



HS2 London to the West Midlands Appraisal of Sustainability

Appendix 1 – The Appraisal Process

A Report for HS2 Ltd

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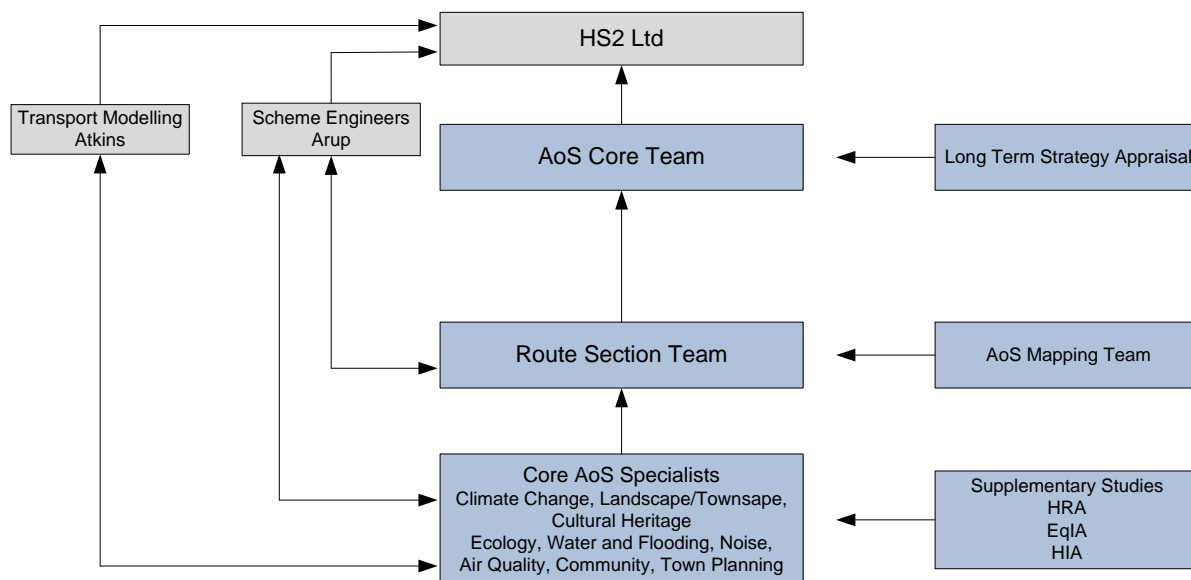
Structure of the AoS report and appendices

Non Technical Summary
Main Report Volume 1
Main Report Volume 2 – Plans and Appraisal Framework
Appendix 1 – The Appraisal Process
Appendix 2 – Greenhouse Gas Emissions
Appendix 3 – Socio-economic Report
Appendix 4 – Associated Assessment Reports
Appendix 5 – AoS Technical Reports
Appendix 6 – March 2010 Preferred Scheme and Main Alternatives: AoS information

1. The appraisal team

- 1.1.1 The Appraisal of Sustainability (AoS) was managed by Booz-Temple (BZT) and included specialist advisors for each of the sustainability issues. This is illustrated in **Figure 1** below.

Figure 1 The AoS Team



2. Role of sustainability in scheme development

2.1 Sustainable design aims

- 2.1.1 An initial task was to establish sustainable design aims, based on the four UK priorities¹, which defined important principles for the design of the options. The sustainable design aims are relevant to all stages of scheme development, although the extent to which some of them may be applied increases with scheme detail. They were not intended to address strategic objectives (for example, associated with employment and regeneration or transport benefits), but to focus on aspects that would have an impact on route and station engineering.
- 2.1.2 The design aims listed below have been a consideration in the development of the scheme to date and their detail was deemed appropriate to the level of design applied at this stage. In practice, the adoption of measures to meet these aims would need to balance other factors, such as cost, journey times and other environmental considerations. However, the consideration of these design aims has been fundamental to scheme design. It is important to note that the distinction between the design aims, which are intended to provide practical guidance to the design team, and the AoS objectives (see Section 3), which define an ideal, best possible outcome (regardless of other considerations) which allows the scheme to be independently appraised.
- 2.1.3 Should HS2 be progressed further it may be necessary to revise and update these design aims in line with the increasing design detail of the scheme.

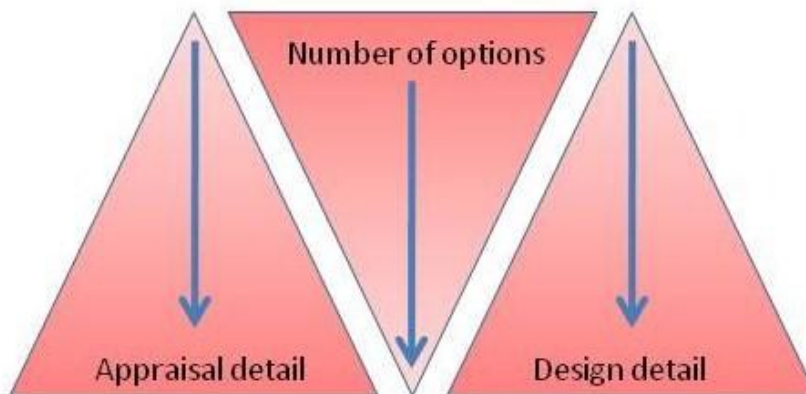
¹ HM Government (2005) UK Sustainable Development Strategy: Securing the Future TSO

Managing energy	The project shall consider the energy efficiency of the operation of trains and rail infrastructure (commensurate with the detail of design), as well as the energy requirements of construction and materials, as a means of establishing low energy priorities within the scheme as a whole.
Managing flood risk	The project shall aim to ensure no increase in flood risk. This would be achieved by maintaining overall flood storage capacity (through, in order of priority, option selection that avoids flood plains, infrastructure design and flood compensation) and minimising disruption of flood flows.
Protecting environmental resources	The project shall, where reasonably practicable, seek to avoid direct or indirect harm to valued landscape, water and ecological resources, and to enhance such resources where practicable. Measures to achieve this would be commensurate with the sensitivity of the resource and the level of protection afforded such resources through relevant laws and policies.
Protecting historic and cultural resources	The project shall seek to avoid direct or indirect harm to valued historic cultural resources and to enhance such resources where practicable. Measures to achieve this would be commensurate with the sensitivity of the resource and the level of protection afforded such resources through relevant laws and policies.
Controlling noise and vibration	Where reasonably practicable, the operation of HS2 infrastructure shall result in no significant adverse noise and vibration impacts to residents and other sensitive receptors near the route or proposed stations. Measures to mitigate potential impacts would be introduced, but where such impacts are unavoidable and cannot be appropriately mitigated, the project shall define circumstances under which residential properties shall be eligible for sound insulation.
Minimising property impacts	The project shall seek to avoid or, where this is not practicable, to minimise demolition of properties and, in particular, to minimise residential land-take and demolition.
Protecting communities	The project shall seek to maintain the health and amenity of residential communities potentially affected by the scheme. This shall include, where practicable, maintenance of access to services (such as health facilities, schools and places of worship) and shops, and maintenance of environmental conditions such that significant adverse effects on health and amenity are mitigated.
Safety	The project design shall seek to ensure that the travelling public and general public are not subject to increased risk of death or injury as a result of the operation of HS2 services.
Optimising the land resource	The project shall seek, where practicable, to use land with planning designation appropriate to development for high speed rail and its infrastructure. The project shall seek to maintain and enhance land use, so long as this does not compromise other sustainability design aims.

2.2 Sifting options

- 2.2.1 As option alignments were developed, the AoS made an important contribution to the options sifting process, ensuring that sustainability matters were considered along with other factors such as strategic fit, costs, engineering and operational feasibility and other practical considerations, and demand and benefits.
- 2.2.2 The detail of the AoS increased in step with the detail of scheme design, as shown in **Figure 2**. These different levels of appraisal are described in more detail in Section 5.

Figure 2 Options reduce as detail increases



2.3 Mitigating impacts

- 2.3.1 As well as establishing certain design principles and supporting the options sifting process, the AoS has also enabled certain adverse effects to be eliminated or reduced through mitigation and, towards the later stages of scheme development, for the Governments proposed route to be refined in order to achieve a better environmental performance. Different general types of mitigation are set out within a mitigation hierarchy.
- 2.3.2 The hierarchy, illustrated in **Figure 3**, reflects different mitigation strategies in order of preference, with avoidance the most preferred and compensation the least preferred. The opportunity to apply each of these types of mitigation tends to vary with the stage in the scheme life cycle. At the earliest stages, and well before designs are fixed, potentially adverse impacts may be avoided; for example by rejecting a damaging option in favour of a benign one. As scheme design increases in detail, flexibility to change it decreases and alternative mitigation strategies become appropriate. In the latest stages of the project lifecycle, with a design fixed and agreed, mitigation might only be possible by providing compensation for an adverse impact that is otherwise deemed unavoidable.
- 2.3.3 In the development of HS2 proposals to date, mitigation has focused on avoiding impacts (mostly through option selection, through use of tunnels and changes in horizontal and vertical alignment) and, to some extent, minimising impacts; for example through reducing the width of the rail corridor within sensitive environments to minimise landtake. Opportunities to abate, repair and compensate adverse impacts would emerge in later stages of scheme development if HS2 progresses further.

Figure 3 The mitigation hierarchy



3. Defining sustainability objectives

- 3.1.1 Sustainability appraisal is a technique used to determine whether policies, programmes or development proposals are consistent with stated objectives for sustainable development. Defining these objectives is the starting point. For HS2, the sustainability objectives were developed with reference to:
- the overall objectives for HS2;
 - the Government’s stated objectives and priorities for sustainable development and sustainable transport;
 - the sustainability issues of most direct relevance to a high speed railway; and
 - other core documents, including, DaSTS and NATA/WebTAG and the Rail Safety Standards Board (RSSB) Sustainable Development Strategy.
- 3.1.2 Drawing on this information, the AoS objectives for HS2 were developed initially as a long list, supported by a review of relevant policies, programmes and plans and taking account of the topic areas addressed by other assessment techniques. This list was then refined in the light of known sensitivities and baseline characteristics within the area between London and the West Midlands. The list was then structured in line with the UK Government’s four priority areas for action and their associated strategic indicators for reviewing progress.
- 3.1.3 A total of 18 key headline sustainability issues emerged from this process. A set of 33 sustainability objectives was developed to support the appraisal of these 18 issues, each supported in turn by one or more evaluation criteria and performance indicators. The objectives were devised as the best possible outcome, unconstrained by the need in practice to balance different objectives, for example economic benefits and costs. This allowed the sustainability performance of the scheme to be appraised independently. This function is distinct from the sustainable design aims (see Section 2.1).
- 3.1.4 The objectives have evolved through successive stages of consultation with the AoS Reference Group and were refined further through experience in application. For example, community integrity was introduced as a new issue in order to consolidate objectives previously captured in other parts of the AoS framework. The issues and sustainability objectives are summarised in **Table 1** below. The way that these issues align with other appraisal techniques is set out in Section 4.

Table 1 Key sustainability issues for HS2 and sustainability objectives for the AoS

Issue no.	Key sustainability issue	Sustainability objective
Reducing greenhouse gas emissions and combating climate change		
Issue 1:	Climatic factors and adaptability	Improve resilience of rail network against extreme weather events
Issue 2:	Greenhouse gases	Contribute to the reduction of greenhouse gas emissions by facilitating modal shift from road and air to rail Reduce relative contribution made by rail to greenhouse gas emissions by promoting energy efficient technologies
Natural and cultural and resource protection and environmental enhancement		
Issue 3:	Landscape and townscape	Maintain and enhance existing landscape character Maintain and enhance existing townscape character
Issue 4:	Cultural heritage	Preserve and protect archaeological assets Preserve and protect historic buildings Preserve and protect historic landscapes
Issue 5:	Biodiversity	Maintain and enhance biodiversity
Issue 6:	Water resources	Protect surface water resources Protect groundwater resources

Issue no.	Key sustainability issue	Sustainability objective
Issue 7:	Flood risk	Conserve and enhance the capacity of flood plains
Creating sustainable communities		
Issue 8:	Air quality	Maintain and enhance local air quality
Issue 9:	Noise and vibration	Maintain and enhance the local noise environment Maintain the local vibration environment
Issue 10:	Community integrity	Maintain and enhance community integrity
Issue 11:	Accessibility	Maintain and enhance pedestrian access Maintain and enhance access to public transport Maintain and enhance public transport interchange
Issue 12:	Health and well-being	Maintain and improve mental well-being Maintain and improve physical health Reduce health inequalities
Issue 13:	Security and safety	Contribute to the reduction of road traffic accidents Protect against crime and fear of crime
Issue 14:	Economic prosperity	Support economic competitiveness and make efficient use of public funds Support wider economic growth and maintain and enhance employment opportunities
Issue 15:	Economic welfare	Support wider economic welfare growth Support planned developments Maintain and enhance regeneration
Sustainable Consumption and Production		
Issue 16:	Soil and land resources	Maintain and enhance land resources Encourage the use of brownfield sites
Issue 17:	Waste generation	Prevent and minimise waste production
Issue 18:	Resource use	Conserve and protect primary material resources

4. Integrating other appraisal techniques

4.1.1 The AoS has drawn on a number of established appraisal techniques, which have themselves been devised to support strategic development of policies, programmes and plans. These appraisal techniques and the processes they support are summarised in **Table 2**. These appraisal techniques have been integrated with the AoS as far as is practicable and appropriate.

Table 2 Summary of sustainability appraisal tools

AoS tool	Details
Strategic Environmental Assessment (SEA)	Requirements for SEA are set out in the SEA Directive (European Directive 2001/42/EC) and the SEA Regulations (in England, the Environmental Assessment of Plans and Programmes Regulations 2004, and in Scotland, the Environmental Assessment (Scotland) Act 2005) that transpose this to the UK. These address the assessment of the effects of certain plans and programmes on the environment. The aim of SEA is the “provision of a high level of protection of the environment and contribution to integration of environmental considerations in the preparation and adoption of plans and programmes”. It allows for the communication of these effects to decision-makers, provides an opportunity for public consultation and ensures these effects are understood and then mitigated and/or monitored.
Sustainability Appraisal (SA)	Under the Planning and Compulsory Purchase Act 2004, SA is mandatory for certain spatial plans. The intention of undertaking SA is to promote sustainable development through the integration of social, environmental and economic considerations into the preparation of Regional Spatial Strategies (RSSs) and for new or revised development plan documents (DPD) and certain supplementary planning documents (SPD). SA incorporates the requirements of the SEA Directive, although the requirement to carry out a SA and an SEA are distinct from each other, as they are also from an AoS.

AoS tool	Details
The New Approach to Appraisal (NATA)/ WebTAG	<p>NATA is the UK Government framework used to appraise transport projects and proposals in the United Kingdom. Guidance on its application is found in the Transport Appraisal Guidance (TAG) also known as WebTAG (www.webtag.org.uk).</p> <p>NATA is a tool that builds on established cost-benefit analysis and environmental impact assessment techniques such as those contained in the Highways Agency's Design Manual for Roads and Bridges (DMRB) for assessing transport projects and proposals. NATA brings together the mass of detailed appraisal information about the effects of transport proposals, some of which are expressed in monetary terms, some using quantitative measures and some in qualitative terms.</p>
Environmental Impact Assessment (EIA)	<p>The requirements for EIA are defined by EC Directive 85/337/EEC, as amended and applied through relevant UK legislation, particularly the Town and Country Planning (Environmental Impact Assessment) Regulations 1999. Requirements for applications for TWA orders are applied through the Applications Rules. Requirements for EIA of Nationally Significant Infrastructure Projects are set out in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009²; The required content of an Environmental Statement (ES) is set out in Rule 11 and Schedule 1 to the Rules and reproduced in Annex 6 to the DfT's Guide to the TWA 2006.</p> <p>EIA is a process which identifies the environmental effects (both negative and positive) of a proposed development. It helps to ensure that the importance of these effects, and the opportunity for reducing them, are properly understood by the public and the relevant competent authority. EIA enables environmental factors to be given due weight, along with economic and social factors, when planning applications are being considered.</p>
Health Impact Assessment (HIA)	<p>HIAs are designed to check whether a policy, programme or project might reinforce health inequalities, or inadvertently damage people's health in its widest sense, namely (based on the WHO 1948 Constitution) "a state of complete physical, social and mental well-being, and not merely the absence of disease or infirmity".</p> <p>HIA is not a statutory requirement but is increasingly undertaken on the recommendation of administrative bodies such as the Select Committee on Health, which recommends its use for major planning proposals. Organisations, including the WHO, the Health Protection Agency, the London Health Commission and primary care trusts, have been promoting their use and have begun to develop good practice guides drawing on the experience of EIA.</p>
Equality Impact Assessment (EqIA)	<p>EqIA is a way of assessing the effects that a proposed policy, plan or proposal 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'.</p> <p>They 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.</p> <p>EqIA of new policies has been required since 2002 in the case of ethnicity, since 2006 in the case of disability, and since 2007 in the case of gender. The 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 and involved in preparing and publishing equality schemes setting out how the duty would be met.</p> <p>The Equality Act 2010 received Royal Assent on 8th April 2010 and came into force (in the main) on 1st October 2010. There is currently no official guidance on undertaking Equality Impact Assessments under the new law. However, although the range of characteristics that would be covered by such Assessments has been widened, the principles and the process are unlikely to change. Specific obligations under the new duty including Equality Impact Assessments are still in development.</p>
Habitats Regulations Assessment (including Appropriate Assessment)	<p>Under Article 6 of the Habitats Directive, the impact that plans and projects could have, 'in combination', on the integrity of Natura 2000 sites must be assessed. Natura 2000 sites are Special Areas of Conservation (SACs) for habitats and species, candidate SACs, Special Protection Areas (SPAs) for birds, and potential SPAs. In the UK, Ramsar wetland sites are also treated like Natura 2000 sites for the purposes of Habitats Regulations Assessment (HRA).</p> <p>Where a screening stage suggests that a plan or project could have a significant impact on the integrity of a Natura 2000 site, a more detailed appropriate assessment is required. If an appropriate assessment shows that a plan or project is likely to have a significant 'in combination' impact on site integrity, the plan or project can only be permitted if there are no alternative solutions, and there are imperative reasons of overriding public interest, and compensatory measures are put in place.</p>

² Infrastructure Planning (Environmental Impact Assessment) Regulations 2009

4.1.2 Although not a legal requirement, the AoS has been undertaken in line with the substantive requirements of SEA and SA. The way that the AoS report addresses the various elements of the SEA Directive is illustrated in **Table 3** below. In the event that HS2 is progressed further, it would need to be the subject of EIA, with much of the information contained in this report providing essential background to that process.

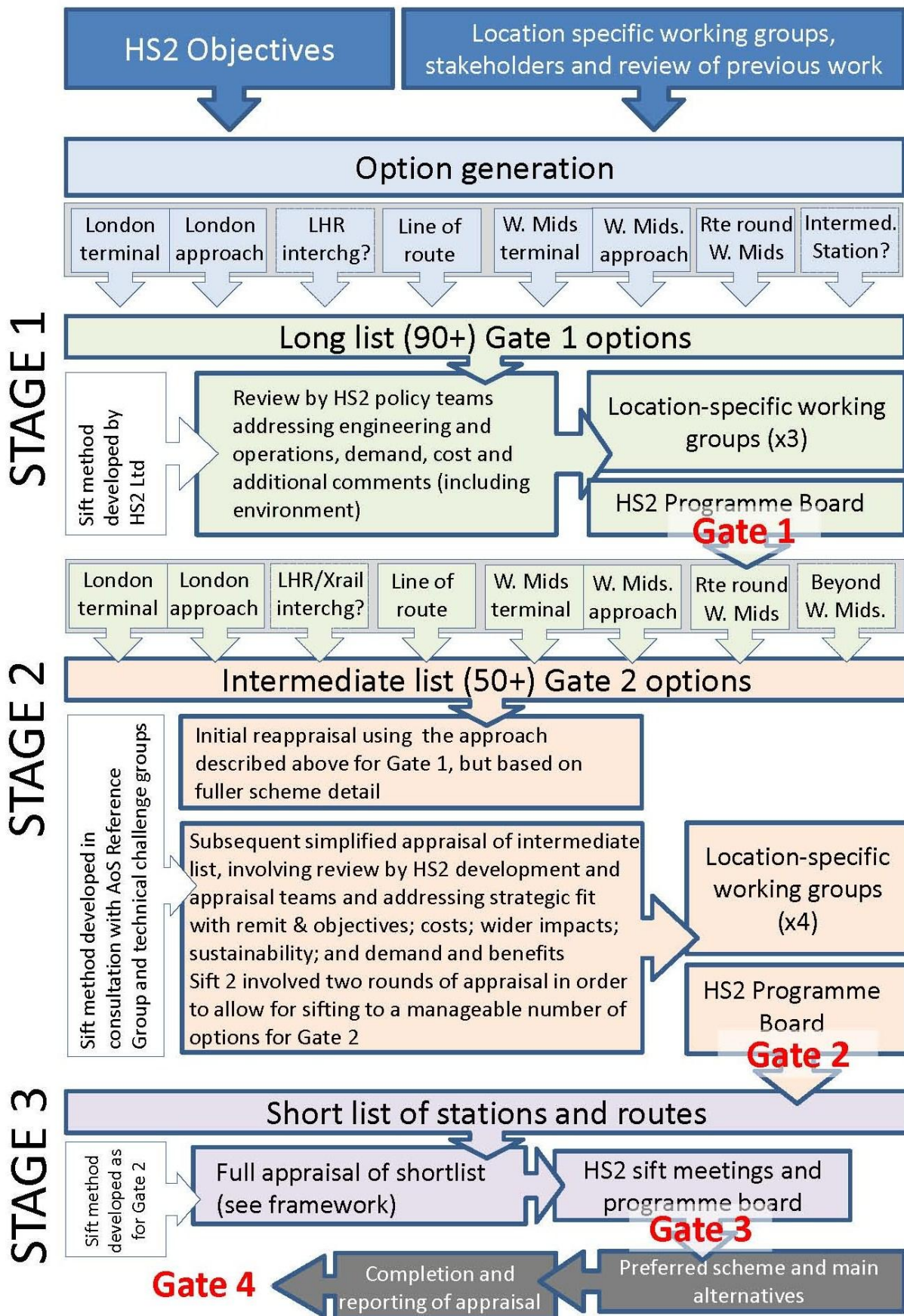
Table 3 SEA requirements and sign-posting summary

Requirement of the SEA Directive	Where this is done in the AoS for HS2
Preparing an environmental report in which the likely significant effects on the environment of implementing the plan, and reasonable alternatives taking into account the objectives and geographical scope of the plan, are identified, described and evaluated. The information to be given is (Article 5 and Annex I):	Overall AoS report
a) An outline of the contents, main objectives of the plan,	Para. 1.3.1 Ch. 3
and relationship with other relevant plans and programmes;	Ch. 6
b) The relevant aspects of the current state of the environment	Sec. 7.3-7.6
and the likely evolution thereof without implementation of the plan;	Vol. 2 maps Ch. 3
c) The environmental characteristics of areas likely to be significantly affected;	
d) Any existing environmental problems which are relevant to the plan including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC;	Sec. 7.7
e) The environmental protection objectives, established at international, Community or national level, which are relevant to the plan and the way those objectives and any environmental considerations have been taken into account during its preparation;	Ch. 6 Table 1 Vol. 2 indicators
f) The likely significant effects on the environment, including on issues such as	
• biodiversity,	8.6
• population, human health,	8.10, 8.11, 8.13, App. 4.2, 5.4, 5.6
• fauna, flora,	8.6
• soil,	8.17
• water,	8.7
• air,	8.9
• climatic factors,	8.3, 8.3, App. 2
• material assets,	8.11, 8.12, 8.15, App. 3
• cultural heritage including architectural and archaeological heritage,	8.5
• landscape and the interrelationship between the above factors.	8.4
(These effects should include secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative effects);	8.20 – 8.22
g) The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan;	blue boxes in Ch. 3 & 8
h) An outline of the reasons for selecting the alternatives dealt with, and	Addressed in <i>Consultation Document</i> , as well as chapters 4 & 5 and Appendix 1
a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information;	App. 1 sec. 8 App. 5
i) A description of measures envisaged concerning monitoring in accordance with Article 10;	Sec. 9.2
j) A non-technical summary of the information provided under the above headings	Separate summary

Requirement of the SEA Directive	Where this is done in the AoS for HS2
The report must include the information that may reasonably be required taking into account current knowledge and methods of assessment, the contents and level of detail in the plan, its stage in the decision-making process and the extent to which certain matters are more appropriately assessed at different levels in that process to avoid duplication of the assessment (Article 5.2)	
Consulting: <ul style="list-style-type: none"> • authorities with environmental responsibilities, when deciding on the scope and level of detail of the information which must be included in the environmental report (Article 5.4) 	Sec. 4.6
<ul style="list-style-type: none"> • authorities with environmental responsibilities and the public, to give them an early and effective opportunity within appropriate time frames to express their opinion on the draft plan and the accompanying environmental report before the adoption of the plan (Article 6.1, 6.2) 	Current consultation process
<ul style="list-style-type: none"> • other EU Member States, where the implementation of the plan is likely to have significant effects on the environment in these countries (Article 7). 	n/a
Taking the environmental report and the results of the consultations into account in decision-making (Article 8)	To be done in the future
Providing information on the decision: When the plan is adopted, the public and any countries consulted under Article 7 must be informed and the following made available to those so informed: <ul style="list-style-type: none"> • the plan as adopted • a statement summarising how environmental considerations have been integrated into the plan and how the environmental report of Article 5, the opinions expressed pursuant to Article 6 and the results of consultations entered into pursuant to Article 7 have been taken into account in accordance with Article 8, and the reasons for choosing the plan as adopted, in the light of the other reasonable alternatives dealt with; and • the measures decided concerning monitoring (Article 9) 	
Monitoring the significant environmental effects of the plan's implementation (Article 10)	

- 4.1.3 NATA/WebTAG has been important in establishing the AoS objectives and the AoS is consistent with the requirements of this appraisal tool.
- 4.1.4 A screening assessment for EqIA (Appendix 4-2) has been completed and the findings of this, together with some preliminary health impact findings, are reported in the main AoS report. The requirement for EqIA is contained within relevant legislation. The screening assessment has established that full EqIA is likely to be needed, although it would rely on the more refined scheme detail that would be developed following any decision to progress the scheme. The EqIA screening report contains mitigation recommendations for next stages.
- 4.1.5 The level of investigation of equality and health impacts is considered appropriate and proportionate given the current stage of scheme development. More detailed analysis would be undertaken as the scheme progresses with both HIA and EqIA accommodated as standalone studies, and with relevant findings accommodated, as appropriate, within the Environmental Statement.
- 4.1.6 The first (screening) stage of a Habitats Regulations Assessment has been completed (Appendix 4-1) and its findings have been used in the AoS.

Figure 4 The sifting of HS2 options



5. The AoS and option development

5.1 Overview

- 5.1.1 The *Consultation Document* describes the processes used to develop, review and sift scheme options that have taken HS2 Ltd from a long list of some 90 possibilities down to the proposed route and the main alternatives. **Figure 4** summarises how the options have been reduced and refined.
- 5.1.2 The contribution of the AoS to the options sifting and selection process has involved an increasingly more detailed examination of sustainability impacts as the number of options reduced. The iterative and structured nature of this process ensured that all elements of the multi-disciplinary team could contribute and participate in the development of a preferred option for the scheme.
- 5.1.3 A simplified AoS framework and full AoS framework provided the means of appraising and documenting this increasing detail at Sift 2 and Sift 3 respectively.

5.2 Sift 1

- 5.2.1 The initial long list of options was established by HS2 Ltd 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.
- 5.2.2 Options were proposed for different geographical elements of the HS2 scheme. These were initially tested in terms of their conformance with the stated objectives of the scheme.
- 5.2.3 An appraisal was then undertaken considering demand, engineering and operational feasibility and cost, together with any additional considerations, such as major environmental impacts.
- 5.2.4 Options presenting obvious significant operational difficulties or impacts that were considered to be 'show stoppers' for other reasons were progressed no further.

5.3 Sift 2

- 5.3.1 Options were developed on Ordnance Survey (OS) mapping in order to produce indicative centre-line alignments. Vertical alignments, junction locations and turnout geometry were not considered except where these could be a serious constraint on the horizontal alignment itself.
- 5.3.2 With an agreed intermediate list of just over 50 options emerging from Sift 1, Sift 2 applied a more refined level of examination. In order to differentiate between options more efficiently using "pairwise comparison" techniques, these were broken down into route segments or "strings" of route sections that could later be assembled into full length routes. For the sift 2 stage, this involved use of mapped environmentally sensitive features comprising:
- "Tier one" features of principally international or national significance that were mapped for the whole area affected by the route options; and
 - "Tier two" features that reflected a more refined level of detail for use at HS2 station option locations and, as necessary, at other locations where options were in close proximity and a greater detail was required in order to distinguish them in sustainability terms.

Table 4 Sustainability Criteria Used to Appraise Options at Gate 2

HS2 sustainability issue	Tier 1 information:	Tier 2 information:
Reducing greenhouse gases and combating climate change		
Climatic factors and adaptability	Not covered at Gate 2	
Greenhouse gases	<ul style="list-style-type: none"> Route length Length of tunnel and/or viaduct 	
Natural and cultural resource protection and environmental enhancement		
Landscape and townscape	<ul style="list-style-type: none"> Areas of Outstanding Natural Beauty (AONB) National Scenic Areas - Scotland 	<ul style="list-style-type: none"> Regional and local landscape designations London Protected Views Regional Landscape Designations (Scotland) – various designations
Cultural heritage	<ul style="list-style-type: none"> World Heritage Sites Scheduled Monuments Listed Structures (Grade I and II*) Registered parks and gardens (England) Gardens and Designed Landscapes (Scotland) Historic Battlefields 	<ul style="list-style-type: none"> Areas Of Archaeological Interest Listed Buildings (Grade II) Conservations areas(where information available)
Biodiversity	<ul style="list-style-type: none"> Sites of Special Scientific Interest (SSSI) - biological Actual and candidate Special Areas of Conservation (SAC) Actual and potential Special Protected Areas (SPAs) Ramsar including proposed National Nature Reserve (NNRs) Sites of Special Scientific Interest (SSSI) (geological) 	<ul style="list-style-type: none"> Local nature reserves (unless also SSSI) SINCs – various designations Ancient Woodlands Biodiversity Action Plan habitats Regionally Important Geological and Geomorphological Sites (RIGS) (where information available)
Water resources	<ul style="list-style-type: none"> Groundwater source protection zones/major aquifers 	<ul style="list-style-type: none"> Main Rivers and watercourses
Flood risk	<ul style="list-style-type: none"> Flood Risk Areas (zones 3) 	<ul style="list-style-type: none"> Flood Risk Areas (Zones 2 and flood defence)
Creating sustainable communities		
Community integrity Air quality Noise and vibration	<ul style="list-style-type: none"> Within 100m of residential area Within 250m of residential area 	<ul style="list-style-type: none"> Air quality management areas
Community integrity Equality of access	<ul style="list-style-type: none"> National Parks Regional Parks (Scotland)³ 	<ul style="list-style-type: none"> Registered Common Land Greens Open country Country Parks
Equality of access Health and wellbeing	<ul style="list-style-type: none"> Super Output Areas with lowest 50% indices of deprivation Super Output Areas with lowest 20% indices of deprivation 	
Employment and regeneration	<ul style="list-style-type: none"> Growth points Growth areas and 	

³ National Parks and Regional Parks were considered under Natural and cultural resource protection and environmental enhancement for Gate 3, following comments from Natural England and Defra.

HS2 sustainability issue	Tier 1 information:	Tier 2 information:
Productivity growth	<ul style="list-style-type: none"> Eco-towns and other major development areas 	
Security and safety	Not covered at Gate 2	
Sustainable consumption and production		
Soil and land resources	<ul style="list-style-type: none"> Green Belt (London specific: MOL Metropolitan Open Land) 	<ul style="list-style-type: none"> Minerals planning areas
	<ul style="list-style-type: none"> Agricultural Land (Grade 1 and 2) 	
	<ul style="list-style-type: none"> EA/SEPA registered “special sites” for contamination and registered landfills 	<ul style="list-style-type: none"> Contaminated Land Registers (local authority sites)
Waste generation Resource use	<ul style="list-style-type: none"> Demolitions (indicative)⁴ 	<ul style="list-style-type: none"> Demolitions
	<ul style="list-style-type: none"> Tunnelling length and major cuttings⁵ 	

5.4 Sift 3

5.4.1 The third sift was applied to a shortlist of full length routes and stations and was undertaken on the basis of a more developed project specification with design detail developed sufficiently to enable the specification to be met. This included 1:5000 scale plans showing:

- alignment and alignment geometry;
- profiles;
- cut depths;
- fill heights;
- earthworks profiles; and
- structures including tunnels, viaducts retained cuttings and overbridges.

5.4.2 A commensurate level of detail was developed for the station designs. This information was sufficient to allow for more detailed appraisal using the full AoS frameworks. The full frameworks provided the first opportunity to appraise the proposed scheme against at least some of the 33 sustainability objectives and their supporting evaluation criteria and performance indicators.

5.4.3 The frameworks were completed as far as possible using information that was both available at the time (information from the demand modelling was not available at this stage) and that would usefully help to distinguish between options. Some information, although vital in understanding sustainability performance, was not markedly different between options, for example for climate change, and therefore was not used to differentiate between alternatives. The full AoS framework as used at Sift 3 is presented in **Table 5** (greyed sections represent those criteria assessed at the preferred route level only). Although these greyed sections were not used to distinguish between route options the information collected in respect of them was, where appropriate, used to guide mitigation and as such were reported in the AoS.

⁴ Information is also proxy for information that required for Creating Sustainable Communities Objective

⁵ Information is also proxy for embedded energy (Combating Climate Change)

Table 5 The AoS framework

Issue	Equivalent NATA Objective or TAG Unit	Core Sustainability Objective	Evaluation Criteria (Measures / Indicators) ⁶	Contribution option would make to core sustainability objective						
				--	-	o	+	++	U	N/A
Reducing greenhouse gas emissions and combating climate change and its effects										
1. Climatic factors & adaptability	No NATA equivalent	1a. Improve resilience of rail network against extreme weather events	Length of line in cutting through geology vulnerable to landslip							
			Length of line at risk of flooding in Flood Zone 3. (H)							
2. Greenhouse gases	Reduce greenhouse gases. See also TAG Unit 3.3.5 <i>Greenhouse Gases Sub-Objective</i> & TAG Unit 3.5.4 <i>CBA</i>	2a. Contribute to the reduction of greenhouse gas emissions by facilitating modal shift from road and air to rail	Change in CO ₂ equivalent (CO ₂ e) emissions released as a result of modal shift achieved from conventional rail/road and flights to high speed rail							
			Carbon emissions resulting from construction in terms of embedded carbon and carbon emissions resulting from tunnel boring							
		2b. Reduce relative contribution made by rail to greenhouse gas emissions by applying energy efficient technologies	Relative efficiency in operations between high speed trains and rolling stock & classic trains							
Natural and cultural and resource protection and environmental enhancement										
3. Landscape and Townscape	Protect and enhance landscape. See also TAG Unit 3.3.7 <i>Landscape</i> & TAG Unit 3.3.6 <i>Environmental Capital</i>	3a. Maintain and enhance existing landscape character	Impacts on the coherence and distinctiveness of landscape resources of national importance crossed by surface or cut and cover sections, e.g. AONBs, ASVs, Special Landscape Areas, National Parks, National Scenic Areas (Scotland). (E, H)							

⁶ (E) refers to issues addressed by EIA, (H) refers to issues addressed by HIA and (Eq) refers to issues addressed by EqIA.

Issue	Equivalent NATA Objective or TAG Unit	Core Sustainability Objective	Evaluation Criteria (Measures / Indicators) ⁶	Contribution option would make to core sustainability objective							
				--	-	o	+	++	U	N/A	
			Impacts on the coherence and distinctiveness of landscape resources of regional importance crossed by surface or cut and cover sections, e.g. registered parks and gardens, Regional Landscape Designations (Scotland) (E, H)								
	Protect and enhance townscape. See also TAG Unit 3.3.8 <i>Townscape Sub Objective</i> & TAG Unit 3.3.6 <i>Environmental Capital</i>	3b. Maintain and enhance existing townscape character	Impacts on the coherence and distinctiveness of townscape resources crossed by surface or cut and cover sections (E, H)								
			No's of strategically important views and/or key vistas physically affected (E, H)								
4. Cultural heritage	Protect the heritage of historic resources See also TAG Unit 3.3.9 & TAG Unit 3.3.6 Env't Capital	4a. Preserve and protect archaeological assets	Impacts on World Heritage Sites and other assets of acknowledged international importance(E)								
			Impacts on Scheduled Monuments (SAMs) crossed by surface or cut and cover sections, e.g. Scheduled Ancient Monuments) (E)								
		4b. Preserve and protect historic buildings	Impacts on the character of heritage resources of national importance crossed by surface or cut and cover sections (Grade I and II* Listed Buildings, Scotland Category A) (E, H)								
			Impacts on the character of heritage resources of regional importance crossed by surface or cut and cover sections, e.g. Conservation Areas, Grade II Listed Buildings, Registered Parks and Gardens, Battlefield and Designed Landscapes (Scotland) (E, H)								

Issue	Equivalent NATA Objective or TAG Unit	Core Sustainability Objective	Evaluation Criteria (Measures / Indicators) ⁶	Contribution option would make to core sustainability objective							
				--	-	o	+	++	U	N/A	
		4c. Preserve and protect historic landscapes	Impacts on the coherence and distinctiveness of historic landscapes of international and national importance (E, H)								
5. Biodiversity	Support biodiversity See also TAG Unit 3.3.10 <i>Biodiversity Sub-objective</i> & TAG Unit 3.3.6	5a. Maintain and enhance biodiversity	Impacts on sites of international importance crossed by surface or cut and cover sections, e.g. SACs/cSACs, SPAs/cSPAs & Ramsar sites (E)								
			Impacts on sites of national importance crossed by surface or cut and cover sections, e.g. SSSIs, Geological SSSIs, NNRs. (E)								
			Impacts on sites of regional importance crossed by surface or cut and cover sections, e.g. RIGS, SINCs, BAP habitats. (E)								
			Area of potential new habitat creation(E)								
6. Water resources	Protect the water environment. See also TAG Unit 3.3.11 <i>Water Environment Sub-objective</i> & TAG Unit 3.3.6 <i>Environmental Capital</i>	6a. Protect surface water resources	Impacts on river catchments. (Area of catchment upstream of river crossing points, Number of major river crossings, number of minor river crossings). (E)								
			Impacts on surface water bodies. (Number of major river diversions, number of minor river diversions, impacts on artificial water bodies, impacts on reservoirs). (E, H)								
		6b. Protect groundwater resources	Impacts on groundwater Source Protection Zones (SPZs) (Length of cut or tunnel through SPZ1 and/or SPZ2) (E, H)								

Issue	Equivalent NATA Objective or TAG Unit	Core Sustainability Objective	Evaluation Criteria (Measures / Indicators) ⁶	Contribution option would make to core sustainability objective							
				--	-	o	+	++	U	N/A	
			Impacts on groundwater flow in strategic aquifers. (Length of cut or tunnel through aquifers classified as "good yield" and/or "good quality" under the WFD) (E, H)								
7. Flood risk	No NATA equivalent	7a. Conserve and enhance the capacity of floodplains	Extent of infrastructure within 1 in 100 year flood zones (Flood Zone 3) (E, H)								
			Extent of infrastructure within 1 in 1000 year flood zones (Flood Zone 2). (E)								
Creating sustainable communities											
8. Air quality	Improve local air quality. See also TAG Unit 3.3.9 <i>Local Air Quality Sub-objective</i> (n.b.: Strategic approach set out in Section 1.2) and 3.3.4 <i>Regional Air Pollution</i>	8a. Maintain and enhance local air quality.	Change in total emissions 'with' and 'without' option as a result of modal shift from road to rail within study area (E, H)								
			Impacts of stations on traffic AQ impacts in Air Quality Management Area (AQMA) (E, H, Eq)								
9. Noise & vibration	Reduce noise. See also TAG Unit 3.3.2 <i>Noise Sub-objective</i> (n.b.: Strategic approach set out in Section 1.5) and TAG Unit 3.3.2 <i>Supplementary Guidance</i>	9a. Maintain and enhance the local noise environment	Change in the population potentially annoyed by operational noise (E, H)								
			The Present Value of Benefits (PVB) for daytime operational-related residential noise								
	No NATA equivalent	9b. Maintain local vibration environment	Nos. of residential properties at risk of vibration and reradiated noise (E, H)								
10. Community integrity	No NATA equivalent	10a. Maintain and enhance community integrity	Nos. of properties demolished or affected by landtake (H)								
			Nos. of properties at high risk of isolation (H)								
			Properties in the 20% most deprived areas demolished or at high risk of isolation (H, Eq)								

Issue	Equivalent NATA Objective or TAG Unit	Core Sustainability Objective	Evaluation Criteria (Measures / Indicators) ⁶	Contribution option would make to core sustainability objective									
				--	-	o	+	++	U	N/A			
			Properties with disproportionately high numbers of equality groups demolished or at high risk of isolation, where known. (H, Eq)										
11. Accessibility	Reduce severance. See also TAG Unit 3.6.2 <i>Reducing Severance</i> Sub-Objective.	11a. Maintain and enhance pedestrian access	Nos. of strategic footpaths, bridleways, nature trails and cycle paths severed and/or requiring diversion (E, H, Eq)										
			Impacts on areas of open access, including common land and greens (H, Eq)										
	Improve access to the public transport system. See TAG Unit 3.6.3 & 3.6.1 <i>Option Values Sub-objective</i> .	11b. Maintain and enhance access to public transport	Potential for improved access to public transport for non-car users (H)										
			Potential to improve option values (H)										
			Population in the 20% most deprived areas with better access to public transport services (H, Eq)										
	Improve transport interchange. See TAG Unit 3.7.1 <i>Transport Interchange Sub-Objective</i>	11c. Maintain and enhance public transport interchange	Potential to improve public transport interchanges as a result of option (H, Eq)										
Ability to accommodate mobility impaired access with option(H, Eq)													
12. Health and well-being	Improve journey ambience. See TAG Unit 3.3.13 <i>Journey Ambience Sub-Objective</i>	12a. Maintain and improve mental well-being	Impacts on the key determinants of mental well-being (H, Eq)										
			No. of residential dwellings within 100m of surface sections of line (potential for nuisance during construction) (E, H)										
	No NATA equivalent		Impacts on areas with highest 20% of tranquillity scores (H)										

Issue	Equivalent NATA Objective or TAG Unit	Core Sustainability Objective	Evaluation Criteria (Measures / Indicators) ⁶	Contribution option would make to core sustainability objective						
				--	-	o	+	++	U	N/A
	Encourage physical fitness. See TAG Unit 3.3.12 <i>Physical Fitness Sub-Objective</i>	12b. Maintain and improve physical health	Potential to encourage a more healthy lifestyle (e.g. through more active travel options) when accessing the network (H)							
			Impacts on the key determinants of physical health (H)							
	No NATA equivalent	12c. Reduce health inequalities	Impacts on the key determinants of health inequality (H, Eq)							
13. Security and safety	Reduce accidents. See TAG Unit 3.4.1 <i>Accidents Sub-Objective</i>	13a. Contribute to the reduction of road traffic accidents	Change in likelihood of accidents as a result of option (modal shift) (H, Eq)							
	Improve security. See TAG Unit 3.4.2 <i>Security Sub-Objective</i>	13b. Protect against crime and fear of crime	Features that might increase crime or fear of crime (H)							
14. Economic prosperity	To support sustainable economic activity and get good value for money. See TAG Units 3.5.1 to 3.5.14.	14a. Support economic competitiveness and make efficient use of public funds	Net business impacts for transport users (i.e. excluding environmental and wider economic benefits and costs)							
		14b. Support wider economic growth and maintain and enhance employment opportunities	Changes in agglomeration, market competitiveness and labour productivity							
	Provide beneficial wider economic impacts. See TAG Unit Units 3.5.8 & 3.5.10 to 3.5.14,		Impacts on labour markets							
15. Economic welfare	Provide beneficial transport user impacts, wider economic impacts and integrate with land use policy. See TAG Unit Units 3.5.1 to 3.5.14, Tag Unit 3.7.2 <i>Land Use Policy Sub-Objective</i>	15a. Support wider economic welfare growth	Net benefits for consumers and commuters (Eq)							
		15b. Support planned developments	Impacts on planned regional growth areas							
			Impacts on planned major housing and sustainable housing developments							
		Impacts on other planned major developments								
15c. Maintain and enhance regeneration	Impacts on other defined regeneration areas (E, H, Eq)									

Issue	Equivalent NATA Objective or TAG Unit	Core Sustainability Objective	Evaluation Criteria (Measures / Indicators) ⁶	Contribution option would make to core sustainability objective						
				--	-	o	+	++	U	N/A
Sustainable Consumption & Production										
16. Soil and land resources	No NATA equivalent	16a. Maintain and enhance land resources	Impacts on Grade 1 & 2 agricultural land crossed by surface or cut and cover sections (E)							
			Area of land designated for mineral extraction that is sterilised as a result of option							
		Area of land designated for waste disposal physically affected by option								
		16b. Encourage the use of brownfield sites	Number of "high risk" brownfield sites brought back into beneficial use, either wholly or partially (E)							
17. Waste generation	No NATA equivalent	17a. Prevent and minimise waste production	Volumes of inert and non-hazardous waste spoil potentially requiring off-line disposal as a result of option							
			Volumes of hazardous waste spoil potentially requiring pre-treatment prior to off-site disposal							
18. Resource use	No NATA equivalent	18a. Conserve and protect primary material resources	Potential to make more efficient use of resources							
			Potential to re-use materials as a result of option (e.g. demolition materials)							

- 5.4.4 The completed frameworks were then used to inform a series of workshops at which different route options were compared in terms of sustainability performance. This allowed different sustainability issues to be considered equitably and overall sustainability preferences, where evident, to be established as being either clear or marginal.

Figure 5 The Sift 3 sustainability workshop



- 5.4.5 Outputs from the workshops, including completed templates, were used to inform option sift meetings involving the whole HS2 team, at which all attributes of different scheme options were compared and contrasted. In some cases, recommendations for overall preferences were possible immediately. In other cases the need for further work became evident. For example, the proposed crossing of the Chilterns presented particular challenges that were not resolved by this initial round of sifting. Further studies and route optimisation were necessary before designs emerged that were deemed acceptable. In other cases, existing designs were adapted in order to resolve particular shortcomings. One of the main alternatives presented in this report was the development of a new hybrid route out of two previous options⁷, in order to take advantage of the key attributes of each.

5.5 Work to report submission

For the time leading to the submission of the report, work on sustainability entailed re-appraising in full the proposed route and main alternatives, taking account of any modifications made during the later optimisation work of Sift 3, as well as other demand modelling forecasts, which affected issues such as socio-economics and climate change through modal shift.

6. Definitions of effects

- 6.1.1 Annex I of the SEA Directive requires an assessment of “the likely significant effects on the environment. These effects should include secondary, cumulative, synergistic, short, medium and long-term, permanent and temporary, positive and negative effects”. For the purpose of the AoS, these and other types of effect are defined in **Table 6** and in **Figure 6** Different types of effects

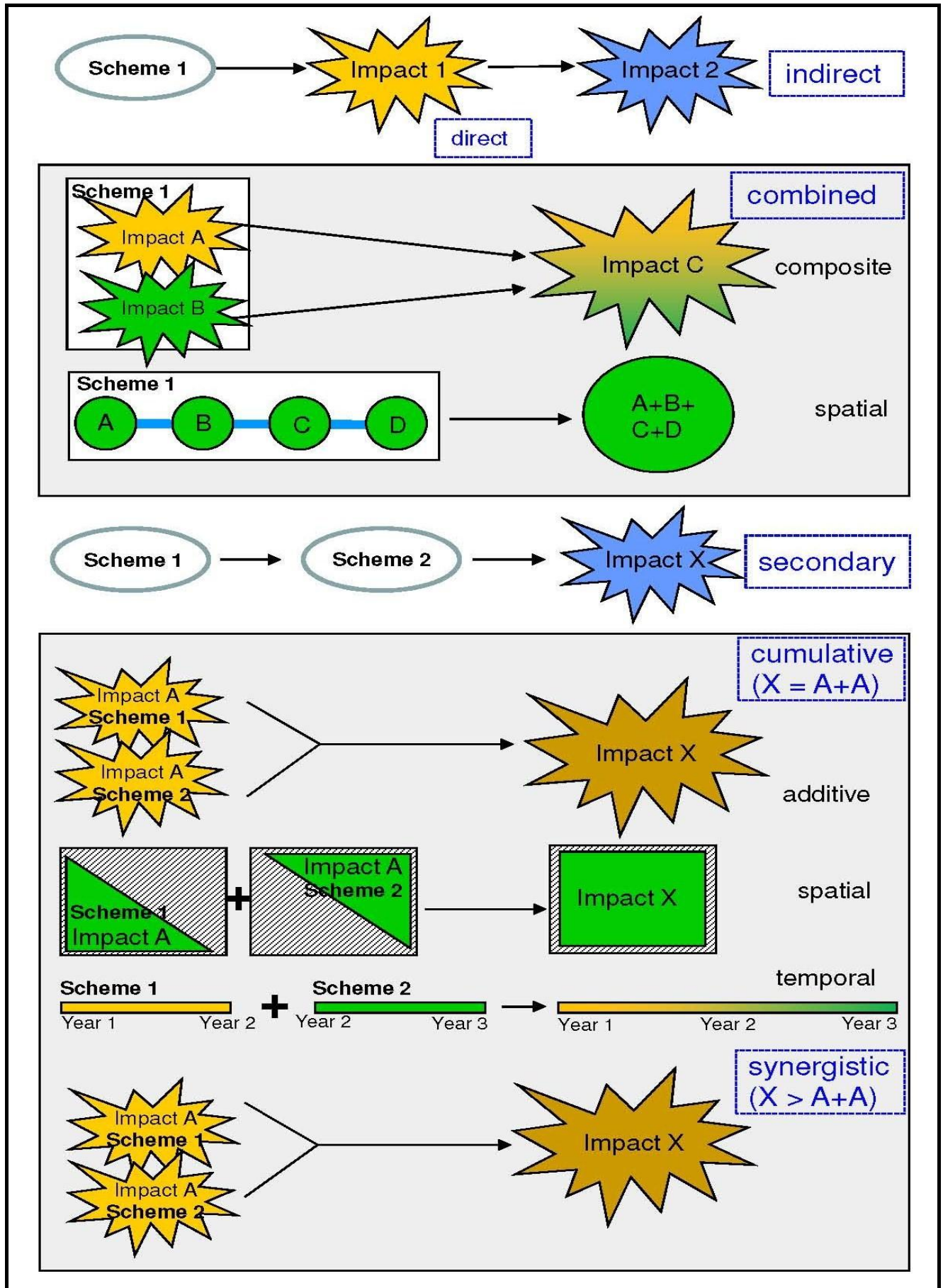
⁷ These were termed Option 2 and Option 3, with the hybrid termed Option 2.5, also referred to as Line of Route 2.5

- 6.1.2 The scope has been broadened to consider wider sustainability effects. The AoS report differentiates these types of effect where it is informative.
- 6.1.3 Impacts and effects are also differentiated here, an impact being defined as a change to the environmental, social or economic baseline (for example, increases in noise level or loss of woodland), whereas an effect is a consequence of the impact taking into account the sensitivity and/or value of the baseline resource or receptor (for example increased annoyance due to noise or depletion of a nationally scarce resource).

Table 6 Definitions of sustainability effects

Effect	Definition
Direct	The direct consequence of a change (impact) brought about by HS2 such as annoyance due to noise increase.
Indirect	A consequence, one or more steps removed, of a change (impact) brought about by HS2: e.g. climate change effects resulting from emissions of carbon dioxide from power generation for HS2.
Combined	An effect which results from two or more other impacts or effects from HS2 such as disturbance due to dust, construction noise and visual intrusion.
Secondary	An effect resulting from another plan or scheme whose existence, scale or intensity, is affected by HS2; e.g. landtake impacts due to development induced around HS2 station.
Cumulative	An effect which results from one or more effects from HS2 in combination with similar effects from one or more unrelated plans, schemes or actions; e.g. economic benefits due to developments at one location.
Synergistic	A type of cumulative effect which is greater than the sum of its constituent effects.
Temporary	An effect related to construction activity and restricted to the construction period.
Short-term	An effect that persists for up to a year following construction.
Medium-term	An effect that persists for up to five years following construction.
Long-term	An effect that persists for between five and fifteen years following construction.
Permanent	An effect lasting more than 15 years.
Positive	An effect that is supportive of a stated sustainability objective.
Negative	An effect that is contrary to a stated sustainability objective.

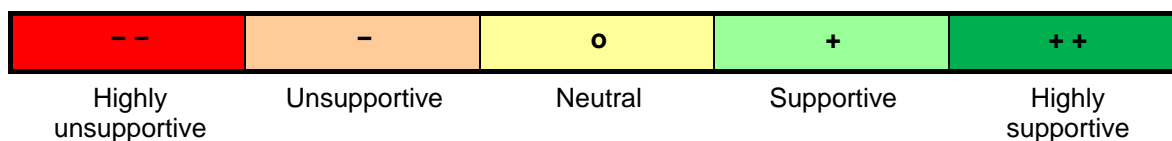
Figure 6 Different types of effects



- 6.1.4 Determining cumulative effects requires a certain number of assumptions to be made in order to establish those plans, programmes and schemes that are likely to be an influential part of the future baseline. Where they have been assumed as part of the baseline, then the effect from HS2 would inherently be a cumulative one, since it would be acting in combination with these other stated plans or schemes.

7. Evaluating scheme performance

- 7.1.1 For each of the evaluation criteria and performance indicators within the AoS framework, the assessors determined the degree to which the proposed scheme is supportive or unsupportive of it. This followed a five level scale as follows, with additional categories where the information was either not known at this stage or the criterion was not applicable to the section under review (signified by “U”).



- 7.1.2 The appraisal of each criterion was then used to determine how it measured against the evaluation of the overarching objective. This evaluation relied extensively on the WebTAG guidance for the relevant topics, which provides advice on determining an overall evaluation for several combined impacts and ensuring broad equitability between different topics (i.e. that a negative ecological conclusion is comparable with a negative noise conclusion). With respect to combined impacts, NATA Refresh⁸ states, in Chapter 5, paragraphs 26-27 (paraphrasing to make relevant to the AoS):

“Understanding the magnitude of the ... impacts can be more difficult when we try to consider their [combined] impacts. We might reasonably reach the conclusion that a ‘slight beneficial’ assessment of one impact broadly offsets a ‘slight adverse’ assessment elsewhere. This is because we would expect the magnitude of the impacts to be broadly similar.

When there are a number of ‘slight’ beneficial or ‘slight’ adverse assessments it can be difficult to understand whether when added together these should alter our provisional assessment. Ultimately, this is a matter of judgement about how many impacts move the [overall] assessment up or down and how sensitive the assessment is. Referring to previous assessments helps to ensure consistency in this judgement.”

- 7.1.3 With respect to impact equitability, Chapter 5, paragraph 28 states:

“It is difficult to compare a ‘slight’ [impact] with a ‘moderate’ or even ‘large’ [impact] across different [topics]. In examples of schemes where there is a variety of assessments, it is necessary to focus our attention on the largest impacts first. These impacts are the most likely to influence our assessment of [sustainability performance] and may be sufficient to cause us to alter our provisional view in isolation.”

- 7.1.4 This was certainly the case with the sifting process where the relative importance of different features was taken into account so that major adverse impacts were the key factors for deciding to cease further progress of an option or to subject it to mitigation in order to reduce this effect. Chapter 5, paragraph 29 states:

⁸ DfT (April 2009) ibid

“When we understand the sensitivity of the assessment we can make a judgement about whether the remaining impacts could be sufficient to alter our indicative view. This allows us to reach a final judgement about the [overall sustainability] of a scheme.”

- 7.1.5 The specialist workshops held during the appraisal process were vital in helping to determine whether appraisal summaries were equitable or not since they exposed each assessor’s conclusions to those of their peers, prompting debate and adjustment where necessary.

8. Assumptions, limitations and information gaps

- 8.1.1 This section should be read in conjunction with the specific assumptions and limitations set out for selected studies/topics, in Appendix 5 – Technical reports.
- 8.1.2 The AoS is robust in terms of what it set out to do i.e. to provide design guidance to the development of route (and station) options; to enable differentiation to be made between options in terms of their sustainability performance relative to each other; and to identify mitigation that can improve the preferred route option that became the proposed scheme. Information on the required level of detail for an SEA is contained in the Government document: *A Practical Guide to the Strategic Environmental Assessment Directive*. In particular the guide notes: ‘*An SEA need not be done in any more detail, or using any more resources, than is useful for its purpose. The Directive requires consideration of the significant environmental effects of the plan or programme, and of reasonable alternatives that take into account the objectives and the geographical scope of the plan or programme. It is desirable to provide sufficient commentary to justify the conclusions arrived at, with reference to the baseline information wherever possible*’.
- 8.1.3 The AoS is a strategic level appraisal and as such any impacts and effects identified and reported should be viewed as provisional at this stage. More detailed work would be carried out should HS2 be progressed further, as part of an EIA. A full EIA would be required under European legalisation.
- 8.1.4 Given the preliminary nature of the design work at this stage, the information regarding construction activities has necessarily been based on experience on other rail schemes and best practice. Consequently the approach to the appraisal has been tailored accordingly. Where the AoS team have been able to agree reasonable assumptions at relevant locations with the engineering design team these assumptions have been documented and are set out as part of the assumptions detailed in the technical reports (see Appendix 5). Operational parameters assumed in the AoS are contained in Section 3 of the AoS Main Report (Volume 1).
- 8.1.5 Consultation has in general been led by HS2 Ltd and much of the sustainability work has been addressed through the AoS Reference Group (which includes relevant statutory agencies). In addition, there has also been direct liaison between HS2 Ltd and interested parties (e.g. Birmingham City Council and Advantage West Midlands) with respect to specific issues. Given the nature of the scheme and routes at the time the consultation has, by necessity, focused on those bodies whose responsibilities lie in the sustainability issues potentially affected. Where discussion has taken place this has been commensurate with the level of detail appropriate to the AoS at this stage. More detailed discussions and further interested parties would be engaged at the next stage should HS2 be progressed further.
- 8.1.6 The AoS has been based on desk top studies supplemented by a limited number of site visits. No actual baseline (or field) measurements have been carried out as part of the AoS and the appraisals have largely been based on published information except where further information has been sourced by HS2 Ltd.

- 8.1.7 Commensurate with the strategic nature of the AoS a high level review of policy has been undertaken from international to national and regional levels to ascertain the extent to which the concept of HS2 is in line with current policy, principally with regard to achieving sustainable development which is now central to all planning and related policy. Given the high level nature of the review, detailed local policy context has only been considered where this is likely to present significant implications for local development or strategies. Therefore, local planning impact has only been evaluated at the various proposed station locations and approaches or where a route alignment affects principal development zones e.g. growth points or growth areas, eco towns or other major development initiatives.
- 8.1.8 A number of aspects of the AoS (the effects on air quality, climate change, noise and socio-economics) depend on projections of demand for services which would either run on HS2 itself or on the WCML as a result of paths on that line being released with the introduction of alternative inter-city services on HS2. The demand analysis has been developed by HS2 Ltd and this report relies on that analysis where appropriate and to the extent to which that analysis to date contributes to the AoS process. Reference should be made to the relevant reporting for details of that work. The timescales of the demand modelling output and the nature and extent of these outputs meant that the approach to some topics had to be modified at a late stage, and as such the full extent of any potential benefits of HS2 may be understated in the AoS.
- 8.1.9 The approach to appraising properties that may be at risk of demolition has varied between rural and urban areas. In rural areas, properties within 25m of the centreline have been considered likely to be demolished and properties within 25m either side of this are considered at risk of land take. Properties (derived from address points⁹) within this buffer are assumed to be affected by land take and demolition. Further design development would almost certainly reduce the reported number of affected buildings. In urban areas, and at stations, the identification of affected properties has been conducted manually in combination with Ordnance Survey terrestrial data and with HS2 plan and profile drawings. Some mitigation measures have already been incorporated into these drawings, and are reflected in the property counts. Although these numbers are reported to a greater level of accuracy, further design might also alter the actual number of affected buildings.
- 8.1.10 The level of detail of the appraisal of carbon impacts is dependent on the results of the demand model. Preliminary results from the demand model are available at present for the proposed route and therefore comparison has yet to be made between the proposed route and either the Reference Case (do-minimum) or the alternative scenarios.
- 8.1.11 The preliminary demand results of the model were available in summary form so the results do not as yet provide any indication of the range in values for each parameter or of the expected distribution of values within the range (e.g. normal, log-normal, etc.).
- 8.1.12 The preliminary results allow for decoupling the transport model from the calculation of carbon emissions associated with electricity generation, road fuel consumption and aviation at a macro level. The results of carbon calculations have been reported in terms of UK wide annual mean totals.
- 8.1.13 Demand model results that were available at the time meant that the results of carbon calculations were not expressed in terms of seat-kilometre or passenger-kilometre for different modes of transport (as requested by the Climate Change Working Group).
- 8.1.14 It is envisaged that the carbon appraisal would be refined over time as the scheme design and operating model are developed and the demand model work completed.

⁹ Property counts were derived from Ordnance Survey digital data sets which combine digital map data bases with postcode addresses to provide a unique 'address point' defining the location and use of each property.

Notwithstanding these limitations, the simplifications to the methodology made at this time still allow for the implications of external policies specific to carbon (i.e. number of flights in the UK and the carbon intensity of both electricity generation and road fuel) to be determined in terms of HS2.

Annex 1: GIS Datasets

National GIS Datasets	Information Source	Date Received
National Forest	National Forest Company	01/06/2009
Flood Risk Areas (Zones 3) - study area only	Environment Agency	01/06/2009
Groundwater Source Protection Zones (major aquifers) - study area only	Environment Agency	01/06/2009
EA Historic and Authorised landfills (study area only)	Environment Agency	01/06/2009
Flood Risk Areas (Zones 2 and flood defence) - study area only	Environment Agency	01/06/2009
National Parks	Natural England	01/06/2009
Country Parks	Natural England	15/06/2010
World Heritage Sites	English Heritage	01/06/2009
Countryside Stewardship Agreements	Natural England	01/06/2009
Environmentally Sensitive Areas	Natural England	01/06/2009
European Diploma Areas	Natural England	01/06/2009
Joint Character Areas	Natural England	18/08/2009
National Inventory of Woodland and Trees	Forestry Commission	01/06/2009
Green Belt	Communities and Local Government	15/06/2009
Areas of Outstanding Natural Beauty (AONB)	Natural England	16/08/2010
Areas of Scenic Value (ASV) - Scotland	Historic Scotland	15/06/2009
Historic Battlefields	English Heritage	15/06/2009
Super Output Areas (SOA) with lowest 50% indices of deprivation	Communities and Local Government	23/06/2009
Super Output Areas (SOA) with lowest 20% indices of deprivation	Communities and Local Government	23/06/2009
Community Forests	Forestry Commission	23/06/2009
Sites of Special Scientific Interest (SSSIs)	Natural England	17/08/2010
Growth Areas	Communities and Local Government	01/07/2009
Special Landscape Areas	Natural England	01/07/2009
Local Nature Reserves	Natural England	17/08/2010
National, Regional and Local Cycle Routes	Sustainable Transport	07/07/2009
Registered Parks and Gardens/ Regional Parks (Scotland) and Gardens and Designed Landscapes (Scotland)	Natural England	10/07/2009
Forestry Commission Woodland Data	Forestry Commission	13/07/2009
Geological Data (Land/Soil type, fault lines etc)	British Geological Society	14/07/2009
Scheduled Monuments (SMs)	English Heritage	12/10/2010
Listed Structures (Grade I and II*)	English Heritage	12/10/2010
Ancient Woodlands	Natural England	13/05/2010
Listed Buildings (Grade II)	English Heritage	12/10/2010
National Nature Reserve (NNRs)	Natural England	10/08/2010
Public Open Space (Open Access Areas)	Natural England	23/09/2009
Biogenetic Reserves (Scotland)	Scottish Natural Heritage	01/08/2009
Biosphere Reserves (Scotland)	Scottish Natural Heritage	01/08/2009
National Rail Network	Network Rail	01/08/2009

National GIS Datasets	Information Source	Date Received
Biodiversity Action Plan Habitats	Natural England	02/08/2009
Special Areas of Conservation (SACs)	Natural England	10/08/2010
Special Protection Areas (SPAs)	Natural England	10/08/2010
Ramsar	Natural England	10/08/2010
Agricultural Land (Grade 1 and 2)	Natural England	11/08/2009
National Trust Land Ownership and Covenant Land	National Trust	13/08/2009
Flood Storage Areas (England, Wales)	Environment Agency	21/09/2009
Groundwater Source Protection Zones (England, Wales)	Environment Agency	21/09/2009
Flood Zones 2 and 3 (England, Wales)	Environment Agency	21/09/2009
Waterbodies Shapefile (England, Wales)	Environment Agency	21/09/2009
DRN (Detailed River Network) (England, Wales)	Environment Agency	21/09/2009
Authorised and Historic Landfill Sites (England, Wales)	Environment Agency	21/09/2009
Registered Common Land	Natural England	23/09/2009
Royal Society for the Protection of Birds Sites	RSPB	23/09/2009
Countryside and Rights of Way - Access Layer	Natural England	23/09/2009
Countryside and Rights of Way - Conclusive Open Country	Natural England	23/09/2009
Countryside and Rights of Way - Conclusive Registered Common Land	Natural England	23/09/2009
Countryside and Rights of Way - S16 Dedicated Land	Natural England	23/09/2009
Countryside and Rights of Way - Open Access Mapping	Natural England	23/09/2009
Registered Parks and Gardens	Natural England	10/08/2010

Information Acquired from Local Authorities	Information Source	Date Accessed
London of Borough of Camden		
Listed Buildings	LB Camden	14/09/2009
Local Conservation Areas	LB Camden	14/09/2009
Public Open Space	LB Camden	14/09/2009
Birmingham City Council		
Statutory Listed Buildings	Birmingham City Council	14/08/2009
Locally Listed Buildings	Birmingham City Council	14/08/2009
Local Areas of Conservation	Birmingham City Council	14/08/2009
Ancient Woodlands	Birmingham City Council	14/08/2009
Local Nature Reserves	Birmingham City Council	14/08/2009
Sites of Importance for Nature Conservation	Birmingham City Council	14/08/2009
Wildlife Action Areas	Birmingham City Council	14/08/2009
Wildlife Corridors	Birmingham City Council	14/08/2009
London Borough of Hammersmith and Fulham		
Listed Buildings	LB Hammersmith and Fulham	23/09/2009
Local Conservation Areas	LB Hammersmith and Fulham	23/09/2009
Public Open Space	LB Hammersmith and Fulham	23/09/2009
London Borough of Ealing		
Local Conservation Areas	LB Ealing	12/10/2009
Local Listed Buildings	LB Ealing	12/10/2009
Statutory Listed Buildings	LB Ealing	12/10/2009

Information Acquired from Local Authorities	Information Source	Date Accessed
Public Open Space	LB Ealing	12/10/2009
Buckinghamshire District Council		
Biodiversity Action Plan Habitats	Buckinghamshire DC	23/10/2009
Common Land and Village Greens	Buckinghamshire DC	23/10/2009
Definitive Rights of Way	Buckinghamshire DC	23/10/2009
Green Spaces and Country Parks	Buckinghamshire DC	23/10/2009
Historic Towns	Buckinghamshire DC	23/10/2009
Listed Buildings	Buckinghamshire DC	23/10/2009
Minerals Safeguarded Areas	Buckinghamshire DC	23/10/2009
Other Archaeology	Buckinghamshire DC	23/10/2009
Proposed Aylesbury Growth Area and Major Development Areas	Buckinghamshire DC	23/10/2009
Strategic Green Infrastructure	Buckinghamshire DC	23/10/2009
Potential Reptile Habitats	Buckinghamshire DC	23/10/2009
Chinese Water Deer Records	Buckinghamshire DC	23/10/2009
Wintering Birds Survey	Buckinghamshire DC	23/10/2009
Breeding Birds Survey	Buckinghamshire DC	23/10/2009
Badgers Survey	Buckinghamshire DC	23/10/2009
Biological Notification Areas	Buckinghamshire DC	23/10/2009
County Wildlife Sites	Buckinghamshire DC	23/10/2009
Local Nature Reserves	Buckinghamshire DC	23/10/2009
Local Wildlife Sites	Buckinghamshire DC	23/10/2009
Special Areas of Conservation (SACs)	Buckinghamshire DC	23/10/2009
Sites of Specific Scientific Interest (SSSIs)	Buckinghamshire DC	23/10/2009
Special Protection Areas (SPAs)	Buckinghamshire DC	23/10/2009
Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) - Protected Sites	Buckinghamshire DC	23/10/2009
Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) - Notable Species	Buckinghamshire DC	23/10/2009
Aylesbury Vale District Council		
Major Development Areas	Aylesbury Vale DC	21/10/2009
Growth Areas	Aylesbury Vale DC	21/10/2009
Employment Areas	Aylesbury Vale DC	21/10/2009
Housing Development Area	Aylesbury Vale DC	21/10/2009
South Buckinghamshire District Council		
Conservation Areas 2003	South Buckinghamshire DC	21/10/2009
Listed Buildings	South Buckinghamshire DC	27/10/2009
GB14 Wilton Park	South Buckinghamshire DC	21/10/2009
Nuneaton and Bedworth Borough Council		
Conservation Areas	Nuneaton and Bedworth Borough Council	26/10/2009
Land Use	Nuneaton and Bedworth Borough Council	26/10/2009
Habitat Biodiversity Audit	Nuneaton and Bedworth Borough Council	26/10/2009

Information Acquired from Local Authorities	Information Source	Date Accessed
Public Accessible Land	Nuneaton and Bedworth Borough Council	26/10/2009
Strategic Flood Risk Assessment	Nuneaton and Bedworth Borough Council	26/10/2009
Regionally Important Geological Sites (RIGs)	Nuneaton and Bedworth Borough Council	26/10/2009
Tree Preservation Orders	Nuneaton and Bedworth Borough Council	26/10/2009
Landscape Character Assessment	Nuneaton and Bedworth Borough Council	26/10/2009
Local Wildlife Sites	Nuneaton and Bedworth Borough Council	26/10/2009
Local Nature Reserves	Nuneaton and Bedworth Borough Council	26/10/2009
London Borough of Hillingdon		
Special Local Character	LB Hillingdon	09/11/2009
Cemeteries and Crematorium	LB Hillingdon	09/11/2009
Golf Course Boundaries	LB Hillingdon	09/11/2009
Landfills	LB Hillingdon	09/11/2009
Parks and Recreation Grounds	LB Hillingdon	09/11/2009
Grade I, II* and II Listed Buildings	LB Hillingdon	09/11/2009

Annex 2: Definition of sustainability terms

Sustainability Criteria	Description
Reducing Greenhouse Gases and Combating Climate Change	
Route characteristics	<p>There is little that can be used to distinguish route options in terms of climate impact. Information on line speed and the number of stops (parkway and intermediate stations requiring greater energy use in slowing and accelerating trains) gives an approximate idea of relative energy requirements at the operational phase.</p> <p>Information on infrastructure requirements gives an indication of potential differences in embedded carbon, with large concrete structures requiring considerable energy to manufacture and build. Tunnels form the most energy-intensive structures, both in terms of the amount of raw material (mostly concrete) required, and the energy required for tunnel excavation and spoil disposal.</p>
Natural and Cultural Resource protection and Environmental Enhancement	
National Parks	<p>The national parks of England and Wales are areas of relatively undeveloped and scenic landscape that are designated under the National Parks and Access to the Countryside Act 1949. The two purposes of the National Park designation are to conserve and enhance the natural beauty, wildlife and cultural heritage of the area; and to promote public understanding and enjoyment of the areas special qualities by the public. In pursuing these purposes, a National Park authority shall seek to foster the economic and social well-being of their local communities. If there arises a conflict between the two purposes, relevant authorities shall give greater weight to the conservation and enhancement purpose.</p> <p>The National Parks (Scotland) Act 2000 enabled the establishment of National Parks in Scotland. In addition to the two purposes described above, National Parks in Scotland are designated to promote the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. These purposes have equal weight and are to be pursued collectively unless conservation interests are threatened.</p> <p>As well as representing a natural and cultural resource, National Parks may equally be considered as crucial in their support of sustainable communities.</p>
Areas of Outstanding Natural Beauty (AONB) – England	<p>AONBs have equivalent status to National Parks as far as conservation is concerned. AONBs are designated under the National Parks and Access to the Countryside Act 1949. The Countryside and Rights of Way Act 2000 added further regulation and protection.</p> <p>The single purpose of AONB designation is to conserve and enhance the natural beauty of the area. Where there is a Conservation Board (as in the Chilterns AONBs), the Board has an additional purpose of increasing the understanding and enjoyment by the public of the special qualities of the area. A Board must also seek to foster the economic and social well-being of their local communities. If it appears to a Board that there is ever a conflict between these two purposes, it must give greater weight to the conservation and enhancement purpose.</p>
London Protected Views (Strategically designated views)	<p>The London Plan requires that the Mayor of London designate a selected set of strategically important views. It requires that the Mayor will, and boroughs should, assess development proposals where they fall within the assessment areas of (listed) designated views against general principles of good design, local urban design policies, and management principles.</p> <p>Policies 4B.16, 4B.17 and 4B.18 of the London Plan relate to protected views and seek to designate, protect and manage twenty-six views of London and some of its major landmarks. The views designated by the London Plan are classified in four ways. They are panoramas across substantial parts of London ('London Panoramas'); views of landmarks framed by objects in the landscape ('Linear Views'); broad prospects along the river Thames ('River Prospects'); or views of the urban townscape ('Townscape Views'). Each view has specific characteristics that contribute to an appreciation of London at the strategic level. New development should make a positive contribution to the characteristics and composition of the Designated Views.</p> <p>In July 2007, the Mayor published the London View Management Framework Supplementary Planning Guidance which provides guidance on the policies in the London Plan. Further, the Mayor published the draft London View Management Framework in June 2009 for consultation.</p>
Local Landscape Designation	<p>A non-statutory local / county-wide designations adopted by planning authorities. PPS7 (paragraph 25) has discouraged their retention in English planning documents, favouring instead the use of criteria-based policies using tools such as landscape character assessment in preference to rigid local designations. However, they remain a material consideration in preparing plans and strategies and in planning decisions where it is felt that criteria-based planning policies cannot provide the necessary protection to valued landscape. Local Landscape Designations have more relevance in Scotland where they are an important tool in safeguarding and enhancing Scotland's landscape.</p>
World Heritage Sites	<p>World Heritage Sites are designated to meet the UK's commitments under the 1972 World Heritage Convention concerning the Protection of the World Cultural and Natural Heritage. These sites are designated for their globally important cultural or natural interest and require appropriate management</p>

Sustainability Criteria	Description
	and protection measures. Sites are nominated and confirmed for inclusion on the list maintained by the international World Heritage Programme administered by the UNESCO World Heritage Committee, composed of 21 State Parties (countries) which are elected by the General Assembly of States Parties for a fixed term.
Scheduled Monuments	Defined in the Ancient Monuments and Archaeological Areas Act 1979 and (in England only) through the National Heritage Act 1983 as a protected archaeological site or historic building of national importance. The Department of Culture, Media and Sport are responsible for identifying and scheduling (registering) new sites, as well as ensuring that scheduled sites are protected. Scheduled Monument Consent is required from the Secretary of State prior to any work affecting a monument taking place. English Heritage (EH) would advise in these matters.
Listed Buildings	A listed building is one that is 'of special architectural or historic interest' and has been included on a list kept by the Secretary of State. A listed building may not be demolished, extended or altered without special permission (listed building consent) from the local planning authority (who typically consult English Heritage/Cadw/Historic Scotland). In England and Wales the authority for listing is granted by the Planning (Listed Buildings and Conservation Areas) Act 1990. Listed buildings are classified according to their importance and are given a grade depending on how important they are:
	<ul style="list-style-type: none"> • Grade I: of outstanding architectural or historic interest
	<ul style="list-style-type: none"> • Grade II*: particularly significant of more than local interest • Grade II¹⁰: of special architectural or historic interest
Conservation Areas	An area of special architectural or historic interest, designated under the Planning (Listed Buildings & Conservation Areas) Act 1990, whose character and appearance it is desirable to preserve and enhance. There are special rules on some development in conservation areas.
Registered Parks and Gardens (England)	Parks and gardens listed within the Register of Parks and Gardens of special historic interest in England, which was established and is maintained by English Heritage. There are currently close to 1,450 sites on the register split into 3 bands according to their significance. Inclusion on the Register brings no additional statutory protection, but local authorities are required by central government to make provision for the protection of the historic environment in their policies and their allocation of resources. Registration is a material consideration in planning terms so, following an application for development which would affect a registered park or garden, local planning authorities must, when determining whether or not to grant permission, take into account the historic interest of the site.
	<ul style="list-style-type: none"> • Grade I: of outstanding landscape and historic interest
	<ul style="list-style-type: none"> • Grade II*: particularly significant landscape and historic interest • Grade II: of special landscape and historic interest
Historic Battlefields	The English Heritage Register of Historic Battlefields offers protection for the 43 English battlefields and promotes a better understanding of their significance. Each Register entry is based on the available evidence and includes a map of the battlefield area showing the position of the armies and features which were part of the original battleground. These maps are intended to be the starting point for battlefield conservation and interpretation by identifying the most visually sensitive areas. The inclusion of a site on the register does not give any statutory protection but it is a material consideration when a local planning authority determines a planning application. At the time of writing the Scottish Government had issued the go-ahead for an inventory for all Scottish historic battlefields to be created by local authorities and Historic Scotland. The list is expected to be complete by 2011. Currently these sites are covered by archaeological and landscape designations.
Actual and candidate Special Areas of Conservation (SAC/cSAC)	SACs are designated under Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the EU "Habitats Directive") as areas identified as best representing the range and variety of habitats and (non-bird) species listed in Annexes I and II to the Directive within the European Union. SACs in terrestrial areas and marine waters within British Fishery limits (up to 200 nautical miles) are designated under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). With SPAs (see below) they form the Natura 2000 network.
Actual and potential Special Protection Areas (SPA/pSPA)	SPAs are classified by the UK Government under Directive 79/409/EEC on the conservation of wild birds (the EU "Birds Directive"). SPAs are areas of the most important habitat for rare (listed on Annex I in the Directive) and migratory birds within the European Union. SPAs in terrestrial areas and marine waters within British Fishery limits (up to 200 nautical miles) are designated under the Wildlife and Countryside Act 1981 but governed by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). With SACs (see above) they form the Natura 2000 network.

¹⁰ Although a national designation, Grade II buildings are deemed of Tier 2 status

Sustainability Criteria	Description
Sites of Community Importance (SCIs)	In accordance with the EU Habitats Directive, a site of Community importance means a site which, in the biogeographical region or regions to which it belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a natural habitat type in Annex I or of a species in Annex II of the Directive and may also contribute significantly to the coherence of Natura 2000 network, and/or contributes significantly to the maintenance of biological diversity within the biogeographic region or regions concerned. For animal species ranging over wide areas, sites of Community importance shall correspond to the places within the natural range of such species which present the physical or biological factors essential to their life and reproduction.
RAMSAR	Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. The Convention covers all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities.
Biosphere reserves	Biosphere reserves are areas of terrestrial and coastal ecosystems promoting solutions to reconcile the conservation of biodiversity with its sustainable use. They are internationally recognized, nominated by national governments and remain under sovereign jurisdiction of the states where they are located (UNESCO).
National geoparks	Geoparks are nationally protected areas with outstanding geological heritage. The Global Network of National Geoparks assisted by UNESCO provides a worldwide platform of active cooperation between experts and practitioners in geological heritage.
Biogenetic reserves	Biogenetic reserves act as 'living laboratories' and are representative examples of various types of natural environment in Europe. They can consist of natural or semi-natural habitats and their selection is based on their value for nature conservation and protected status based on four criteria: 'typical', 'unique', 'rare' and/or 'endangered' which can be applied to habitats or species. The protected status must be adequate to ensure the conservation or management of the sites in the long term in accordance with fixed objectives.
EU Diploma Sites	The European Diploma is an award established by the Council of Europe under Regulation (65) 6 of the Committee of Ministers of the Council of Europe of 6 March 1965 for certain landscapes, reserves and protected national features, and Resolution (73) 4 of 19 January 1973 on the Regulations for the European Diploma (amended and revised by Resolution (88) 39 of 5 December 1988, (89) 12 of 19 June 1989 and (91) 16 of 17 June 1989). By awarding the European Diploma, the Council of Europe recognises that the area is of particular European interest for natural-heritage and that the area is properly protected. The Diploma can be awarded to national parks, nature reserves or natural areas, sites or features. The award is for a five-year period. Annual reports are required for each area, and the renewal of the award at 5 years is only made after independent assessment of the site. The Diploma can be withdrawn at any time if the area comes under threat or suffers serious damage.
National Nature Reserves (NNRs)	NNRs contain examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats or to provide special opportunities for scientific study of the habitats communities and species represented within them. NNRs are declared by the statutory national conservation agencies (NE, SNH, CCW) under the National Parks and Access to the Countryside Act 1949 and the Wildlife and Countryside Act 1981.
Sites of Special Scientific Interest (SSSI)	Identified by Natural England (or SNH in Scotland) under section 28 of the Wildlife & Countryside Act 1981 as requiring protection from damaging development on account of its flora, fauna, geological and/or physiological features. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and the Nature Conservation (Scotland) Act 2004. The SSSI series has developed since 1949 as the national suite of sites providing statutory protection for the best examples of the UK's flora, fauna, geological or physiographical features. These sites are also used to underpin other national and international nature conservation designations (see below). Most SSSIs are privately-owned or managed; others are owned or managed by public bodies or non-government organisations.
Local Nature Reserves	A Local Nature Reserve is a statutory designation made under Section 21 of the National Parks and Access to the Countryside Act 1949 by principal local authorities. Parish and town councils can also declare LNRs but they must have the powers to do so delegated to them by the principal local authority. To establish a LNR the declaring local authority must first have a legal interest in the land concerned and the land must lie within the area which the declaring authority controls. LNRs are of local, but not necessarily national, importance. LNRs are almost always owned by local authorities, and they often pass the management of the LNR onto County Wildlife trusts. An LNR can also be an SSSI, or may have other designations (see below), although an LNR cannot also be an NNR.

Sustainability Criteria	Description
Sites of Importance for Nature Conservation (SINCs)	Site of Importance for Nature Conservation (SINC) is a designation used in many parts of the United Kingdom to protect areas of importance for wildlife at a county scale. In other parts of the country the same designation is known by various other names, including Site of Nature Conservation Interest (SNCI), County Wildlife Site and Site of Metropolitan Importance for Nature Conservation. Overall, the designation is referred to as a "non-statutory wildlife site", or a "Local Site". The designated sites are protected by local authorities from most development. In some areas, the designation is either subdivided, or additional local designations are used. For example, in London, sites are classified as being of metropolitan importance, borough importance or local importance for nature conservation, the former being of SNCI status.
Ancient Woodlands	Ancient woodland is land continuously wooded since AD1600 in England and Wales or AD1750 in Scotland and which has never been cleared or replanted. Many ancient woodlands are designated for their scientific and conservation importance. The ancient woodland inventory records such woods over 2 hectares in England. Ancient woodlands do not enjoy their own statutory protection, although many are protected through designations such as SSSIs or other designations.
Biodiversity Action Plans (habitats and species)	<p>A Biodiversity Action Plan (BAP) is an internationally recognized program addressing threatened species and habitats and is designed to protect and restore biological systems. The United Kingdom BAP covers terrestrial species, marine species and migratory birds. In August 2007, the new BAP (the original having been launched in 1997) identified 1,149 species and 65 habitats in the UK that need conservation and greater protection.</p> <p>UK BAP habitats are rare or threatened semi-natural habitats that are the subject of concerted action by many different organisations involved in wildlife conservation. The mapping of some habitats is incomplete and the data is being updated, with new habitats added as soon as the information becomes available.</p>
Regionally Important Geological and Geomorphological Sites (RIGS)	RIGS, identified by locally developed criteria, are currently the most important places throughout the UK for geology and geomorphology outside statutorily protected land such as SSSI, which include sites of earth science importance as well as biological ones. RIGS are selected on a local or regional basis using four nationally agreed criteria, namely educational value, academic value, historical value and aesthetic value.
Flood Risk Areas	<p>Before considering development, land or property that lies within a Flood Risk Zone (FRZ) needs to be identified. The Environment Agency (EA) produce indicative flood plain maps which indicate which areas are at high, medium or low risk of flooding. High to medium risk zones are as follows:</p> <ul style="list-style-type: none"> • Zone 3b. Functional flood plain • Zone 3a. High risk of flooding; area designated as having a 1 in 100 or greater chance of river flooding (>1%) • Zone 2. Medium risk of flooding; area designated as having between 1 in 100 and 1 in 1000 chance of river flooding (1% - 0.1%)
Source Protection Zones	<p>Some aquifers are naturally protected against pollution by being covered with impermeable soil or rock, but where this is not the case several approaches are taken to provide protection. The first of these is to map where groundwater sources such as wells, boreholes and springs used for public drinking water supply, are most vulnerable. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. For large public groundwater supplies, the areas of land from which water flows is also mapped, and activities that might cause pollution are carefully controlled. These areas are called Source Protection Zones (SPZs). The EA have defined SPZs for 2000 groundwater sources. SPZs are mapped showing different zones – inner (zone 1), outer (zone 2) and total catchment (zone 3) zones – which indicate the increasing vulnerability of the groundwater source to contamination. A fourth zone of special interest is sometimes also defined, where local conditions mean that industrial sites and other polluters could affect the groundwater source even though they are outside the normal catchment area.</p> <ul style="list-style-type: none"> • SPZ1 – inner zone • SPZ2 – outer zone • SPZ3 – total catchment

Sustainability Criteria	Description
Water bodies	<p>Main rivers are usually larger streams and rivers. However, they do include smaller watercourses of local significance. An ordinary watercourse is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a main river. Environment Agency powers to carry out flood defence works apply to main rivers only, but its other duties and functions extend to all watercourses.</p> <p>Until recently, a general quality assessment (GQA) scheme has been used to assess river water quality using chemistry, biology and nutrients as indicators of overall quality; and biological quality as an indicator of overall river 'health'. The European Water Framework Directive (WFD) now provides a more sophisticated way of assessing the whole water environment by looking at over 30 measures, grouped into ecological status (this includes biology as well as 'elements' like phosphorus and pH) and chemical status ('priority substances'). The WFD covers estuaries, coastal waters, groundwater and lakes as well as rivers. Ecological quality of rivers and lakes is mapped for silt 3, with their status classified into five grades between high and bad.</p>
Catchment areas	A catchment area is the area of land drained by a river and all its tributaries. The limits of a given catchment areas are the heights of land (watersheds) separating it from neighbouring drainage systems.
Major and minor rivers	Major rivers are defined as having catchment areas greater than 50km ² . Rivers with a total catchment area of less than 50km ² are defined as minor rivers.
Creating Sustainable Communities	
Air Quality Management Areas	Since 1997 local authorities in the UK have been carrying out a review and assessment of air quality in their area. The aim of the review is to assist authorities in carrying out their statutory duty to work towards meeting the national air quality objectives. If a local authority finds any places where the objectives are not likely to be achieved, it must declare an Air Quality Management Area there.
Growth points	<p>The Government's Growth Points initiative is designed to provide support to local communities who wish to pursue large scale and sustainable growth, including new housing, through a partnership with Government. The Government invited local authorities to submit strategic growth proposals which were sustainable, acceptable environmentally and realistic in terms of infrastructure to be assessed by Government and its agencies. Criteria for growth points were published to help local partners develop good quality growth proposals. Twenty nine new Growth Points were announced in October 2006 with a wide regional spread covering the East and West Midlands, the East, South East and South West of England.</p> <p>Growth Points status is not a statutory designation but a relationship (defined by explicit conditions and based on detailed factual assessment) between central government and local partners.</p>
Growth Areas	Growth Areas are closely related in intent to growth points and are one of the measures that the Government has established to tackle housing supply in the wider South East due to its failure to keep pace with the numbers of new households. The existing growth areas comprise the Thames Gateway and the three new Growth Areas of Milton Keynes and South Midlands; London-Stansted-Cambridge-Peterborough; and Ashford.
Eco-towns	<p>Eco-towns are planned to be new communities with 5,000 -15,000 homes adhering to strict standards of building and performance¹¹. Environmental building standards and low carbon energy sources would be used to make sure that eco-towns have the minimum impact on the environment. At least 30 per cent of housing would be affordable. The Government also announced plans to create hundreds of thousands of homes in 10 "carbon neutral" communities. Construction is to be underway by 2016.</p> <p>The locations of four new eco-towns were announced by the Government in July 2009, comprising Rackheath (Norfolk); north-west Bicester (Oxfordshire and within the London to West Midlands study area); Whitehill Bordon (East Hants); and the China Clay Community near St Austell, Cornwall.</p>
Super Output Areas and Indices Of Multiple Deprivation	<p>The English Indices of Deprivation 2007 (ID 2007) are the Government's official measure of multiple deprivation at small area level. The Index of Multiple Deprivation 2007 (IMD 2007), which forms part of the ID 2007, is based on the small area geography known as Lower Super Output Areas (LSOAs). LSOAs have between 1000 and 3000 people living in them with an average population of 1500 people. In most cases, these are smaller than wards, thus allowing the identification of small pockets of deprivation.</p> <p>There are 32,482 LSOAs in England. The LSOA ranked 1 by the IMD 2007 is the most deprived and that ranked 32,482 is the least deprived. The measures used in the AoS refer to those LSOAs containing respectively the 20% and 50% most deprived LSOAs. The IMD brings together 37 different indicators which cover specific aspects or dimensions of deprivation: income, employment, health and disability, education, skills and training, barriers to housing and services, living environment and crime.</p>

¹¹ <http://www.communities.gov.uk/news/corporate/904561>

Sustainability Criteria	Description
	<p>These are weighted and combined to create the overall IMD 2007.</p> <p>Identification of areas of high deprivation is a proxy for those areas considered relatively more sensitive to further adverse impacts associated with HS2. Equally, there are potential benefits where HS2 offers regeneration opportunity from which people in deprived areas might benefit.</p>
Registered Common Land	<p>Common land is subject to 'rights of common' held by other individuals over the common, and to the special statutory controls that apply under commons legislation. Rights of common have their origin in local custom and include, for example, the right to graze stock. The Commons Registration Act 1965 established definitive registers of common land and town and village greens in England and Wales and recorded details of rights of common. The Act extends only to England and Wales; common land in Scotland and Northern Ireland is of a different character and subject to different legislation. There are around 572,000 hectares of common land in England and Wales.</p> <p>Many commons are still used for agriculture and serve the economic interest of farming communities. They are also valued for their landscape, wildlife and archaeological interests, and for public enjoyment. Over half of common land in England has been designated as SSSIs (see above). There is a public right of access to nearly all common land, either under the Countryside and Rights of Way Act 2000 (see below) or under earlier legislation.</p> <p>Like public open space, building on common land is discouraged and, where it is unavoidable, it is incumbent on developers to offer at least an equivalent area of replacement which is equally advantageous to its users.</p>
Greens	<p>A piece of land can be registered as a town or village green if a significant number of local inhabitants has indulged in lawful sports and pastimes, for 20 years, as of right on this land. It is estimated that there are about 3,650 registered greens in England and about 220 in Wales, covering about 8,150 and 620 acres respectively. Greens are protected under section 29 of the Commons Act 1876, together with section 12 of the Inclosure Act 1857. Registration as a town or village green can sterilise land from development.</p> <p>Doorstep Greens (of which there are about 200) were set up between 2001 and 2003 as permanent areas of public green space, close to people's homes, in disadvantaged areas where regeneration of the local environment is crucial. Doorstep Greens are protected by restrictions on the registered title of the land in question.</p> <p>Millennium Greens (of which there are about 245) are also permanent areas of public green space, close to people's homes, in urban or rural locations that provide breathing spaces for relaxation, play and enjoyment of nature. The Millennium Greens project was started in 1996 and ran until 2001.</p>
Open Country	<p>Under the Countryside and Rights of Way Act 2000 (CROW), the public can walk freely on mapped areas of mountain, moor, heath, downland and registered common land (see above) without having to stick to paths. The new rights came into effect across all of England on 31 October 2005.</p> <p>In Scotland, under Part 1 of the Land Reform (Scotland) Act 2003, everyone has the right to be on most land and inland water (including mountains, moorland, woods and forests, grassland, margins of fields in which crops are growing, paths and tracks, rivers and lochs, the coast and most parks and open spaces) providing they act responsibly (in line with The Scottish Outdoor Access Code).</p>
National Trust Land	<p>National Trust and is land owned by the National Trust. The National Trust is an organisation set up to protect special places in England, Wales and Northern Ireland, in perpetuity, for everyone.</p>
Country Parks	<p>There are about 250 recognised Country Parks in England and Wales. Most were designated in the 1970s, under the Countryside Act 1968 with the support of the former Countryside Commission. In more recent times there has been no specific financial support for country parks directly, and fewer have been designated. Most are managed by local authorities, although other organisations and private individuals can also run them. There is nothing to stop anyone opening a site and calling it a Country Park, although they might not receive recognition from Natural England.</p>
Sustainable Consumption and Production	
Green Belt (and Metropolitan Open Land in London)	<p>Green Belt is designated for many reasons, including protection of natural environments; improving air quality within urban areas; ensuring urban dwellers have access to countryside and protection of rural communities from expanding suburbs. Green Belt therefore provides both a natural and community resource. Green Belt is, however, considered under sustainable consumption and production since in the UK it is principally a policy for controlling urban growth and preventing the coalescence of main urban areas. A railway through Green Belt could be considered adversely since, for example, it may create pockets of land that are susceptible to development infill and may conflict with the open and contiguous character for which a Green Belt is designated.</p> <p>Land included in the Green Belt must contribute to one or more of the five purposes of the Green Belt set out in Planning Policy Guidance Note 2 (PPG2 Green Belts): to check the unrestricted sprawl of built-up areas, safeguard the surrounding countryside from further encroachment, prevent neighbouring towns from merging into one another, preserve the special character of historic towns and to assist in urban regeneration. PPG2 states that there is a presumption against inappropriate development. Such development should not be approved except in very special circumstances. PPG2 includes guidance</p>

Sustainability Criteria	Description
	on development which would not be considered inappropriate.
EA/SEPA registered "Special Sites" for Contamination and Registered Landfills	<p>Thousands of sites have been contaminated by previous industrial use, often associated with traditional processes which are no longer used. These sites may present a hazard to the general environment, but there is a growing need to reclaim and redevelop them. The EA (SEPA in Scotland) are responsible for the regulation of "special sites" of contamination and for the maintenance of a register of regulatory action on such sites.</p> <p>Special sites do not necessarily represent the most heavily contaminated land but they are designated as such where they meet one of the descriptions in the Contaminated Land Regime. Special sites include sites owned by the Ministry of Defence, land contaminated by certain industrial activities or radioactive substances, nuclear sites, and contamination affecting rivers, groundwater and drinking water supplies.</p> <p>Contaminated land is regulated in two main ways:</p> <ul style="list-style-type: none"> • Town and Country Planning Act 1990: Contamination or the potential for contamination should be considered during the planning process. Local authorities can place conditions on planning permissions requiring that developers investigate contamination and, where it's found, clean it up to prevent harm. • Contaminated land regime (Part 2A of the Environmental Protection Act 1990): The regime comes into effect if a site is not being redeveloped but is causing or has the potential to cause significant harm.
COMAH sites	COMAH registered sites are sites regulated under the Control of Major Accidents Hazards Regulations. These Regulations apply mainly to the chemical and petrochemical industries, fuel storage and distribution. These are regulated in England by the Health and Safety Executive and the Environment Agency.
Agricultural Land (Grade 1 and 2)	<p>The quality of agricultural land in England and Wales is assessed according to a system devised by MAFF/DEFRA, revised and published in 1989 and known as the Agricultural Land Classification (ALC). This is the nationally applicable system used for land use planning and development control. The two top grades are as follows:</p> <ul style="list-style-type: none"> • Grade 1: excellent quality agricultural land - land with no or very minor limitations to agricultural use; • Grade 2: very good agricultural land - land with minor limitations which affect crop yield, cultivations or harvesting. <p>Local authorities should take account of Agricultural Land Classification in order to make informed choices about future land use within the planning system.</p>
Minerals planning areas	<p>Minerals planning authorities are local authorities with responsibility for planning control over mineral working. Amongst their various duties are the identification of suitable locations for the winning and working of minerals and associated development. MPAs may also be waste planning authorities, responsible for the land use planning of facilities for the management of all forms of waste.</p> <p>All proposals for allocating land for minerals purposes are required to be included on an OS-based proposals map. Such sites are generally safeguarded from development. In addition, specific consultation areas are defined in order to ensure consultation between the relevant MPA, the minerals industry and others before certain non-mineral planning applications are made within the area.</p>
Waste planning areas	Waste planning authorities are expected to plan for and consent the necessary number and range of facilities to support sustainable waste management. Regional planning bodies must also consider provision of waste management in the preparation of regional spatial strategies. Requirements for waste planning are contained in PPS10 (Planning for Sustainable Waste Management). Areas designated for waste management are designated as active or preferred sites in waste local plans.
Contaminated land Registers (Local Authority Sites)	Part 2A of the Environmental Protection Act 1990 requires local authorities to inspect their areas and identify any contaminated land. Land qualifies for inclusion if it is deemed to pose a risk to an identified sensitive receptor.

