, since the scheme is some 200m from the main water body of interest, Broadwater Lake. This population may be part of a meta population using the South West London Waterbodies SPA/Ramsar, some 12km to the south, which is designated for internationally significant numbers of both gadwall and shoveller. Further work would therefore be necessary to provide a robust assessment of the value of Broadwater Lake for the relevant wildfowl species.

6.1.3 It is considered unlikely that the proposed route or main alternatives would significantly exacerbate any potential impacts from proposals identified within regional planning documents. However, should future decisions result in a reconsideration of options not pursued at Gate 3, they must also be subject to a further screening process.

6.1.4 Route options considered at an earlier stage that were considered likely to require an AA are listed below. However, apart from the Heathrow options, none of these is now proposed as a preferred scheme or main alternative. The options for a direct Heathrow connection are also considered unlikely to result in permanent impacts on the South West London Waterbodies SPA/Ramsar, although flood risk associated with the Iver station option may impinge associated habitat. There is a risk that construction activity may lead to disturbance of associated habitat and the birds that use it. This would need to be the subject of consultation with Natural England in order for the need for AA to be confirmed or dismissed.

6.1.5 Information on route sections for which an AA would be expected to be provided is summarised in **Table 5**.

Table 5 - Route Sections which would require an Appropriate Assessment

Option number	**3 x Heathrow spurs**			**1 -Heathrow option**		**1/2**	**1**	**2a**	**2**	**NA**	**2/3**
Current status	**Not pursued for the proposed scheme**			**Not pursued after Gate 3**					**Not pursued after Gate 2**		
Route reference number	**T5**	**T6**	**Iver**	**808**	**813**	**817**	**824**	**816**	**823**	**818**	**822**
SAC/SPA Name											
Chilterns Beech-woods							87	231	0	313	600
Aston Rowant							0				
Burnham Beeches					359	359	295				
SW London Water-bodies	750	2,802	4,410	6,133	6,104						

Note: the numbers represent distances in metres from the route

Routes for which AA would be required

6.1.6 Mitigation was considered necessary to avoid the risk of significant adverse effects at the River Mease SAC, for which there is also a risk of in-combination effects. A further site (SW London Waterbodies SPA/Ramsar) was considered unlikely to require an AA but further research would be required to confirm this. The sites in question are as follows:

6.1.7 **The River Mease SAC:** Otters are among the Annex II species present and are potentially vulnerable to habitat fragmentation, disturbance, and death from train strike. Adverse effects are not likely to be significant, but mitigation to avoid the risk of impacts mentioned above, (achieved through appropriate design of crossings over watercourses, as well as specific controls during construction) would be required to reduce this risk to a negligible one. It is possible that housing developments at Lichfield would result in habitat fragmentation through modifying watercourses.

6.1.8 **The South-West London Water-bodies SPA:** Neither the proposed route or LoR 2.5 would have any direct effects on the SPA or cause habitat fragmentation within the group of waterbodies that form the SPA. The proposed route is on viaduct over the Mid Colne Valley SSSI and may result in disturbance to wildfowl on component waterbodies, including gadwall. This species may be part of a population that uses the SPA some 12km to the south; internationally significant populations of gadwall and shoveler give rise to the SPA's designation. If the SSSI provides supporting habitat for this population, disturbance of the SSSI could affect the integrity of the SPA. However, due to the distance and alignment of the route in relation to the main SSSI water body, it is considered that wildfowl are unlikely to be significantly disturbed by the construction or operation of HS2 and therefore significant adverse effects on the SPA are equally unlikely. However, further research would be required to establish the current size and importance of the population of gadwall at Colne Valley SSSI and likely adverse effects on the SPA arising from impacts on the SSSI. The options for new HS2 stations at Heathrow are considered unlikely to result in any permanent indirect impacts as they are almost wholly below ground and at some distance from the SPA. There is the potential for flood risk, particularly associated with the Iver station option, to affect habitat associated with the SPA and supporting qualifying species of wildfowl, but not the SPA directly. There is also a risk of possible disturbance to associated habitat due to construction of the various options, especially at T5 which is closest to the SPA. On this basis, were the Heathrow options to be pursued, it is likely that an AA would be required. Further discussion would be required with Natural England as to the need for AA were any of these options to be progressed.

6.1.9 Seven of the sites within 10km of the proposed route and alternatives are not considered to be subject to *any* adverse effects, significant or otherwise, from the proposed route or previous options. These sites do not support mobile species that may be affected by routes some distance from the site boundary, and the Annex II habitats present are either not likely to be damaged by effects generated some distance from the site boundary, or effect pathways between the route and the site were not identified.

6.1.10 The following information summarises those aspects of the considered Natura 2000 sites which are not vulnerable to impact from HS2. These findings would form the basis for further discussion with Natural England to confirm the conclusion that there would be no adverse effects on the Natura 2000 network as a result of HS2.

6.1.11 **Aston Rowant SAC:** The site is designated for its beech woodland, juniper scrub and calcareous grassland habitats. The conservation objectives for the site are to maintain in favourable condition the beech forest habitat and lowland juniper scrub. No adverse effects on the site are predicted due to the distance of nearest element of the proposed route and LoR 2.5 which would be 8.6km from the site, with all elements of the proposed route situated further from the site. Due to the distance of the routes it is not considered that any adverse effects on the designated vegetation types, such as air or water borne pollution or changes in hydrology would arise. The site is not designated for any mobile Annex II species that could be adversely affected some distance from the site.

6.1.12 No impacts on the site are predicted in the draft South East Plan and overall no adverse effects on the site would arise.

6.1.13 **Burnham Beeches SAC:** The site is designated for its beech woodland on acid soils and is noted for its nationally important associated invertebrate and epiphyte interest. The conservation objectives for the SAC are to maintain in favourable condition beech forests with holly and yew rich in epiphytes. LoR 2.5 would be about 3.8km from the site and all elements of the proposed route are situated further from the site. The site is considered sensitive to groundwater change. However, adverse effects are unlikely to occur as LoR 2.5 is at grade and would not affect groundwater flows, and the nearest tunnelled section of the proposed route is 7km away with intervening geology and urban development making it unlikely to affect groundwater movements. The site is not designated for any mobile Annex II species that could be adversely affected some distance from the site.

6.1.14 The AA for the draft South East Plan defines potential impacts on the site as being increased deposition of airborne pollution and increased recreational pressure. No in-combination effects are predicted with the Plan and overall no adverse effects on the site would arise.

6.1.15 **Cannock Chase SAC**: The SAC is designated for its wet and dry heaths. The conservation objectives for the site are to maintain the heathland communities in favourable conservation status. The proposed route would be about 8.7km from the site at its closest point. The site is considered sensitive to groundwater change and water borne pollution. However, adverse effects are unlikely to occur as the valley mires are fed by springs within the site itself and therefore not vulnerable to any groundwater changes generated some distance from the site. In addition the proposed route would be in a valley bottom location with no likely hydrological connection between the site and the route. The site is not designated for any mobile Annex II species that could be adversely affected some distance from the site.

6.1.16 The HRA for the Regional Spatial Strategy for the West Midlands identified potential impacts from increased recreation, deposition of airborne pollution and potentially water abstraction No in-combination effects are predicted with the RSS and overall no adverse effects on the site would arise from HS2.

6.1.17 **Cannock Extension Canal SAC:** The Cannock Extension Canal is designated for its population of floating water plantain. The site's conservation objectives are to maintain in favourable condition the habitat for the internationally important population of this species. The proposed route would be approximately 11km from the site at its closest point; Gate 3 route sections [no longer considered] would be within the 10km buffer. Due to distance from the site and the lack of hydrological connection of canal to groundwater flow, there is no potential for impacts from HS2 to affect this site directly. The site is not designated for any mobile Annex II species that could be adversely affected some distance from the site.

6.1.18 The possible impacts noted in the HRA for the Regional Spatial Strategy for the West Midlands were from increased recreational pressure and possible increased pollution from road runoff with HS2 and overall no adverse effects on the site would arise.

6.1.19 **Chilterns Beech Woods SAC:** The Chilterns Beech Woods are designated for the presence of dry calcareous grassland and extensive calcareous beech woodlands. The conservation objectives for the site are to maintain beech forest, scrub and grassland habitats, and at one site, to maintain stag beetle habitat in favourable conservation status. The nearest part of LoR 2.5 to the site would be 250m away, but in deep tunnel. The proposed route would be 2.7km at its closest point and in a mixture of cutting and embankment. Neither route would involve habitat removal or fragmentation, or other on-site effects such as shading or soil compaction. Due to the distance of the routes from component sites supporting stag beetle (more than 10km), it is not considered that population fragmentation or killing and injury would occur. Due to the depth of the bored tunnel of LoR 2.5 below the site there is no potential for changes in groundwater flows or groundwater pollution to affect the site. Stag beetles are susceptible to light pollution but the routes are too distant for adverse effects to arise.

6.1.20 **The South East Aylesbury** growth area may result in additional recreational pressure on open space in addition to localised land-take for development, but this would not result in in-combination effects with HS2. Overall no adverse effects on the site would arise.

6.1.21 **Richmond Park**: Richmond Park SAC is designated for its population of stag beetle and the conservation objective for the site is to maintain its outstanding population of this species. The proposed route and alternative LoR 4 would both be approximately 7.4km from the site at their closest point and respectively in cut and tunnel, and on the opposite side of the River Thames. Due to distance, no on-site effects such as habitat removal, changes in soil structure or shading would arise. In addition, due to distance and the presence of the River Thames between the routes and the site, no changes in groundwater flows, which are potentially damaging to old trees on freely drained soils, would arise. Because of the distance of the route from the site, the urbanised nature of habitat in the vicinity of the route, and the route's location on existing track, no affects from population fragmentation or increased mortality on stag beetle are predicted. Stag beetles are susceptible to light pollution, but the routes are too distant for adverse effects in this regard to arise.

6.1.22 The HRA for the Draft Replacement London Plan notes the potential for impacts from changes in groundwater levels and water quality, development pressure, disturbance and vandalism, and deposition of atmospheric pollution. It also notes the potential for in-combination effects with transport schemes that may result in visitor pressure on habitats and species. There is no potential for HS2 to exacerbate these impacts. No in-combination effects are predicted, and no adverse effects on integrity would arise.

6.1.23 **River Mease SAC**: The SAC is designated for its riparian habitats and plant assemblages and the presence of two Annex II species of fish, white-clawed crayfish and otter. Conservation objectives are to maintain designated habitats and species in favourable conservation status. The proposed route would be situated 6.6km from the site. Due to the distance of route there would be no direct impacts such as habitat removal or shading. Riparian habitats are vulnerable to inputs of pollutants and silt, but, the River Tame is situated between the route and the River Mease and both the Mease and the Tame are tributaries of the River Trent. Because watercourses crossed by the route drain into the Tame rather than the Mease there is also no potential for changes in surface water or groundwater flows to affect the SAC. The SAC is designated partly for the presence of otter, which is a wide-ranging species vulnerable to habitat fragmentation and mortality if habitat is affected by transport routes. It is possible that crossings of the Tame tributaries could affect otters that also use the Mease. Measures to ensure that this would not arise are set out in Annex 2.

6.1.24 The HRA of the Regional Spatial Strategy for the West Midlands notes that proposed housing in Lichfield is likely to involve additional crossings and alterations to watercourses. These would be more extensive than those generated by HS2, although even in-combination it is considered that effects would not be significant. However, potential impacts from this are described above Overall no significant adverse effects are considered likely.

6.1.25 **Wimbledon Common SAC**: The site is designated for its wet and dry heath and for its population of stag beetle. The conservation objectives for the site are to maintain all designated features in favourable conservation status. The proposed route and alternative LoR 4 would both be approximately 8.7km from the site at their closest point and respectively in cutting and tunnel, and are on the opposite side of the Thames from the site. The distance of the routes means there is no potential for on-site effects such as habitat removal, shading or changes to soils structure. There is no potential for adverse changes to hydrology because of the lack of groundwater connection between the routes and the site, due to the presence of Thames. This would also preclude any possible effects from groundwater pollution. Because of the distance of the route from the site, the urbanised nature of habitat in the vicinity of the route, and the route's location on existing track, no affects from population fragmentation or increased mortality on stag beetle are predicted. Stag beetles are susceptible to light pollution but the routes are too distant for adverse effects to arise.

6.1.26 The HRA for the draft Replacement London Plan notes the potential for impacts from changes in groundwater levels and water quality, development pressure, disturbance and vandalism, and deposition of atmospheric pollution. It also notes the potential for in-combination effects with transport schemes that may result in visitor pressure on habitats and species. There is no potential for HS2 to exacerbate these impacts. No in-combination effects are predicted, and overall no adverse effects on the site would arise.

6.1.27 **Pasturefields Salt Marsh SAC:** The site is designated as the only known remaining spring fed inland salt meadow in the UK, the conservation objective is to maintain the site in favourable conservation status. It would be situated approximately 16km north of the West Midlands terminus of the proposed route. Due to distance the only potential effect considered is alteration of groundwater flows leading to a decline in the saline water source at the site. No effects are predicted because the route ends on the opposite side of the River Trent to the SAC. As no non-significant effects were identified, there is no potential for combined effects with those identified in HRA for the West Midlands RSS and no adverse effects would arise.

6.1.28 **The Lee Valley SPA/Ramsar:** The SPA is designated for important numbers of wintering gadwall and shoveler, as well as significant numbers of bittern. The conservation objective is to maintain, in favourable condition, the habitats for the populations of migratory bird species of European importance. The proposed route and alternatives would be 7.2km from the site and in tunnel. All sites within the SPA are to the east of the routes. Due to the distance of the route from the site and nature of intervening urban areas it is considered that there is no potential for adverse effects in terms of bird strike, disturbance or population fragmentation. As no non-significant effects were identified, there is no potential for combined effects with those identified in HRA for the draft Replacement London Plan, and no adverse effects would arise.

6.1.29 **The South West London Waterbodies SPA/Ramsar:** The site is designated for internationally important numbers of wintering gadwall and shoveler. The proposed route and LoR 2.5 would both be approximately 12km from the site, the former on viaduct and the latter at grade. Due to the distance of the routes there would be no direct impacts on the constituent water-bodies of the SPA, and, as the route is to the north of the SPA, population fragmentation within the SPA would not occur. Neither route is likely to result in changes to surface or groundwater flows in the SPA, due to distance and the lack of direct impacts on the River Colne. Potential risks to this site from the proposed route and from the Heathrow options are discussed above.

6.1.30 The HRA for the draft replacement London Plan does not identify any effects likely to have a combined effect on the SPA.

6.1.31 Airtrack is a proposed scheme outwith the remit of the London Plan, although its main works lie partly within Surrey (Spelthorne) and partly within London (Hillingdon). However, it has been the subject of an AA owing to the passage of a new surface railway between two of the designated waterbodies and through the Bedfont Court area, although not directly affecting the SPA. Conclusions state that Airtrack would give rise to no impacts on the SPA or supporting habitat, either on its own or in combination with other proposals.

Figure 2 SAC and SPA within 10km of the route (southern sections of route)

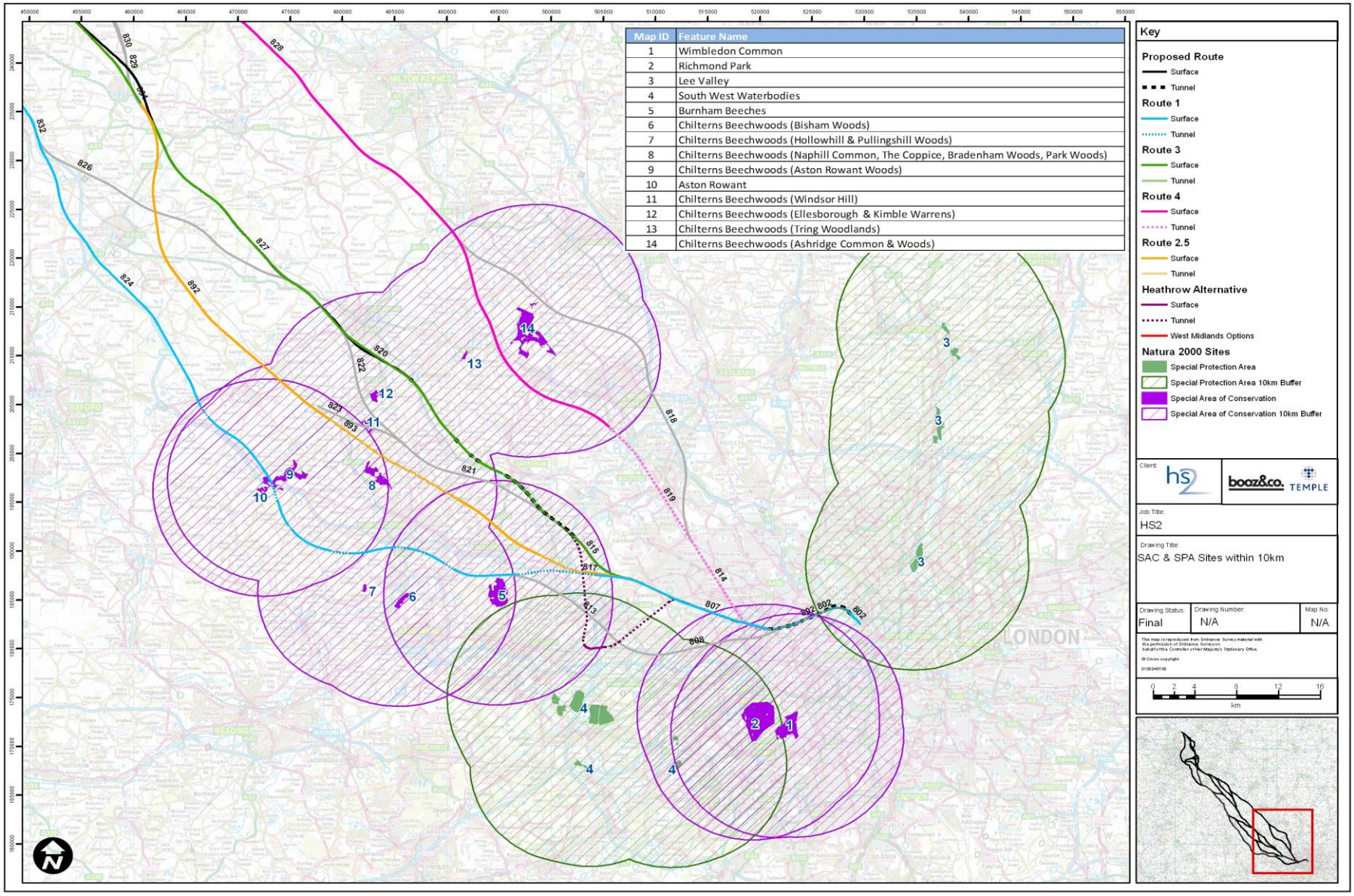


Figure 3 SAC and SPA within 10km of the route (northern sections of route)

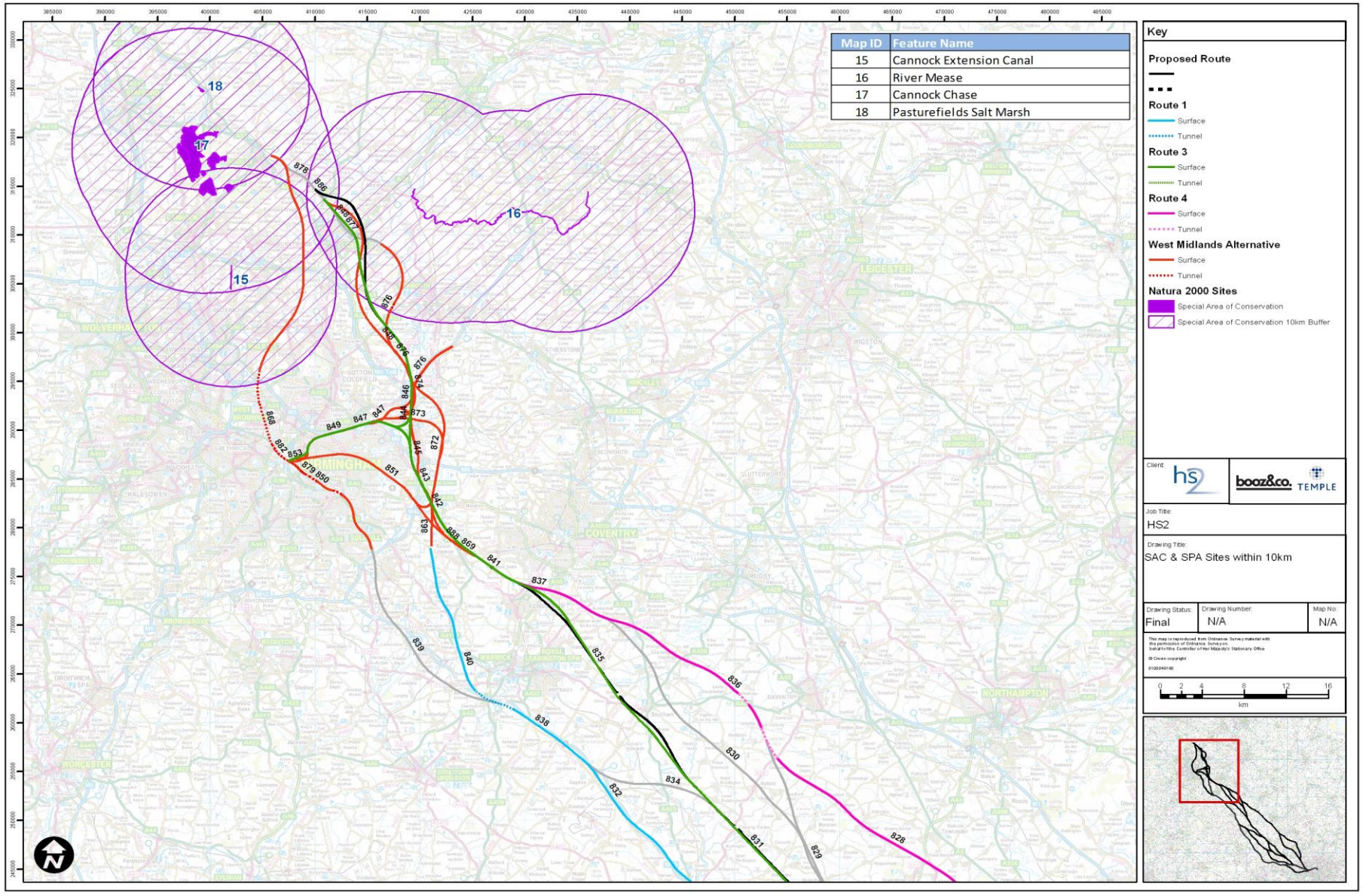
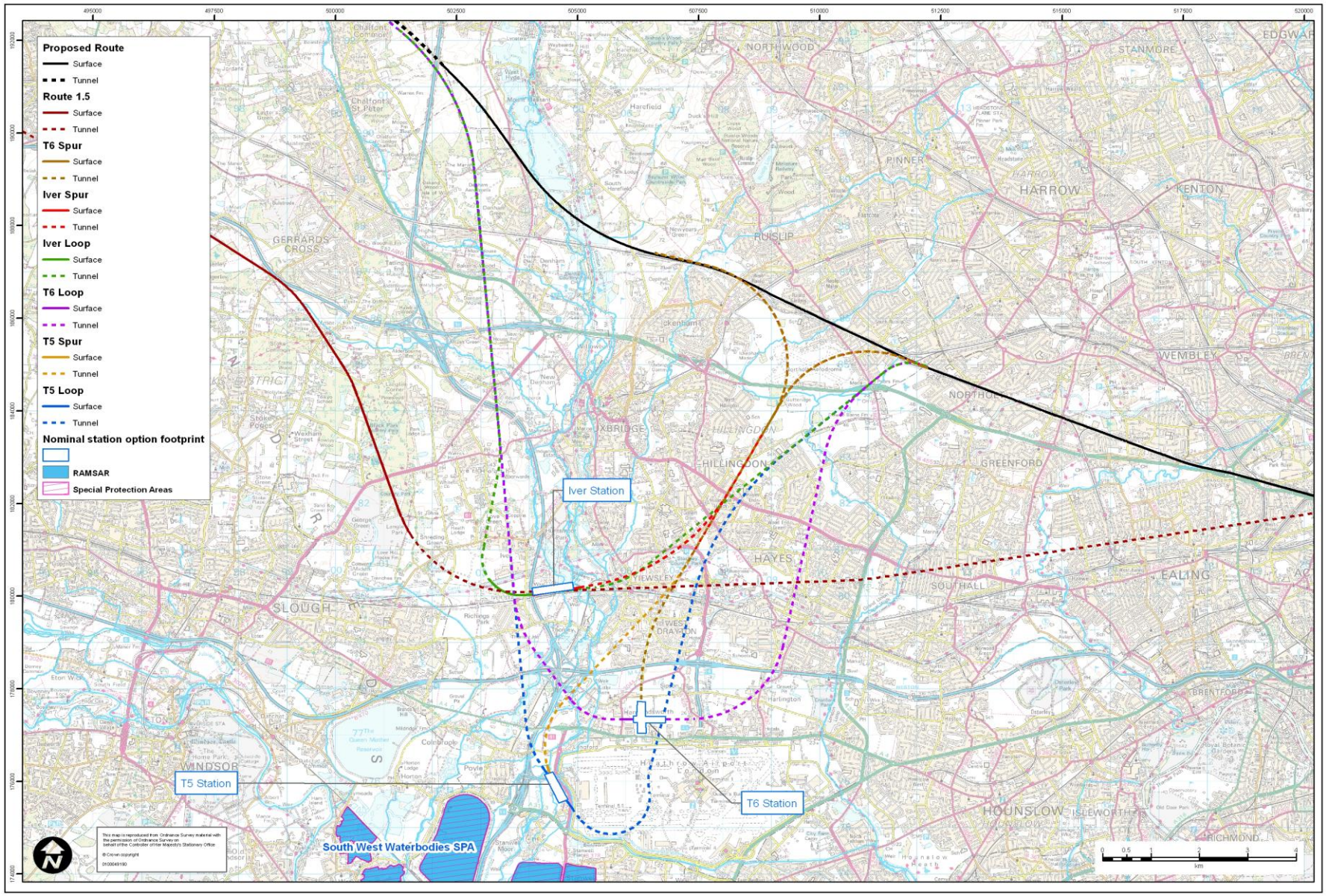


Figure 4 Southwest London waterbodies SPA and Heathrow options



Annex 1: Minimum Standards for Maintenance of Air Quality during Construction

Risk of dust impacts

One of the key issues regarding the effect of construction activities on air quality would be the generation of fugitive dust emissions from activities such as the digging of foundations, excavation, construction of embankments, tipping and vehicle movements on un-surfaced haul roads. As construction activities are temporary in nature, it is likely that the potential impacts would be in relation to dust deposition and potential nuisance in the immediate vicinity of the site rather than long term air quality (PM_{10}) concerns.

There is no standard methodology for assessing this impact; however, Minerals Planning Statement 2, Annex 1 contains a semi-quantitative assessment of the potential impact of dust impacts from mineral sites. An assessment can be made based on the spatial scope detailed in the MPS 2:

> *"Dust particles are dispersed by their suspension and entrainment in airflow. Dispersal is affected by the size of the particles emitted and wind speed as well as their shape and density. Smaller dust particles remain airborne for longer, dispersing widely and depositing more slowly over a wider area. Large dust particles (greater than 30 micrometers (µm))… would largely deposit within 100 metres of sources. Intermediate-sized particles (10-30µm) are likely to travel up to 200-500 metres. Smaller particles (less than 10 µm)…are only deposited slowly but may travel 1000 metres or more. Concentrations decrease rapidly on moving away from the source due to dispersion and dilution. Large and intermediate-sized particles are often referred to as nuisance dust, while small particles (PM10) are associated with effects on human health."*

In practice, dust from construction activities within the environment generally does not give rise to nuisance at distances beyond approximately 200m from the works (in the absence of mitigation). The majority of any deposition that could give rise to significant soiling tends to occur within 50 to 100m.

The construction activities with the highest potential for dust entrainment due to magnitude and duration have been identified as those relating to sites subject to significant earthwork activities.

Liaison with local councils prior to the start of construction would be undertaken to agree proposed working practices and environmental controls.

In the absence of a detailed construction schedule and knowledge of individual construction activities and timings, the proposed approach is to identify the main potential sources of emissions, to undertake a qualitative assessment of these impacts and identify potential mitigation measures.

A range of environmental management controls would be developed with reference to the Building Research Establishment (BRE) guidance *Controlling Particles, Vapour and Noise Pollution from Construction Sites*' and the *Mayor of London Best Practice Guidance – The Control of Dust and Emissions from Construction Sites* to prevent the release of dust entering the atmosphere and/or being deposited on nearby receptors.

Based on these discussions, a site contractor would be required to work to a code of practice or similar, which would include measures to minimise fugitive dust emissions, especially in the vicinity of potential receptors. As appropriate, the code of practice would include the measures detailed below.

Minimisation of fugitive dust emissions from construction activities:

- Adhere to relevant legislation and guidance;
- The use of plant or machinery that would create dust could be avoided wherever reasonably possible;
- Areas at risk of creating dust to be dampened down as appropriate;

- Construction activities to be appropriately controlled to minimise dust release;
- Material cutting, such as the use of abrasive disc cutters, to utilise water suppression where appropriate;
- Significant material stockpiles to be enclosed as far as is practicable;
- The mixing of large quantities of concrete to be carried out only in enclosed or shielded areas where possible;
- All material handling areas to be maintained in a dust free state as far as is practicable i.e. appropriate handling and storage of materials, restricting materials drop heights onto lorries etc;
- No fires to be permitted on the site; and
- Procedures to be established to ensure that the site is regularly inspected for spillage of dusty or potentially dusty materials and any such spillage to be dealt with promptly.

Minimisation of dust from vehicle movements:

- Attention to be given to maintaining medium and heavily used routes in as dust free state as is reasonably possible;
- Any unsurfaced routes to be regularly damped down using water bowsers during periods of dry weather where they have the potential to cause nuisance;
- Appropriate speed limits to be established and enforced, as necessary; and
- Wheel washing facilities to be installed if appropriate and heavy vehicles leaving the site would be required to use the installation as necessary.

Monitor compliance:

- The contractor to be required to set up their own monitoring programme to evaluate compliance with this code; and
- All policies, practices and procedures to be periodically reviewed to ensure their appropriateness

Such measures are routinely and successfully applied to construction projects throughout the UK, and are anticipated to reduce significantly the potential for adverse nuisance dust effects associated with the various stages of demolition and construction work.

Plant operating on the site, and construction vehicles entering and leaving the site, would have the potential to contribute to local levels of air pollution, particularly NO_2 and PM_{10}. However, any such effect would be small.

Annex 2: Mitigation of Impacts on Otters

Overview

The proposed measures for mitigation of impacts on otters is based on the: DESIGN MANUAL FOR ROADS AND BRIDGES Volume 10 Environmental Design and Management Section 4 Nature Conservation PART 4 NATURE CONSERVATION ADVICE IN RELATION TO OTTERS. (http://www.standardsforhighways.co.uk/dmrb/vol10/section4/ha8199.pdf accessed 200510). The information below provided to inform design and does not account for the legal implications of destroying or disturbing otter habitat.

Construction effects

Otters are potentially susceptible to noise, night time lighting, use of machinery, presence of large numbers of people, and blocking of paths/obstruction of holts.

The main potential adverse effects on otters from rail projects are: killing and injury, habitat severance, habitat destruction, pollution and disturbance.

Key recommendations to avoid construction effects are as follows:

- Survey to identify the presence of otter and suitable habitat for laying up, commuting etc in addition to breeding and foraging. Pre site-clearance surveys shall be carried out but if use of otter is detected during clearance carried out with a watching brief exclusion zones or a significant delay to works (depending on the type of otter activity) are likely to arise).
- Avoiding site compounds on or near potential otter habitat to avoid pollution of habitat and disturbance and disruption of movements, and fencing any suitable adjacent habitat.
- Suspending night working where otters are thought to be active.
- Communication within construction team to ensure that all are briefed on the presence of otters and measures to mitigate construction effects.
- Suitable fencing of construction sites to exclude animals and providing safe alternative routes to guide them around the site and direct them away from nearby hazards (roads etc).
- Retaining habitat to maintain favoured routes e.g. keeping at least one bank of river in suitable condition for otter, to avoid animals making potentially hazardous detours.
- Avoiding otter paths to limit potentially hazardous changes in preferred routes.
- Ensuring site maintenance works do not compromise otter mitigation measures.
- Monitoring condition of mitigation measures.

Key requirements for mitigation at the project planning stage are as follows:

- Pre-design stage surveys to identify all areas used or potentially used by otter and avoiding. these area in design process.
- Avoiding river corridors or allowing at least a 50m buffer of suitable habitat.
- Avoiding multiple crossings of rivers.
- Avoiding river realignment and reduction of riparian habitat.
- Avoiding culverting.
- Providing bridges with a sufficiently wide span to allow otters a dry passage beneath the bridge.

Crossing watercourses

Bridge and viaduct design: Viaducts are the preferred form of crossing and shall use piers rather than embankment to minimise habitat loss. Abutments shall be set as far as possible from banks and a single span of over nearby parallel watercourses is preferable to multiple crossings

Sluice gates and weirs: If such features are associated with a crossing then ledges or steps shall be provided to allow otters to pass around the obstruction.

Culverts

Otters would use any watercourse no matter how small, especially when moving to new areas.

Cylindrical culverts pose a risk of drowning to otters, especially in times of flood and otters would avoid a hazardous watercourse, exposing them to other risks, principally though making extra track/road crossings. The use of cylindrical culverts is significant cause of otter mortality and alternative solutions should always be sought. If culverts must be used they must provide a large amount of air space during high flows and shall include a ledge above water level to provide a dry route. If culverts of suitable design cannot be used then alternative routes for otter must be provided (e.g. a nearby underpass above flood level). Generally culverts are ecologically damaging (loss of habitat, adverse effects on upstream and downstream flows etc) and shall be avoided where otters are present; bridges are preferable.

Ledges

Where it is not possible to retain natural bank beneath a crossing then ledges shall be provided along the inside of the abutment on side of the watercourse showing most evidence of use by otters. Ledges can be of solid concrete or bolted on metal structures at least 500mm wide, accessible from the bank via ramps, at least 150mm above water level and with 600mm headroom.

Underpasses

Underpasses shall be used where ledges are not feasible to provide a safe route through an embankment rather than forcing an otter to cross tracks. They shall be positioned within 50m of the watercourse, above flood level and close to the track (so animals associate the crossing with avoiding the track). The track in the vicinity of the crossing shall be fenced. Underpasses shall be 600-900mm diameter depending on length and ideally straight.

Fencing

Fencing shall not be used in isolation to exclude otters but to guide otters to other forms of mitigation. 50mm mesh used and installed with sufficient depth buried (500mm with 300mm return away from the track) to avoid it being undermined by badger and rabbits. It shall be 1500m high with an additional 300mm angled at 45^{o} away from the track. Gates, stiles and bridge guard rails shall also be fenced and all fencing must be adequately maintained. Fencing shall be continuous on both sides of the track to avoid otters becoming trapped in the rail corridor. It is difficult to define length although most deaths occur within 100m of a crossing point.

Protection and restoration of habitat

Focuses on restoring river corridors, tree planting, excluding livestock, creating fenced and inaccessible areas etc.

Artificial holts

Not recommended near rail schemes.

Drainage systems

Shall be of a design that does not risk trapping otter.

Maintenance

At least six monthly checks of ledges underpasses and fencing.

APPENDIX 4.2
Equality Impact Assessment: Screening Report

1 Context

1.1 Purpose

1.1.1 The purpose of this screening report is to provide an initial appraisal of the extent to which groups vulnerable to discrimination and social exclusion may be differentially affected by the HS2 proposals between London and West Midlands. It identifies the priority equality groups to be considered and indicates the potential for significant adverse impacts, based on the sustainability appraisal work carried out to date.

1.1.2 The report was devised to help HS2 Ltd determine whether, and at what stage, a full Equality Impact Assessment (EqIA) is likely to be required for the Government's proposed route, either as a whole or at any specific locations affected by a particular scheme element.

1.1.3 There would be some aspects of the scheme that are likely to result in a positive impact on priority equality groups, which has been highlighted in the screening report where relevant. It should be noted, however, that the requirement for full EqIA is triggered by the presence of potentially significant differential impacts with potentially *adverse* effects.

1.1.4 The EqIA screening report also provides supporting material to the AoS Main report (Volume 1), which describes the implications for sustainable development objectives of HS2: London to West Midlands. At the time of the submission of the draft information to Government in March 2010, HS2 comprised a proposed route together with a number of main alternatives. Subsequently, the Government requested that some refinements to the HS2 design were developed and appraised; these have since been adopted where appropriate resulting in the Government's proposed route which is the subject of public consultation. However, for the purposes of EqIA screening, the scheme remains largely the same as at March 2010 and the conclusions of this report remain valid. No further equalities assessment work has therefore been undertaken at this stage.

1.2 What is Equality Impact Assessment?

1.2.1 EqIA is a way of assessing the effects that a proposed policy or strategy (and in this case, project) is likely to have on people, depending on their gender, ethnicity, disability, age, faith or sexual orientation, and promoting positive outcomes for these 'priority equality groups'.

1.2.2 EqIAs also fulfil the statutory duties of public bodies to carry out race, disability and gender impact assessments as required under the Race Relations (Amendment) Act 2000, the Disability Discrimination Act 2005 and the Equality Act 2006 respectively.

1.2.3 In addition to the six equalities groups most commonly included, EqIAs can be expanded to cover social inclusion issues such as impact on family poverty.

1.2.4 Some equality issues are already addressed as part of other statutory assessments, such as Sustainability Appraisal (SA) and Environmental Impact Assessment (EIAs). However, EqIAs offer a more detailed look at the implications of development plans and policies on diversity and equality for particular groups.

1.3 Legal & Policy Framework

1.3.1 Equality impact assessments of new policies have been required since 2002 in the case of ethnicity, since 2006 in the case of disability, and since 2007 in the case of gender. This Equality screening report was prepared before the advent of the Equality Act 2010, which received Royal Assent on 8th April 2010 and came into force (in the main) on 1st October 2010. The Equality and Human Rights Commission has recently issued guidance on the public sector equality duty[20]. It suggests that the current approach to EqIA may be of use

[20] Equality and Human Rights Commission (January 2011) *The essential guide to the public sector equality duty*

to authorities in fulfilling the requirements of the new duty to analyse the effects on equality of its policies and practices. It is hoped that there would be clear guidance available when work on the full EqIA for the project begins at a later date should the project be progressed further.

1.3.2 The previous legislative requirements are contained within frameworks which distinguish between a) 'the general duty', which apply to all public bodies, and b) 'specific duties', which fall on named public bodies involved in preparing and publishing equality schemes setting out how the duty would be met. The core statutory duties are set out in the following legislation:

- The Race Relations (Amendment) Act 2000;
- Disability Discrimination Act (2005); and
- Equality Act 2006.

1.4 Equality Strands & Priority Groups

1.4.1 At present there are no statutory duties in place to promote equal treatment and anti-discrimination on the basis of sexual orientation, age or religion and belief. However, the Equality Act, once the relevant element is enacted (not before April 2011), contains a number of provisions that would extend public sector equality duties to include the following 'protected characteristics':

- age;
- sexual orientation;
- faith (religion or belief);
- pregnancy and maternity; and
- gender reassignment.

1.4.2 Marriage and civil partnership is also a protected characteristic in the Act, but is not included in the public sector duty.

1.4.3 Echoing these forthcoming duties, the Department for Transport (DfT) has recognised the following equality strands in its Diversity Strategy and Delivery Plan for 2009 – 2012:

- gender;
- race;
- age;
- disability;
- sexual orientation;
- transgender; and
- faith (religion and belief).

1.4.4 In addition to legislation, the Department for Communities and Local Government has published guidance[21] on the role that planning can play in supporting the Government's commitment to tackling disadvantage. In response, the GLA has published Supplementary Planning Guidance[22], which identifies the priority equality groups for London and explains how planning policies and proposals can be used to address them.

1.4.5 The equality strands identified for this screening report drew upon legislation that was current at the time of option development as well as certain changes that were anticipated. On this basis the priority groups in the table below were identified for further consideration. Changes to equality legislation are likely to affect the identification of equality groups going forward.

Table 1 Priority Equality Groups

Equality Strand	Priority Equality Group
Gender	Women
Race	Black, Asian & Minority Ethnic (BAME), Gypsies and Traveller communities[23]
Disability	All disabled people, but especially those with a physical or mental impairment that affects their ability to make use of public transport
Age	Children and young people up to the age of 25 and older people (over 60).
Faith	Minority faith groups, including Buddhist, Hindu, Jewish, Muslim & Sikh
Sexual Orientation	Lesbians, gay men, bisexual and transgender people.
Socio-economic deprivation	People living in the top 20% most deprived wards based on Index of Multiple Deprivation[24].

2 Methodology

2.1 Overview of EqIA Process

2.1.1 The (DfT) is yet to publish formal guidance for carrying out EqIAs of transport policies, plans and major projects, although a consensus is starting to emerge over the key areas that such assessments should consider.

2.1.2 The overall approach to the EqIA of HS2 draws upon the guidance published by a number of organisations, including: the former Commission for Racial Equality, Equality and Human Rights Commission, Greater London Authority, Transport for London and Birmingham City Council. It also takes account of the approaches that have been adopted for other major transport infrastructure projects notably Crossrail and, more recently, the EqIA for adding capacity at Heathrow.

2.1.3 The common elements to each of these approaches can be grouped into four key tasks. These are:

- Defining overall aims – a clear definition of the overall aims and objectives of the policy or proposal and the extent to which they are designed to promote equality or tackle discrimination;
- Collecting information – establishing the particular needs or sensitivities of any equality target group that are particular to that group and that are likely to be affected by the policy or proposal including, where appropriate, consultation with priority equality groups;

[21] CLG (2005) Diversity and Equality in Planning – A Good Practice Guide

[22] GLA (2007) Supplementary Planning Guidance: Planning for Equality & Diversity in London

[23] For the purposes of this report, 'race' includes Gypsies (including Romany people) and the British Isles 'Travelling community'.

[24] The Index of Multiple Deprivation 2007 combines a number of indicators, chosen to cover a range of economic, social and housing issues, into a single deprivation score for each small area in England. This allows each area to be ranked relative to one another according to their level of deprivation. IMD 2007 has been produced at Lower Super Output Area level, of which there are 32,482 in the country

- Differential Impact – reaching an informed decision on whether or not there is a differential impact on priority equality groups, at what level and what would be done to address or mitigate any adverse impact; and
- Measuring outcomes – stating how the policy or proposal would be monitored at successive stages to ensure that the expected outcomes are being met.

2.1.4 Reflecting these tasks, EqIA is generally carried out in two stages, starting with initial screening. If this shows there could be a differential impact with potentially adverse effects, or that further information is required to draw robust conclusions, there must be a full assessment. An overview of this process is summarised in the flow chart in **Figure 1**[25], in this case using race equality as the salient issue, although it is applicable to any equality issue or priority equality group.

2.2 EqIA Screening Process

2.2.1 In the case of HS2, the outcome of the screening exercise needed to do more than provide an objective statement on whether the proposals are relevant to equality. It also needed to provide a means of appraising the equality implications of the route options under consideration, albeit at a strategic level.

2.2.2 Accordingly, a five step screening process was defined, which allowed an initial appraisal of impacts to be carried out as a means of informing the selection and refinement of options. This process is summarised as follows:

Step 1:	Establish the overall aims and objectives of HS2 and their potential relevance to the DfT's statutory duties to promote equality and tackle discrimination.
Step 2:	Establish 'priority equality groups' by gathering known information on the diverse needs of each group and whether these needs are likely to be significantly affected by the construction and operation of a high speed railway.
Step 3	Identify the potential impacts of HS2 as compared with the Reference Case, within the area over which significant adverse or beneficial impacts are anticipated to occur.
Step 4:	Identify any disproportionate adverse impacts that could arise both due to increased representation in a particular area of a priority equality group and an accepted predisposition or sensitivity to the type of impact predicted.
Step 5:	Document findings and confirm whether further information is required to make an informed decision about differential impacts for a particular group or at a specific location, or whether full EqIA is required.

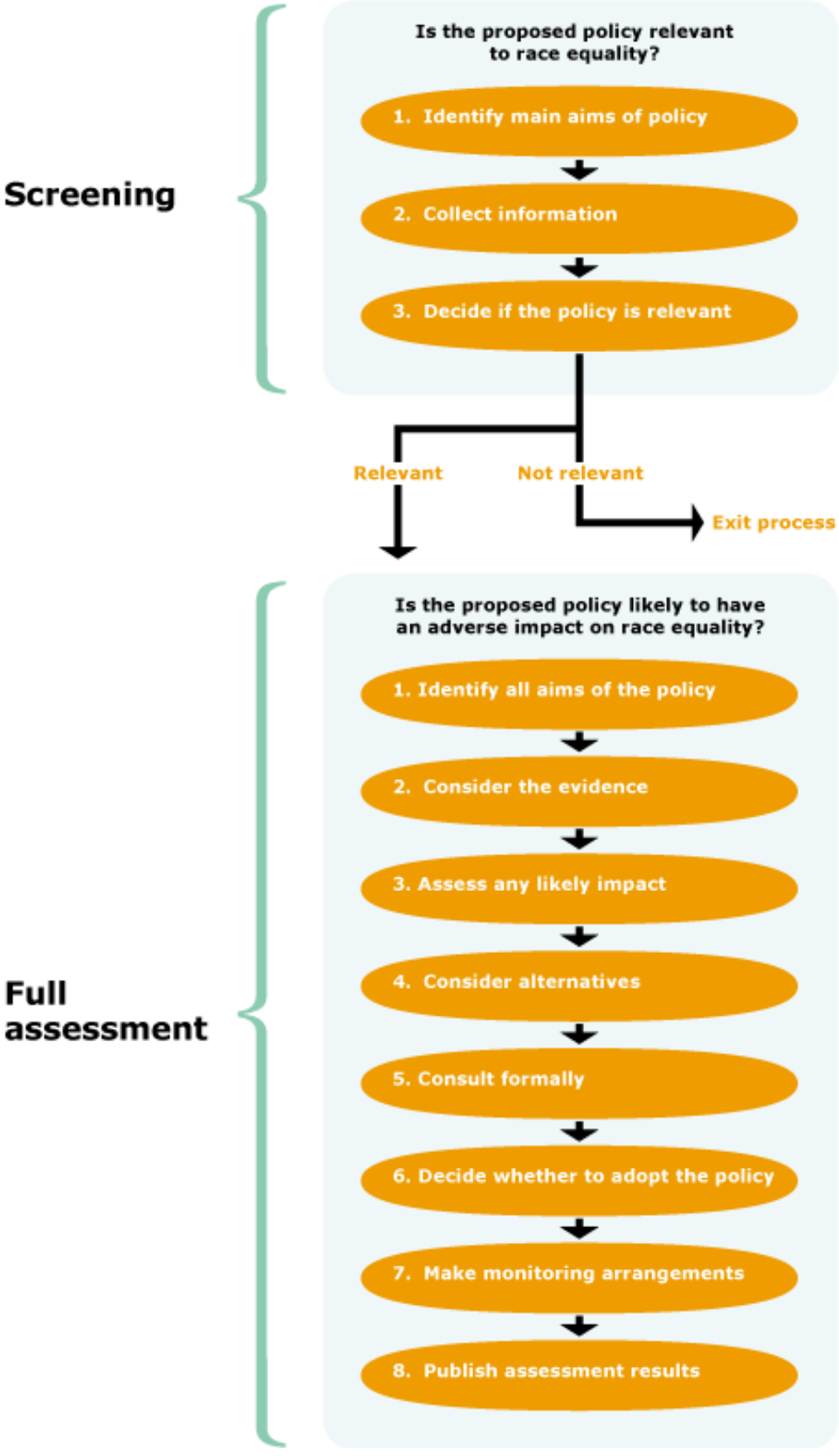
2.2.3 It should be stressed that the presence of a particular equality group in any given location does not necessarily constitute a differential impact in its own right. For a differential impact to occur, there also has to be a higher degree of sensitivity or vulnerability to the identified impact as compared with the general population.

2.2.4 The approach taken for HS2 involved undertaking steps 2 and 3 in tandem. Given the length of the HS2 route options and, indeed, of the proposed scheme, which extends for some 225km in total, it was not practical for the EqIA screening to identify each priority equality group's representation along the whole route. The locations of areas of relatively higher deprivation were identified, however; the rationale for this is explained below.

[25] Source: Former Commission for Racial Equality

2.2.5 At the same time, potential impacts along the route were identified in order to define locations where priority equality groups would be disproportionately represented and potentially be differentially affected. At these impact areas, ward data was examined to determine whether priority equality groups were present.

Figure 1 Flowchart: The Impact Assessment Process



2.3 Priority Equality Groups

2.3.1 An initial screening of priority equality groups was carried out, looking at readily available information on the diverse needs of each group and considering these in the context of the potential adverse impacts identified during the appraisal of options. This included information from the department of Communities and Local Government, former Commission for Racial Equality, GLA, Birmingham City Council and local authority planning guidance (See also *Annex 2* for a full list of references).

2.3.2 The key priority groups identified for the proposed HS2: London to West Midlands are set out in **Table 2**[26], together with the main generic issues to which these groups are deemed potentially susceptible. An analysis of the potential relevance of these concerns in the context of the potential impacts of the HS2 proposals is then set out in Section 2.5.

Table 2 Priority Groups and Key Equality Concerns

Equality Strand	Priority Group	Key Equality Concern
Gender	Women	Balancing work and family responsibilities Access to affordable housing Access to affordable childcare Access to reliable public transport Personal safety on public transport (lone travelling and travelling at night). Access to safe walking and cycling routes
Race	Black, Asian and Minority Ethnic	Unemployment (notably for BAME males) Access to employment opportunities Access to essential social facilities (cultural sensitivity, overt racism and language barriers) Access to reliable and affordable public transport Poor housing conditions and overcrowding Isolation and marginalisation (older populations) Hate crime and harassment
	Refugees and Asylum seekers	Access to appropriate accommodation Overcrowded and insecure housing Access to basic social and health care Access to affordable transport Access to employment Hate crime and harassment
	Gypsies and Travelling Communities	Chronic shortage of appropriate accommodation sites Access to basic social and health care Access to affordable transport Access to employment Hate crime and harassment
Disability	People with physical or mental well-being problems, deaf people	Unemployment Shortage of accessible housing Access to social services & facilities High levels of discrimination Access to public transport Hate crime and harassment
Age	Children and young people	Child poverty and social exclusion Lone parent households Poor housing conditions and overcrowding Access to key services Outdoor playspace provision

[26] Information has been drawn from a number of sources including: GLA (2007) Planning for Equality and Diversity in London – Supplementary Planning Guidance for the London Plan, Birmingham City Council Population Census Topic Reports and case information cited in Appendix 2.

Equality Strand	Priority Group	Key Equality Concern
		Discrimination by adults Crime, safety and vulnerability Safe routes to school Access to reliable, cheap or free public transport
	Older people (60+)	Poverty Fuel poverty Poor housing conditions Shortage of sheltered and specialist accommodation Access to health and social care facilities Crime, safety and vulnerability Isolation Access to public realm spaces Access to reliable and affordable public transport
Faith (Religion and belief)	Minority faith groups	Access to appropriate housing especially for larger families Access to specialised service provision such as appropriate retail food outlets Access to places of worship Hate crime and harassment Burial space (Jewish, Muslim, Buddhist, Roman Catholic, Hindu and Zoroastrian religions)
Sexual Orientation	Lesbians, gays, bisexual people and trans people	Hate crime and harassment Access to area-based facilities and services
Socio-economic Deprivation	People living in the 20% most deprived wards according to IMD 2008	Shortage of affordable and appropriate housing Overcrowding and poor public heath Higher environmental risk exposures Increased risk to children of being killed or seriously injured on the roads Access to employment High levels of unemployment Access to open space and recreation facilities Access to key social and health services Crime and fear of crime Social exclusion

2.4 Potential Impacts on Priority Equality Groups

2.4.1 Differential impacts are those that affect a particular priority equality group more than others in the community as opposed to an impact that affects everyone equally. This may be due to a particular sensitivity or vulnerability to a particular type of environmental exposure, or due to the loss, demolition or impairment of a facility upon which a priority group relies. Impacts can be direct, indirect, combined or secondary. However, given the high level of appraisal undertaken for the AoS, the potential impacts of the proposed scheme, and the receptors potentially affected by them, are provisional only at this stage. More detailed assessment work would be required during EIA (and EqIA) to establish more precisely the level of impact and the identity of properties affected by them.

2.4.2 In total, nine areas of potential impact have been defined as having particular implications for equality. These are summarised in **Table 3** below. For ease of reference, the information is presented in the same order as it appears in the AoS Framework, namely, by 'sustainability issue'.

Table 3 Potential Range of Impacts

Type of impact	Sustainability issue	Potential environmental impact	Potential for equality effect where known
Direct	Air Quality	Significant adverse air quality impacts during construction or operation, although these are deemed unlikely for HS2.	Not determined at property level.
	Noise	Significant adverse noise impacts during construction or operation where they affect a sensitive community facility, such as a school or mental well-being unit[27].	Determined at preliminary level for route sections and groups of properties, but not for specific properties at this stage.
	Community Integrity	Demolition, landtake or impaired access to a community facility or place of worship used by a priority equality group. Demolition, landtake or impaired access to some 10 residential dwellings in any one location in the 20% most deprived wards. High risk of isolation due to the route alignment likely to affect people living in the 20% most deprived wards.	Demolitions and isolation impacts have been determined by property type drawing on map data. These are reported in context of 20% most deprived wards. Access impacts have not been determined for specific facilities.
	Accessibility to key services etc.	Loss, landtake or impairment to a public open space or recreational facility used by people living in one of the 20% most deprived wards. Improved access to public transport and public transport interchange for people living in the 20% most deprived wards. Improved access to public transport and public transport interchange for those without access to a private vehicle, particularly, young people. Reduced crime and fear of crime through careful design of pedestrian walkways, lighting and appropriate surveillance.	General public transport improvements (described in the AoS, with reference to HS2, released capacity on WCML and at key interchange points) would be beneficial for priority equality groups.
	Physical accessibility	Pedestrian diversions over 100 metres affecting people with restricted mobility. Improved access to public transport and public transport interchange for mobility impaired users.	Diversions have not been determined. HS2 facilities to be compliant with relevant disability legislation; therefore no adverse effects envisaged.
	Socio-economic impacts	Loss, landtake or impairment to an existing regeneration area. Demolition, loss or impairment to business premises likely to affect people living in the 20% most deprived wards. Improved affordability of public transport services for people living in the 20% most deprived wards. Jobs created that are likely to benefit people living in the 20% most deprived wards.	Potential employment opportunities would be significant, especially around stations, where HS2 is expected to catalyse regeneration. Clusters of demolition impacts on commercial properties are identified, in context of 20% most deprived wards.
Indirect	Traffic impacts	Significant adverse air quality impacts resulting from increased road traffic in the vicinity of stations and terminals affecting people living in the 20% most deprived wards. However, these are deemed unlikely given good public transport links.	Not determined at property level.
	Wider socio-economic benefits	Improved accessibility to existing regeneration areas resulting in agglomeration and wider economic benefits.	Substantial benefits are predicted) which would be beneficial for priority equality groups.

[27] Noise impacts on residential properties would only be considered by exception, or as part of an appraisal of combined impacts that could have implications for health and well-being

Type of impact	Sustainability issue	Potential environmental impact	Potential for equality effect where known
Combined	Health & well-being	Other impacts affecting the 20% most deprived wards, when combined (e.g. noise, loss of facilities and a high risk of isolation).	Determined for route sections and groups of properties, but not for specific properties.
Secondary		Some impacts may not yet have been identified or may exist as secondary impacts. The ongoing nature of the appraisal process allows for these to be considered.	Not determined at this stage.

2.5 Identifying Priority Equality Groups

2.5.1 The location of priority equality groups was undertaken in two ways: 1) reviewing ward data to determine the level of presence of such groups where potential impacts had been identified; and 2) reviewing the proposed route as a whole to identify areas of relatively higher deprivation.

2.5.2 Any location potentially subject to the types of impact identified in Table 3 above, where known with sufficient detail, prompted an examination of ward data to establish whether any priority equality groups were present in the area, that could be affected. The potential environmental impacts are not, at this stage, known at a property level (other than demolitions and islanding, although these may change in detail). Assessing impacts at a property level would be one of the objectives of full environmental impact assessment. Moreover, ward data is relevant to an area and does not differentiate any variations by property. It was therefore neither possible nor pertinent to obtain information on the equality characteristics of the people who might be living, working or making use of potentially affected properties along the route as a whole.

2.5.3 This approach was not taken for the whole route since much of it would either not be susceptible to impact generally (for example, along tunnelled section) or would be subject to impact that would not affect priority groups, or at least not affect them differentially. Instead, multiple deprivation data was used as an indicator of areas most likely to be represented by particular priority equality groups.

2.5.4 In each case where an option crossed an area defined as being one of the 20% most deprived wards, ward profile data[28] helped to build a more detailed picture of the areas that are strongly represented[29] by particular priority equality groups, including in particular:

- Black, Asian and minority ethnic groups;
- elderly people;
- children and young people; and
- economically disadvantaged people.

2.5.5 The rationale for focusing on impact assessment criteria that make use of Indices of Multiple Deprivation (IMD) data is that extreme income inequalities are often good indicators of cycles of poverty, reduced opportunities and entrenched area-based social inequalities[30].

2.5.6 Areas inhabited by communities experiencing social exclusion and disadvantage are also more likely to be of poor environmental quality or in areas facing greater environmental threats, such as flooding or pollution. This, combined with poor quality and inappropriate housing, lack of access to social and community facilities, inaccessible and inadequate public transport, crime, lack of open space or lack of employment and recreation opportunities generates key quality of life concerns for these communities.

[28] Obtained from available 2001 Census information.

[29] For the purposes of appraisal, a variation of 10% or more as compared with the Borough average was used to define wards with a strong representation by a particular priority equality group.

[30] GLA (2007) Planning for equality and diversity in London – Supplementary Planning Guidance to the London Plan.

2.5.7 Additionally, there is both an ethnic and a disability dimension to the distribution of 'deprived' communities. Most minority groups experience high levels of child poverty and unemployment, whilst three out of every ten disabled people live in poverty[31].

2.5.8 The rationale for including criteria that highlight sensitive community facilities, such as schools, is based on a strong body of evidence for differential impacts on children. Some of these effects are summarised by Stansfield and Matheson in research carried out in 2003 (see end references) as follows: Deficits have been found in sustained attention and visual attention and noise-exposed children have difficulties in concentrating in comparison with children from quieter schools. Children exposed to chronic environmental noise have also been found to have poorer auditory discrimination and speech perception as well as poorer memory requiring high processing demands. Finally, chronically exposed children tend to have poorer reading ability and school performance on national standardized tests.

2.5.9 Conversely, there is very limited research or evidence pointing towards a correlation between environmental exposures and other equality dimensions.

2.6 Relationship with HS2 Gate Process

2.6.1 The definition of route and station options for HS2 has been carried out in three principal phases, followed by some further route refinement undertaken in 2010. This has culminated in the identification of a proposed scheme.

2.6.2 A test of 'reasonableness' has been carried out to ensure that equality dimensions are considered at an appropriate scale of enquiry at each stage of the option selection process. At the initial stages of option definition, for example, the large study area and absence of engineered lines on maps meant that the potential impacts on people could only be appraised in absolute terms. The type of information appraised at each stage is summarised below.

Gate 1: At the early stages of option definition, an initial long list of options was identified through a variety of means, including review of existing proposals by others, internal review of possible locations and routes, and discussions with a number of industry and other stakeholders. These were initially tested in terms of their conformance with the scheme's stated objectives. An appraisal was then undertaken which considered demand, operational feasibility and cost, together with any additional factors, such as major environmental impact, location of major centres of population and strategic fit with future expansion plans.

Gate 2: An intermediate list was then developed on OS mapping in order to produce indicative centre-line routes. These were appraised using simplified appraisal frameworks and information on the sustainability impacts for each option, both positive and negative, was recorded on template forms. At this stage the optioneering process focused on avoiding direct impacts in the form of demolitions, landtake and matching potential station options to potential growth areas and regeneration areas. It also identified route alignment likely to affect the 50% and 20% most deprived wards on the basis that people living in these areas are potentially more susceptible to impact due, *inter alia*, to potential level of presence of priority equality groups.

Gate 3: A short-list was then taken forward and more detailed engineering made available on vertical and horizontal route alignments and projected land take. These were appraised using a full AoS Framework with information on sustainability impacts for each option recorded on template forms. This considered the numbers and types of demolitions, general areas at high risk of isolation, impacts on public open spaces, impacts on planned growth

[31] JRF (2005) Monitoring poverty and social inclusion in the UK.

areas and regeneration areas and combined impacts on the 20% most deprived wards, again recognising the potential greater vulnerability of people in deprived areas to impact.

2.6.3 During option development, equality matters were therefore considered implicitly through consideration of areas of relatively higher deprivation, within which people were deemed to be more vulnerable to impact.

2.6.4 In those instances where particularly significant adverse impacts were identified in terms of demolitions, landtake or absolute numbers of people affected, further engineering work was conducted to refine the profile or alignment of the option concerned to avoid or reduce the identified impacts. Where residual impacts were still identified, these locations were flagged for further work.

2.7 Consultation

2.7.1 An initial programme of consultation with local planning authorities was conducted by HS2 Ltd to enable location-specific issues, impacts and potential benefits to be identified.

2.7.2 A Reference Group comprising representatives from across Government, as well as certain statutory bodies, was established to comment and advise on the approach to be taken to the AoS. This included consideration of health and equality issues. Moving forward, equality issues would form a part of the next phase of consultation. Particular attention would be given to any locations where potentially significant adverse impacts are predicted, to ensure that the type of mitigation proposed is appropriate and has a high likelihood of success.

2.7.3 The type of mitigation proposed would change as the scheme progresses. At the early stages of option selection, the priority was to avoid and reduce impacts on major settlements in absolute terms. As more detailed engineering information became available, adjustments were made to the horizontal and vertical alignment to provide further mitigation.

2.8 EqIA as an Ongoing Process

2.8.1 As stated in section 2.2, the HS2 EqIA screening exercise needed to do more than provide a statement on whether the proposals are relevant to equality. It also needed to provide a means of appraising the equality implications of the proposed route under consideration. Although this has been at a strategic level, where particular locations were identified where equality issues were considered pertinent, these have been described. Accordingly, the screening exercise also included the collection of evidence, where available, and an initial appraisal of impacts.

2.8.2 EqIA is an iterative process that should allow potential equality impacts to be identified and addressed through successive project phases. Where this report has identified further assessment work is required, the ongoing equality assessment programme would include the following elements:

- Policy review: A gap analysis to identify current policy, further review of best practice guidance and local documentation where required.
- Impact mitigation: Identification of potential mitigation measures that HS2 Ltd could implement in order to tackle the adverse or unintended impacts of its proposals.
- Equality consultation: Consultation programme for HS2 Ltd to include equality issues on their agendas. Consideration to be given to the formation of an Equality Forum[32] to assist with the identification of impacts and to comment on the appropriateness of proposed mitigation.

[32] An 'Equality Forum' can be defined as: "A setting where people who experience and understand project-relevant issues faced by diverse communities can provide insights into those issues that enable the project to address risks and opportunities effectively" (personal communication with A Maynard, 2009).

- Equality design specifications: Refinement of proposed design specifications to take account of the particular needs of priority equality groups at the location concerned.
- Area-specific case studies: At locations where specific impacts are anticipated, e.g. demolition of social housing or community infrastructure, there might be a case for more detailed impact assessment at that location.

3 Outcomes of screening process

3.1 Step 1 – Establish the Overall Aims and Objectives

3.1.1 The objectives of HS2 are to increase passenger capacity; provide a high speed service; integrate transport and land use and to examine the potential to bring about a modal shift from car and air to rail. The introduction of new high speed services combined with released capacity on existing lines could also provide a catalyst for wider socio-economic growth and regeneration.

3.1.2 Drawing on the conclusions of the main AoS Report, the principal potential benefits for people could include:

- Improved journey times for business users and commuters making use of HS2, with associated economic benefits;
- Agglomeration benefits around any stations or termini associated with HS2, with associated employment benefits;
- Improved accessibility for recreational and other users and for people who live or work in close proximity to an HS2 intermediate station or terminal;
- Indirectly, providing a catalyst for regeneration and growth in the areas around the intermediate stations and terminals; and
- Improved travel conditions for people using classic lines that have benefited from released capacity due to HS2.

3.1.3 While none of these objectives have an explicit equality motive, decisions on where to locate the terminals and the intermediate stations can have implications for the scale of impact or benefit for priority equality groups. Conversely, decisions on the proposed route alignment could have unintended adverse impacts on a priority equality group or groups.

3.2 Step 2 – Identify Relevant Priority Equality Groups

3.2.1 At the option definition and selection stages, the level of engineering detail was not sufficiently refined to allow a detailed analysis of the extent to which priority equality groups could be affected. Instead, multiple deprivation data was used as an indicator of areas most likely to be represented by particular priority equality groups. In each case where an option crossed an area defined as being one of the 20% most deprived wards, ward profile data was obtained to help build a more detailed picture of the areas that are strongly represented[33] by particular priority equality groups, including in particular:

- black, Asian and minority ethnic groups;
- elderly people;
- children and young people; and
- economically disadvantaged people.

[33] For the purposes of appraisal, a variation of 10% or more as compared with the borough average was used to define wards with a strong representation by a particular priority equality group

3.2.2 Disabled people were not included among the groups considered. Although it is possible to find out whether there is a disproportionate number of people with long-term limiting health conditions, their access needs would be so different that it would be difficult to identify specific impacts at this point in the process.

3.2.3 IMD 2007 data was also used to determine at these locations where there may be the risk of a disproportionate impact by identifying the types and numbers of community facilities in deprived areas (where these were identifiable from address point data) that were potentially at risk of demolition or land take. However, although indicative of potential impacts on particular priority equality groups, the precise nature of the impact would require further research into the characteristics of the populations making use of the facility concerned, which would be undertaken as part of a full EqIA. Moreover, a detailed land use survey has not been undertaken at this stage.

3.2.4 Predicting impacts on people within priority equality groups would often rely on detailed design; for example determining the design elements that would be required to maintain access for mobility impaired or elderly people.

3.2.5 Full EqIA would be required during the later design stage (when the potential scale of impacts is better understood) to inform development of the detailed design.

3.3 Step 3 – Identify the Potential Impacts of HS2

3.3.1 The findings of the appraisal for each of the nine impact areas of most direct relevance to equality is set out in section 10 of the AoS Framework (Volume 2).

3.3.2 Where identified impacts were known (see **Table 3**) the location concerned was appraised in more detail to establish whether any priority equality groups could potentially be affected. This information was also cross-referenced against the IMD data showing the 20% and 10% most deprived areas (See also *Annex 3*).

3.3.3 A summary of the potential significance of these impacts is then presented below in **Table 4**.

Table 4 Potential Significance of Equality Concerns for Elements of the Proposed Route

Proposed Route Element	Commentary and Equality Concerns	Potential significance for Equality
Euston station (including throat)	**Description:** Westward expansion of existing station complex. **Demolitions:** Around 240 likely demolitions, including some dwellings on the Regents Park Estate, and landtake from locally important public open spaces. **Profile:** Station is located in an area that is classified as one of the 20% most deprived and Regents Park Estate lies in an area that is classified as one of the 10% most deprived according to IMD 2007. The station and throat result in potential impacts on an area with potential equality concerns in respect of socio-economic status, and an Asian population that is higher than the Borough average (see s.3.3.4). **Isolation and Accessibility:** The station and throat do not increase the risk of isolation for existing communities, although the need to relocate large numbers of people could have secondary impacts on the local businesses and services that currently rely on those communities. There are no permanent access impacts on footpaths, cycle routes or areas of common land.	Potentially significant due to potential impacts on properties
Tunnel from Euston to Old Oak Common	**Description:** All in tunnel, apart from intermittent vent shafts. **Demolitions:** The Alexandra Road West vent shaft site would result in the demolition of one block comprising of 7 residential dwellings, 1 community facility and 13 commercial properties. **Profile:** Tunnel section is largely beneath areas of the 20% most deprived. **Isolation and Accessibility:** The vent shaft site would not create areas of isolation or create permanent access impacts on footpaths, cycle	Potential impacts relatively low; unlikely to be significant for equality

Proposed Route Element	Commentary and Equality Concerns	Potential significance for Equality
	routes or areas of common land.	
Connection to HS1	**Description:** Predominantly in tunnel or at grade along existing track. **Demolitions:** No demolitions envisaged. **Profile:** The at grade section does pass through areas of the 20% most deprived in the London Borough of Camden. **Isolation and Accessibility:** No areas of isolation generated and no permanent access impacts on footpaths, cycle routes or areas of common land.	Potential impacts relatively low; unlikely to be significant for equality
Old Oak Common (OOC) station (including box and throats)	**Description:** Expansion and redevelopment of existing rail station. **Demolitions:** No likely demolitions of residential dwellings although approximately 25 are at risk of land take, the risk of which may be reduced once more detailed design is undertaken. **Profile:** These residential properties at risk of demolition are all located in a 20% most deprived area, which also records a higher black population (13.4% in the ward compared to the borough average of 8.8%). However, extent to which demolitions involve residents from this community is not known. **Isolation and Accessibility:** Alignment does not increase the risk of isolation for existing communities, and no permanent access impacts on footpaths, cycle routes or areas of common land.	Potential impacts relatively low; unlikely to be significant for equality although would require further consideration on basis of detailed design
OOC to West Ruislip	**Description:** Widening of the existing rail track in a highly built up area. **Demolitions:** There are 15 residential dwellings and about 51 other commercial or community dwellings likely to be demolished. **Profile:** Small incursion into a 20% most deprived area in the vicinity of Northolt. No residential dwellings demolished in this area. Runs alongside, but does not intersect, two further areas of the 20% most deprived. This area is characterised by a slightly higher black population at 10.1% compared with the Borough average of 8.8%. **Isolation and Accessibility:** No areas of isolation identified and no permanent access impacts on footpaths, cycle routes or areas of common land.	Potential impacts relatively low (demolitions are scattered); unlikely to be significant for equality
West Ruislip to Aylesbury	**Description:** Scheme crosses predominantly rural area predominantly at grade. **Demolitions:** 12 scattered residential dwellings likely to be demolishedalong this route section. **Profile:** No deprived areas are directly affected. No priority equality target groups known to be affected. **Isolation and Accessibility:** No areas at risk of isolation. There may be temporary impacts to access routes during construction.	Potential impacts relatively low; unlikely to be significant for equality
Aylesbury to Brackley (A421 crossing)	**Description:** Scheme crosses rural area at grade. **Demolitions:** Up to 6 scattered residential dwellings likely to be demolished. **Profile:** No deprived areas are directly affected. No priority equality target groups known to be affected. **Isolation and Accessibility:** Impacts to access routes mainly limited to the construction period, although 2 paths may be disrupted. Two small areas land at risk of isolation (one dwelling affected).	Potential impacts relatively low; unlikely to be significant for equality
Infrastructure maintenance depot (Steeple Claydon)	No demolitions likely, no deprived areas are directly affected and no priority equality target groups are known to be affected.	Potential impacts relatively low; unlikely to be significant for equality
Brackley (A421 crossing) to Kenilworth/ Coventry gap	**Description:** Scheme crosses rural area mainly at grade. **Demolitions:** 13 scattered residential dwellings likely to be demolished. **Profile:** No deprived areas are directly affected. No priority equality target groups identified. **Isolation and Accessibility:** No areas of isolation identified. There	Potential impacts relatively low; unlikely to be significant for

Proposed Route Element	Commentary and Equality Concerns	Potential significance for Equality
	may be temporary impacts to access routes during construction.	equality
Kenilworth/ Coventry gap to Berkswell Rail Station	**Description:** Scheme crosses rural area mainly at grade. **Demolitions:** Resulting in some scattered likely demolitions (about 4 residential dwellings). **Profile:** No areas of multiple deprivation are directly affected, although parts of Castle and Burton Green ward are defined as deprived in terms of access to housing and services. Burton Green Ward area characterised by a slightly higher population over 60 at 26.6% compared with the borough average of 21.2% [this was identified due to previous severance at this location, now mitigated through introduction of a 'green bridge']. **Isolation and Accessibility:** Impacts to access routes limited to the construction period.	Potential impacts relatively low; unlikely to be significant for equality
Berkswell Rail Station to Middleton	**Description:** Scheme crosses area at grade. **Demolitions:** Scattered demolitions (1 community facility, 4 residential dwelling and 7 commercial/industrial premises). **Profile:** No deprived areas are directly affected along this section with the exception of a 250m section where the scheme intersects the M6. This also coincides with an area of land that is at high risk of isolation as a result of the scheme. However, no residential dwellings or community facilities are affected in this area. No priority equality groups identified. **Isolation and Accessibility:** 8 areas of isolation although this area is already fragmented from existing transport infrastructure. Impacts to cycle routes or footpaths limited to the construction period.	Potential impacts relatively low; unlikely to be significant for equality
Birmingham Interchange station (including throats)	**Description:** Construction of a new station on undeveloped land. **Demolitions:** No demolitions. **Profile:** This is not in an area of the 20% most deprived. No priority equality target groups identified **Isolation and Accessibility:** No areas of isolation identified and no impacts on access routes or common land.	Potential impacts relatively low; unlikely to be significant for equality
Birmingham spur	**Description:** Widening of the existing rail corridor. **Demolitions:** 28 residential dwellings, and 27 commercial premises **Profile:** Predominantly within an area of the 20% most deprived (including Washwood Heath ward, see below). Four main wards along the spur within the 20% most deprived areas. Wards to the east of the depot (Kingsbury and Hodge Hill) not found to contain significant numbers of priority equality groups. To the west, (Washwood Heath and Nechells) contain higher than the Borough average of BAME communities including (48% and 46.4% Asian population respectively). **Isolation and Accessibility:** There are 3 areas of isolation identified in the Birmingham spur section; however these are not in the vicinity of priority equality groups or areas of multiple deprivation. Impacts on access routes and common land limited to construction.	Potentially significant due to impacts on property (related to impact below)
Rolling stock depot (Washwood Heath)	**Description:** Proposed 65ha site **Demolitions:** Landtake for the depot footprint would require the demolition of 32 residential dwellings and up to 19 commercial/industrial/community buildings in total. **Profile:** In an area of the 20% (and 10%) most deprived The depot is situated in the Washwood Heath ward, containing higher than average proportions of BAME communities in relation to the borough average. These have been considered above and in section 3.3.4. There is the potential for equality impacts from the immediate depot site, however for potential effects to the ward, please refer to the section on Birmingham Spur above. **Isolation and Accessibility:** No areas of isolation. No access routes or common land impacted.	Potentially significant due to impacts on property (related to impact above)
Birmingham	**Description:** This mainly follows an existing rail track.	Unlikely to be

Proposed Route Element	Commentary and Equality Concerns	Potential significance for Equality
Curzon Street station and approach	**Demolitions:** 1 residential dwelling and 2 commercial premises, one of which is a complex of student units. **Profile:** Slight encroachment into an area of 20% most deprived. Area is characterised by a higher than average Black population at 23.7% in the SOA for Birmingham Curzon Street as compared with 9.7% for the ward and 6.12% for the borough. The station itself is not in a 20% most deprived area, and there are limited demolitions, however there is a higher than average proportion of the Chinese population (6.5% in the SOA compared to 1.2% borough average). This is unlikely to be significant **Isolation and Accessibility:** One small area of isolation in this route section. Effects on access routes limited to during the construction period.	significant
Middleton to West Coast Main line (Lichfield)	**Description:** Scheme crosses area at grade. **Demolitions:** 4 residential dwelling demolitions (0 community demolition and 3 commercial demolitions). **Profile:** No areas of multiple deprivation are directly affected. No priority equality groups identified. **Isolation and Accessibility:** One area of isolation identified although no dwellings affected. Impacts to cycle routes or footpaths limited to the construction period.	Unlikely to be significant

3.3.4 There is potential for significant adverse impacts to priority equality groups at two locations, namely Euston and Washwood Heath. HS2 Ltd would work closely with the London Borough of Camden and the GLA, with the intention of agreeing jointly an ambition for development of the Euston area. This would include working closely with community groups, residents' associations and affected residents generally. At Washwood Heath in Birmingham, a similar approach would be undertaken, involving close working with Birmingham City council and the local residential and business community.

3.3.5 Potential impacts at Old Oak Common are most likely to be positive, given the extensive regeneration that is likely here; however, further assessment during the EqIA would be required at this location, on the basis of the more detailed design.

3.3.6 Birmingham Curzon Street station is likely to involve the demolition of one dwelling as well as a complex of student units. Further work may be required to establish the equality implications of the loss in affordable accommodation for students. However, it is assumed that replacement accommodation would be provided.

3.4 Step 4 – Identify Differential Impacts on Priority Equality Groups

3.4.1 With the exception of Euston and Washwood Heath, the proposed route is considered unlikely to significantly and adversely affect priority equality groups. Where potential demolitions would affect known community facilities (predominantly places of worship or culturally sensitive social facilities), initial checks have been made to establish whether they are located in areas with a higher than average representation by a relevant priority equality group. However to establish the scale of impact, further research is likely to be required when conducting the EqIA.

Euston

3.4.2 The key potential impacts in the Euston area are summarised below:

- Loss of social housing: The station footprint is likely to require the demolition of high-rise council blocks within the Regents Park Estate, which comprises approximately 190 residential dwellings. The confirmed demolitions could require the relocation of approximately 500 people (as calculated using the 2.36 national average occupancy). Some dwellings within the low-rise terraces along Cobourg St, Euston St and Melton

Street would also require demolition. A further three high-rise Council blocks (up to 170 dwellings) in the same area would be newly exposed to impacts from the railway.

- Loss of community facilities: No places of worship or culturally sensitive social facilities are likely to require demolition, although Euston Square Gardens, St James's Gardens, a hall at Regents Park Estate and the sports court adjacent to Maria Fidelis School are likely to be required during construction.
- Loss of commercial premises: The station footprint would require the relocation of several businesses, including a Post Office distribution centre, and a small business space site through the potential demolition of 20 commercial premises. The Post Office facility is likely to employ a high proportion of local people. The extent to which other employment losses would affect local job opportunities is yet to be established.
- Socio-economic characteristics: The area around Euston (the station and surrounding buildings) is classified as one of the 10% most deprived in terms of barriers to housing and services; crime and disorder; living environment; health deprivation and disability. Unemployment rates for the Regents Park Estate stood at 10% in 2001, which is higher than the 8% average for Camden.
- Population characteristics: An analysis using super output area data has identified a higher than average proportion of people of black, Chinese and, particularly, Asian population (34.4% compared with the borough average of 10.38%). There is also a slightly above average proportion of children aged between 0 and 4 (7.2% compared with the borough average of 6.0%). The proportion of 0-15 year olds within Regents Park ward is 19.8%, compared to a Borough average of 16.6%.

3.4.3 Given these indicators, it is considered highly likely that the residential and commercial demolitions and loss of public open space could disproportionately affect the Asian population as well as those with low socio-economic status. Preparation of a full EqIA could help to determine the scale of impact on the surrounding population and is therefore recommended. HS2 Ltd would be committed to working closely and at an early stage with the London Borough of Camden and the GLA and with community groups, residents' associations and affected residents generally to ensure that effective arrangements are in place to meet the housing needs of those affected by demolition of these dwellings, and to help to address wider impacts on the local community.

Washwood Heath

3.4.4 The key potential impacts in the Washwood Heath area are summarised below:

- Loss of dwellings: The depot footprint would require the demolition of 32 residential properties, all of which lie along Common Lane, although some of these may be able to be avoided during later design phases. There are also up to 28 residential dwelling demolitions along the length of the Birmingham spur.
- Loss of community facilities: No places of worship or known culturally sensitive social facilities are likely to require demolition.
- Loss of commercial premises: The proposed route would require the relocation of several businesses, including some at Saltley Park (a 19.5ha development production and warehousing units) and Castle Bromwich Business Park. The extent to which employment losses would affect local job opportunities is yet to be established.
- Socio-economic characteristics: The area around Washwood Heath is classified as one of the 10% most deprived in terms of barriers to housing and services; crime and disorder; living environment; health deprivation and disability. The percentage of unemployed men and women in the Washwood Heath ward stood at 50% in 2001 and 49.2% in the Nechells ward which is higher than the borough average.
- Population characteristics: An analysis using super output area data has identified a higher than average proportion of people of BAME communities, most notably, the Asian population in Washwood Heath at 65% of the ward population and 33.8% in

Nechells (compared with a borough average of 19%). The area is also characterised by a younger age profile compared to that of Birmingham city.

3.4.5 Given these indicators, it is considered possible that the residential and commercial demolitions could disproportionately affect the Asian population as well as those with low socio-economic status. Preparation of a full EqIA could help to determine the scale of impact on the surrounding population and is therefore recommended. A similar approach to Euston would be undertaken here, involving close working between HS2 Ltd and Birmingham City council, as well as with local residents and businesses, to help to minimise disruption to this community.

3.5 Step 5 – Document Findings

3.5.1 The key recommendations of this EqIA screening exercise are set out in Section 4 of the report. Its findings have also have informed the ongoing AoS process, and the key outcomes have been documented in the Main Report (Volume 1).

4 Recommendations and Next Steps

4.1.1 A key recommendation of this screening report is that a more detailed analysis should be carried out across the whole scheme to identify potential for impacts on priority equality groups. To date, however, it has been possible to establish areas within which impacts on priority equality groups are potentially more likely. This should help to focus the scope for any further assessment to ensure that resources are allocated appropriately and the approach defined correctly.

4.1.2 Work to develop the full EqIA would take into account impacts across the route as a whole, but particular attention would need to be focused on the two geographical locations that the screening process has identified namely:

- Euston; and
- Washwood Heath and surrounds.

4.1.3 Further consideration of impacts at Old Oak Common should also be a focus for attention. The scope of the full EqIA would consider amongst other things the ongoing equality programme as identified in section 2.8.2.

ANNEX A: Key Definitions

Equality

Equality relates to the fair and/or equal treatment of people who can be defined to one or more common group characteristic based on for example their age, gender, ethnicity, disability, sexual orientation, religion or belief in relation to other people who share one or more common group characteristics.

Equality (of opportunity) is often related to and supported by a legal framework, which makes it illegal to discriminate against people because they belong to one or more defined or self-defined identity groups.

Diversity

Diversity refers to the individual differences that people have and how these are understood and valued. Understanding and valuing the difference that exists in all of us as individuals and the groups we belong to is important.

Human Rights

Human rights and equality are inextricably linked. Equality is treated as a fundamental human right in the core international human rights treaties; and conceptually, human rights and equality derive from the same fundamental principle – fairness and respect for the inherent dignity of all. The Human Rights Act was adopted in 1998.

Age

It is unlawful to discriminate against someone or treat them unfairly without justification because of their age, or harass or victimise someone because of their age.

Age discrimination law currently applies only in employment and vocational training where somebody is treated less favourably on the basis of age, without justification.

Gender

It is unlawful to discriminate against someone or treat them unfairly because they are a woman, a man or transsexual. Women, men, transsexual, transgender and transvestite people can all experience sex discrimination.

Sex discrimination also includes treating someone less favourably because they are married or in a civil partnership: for example, by not hiring married women.

Race

It is unlawful for a person to discriminate on racial grounds against another person. The law defines racial grounds as including race, colour, nationality or ethnic or national origins. Some religious groups such as Sikhs and Jewish people are protected under race laws.

Disability

The Disability Discrimination Act says a disabled person is someone with a physical or mental impairment which has a substantial and long-term adverse effect on his ability to carry out normal day-to-day activities. It also highlights certain specifically included conditions that may fall outside this definition. Examples include cancer, diabetes, multiple sclerosis and heart conditions; hearing or sight impairments, or a significant mobility difficulty; and mental well-being conditions or learning difficulties.

Sexual Orientation

Sexual orientation refers to the general attraction a person feels towards one sex or another (or both).

It is unlawful to discriminate against someone or treat them less favourably due to their sexual orientation, their perceived sexual orientation, or the sexual orientation of those they associate with.

Faith

In order to be protected under the Equality Act 2006, a religion or belief must be recognised as being cogent, serious, cohesive and compatible with human dignity. The concept includes religions that are widely recognised in Britain (although it isn't limited only to these), such as:

- Baha'i faith;
- Buddhism;
- Christianity;
- Hinduism;
- Islam;
- Jainism;
- Judaism;
- Rastafarianism;
- Sikhism; and
- Zoroastrianism.

Denominations or sects within a religion would also be considered as religions, or religious beliefs, such as Catholicism and Protestantism, which are divisions of Christianity.

For the purposes of the Equality Act 2006, belief is defined as including philosophical beliefs, such as humanism, which are considered to be similar to a religion. Other categories of beliefs, such as support for a political party, are not protected by the Equality Act.

Trans People

The term Trans people refers to people who are defined as transgender, transsexual or transvestite. The Sex Discrimination Act (Sex Discrimination Act) was amended in May 1999 to protect transsexual people against discrimination in employment and vocational training.

ANNEX B: References

EqIA Policy Framework and Guidance

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AW (2008):	Advantage West Equality Impact Assessment Guidance (Draft)
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BCC (2009):	Birmingham Big City Plan
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LB Camden (2009)	Euston: A Framework for Change – Supplementary Planning Document – Approved.
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TfL (2004):	Equality Impact Assessments – How to do them

EqIA Case reports

DfT (2005):	Crossrail Equality Impact Assessment – Project and Policy Assessment Report
DfT (2008):	Adding Capacity at Heathrow Equalities Impact Assessment Report

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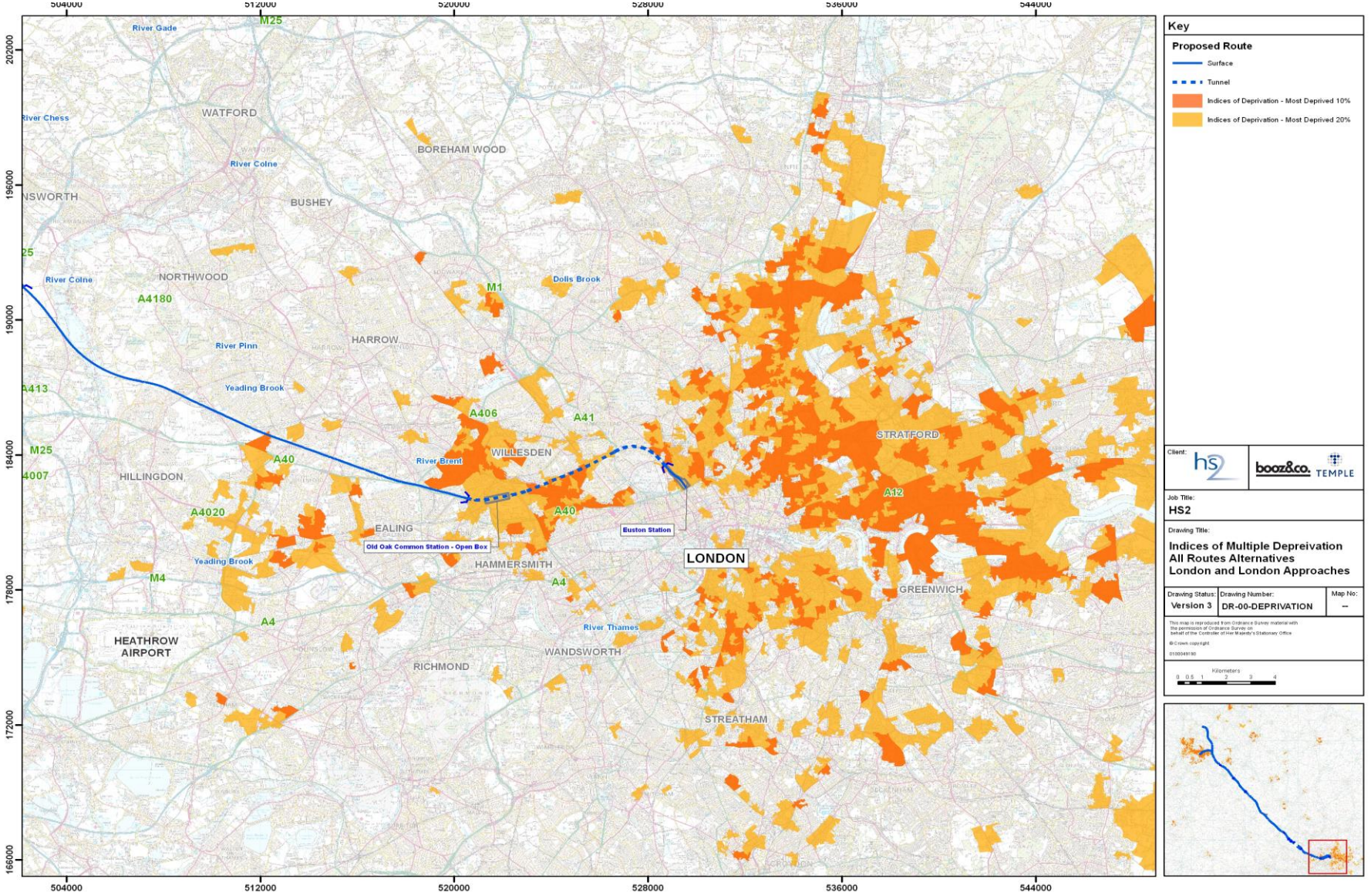
Annex C: Index of Multiple Deprivation Maps

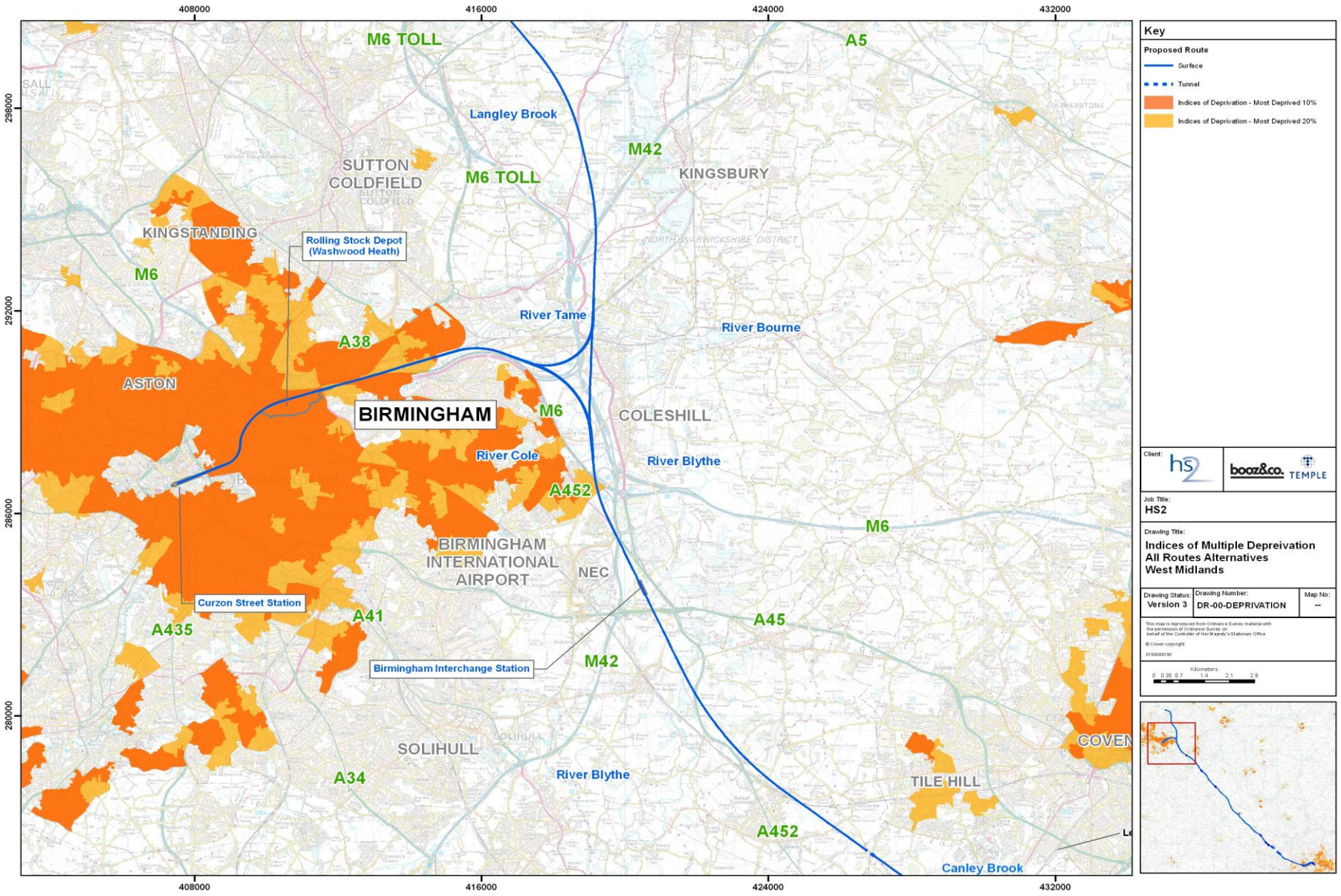
Maps showing the 10% and 20% Most Deprived Areas in relation to the proposed route and Alternatives.

- Map 1 - London
- Map 2 - Birmingham

London Deprivation Map



Birmingham Deprivation Map



APPENDIX 4.3
WebTAG Compliance and ASTs

1 WebTAG Compliance

1.1 Introduction

1.1.1 The remit of this engagement requires that, where possible, the AoS uses methodologies that are consistent with DfT appraisal guidance material, as defined by WebTAG. As such, the relevant NATA Objectives and Sub-objectives have been mapped onto the AoS Framework, and the methodologies for each assessment have been used in the design of the relevant evaluation criteria. This approach enabled us to rely on the metrics and appraisal methodologies developed and tested by DfT, but for the results to be presented in a way that is compatible with the wider AoS.

1.1.2 In many instances, WebTAG presents separate methodologies for the appraisal of transport strategies and transport plans, with the latter representing the stage of scheme development that requires a greater level of detail for scheme design definition, impact modelling and evaluation. Given the current stage in the development process for HS2, WebTAG has been applied at the “strategic” level. In some cases, the evaluation criteria and subsequent appraisals have been adapted to match the level of data availability.

1.1.3 This appendix presents how each of the NATA objectives as defined by WebTAG (**Table 1**) has been addressed within the AoS framework. The remainder of the appendix presents the results of the AoS for the proposed route and the classic line alternative in the form of the Appraisal Summary Table (AST), as per the DfT approach.

1.2 Summary of Findings

1.2.1 **Table 2** summarises the findings of the AoS Framework Appraisal of the HS2 proposed route, expressed in terms of the WebTAG criteria.

Table 1 Summary of WebTAG Objectives

Objective	Sub-objective	AoS Framework criteria	Comments
Environment	Noise	9a, 9b	AoS framework criteria measures: Population numbers likely to be annoyed by operational noise.
	Local Air Quality	8a	AoS framework criteria measures: Changes in total vehicle emissions from modal shift at a local level (dependant on information availability)
	Greenhouse Gases	2a, 2b	AoS framework criteria measures: Embedded carbon emissions (by proxy) from construction of the scheme Ongoing carbon emission from operation of the scheme
	Landscape	3a	AoS framework criteria measures: Impacts to landscape resources of national and regional importance Impacts on strategically important views
	Townscape	3b	AoS framework criteria measures: Impact on the cohesiveness of townscapes
	Heritage of Historic Resources	4a, 4b, 4c	AoS framework criteria measures: Impacts on heritage resources of national and regional importance Impacts on historic landscapes
	Biodiversity	5a,	AoS framework criteria measures: Impacts on ecological sites of international, national and regional importance Potential for new habitat creation and re-creation
	Water Environment	6a, 6b	AoS framework criteria measures: Impacts on river catchments Impacts on surface waterbodies Impacts on groundwater source protection zones
	Physical Fitness	12b	AoS framework criteria measures: Potential to encourage more healthy lifestyles Impacts on key determinants of health Impacts on people during construction
	Journey Ambience	12a	AoS framework criteria measures: Impacts on key determinants of mental well being
Safety	Accidents	13a	AoS framework criteria measures: Contribution to the reduction of traffic accidents
	Security	13b	AoS framework criteria measures:

Objective	Sub-objective	AoS Framework criteria	Comments
			Features that might increase crime, or the fear of crime
Economy	Public Accounts	N/A	TBC
	Transport Economic Efficiency: Business Users & Transport Providers	14a	AoS framework criteria measures: Net business impact for transport users
	Transport Economic Efficiency: Consumers	15a	AoS framework criteria measures: Net benefits for consumers and commuters
	Reliability	14a, 15a	AoS framework criteria measures: Net business impact for transport users Net benefits for consumers and commuters
	Wider Economic Impacts	14b, 15c	AoS framework criteria measures: Market conditions/ market changes Labour market impact
Accessibility	Option values	11b	AoS framework criteria measures: Potential to improve option values
	Severance	10a, 11a	AoS framework criteria measures: Properties at risk of isolation and/or severance Severance to footpaths, cycleways and other Rights of way
	Access to the Transport System	11b	AoS framework criteria measures: Potential to improve access to public transport
Integration	Transport Interchange	11c	AoS framework criteria measures: Potential to improve public transport interchanges Ability to accommodate mobility impaired access within the scheme
	Land-Use Policy	15b, 15c	AoS framework criteria measures: Impacts on planned growth areas Impacts on major planned housing and commercial developments Impacts on defined regeneration areas
	Other Government Policies	N/A	N/A

2 Appraisal Summary Tables

Table 2 Summary of the Proposed Route Appraisal

Option	Proposed Route
Description	A proposed high speed railway between London and the West Midlands. The proposed route would run from an expanded London Euston station to a connection with the WCML near Lichfield with a spur into a new terminus station in central Birmingham.
Problems	• Significant number of people potentially annoyed by daytime noise from scheme operation in year 15. • Direct and indirect impacts on landscape areas of national importance, including the Chilterns Area of Outstanding Natural Beauty. • Adverse physical impacts on two Scheduled Monuments, 14Grade II listed buildings and 3 Grade II* Registered parks and gardens within the physical impact corridor. • Indirect impact on a number of areas of regional importance, including multiple areas designated as country parks • A number of river crossings are required, with a small number possibly requiring major river diversions and a few possibly requiring minor river diversions.
Present Value of Net Costs to Government	£10,400 million.

Objective	Sub-objective	Qualitative assessment	Quantitative assessment	Assessment Result[34]
Environment	Noise	~ 10 dwellings experience high noise levels ≥73 dB $L_{Aeq,18hr}$. ~ 150 dwellings may qualify for noise insulation. ~ 4700 noticeable noise impacts. ~ 800 non residential receptors (community; education; healthcare; and recreational/social facilities) within 300m of the proposed route have the potential at risk of vibration and reradiated noise.	Additional persons potentially annoyed by noise in year 15: Scheme with additional mitigation = ~850 Scheme without addition mitigation= ~4300	NPV= ~ £41M
	Local Air Quality	Some stations are currently located in areas subject to elevated air pollutant concentrations (having been declared AQMAs). There is the potential, that in future, these areas would not experience air quality pollutant concentrations at levels causing concern. However access/egress trips to stations served by the proposed route would increase. The air quality effects, arising from the additionally generated traffic movements, may lead to air quality impacts at certain locations. These effects may be mitigated at certain stations (e.g. in detailed design work for the		Concentrations weighted for exposure: N/A

[34] As per Volume 2 – AoS Framework

Objective	Sub-objective	Qualitative assessment	Quantitative assessment	Assessment Result[34]
		stations and redesigned of access/egress arrangements due the proposed route). Two stations are likely to see a reduction in accessing/egressing road traffic and thus would experience beneficial effects due to the proposed route.		
	Greenhouse Gases		Total embedded carbon emissions for the proposed route are reported 992,200 tonnes CO2, of which an estimated 229,100 tonnes CO2 (approximately 20%) arises from the construction of tunnel sections. Operational Carbon (60 year lifetime): -13.7 to +15.7 $MtCO_2e$. The range of uncertainty associated with these estimates is significant and may result in the net carbon emissions over the 60 year lifetime being positive or negative.	Score: Unknown
	Landscape	The route has direct and indirect impacts on landscape areas of national importance, including travelling directly through the Chilterns Area of Outstanding Natural Beauty. The route has an indirect impact on a number of areas of regional importance, including the following country parks: Denham, Bayhurst Wood, Sheldon, Kingfisher and Kingsbury Water Park.	4.4km of track would lie within 3km zone of visual influence defined as the theoretical area from which HS2 would be visible and 14km with direct physical impact traversing the area. ~9km of route runs at surface, outside of existing transport corridor defined as a 150m buffer from the centreline of the route alignment.	Score: - -
	Townscape	Views associated with Conservation Areas may be affected by the route at Euston Station and around the villages of Lower Hartwell, Stoneleigh The route has a direct visual impact on modern and historic buildings and important public open spaces near Euston Station. The route has a direct townscape impact on London Boroughs. In the West Midlands it impacts upon the residential edge of Kenilworth, Coleshill and employment areas within Birmingham. At Birmingham Curzon Street Station, it affects established industrial areas, some of local historical importance.		Score: -
	Heritage of Historic Resources		Two Scheduled Monuments, Buckinghamshire Grim's Ditch, and a Roman Villa site near Edgcote would be physically impacted by the route. 14 Grade II listed buildings may be physically impacted by the route. This includes six (6) in the Euston station and throat area, and three (3) in the Birmingham Curzon Street station and throat area. There would be direct impacts to the Hartwell Conservation Area and Warwick Bar Conservation Area. There may also be direct adverse physical impacts on the Bloomsbury Conservation	Score: -

Objective	Sub-objective	Qualitative assessment	Quantitative assessment	Assessment Result[34]
			Area. . Two undesignated historic landscapes of potentially regional importance would be physically impacted upon. 5 (Five) scheduled monuments within 350m of route. Three (3) Grade II* Registered parks and gardens within the physical impact corridor. Two Grade I Registered parks within the 350m buffer area.	
	Biodiversity	Impacts on BAP habitats are less severe than other route options in much of the route. Overall it is considered that effects on BAP habitats are likely to be minor adverse. Much of the route passes through low lying open country side where there would be the opportunity to reinstate hedges and ponds and improve watercourses in the vicinity of the route. Effects at the local level may be minor beneficial if sufficient to offset fragmentation.	A single SSSI (Long Itchington and Ufton Woods) would experience partial land-take by the scheme. Moderate habitat loss would occur at one other site (Colne Valley SSSI) and minor loss at two others (Sheephouse Wood south of Steeple Claydon and the River Blythe). Significant bird disturbance is likely to occur at one site.	Score: -
	Water Environment	Diversion of any main river would have significant effects on river morphology and riparian habitat, and hence the quality of the river as specified in the WFD. It is impractical to mitigate the effects on river catchment hydrology completely and it is inevitable that overland flow would be collected adjacent to the track by filter drain and piped to convenient crossing points such as culverts and bridges. A significant proportion of the UK drinking water is obtained through the abstraction of groundwater and this process is licensed by the Environment Agency. Each abstraction licence is associated with a corresponding Source Protection Zone to prevent pollution of the groundswater subject to abstraction. Cutting or tunnelling through source protection zones is likely to have significant detrimental effects on the quality of the water and on the flow within the aquifer.	The total catchment upstream of this route amounts to 5,580km^2, with 24 Major River crossings and 88 Minor River crossings. There are 102 river crossings in this route with a median catchment size of 5.7km^2. There are also 12 crossings of navigable canals and 11 instances where the line passes directly over a lakes or reservoir. 5 of the river crossings may require major river diversions (catchments greater than 50km^2) and 8 which may require a minor river diversion (river catchment less than 50km^2). The route requires cut or tunnel through 4,900m of SPZ1, and 14,700m of cut or tunnel through SPZ2.	Score: - -
	Physical Fitness	Birmingham Curzon Street would tie in with existing public transport options and the stations at London (Euston and Old Oak Common) are existing stations which would be modified so do not create new travel options. The scope to further encourage a healthier lifestyle is limited. Health benefits through the use of active travel options may be realised. The main implications in terms of physical health are likely to be in terms of potentially increasing/ exacerbating cardiovascular		Score: o

Objective	Sub-objective	Qualitative assessment	Quantitative assessment	Assessment Result[34]
		and respiratory disease and causing sleep disturbance. Overall, it is likely that there would be no or negligible effects on rates of cardiovascular and respiratory disease due to the scheme and hence this is not likely to be detectable through routine statistics. Operational hours are predominantly during daytime hours with minimal operations during night-time periods and therefore the effects of sleep disturbance would be low. Future air quality assessment findings are likely to show that there would be negligible direct effects on air quality during operation, given the scheme would run on electricity. During construction, best practicable means are recommended with dust levels being carefully controlled. Therefore during both the construction and operation phases the potential adverse physical health impacts are likely to be minor e.g. increases/exacerbations of cardiovascular and respiratory disease.		
	Journey Ambience	Significant betterment due to new services, new trains and new stations/ improvements. No intermittent stops coupled with a high frequency of service provide limited potential for delays. The vast majority of route is above ground allowing open views.		Score: ++
Safety	Accidents	The proposed route may potentially reduce a small number of road traffic accidents from some existing motorways (depending on the level of modal shift) but is unlikely to have any measurable effect on road traffic incident rates in the two cities as the percentage modal shift compared to the number of motor vehicles in the city would be extremely small.		Score: Unknown
	Security	The impacts associated with these criteria are not known at this early stage in the design. The stations, footbridges and other pedestrian access areas would be assumed to be designed in accordance with the 'Secured by Design' guideline. It is assumed that safe waiting rooms would be incorporated into the design specification accreditation sought under the Government, British Transport Police and Crime Concern Secure Stations Scheme.		Score: Unknown
Economy	Public Accounts		Central Govt PVC, Local Govt PVC	PVC £m (refer to HS2 business case)

Objective	Sub-objective	Qualitative assessment	Quantitative assessment	Assessment Result[34]
	Transport Economic Efficiency: Business Users & Transport Providers	Total business user benefits are expected to be large, equivalent to a double positive assessment. This reflects the large journey time savings that HS2 affords and the high levels of underlying demand for business journeys on the WCML.	Users PVB, Transport Providers PVB, Other PVB	PVB £m (refer to HS2 business case) Score: ++
	Transport Economic Efficiency: Consumers	Total consumer benefits are expected to be large. This represents a very large benefit, reflecting the large journey time savings that HS2 affords and the high levels of underlying leisure demand on services between the major centres of London, Birmingham, Manchester, Liverpool and Glasgow.	Users PVB	PVB £m (refer to HS2 business case) Score: ++
	Reliability	Reliability benefits are expected for intercity services due to improved high speed signalling, as well as through crowding reductions on the WCML.		Score: (refer to HS2 business case) Score: +
	Wider Economic Impacts	The potential for HS2 services to generate wider economic benefits due to agglomeration is limited. It can be expected that further refinements of the released capacity strategy would deliver agglomeration benefits by enhancing labour catchments for firms in both London and Birmingham. Output gains in imperfectly competitive markets are modelled as a proportion of business user benefits and these are expected to be significant (adding 7% to total benefits). Labour market impacts are expected to be smaller but positive, however, land use changes over time may magnify benefits along the WCML. Labour market impacts may be enhanced by any agglomeration impacts, The attraction of globally mobile activity due to enhanced international connections reinforces the likelihood that HS2 would generate wider economic benefits.		Score: +
Accessibility	Option values	The gains from the option across a large proportion of the population would be offset to some degree by the incremental nature of HS2 as an option for accessing major cities along the WCML, where very good road and rail links are already in place.		Score: +
	Severance	Access would be maintained for all isolated dwellings, however they would be bounded by transport infrastructure.	164 dwellings identified as being at risk of isolation	Score: -
	Access to the	The fact that London, Birmingham, Liverpool, Manchester and Glasgow are places with higher than average proportions of		Score: o

Objective	Sub-objective	Qualitative assessment	Quantitative assessment	Assessment Result[34]
	Transport System	households without cars, and are connected to HS2 high speed services, demonstrates a positive for the Accessibility appraisal. These areas represent a significant proportion of the UK population. For released capacity services in the West Midlands to the south of Birmingham, affected places such as Warwickshire, Solihull and Coventry all have relatively high levels of car ownership. In places to the immediate north of London, all places exhibit very high levels of car ownership. Therefore, any improvements in released capacity services in these areas are not likely to benefit many households with low levels of car ownership. Of the other major towns along the WCML that would be affected by released capacity changes, both Crewe and Stoke-on-Trent exhibit lower than average levels of car ownership, although the impacts of changes in service levels for these areas are not yet fully understood. While it is difficult to make a comprehensive assessment at this stage of scheme design, on balance, the evidence suggests a neutral score for this assessment. In considering the gains in accessibility for people without cars, it is important to consider issues relating to personal affordability. While many areas would gain from high speed rail connections, many people in these areas would not be able to afford these services.		
Integration	Transport Interchange	HS2 presents an opportunity to enhance public transport interchange through the provision of modern station facilities and excellent service operations. This could be offset due to potential issues relating to linkages with other services, particularly at the Birmingham terminal.		Score: +
	Land-Use Policy	Current land use planning policy, from government advice and guidance to the new system of spatial planning, is based upon the principle of sustainable development. In principle therefore, high speed rail and its potential to promote more sustainable communities through both modal shift to cleaner public transport and the consequent environmental benefits aligns with current policy. In terms of HS2's impact, the route has been developed to avoid as far as possible existing communities and proposed areas for expansion, so that its impact on land use and development is neutral in most cases.	European Spatial Development Perspective – HS2 compliant National policy – HS2 has been developed and refined having regard to all national Planning Policy Statements, in particular the Sustainable Development elements of PPS 1 (and its Supplement) and PPS 4. The concept and proposed route accords with the transport emphasis of modal shift towards and enhancement of public transport in relevant Regional Spatial Strategies (RSS) and Local Development Frameworks along the proposed line of route and has been refined to avoid major development and growth areas as far as possible. RSS for London, SE, W Midlands, E Midlands, East of England –	Score: o

Objective	Sub-objective	Qualitative assessment	Quantitative assessment	Assessment Result[34]
			HS2 compliant: proposed route avoids strategic developments and reflects land use and transport policies	
	Other Government Policies	The general policy review includes policy on Climate Change, Emissions Policy, Energy, Biodiversity, Flood Risk, Health, Equality, Sustainable Consumption, Sustainable Economic Development, Sustainable Transport which are the responsibility of a number of different government departments. All of the above policy areas have been reviewed as part of this Appraisal of Sustainability and incorporated into the overall objectives for HS2. Evaluation of route options and alignment plus any associated mitigation measures are designed to comply with this overall strategic policy context as far as practicable. A selection of the most relevant statutes and their associated subsidiary documents are listed below. EU Renewed Sustainable Development Strategy 2006. Kyoto Protocol and the Cancun Agreement.EU Climate Change and Energy Package 2008. UK Sustainable Development Strategy and 'One Future Different Paths'. EU Biodiversity Strategy and action plans plus directives on conservation of habitats, birds etc. Conserving Biodiversity – the UK Approach 2007. EU Air Quality and Noise Directives UK Air Quality Strategy 2007 Health Inequalities Progress & Next Steps' D.o.H 2008 plus associated PSA Delivery agreements Sustainable Consumption & Production EU Action Plan 2008 Sustainable Communities Building for Future 2003 (ODPM) and associated directives/PPGs on waste, Green Belts, etc EU Rural Development Policy 2007-13 Planning for Economic Development ODPM 2004 UK Rural Strategy Defra 2004	Quantifiable measures are not readily available to measure compliance with each of the policy instruments but HS2 as a concept complies with overall sustainability and related policy.	Score: o