

Water Framework Directive compliance assessment review

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1 Executive summary

- 1.1.1 The hybrid Bill for Phase One of High Speed Two (HS2), including Additional Provisions (referred to from hereon in as the Proposed Scheme) has been assessed for compliance with the Water Framework Directive (WFD) objectives in a series of published WFD compliance assessment documents.
- 1.1.2 The Proposed Scheme was the first of its nature in England to be assessed for compliance against the WFD; the assessment methodology was developed in close consultation with the Environment Agency.
- 1.1.3 Since the WFD compliance assessment methodology was developed and applied for the Proposed Scheme, the Court of Justice of the European Union (CJEU) has ruled in favour of a challenge against a WFD objective assessment process applied for a scheme in Germany. This case has been commonly referred to as the 'Bund case'.
- 1.1.4 In its judgement on the Bund case, the CJEU clarified the way in which compliance with the Directive's key environmental objectives should be interpreted in the assessment of new developments and scheme proposals. The clarifications were:
- Deterioration in individual water body quality elements constitutes deterioration as defined by the Directive (not just overall water body status deterioration);
 - 'Any deterioration' in quality elements in the lowest class constitutes deterioration; and
 - Certainty regarding the project's compliance with the Directive is required at the planning consent stage; hence, where deterioration 'may' be caused, derogations under Article 4.7 of the WFD are required at this stage.
- 1.1.5 In light of the ruling, there is a requirement to review the WFD compliance assessments completed for the Proposed Scheme to date, and consider whether the clarifications alter the conclusions of the WFD compliance assessment.
- 1.1.6 As a result of the review, Article 4.7 derogations are required for nine water bodies at this stage. It is likely that in several cases, deterioration may not occur, but the derogations are necessary due to the clarification that certainty of compliance is required at this project stage.
- 1.1.7 A review of the requirements of the Article 4.7 in relation to the Proposed Scheme have been reported and used alongside the European Commission (EC) guidance document on exemptions to prepare Article 4.7 derogation statements for the nine affected water bodies.
- 1.1.8 The statements demonstrate that, for the Proposed Scheme, the conditions under Article 4.7 of the Directive can be met sufficiently to demonstrate that the Proposed Scheme will be compliant with the WFD. In conclusion, following the clarifications of the ruling made by the CJEU in relation to the Bund case, the Proposed Scheme remains compliant with the WFD.

- 1.1.9 It should be noted that the works to which this assessment relates will all require post- Royal Assent consents from the Environment Agency. Compliance (and exemptions) will have to be maintained either up until construction or until such time as it can be demonstrated that there will be no deterioration of the water body. The Environment Agency will determine compliance (including derogations) at the point in time when they consider the granting of consent for work affecting a water body which is set out in the protective provisions associated with the hybrid Bill.

2 Introduction

- 2.1.1 The Water Framework Directive 2000/60/EC (WFD) sets out environmental objectives that must be met for all water bodies within Member States. Prior to receiving consent, new developments that have the potential to affect water bodies (or schemes which lead to modifications of water bodies) should be assessed against the Directive's environmental objectives to determine whether they have the potential to prevent these objectives from being met.
- 2.1.2 The Phase One HS2 scheme, including Additional Provisions (from henceforth referred to as the Proposed Scheme) has been assessed for compliance against the WFD objectives in a series of published WFD compliance assessment documents¹. The methodology used for the WFD compliance assessment of the Proposed Scheme was developed in close consultation with the Environment Agency as the competent authority for the implementation of the WFD in England.
- 2.1.3 Since the methodology was developed and applied for the Proposed Scheme, the Court of Justice of the European Union (CJEU) has ruled in favour of a challenge against the WFD objective assessment process (and its findings) for a proposed dredging scheme on the River Weser in Germany. The CJEU ruling in question is the judgement passed by the Court for Case C-461/13 (*Bund für Umwelt und Naturschutz Deutschland eV v Bundesrepublik Deutschland*) from July 2015 (the Bund case). The judgement of the CJEU in the Bund case is henceforth in this report referred to as 'the ruling'.
- 2.1.4 In making its judgement, the CJEU clarified the way in which compliance with the Directive's key environmental objectives should be interpreted in the assessment of new developments and scheme proposals. It also established that there was a duty on development consent decision makers to refuse consent in cases where development would result in non-compliance with WFD standards unless derogations were made out. In light of the ruling, there is a requirement to consider whether the Proposed Scheme's WFD compliance assessment process is consistent with the findings of the ruling.
- 2.1.5 In so doing, there is need to consider where derogations to meeting WFD environmental objectives (as set out in Article 4.7 of the Directive) may be required to ensure consistency with the ruling. Detailed guidance on the application of WFD exemptions was published by the European Commission in 2009 via Technical Report 2009-027 "Common Implementation Strategy for the Water Framework Directive (2000/60/EC), Guidance Document No. 20, Guidance on Exemptions to the Environmental Objectives" (Herewith referred to as the 'EC

¹ *The hybrid Bill scheme*: London to West Midlands Environmental Statement, Vol 5 – technical Appendices: Route-wide Appendix (WR-001-000) Water Resources (Nov 2013);

The hybrid Bill scheme plus further baseline studies and Additional Provisions 2 scheme: High Speed Rail (London to West Midlands – Supplementary Environmental Statement and Additional Provision 2 Environmental Statement; Vol 5 – Technical Appendices, Water Resources (WR-001-000)

Additional Provision 4 scheme: High Speed Rail (London to West Midlands – Supplementary Environmental Statement 3 and Additional Provision 4 Environmental Statement; Vol 5 Water Resources (WR-001-000)

exemption guidance'. The EC exemption guidance has been used to inform and scope this review paper.

- 2.1.6 This paper sets out the findings of a review process of the HS2 WFD compliance assessment for the Proposed Scheme. It includes derogations for locations where there is a risk of deterioration in status as defined by the ruling so that Parliament, as the development consent decision makers, are able to approve the scheme under the terms of the ruling.

3 The Proposed Scheme and the WFD

3.1 WFD Principal environmental objectives

- 3.1.1 The environmental objectives of the WFD are set out in Article 4 of the Directive and relate to ensuring the continued protection of the condition (the WFD status or potential) of all water bodies, and the development of plans to deliver measures to improve failing water bodies to a good condition (or better).
- 3.1.2 The two key objectives against which new developments or schemes should be assessed are:
- No deterioration of status (or potential) for surface and groundwaters; and
 - Achievement of good status (or potential) by 2021 or 2027, for water bodies currently failing to achieve this status or potential.
- 3.1.3 WFD compliance assessments for new developments and schemes must therefore demonstrate that the proposals will not result in the deterioration in status (or potential) of any water body, and in the case of an impacted water body being at less than good status (or potential), must demonstrate that implementation of the proposals will not prevent the water body from meeting good status (or potential) in the future. Where these objectives cannot be met, Article 4.7 of the Directive sets out specific situations and conditions whereby derogations can be permitted.

3.2 The Proposed Scheme WFD compliance assessment process

- 3.2.1 The Proposed Scheme was assessed for its effect on achieving the two key environmental objectives set out in section 3.1. This was undertaken for each water body where the scheme resulted in some modification to a water body or an indirect effect to the volume or quality of water within a water body.
- 3.2.2 Scheme elements were assessed for impact on a defined WFD water body individually, and for multiple scheme elements occurring within one water body. Additionally, scheme elements that could result in indirect impacts on a water body downstream of the immediately affected water body were also considered within a water body assessment.
- 3.2.3 Scheme elements were considered against each of the WFD elements that make up the water body classification of the water body.
- 3.2.4 It should be noted that the same methodology for WFD compliance assessment has been used for all assessment undertaken and was developed in close consultation with the Environment Agency.

Precautionary risk based approach

- 3.2.5 A precautionary risk based approach was taken to the assessment. This approach involved consideration of the level of risk to deterioration or prevention of future good status, taking

into account the uncertainty of potential impacts. It took into account the level of information available at the outline design stage at which the assessment was undertaken as well as the lack of detailed baseline information for many of the water bodies assessed.

- 3.2.6 The precautionary approach adopted was advocated by the Environment Agency to ensure that all potential adverse effects were to be reported and detailed, even where the likelihood an effect occurring was very low, or the extent of that effect was limited; the primary driver being to ensure that WFD effects continued to be considered and addressed through the design development and into the consenting phase.
- 3.2.7 A colour coding “Red, Amber, Green” (RAG) system was used for the risk based approach as agreed with the Environment Agency. Definitions for the colour coding were assigned to indicate the level of risk of objective non-compliance within each water body once mitigation had been considered. The definitions were as follows:
- **Dark Blue:** beneficial effect of a scale sufficient to increase status class for the water body (certain);
 - **Light Blue:** beneficial effect resulting in a localised improvement, but insufficient to increase status class at water body scale (certain);
 - **Green:** no measureable change to (or effect on) water body (certain);
 - **Yellow:** minor localised and/or temporary effect when balanced against likely embedded mitigation – insufficient to affect an element at a water body scale (certain);
 - **Amber:** an adverse effect is possible when balanced against likely embedded mitigation – the extent of effect is uncertain, and there remains a potential to affect water body status. There are two categories based on the level of uncertainty:
 - **Low risk amber:** there is more certainty regarding the efficacy of mitigation and/or extent of effect; hence impact on quality element at a water body scale is unlikely.
 - **High risk amber:** there is higher uncertainty in extent of adverse effect as a result of paucity of baseline data and/or lack of developed design for mitigation, therefore there is a higher risk that a quality element change could be affected at a water body scale;
 - **Red:** adverse effect of sufficient scale to impact on a quality element at a water body scale (certain).
- 3.2.8 The approach taken for all of the Proposed Scheme assessments was that only red risks constituted a certain deterioration (or prevention of good status) in a water body. Amber risks were highlighted to signpost that an effect was possible and that deterioration and prevention of good status may occur, but this was less likely if mitigation could be developed sufficiently to offset the impact as the design of the Proposed Scheme progressed.

- 3.2.9 However, it was not possible at the Bill submission stage to give a greater certainty around the efficacy and feasibility of the range of mitigations required, resulting in a precautionary risk based assessment for high risk amber water bodies. In addition, there was a paucity of baseline data in some cases (e.g. due to lack of access for surveys) which meant that a precautionary amber risk was assigned when there was uncertainty around how sensitive a water body would be to an impact from the HS2 development.

Defining status

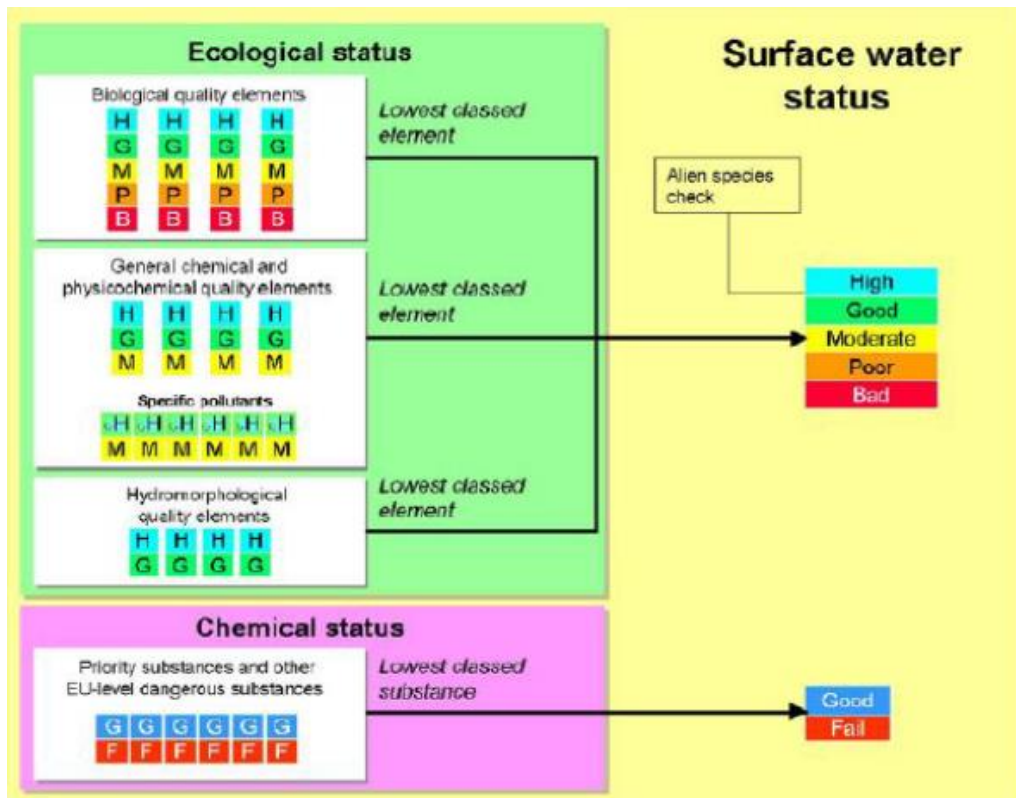
- 3.2.10 In order to fully assess the implications of the ruling, it is necessary to summarise how status is defined for water bodies and hence how this relates to the principal WFD. The status of a surface water body or groundwater body² is made up of an assessment of the condition of a series of supporting 'quality elements', which are defined within Annex V of the WFD and as explained in the following sections. A full explanation is provided within the WFD compliance assessments undertaken for the Proposed Scheme¹.

Surface Waters

- 3.2.11 For surface waters, status comprises an assessment of overall ecological status, and where there are known sources of defined priority pollutants, an assessment of chemical status. This is represented in Figure 1.

² It should be noted that, although the ruling was made in relation to a surface water body assessment, the implications of the ruling are such that they are also likely to relate to the assessment of groundwater bodies.

Figure 1: WFD classification process for surface water bodies



- 3.2.12 Ecological status is comprised of three main supporting quality elements: biological, physico-chemical and hydromorphological, which have different range of 'classes' defining the relative condition of that quality element; the classes are termed as 'high', 'good', 'moderate', 'poor' and 'bad'. Each of these quality elements is made up of a series of sub-elements that describe the make-up of that quality element, and in many cases have defined numerical standards that need to be met for a certain class to be assigned to that quality element.
- 3.2.13 As an example, the biological quality element consists of sub-elements such as fish, macro-invertebrates and phytoplankton, which are measured for their diversity of species and abundance to arrive at a class definition. If one of these sub-elements is classified as 'poor' for example, the biological quality element would be poor overall, even if the other biological sub-elements are classified higher on the scale.
- 3.2.14 Where it is assessed, the chemical status is defined according to whether the concentration of a set of pollutants within a water body fails a limit set centrally by the European Union (moderate status) or passes (good status).
- 3.2.15 The class assigned to each quality element of ecological status and the chemical status affects the overall water body status in different ways. At the most fundamental level, the overall status of the water body is defined by the lowest class defined for either ecological or chemical status. For example, if the ecological status of a water body is good, but the chemical status is moderate, the overall water body status would be moderate (limited by the chemical status).

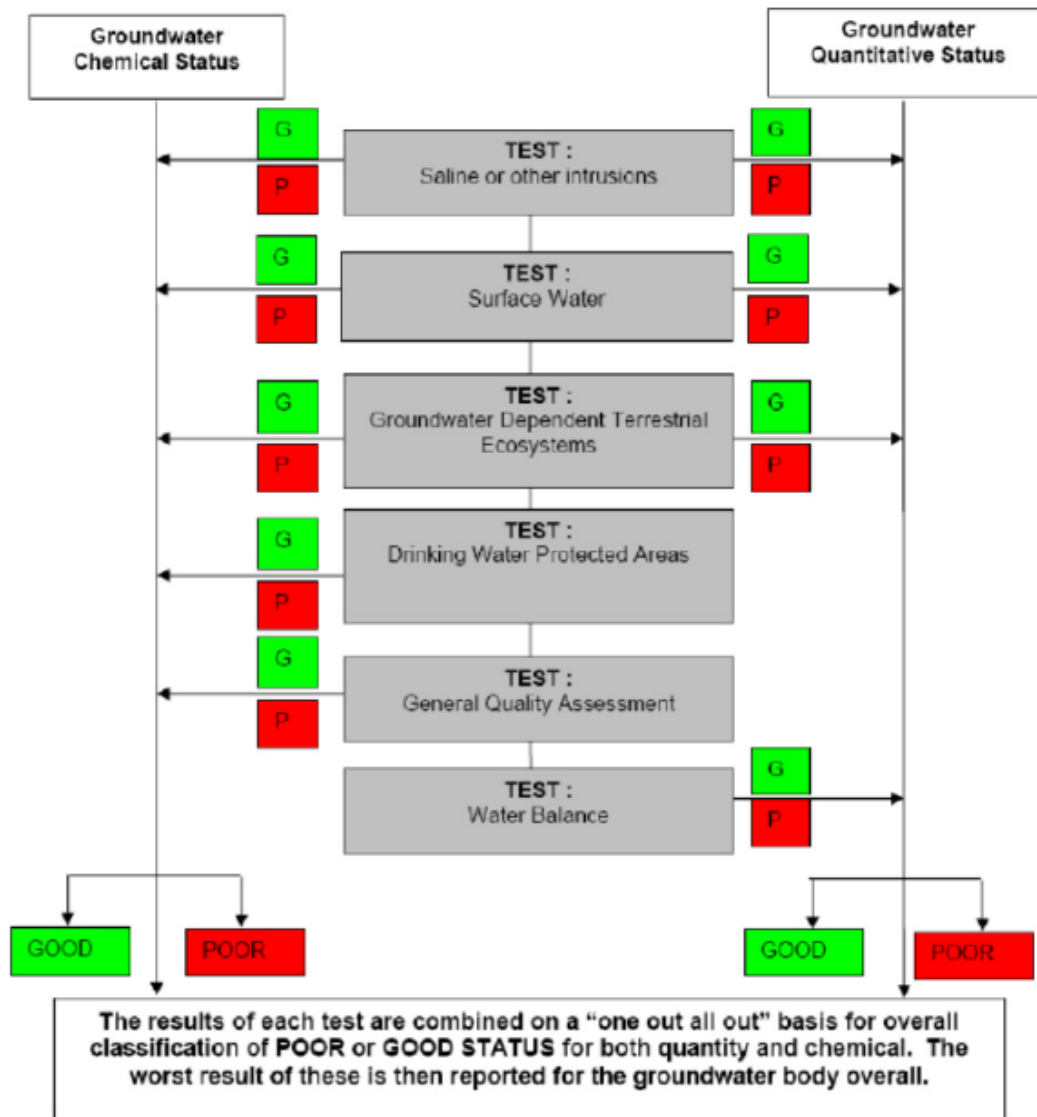
The ecological status is also influenced differently by the various quality elements. The biological quality element essentially takes precedent, whereby the ecological status of a water body can only be classed below moderate if one or more of the biological sub-elements is less than moderate, irrespective of whether the physicochemical quality element is classified as less than good. For example, in a case where the physicochemical element of a water body was defined as bad, but all the biological sub-elements were 'moderate', the ecological status would be limited to 'moderate'.

- 3.2.16 In classifying the overall water body status in this way, it can be demonstrated that deterioration in class of one supporting quality element (or sub-element) does not always constitute an overall deterioration of a water body status for surface waters.

WFD compliance assessment of groundwater bodies

- 3.2.17 For groundwater bodies, status is based on two elements: groundwater chemical status (quality element) and the groundwater quantitative status (quantity element). Both the quality and quantity status is defined as being either 'Good' or 'Poor' based on a test against a series of supporting elements .
- 3.2.18 If one (or more) of the groundwater tests results in a poor classification, then the overall quantity or quality element is classed as poor. If one or both of the quality and quantity elements are poor, then the overall water body status is limited to poor status. This is represented in Figure 2.

Figure 2: WFD classification process for groundwater bodies



4 The ruling clarifications

4.1 The ruling outcome

4.1.1 The Bund case concerned a challenge by a Non-Governmental Organisation (NGO) – Bund für Umwelt und Naturschutz Deutschland – against a proposed scheme to dredge the River Weser for the purposes of navigation, allowing larger vessels to call at German ports. A WFD compliance assessment was undertaken, considering the impacts the scheme would have on the hydromorphological, water quality and biological supporting quality elements and concluded that although the some of the quality elements would potentially be deteriorated, the overall status would not. The assessment concluded that the proposals were therefore compliant with the objectives of the WFD as the scheme would not result in a deterioration of overall water body status.

4.1.2 The NGO challenged this position, arguing that the Directive defines water body deterioration to occur when there is deterioration in any of the WFD supporting elements, even if the overall status is not deteriorated.

4.1.3 The CJEU ruled in favour of the NGO, and in the process clarified several definitions with respect to what constitutes deterioration within the meaning and purpose of the WFD.

4.1.4 The three most significant aspects in relation to the assessment of HS2 are set out below:

- *"deterioration of the status" of the relevant body of surface water includes a fall by one class of any **element** of the "quality elements" within the meaning of Annex V of the WFD even if the fall does not result in the a fall of the classification of the body of surface water as a whole;*
- *consent for development must not be granted by an authorising authority – unless a derogation is granted - where the project **may** cause a deterioration in the status of a body of surface water or where it jeopardises the attainment of good surface water status or of good ecological potential and good surface water chemical status by the date laid down in the directive; and*
- *If the quality element is already in the lowest class, **any deterioration** of that element represents deterioration of status within the meaning of Article 4(1)(a)(i).*

4.1.5 Each of these ruling aspects is considered in detail in the proceeding subsections of this chapter with reference to how it affects the WFD compliance assessments carried out for the Proposed Scheme.

Quality element deterioration

4.1.6 The implication of the ruling is that development proposals and schemes should be assessed for deterioration (and potential failure to achieve good status or potential) against each individual quality element (and sub-element) of that water body irrespective of whether overall water body status is affected.

- 4.1.7 The Proposed Scheme assessments considered in detail the potential for deterioration against each quality element (and each sub-element) for each water body affected by a scheme element. It considered this for each scheme element individually as well as combined scheme elements where there was potential for smaller impacts to have a larger cumulative impact on a water body when considered in combination.
- 4.1.8 For the Proposed Scheme, no scheme element (or combination of elements) was assessed as being at risk of causing a deterioration in a quality element, but not overall status. Where a single quality element was determined to be at risk of deterioration, the same overall risk was applied to the water body assessment.
- 4.1.9 It is concluded that this aspect of the ruling does not materially alter the previous WFD compliance assessments undertaken for the Proposed Scheme.

Development which may cause deterioration

- 4.1.10 The legal Interpretation of this element of the ruling is that it results in a **'precautionary principle'** approach being required, whereby if there is a risk of deterioration from a scheme element, the burden of proof that it does not cause deterioration falls on HS2 as the promoter of the scheme. This would put the assessment approach for WFD on a par with that of the Habitats Directive (92/43/EEC) for impacts of development proposals and schemes on Natura 2000 sites.
- 4.1.11 In addition to adverse effects which are considered certain to effect objectives (red rating), adverse effects with a high risk of resulting on objective failure could in effect be considered to cause a deterioration without further certainty around baseline condition and/or suitability of detailed mitigation as they may cause deterioration as clarified in the ruling.
- 4.1.12 This element of the ruling has the biggest implication for the assessments undertaken for the Proposed Scheme to date. The pre-ruling approach was to only apply a derogation under Article 4.7 where there was certainty of objective failure as a result of a scheme element. The ruling implies that derogations are required where there is a risk of a scheme element resulting in objective non-compliance. These would be needed until such a time as detailed mitigation can be designed and the WFD compliance assessment repeated for each at risk scheme element. These were previously considered as only being required at the activity consent stage.

Deterioration in the lowest element class

- 4.1.13 The implication of this element of the ruling is that any adverse effect on a quality element that is classed as 'bad' in a surface water, or 'poor' in a groundwater body is a deterioration and hence failure of the WFD environmental objectives. This element of the ruling has a different implication for surface waters and groundwater bodies due to the way in which status is defined and the classification applied to different quality elements within the water bodies, and hence it is covered separately in this section of the report.

- 4.1.14 For surface water bodies, any one of the supporting sub-elements classed as 'bad' (the lowest class) for either the physicochemical quality element, or the biological quality element would result in that quality element classified as 'bad' overall³. Some impacted water bodies affected by the Proposed Scheme had one or more sub-element classified as bad, and had a risk of deterioration (or prevention of good status) assessed for that sub-element.
- 4.1.15 These water body quality elements were assessed as having an adverse effect associated with one or more scheme elements, but no risk of objective non-compliance. This element of the ruling requires these assessments to be revisited to clearly identify whether the adverse effect constitutes 'any deterioration' as defined by the ruling.
- 4.1.16 For groundwater bodies, status is defined as being either 'Good' or 'Poor'. If one of the groundwater tests results in a poor classification, then the overall quantity or quality element is classed as poor. Six impacted groundwater bodies affected by the Proposed Scheme had one or more tests classified as bad, and had a risk of potential deterioration assessed for that test.
- 4.1.17 These water body tests were assessed as having an adverse effect associated with one or more scheme elements, but no risk of objective non-compliance. The ruling implies that any effect on an element already at poor status could constitute deterioration and as such these assessments need to be revisited.
- 4.1.18 The EC exemption guidance states that if the condition of each affected water body is adversely affected for only a short period of time and recovers within a short period of time without the need for any restoration measures, such fluctuations will not constitute deterioration of status.

³ It should be noted that the hydromorphological quality element cannot be classed lower than good in its own right. WFD hydromorphological standards only separate out a water body. Whilst hydromorphology effects can be deemed to 'not support good status' this would need a resultant effect on the biological (or physicochemical) quality element to be manifest.

5 Water body assessment review

- 5.1.1 A review of the assessments of surface water and groundwater bodies has been undertaken for the Proposed Scheme, and subsequent AP schemes in light of the two key ruling implications of 'water bodies at risk in the lowest class', and 'water bodies where development may cause deterioration'

5.2 Water body assessment overview

Surface water bodies

- 5.2.1 The WFD compliance assessment for the original scheme concluded that, of the 60 surface water bodies assessed, no scheme elements were assessed as certain to result in objective non-compliance for the water bodies. However, four surface water bodies were assessed as being at high risk of deterioration (or prevention of good status) resulting from one or more of the quality elements being impacted. Eleven were determined to be subject to an adverse effect, but with a low risk of objective non-compliance.

Groundwater bodies

- 5.2.2 The WFD compliance assessment for the original scheme concluded that, of the 15 groundwater bodies assessed, six had no risk of deterioration; nine had some risk of potential deterioration and one (Mid Chilterns Chalk) had a certain risk of deterioration.

Mitigations

- 5.2.3 The Proposed Scheme includes several mitigation measures. The WFD compliance assessment for both surface water bodies and groundwater bodies assumes all the mitigation measures presented in the ES are in place including:
- Avoidance (route planning);
 - Design measures;
 - Provision of compensation areas and habitat creation where practicable;
 - Code of Construction Practice;
 - Operation and Maintenance Plan;
 - Additional mitigation measures to help manage risks to WFD status have been identified during the assessment where appropriate; and
 - Monitoring will be undertaken prior to, during and post-construction to inform the development of mitigation measures.

5.3 Water bodies where development may cause deterioration

Surface water bodies

- 5.3.1 The original scheme was re-assessed for design changes as part of the first Supplementary Environmental Statement (SES) with the outcome of targeted WFD surveys of watercourses (the SES scheme). These surveys were completed where the uncertainty in baseline conditions was a key factor in the assignment of a risk of objective non-compliance (15 water bodies in total) and land access was available. For six of these watercourses, the survey data highlighted a baseline condition that would be insensitive to the changes proposed by the original scheme, and risk for these water bodies was downgraded from low risk to no risk for those quality elements and the water body overall. For the purposes of this paper, the first SES is taken as the baseline as it includes and updates the WFD compliance assessment for the original scheme with new baseline data.
- 5.3.2 Assessment of subsequent proposed Additional Provisions (the AP2 scheme and the AP4 scheme) resulted in the inclusion of an additional water body (making 61 assessed water bodies in total) which was assessed as a high risk water body. This resulted in a total of five high risk water bodies up to (and including) the AP4 scheme.
- 5.3.3 The low risk water bodies were assessed as unlikely to cause deterioration for one or more of the following reasons:
- Although an adverse effect was possible, the geographical scale of impact was limited and unlikely to affect that quality element condition at the water body scale;
 - The adverse effects resulted in hydromorphological impacts on water bodies which did not result in a biological deterioration and where hydromorphological quality elements did not support 'High Status'. As hydromorphological quality element standards alone do not affect Status, this would not be a deterioration or limitation in good status in the future at the water body scale (where mitigated); and
 - When worked up in detail, the fully embedded mitigation measures are likely to reduce any operational effect to localised and/or temporary during construction and hence no impact at the water body scale.
- 5.3.4 On this basis, the low risk water bodies are not likely to result in failure of the WFD environmental objectives, and hence do not require an Article 4.7 derogation. Only the five high risk surface water bodies have been tested against the conditions for the derogation process. A summary of the review process is provided in Table 1. This table set out the scheme element(s) resulting in the impact, the WFD quality element at risk within the water body and the primary impact mechanism.

Table 1: Surface water bodies at high risk of deterioration and summary of impact mechanisms

Water body	Scheme Element	WFD Quality element at risk (and current element classification)	Primary Impact mechanism
Stoke Brook Aylesbury	Wendover cutting	Macrophytes (N/A) Macroinvertebrates (Moderate) Phosphate (Moderate)	Hydrological change as a result of dewatering associated with the cutting affecting water quality (reduced dilution). Biology directly affected as a result of reduced flows and indirectly due to the changes in water quality.
Padbury Brook	Several – cumulative impacts of culverts, river diversions and viaducts through water body catchment	Macroinvertebrates (Good) Fish (High)	Cumulative effect of minor impacts brought about by the hydromorphological change, loss of and fragmentation of macroinvertebrate and fish habitat associated with numerous culverts and river diversions (on both the main water body and minor tributaries) within a catchment of high sensitivity.
Ouse (Upstream of Brackley)	Brackley south cutting	Fish (High)	Hydrological change due to cutting interrupting groundwater flow and reducing spring flows to a major tributary of the Ouse. Fish directly affected (but no effect on the Ouse itself) as a result of reduced flows.
River Blythe (from Patrick Bridge to River Tame)	Cumulative impact of culverts, river diversions, cuttings and viaducts throughout water body catchment and the u/s River Blythe catchment	Fish (High)	Cumulative effect of minor impacts (largely associated with loss of fish habitat loss) on both of the River Blythe water bodies (two reaches of the River Blythe designated under the WFD) associated with viaduct crossings, culverts and river diversions.
	River Blythe bypass culvert and horn brook culvert	Fish (High)	Loss of fish habitat and obstruction to fish migration. Lack of baseline data.
	Diddington cutting	Fish (High)	Hydrological change due to the alteration of the surface water catchment caused by the cutting, leading to reduced surface water contributions and reduced flows within the Holywell Brook (tributary of River Blythe) affecting water quality (reduced dilution). Fish directly affected as a result of reduced flows and indirectly due to the changes in water quality.
Horton Brook	Horton Brook culvert	Fish (N/A)	Loss of fish habitat and obstruction to fish migration. Lack of baseline data.

Groundwater bodies

- 5.3.5 Following the ruling, eleven groundwater bodies have been identified where WFD elements have a risk of deterioration from the development including the additional scheme element impacts from the design change and amendment process. These are:
- Mid Chilterns Chalk
 - Warwickshire Avon - Secondary Mudrocks
 - Warwickshire Avon - PT Sandstone Warwick/Avon Confined
 - Warwickshire Avon - Coal Measures Coventry
 - Tame Anker Mease - Secondary Combined
 - Chiltern Chalk Scarp
 - Upper Bedford Ouse Oolite Secondary
 - Upper Bedford Ouse Oolite Principal 1
 - Byfield Jurassic
 - Tame Anker Mease - PT Sandstone Nuneaton & Meriden
 - Tame Anker Mease - PT Sandstone Birmingham Lichfield
- 5.3.6 In total there are 21 quality elements at potential risk across these water bodies. Most of these are associated with temporary dewatering during the construction phase. The EC exemption guidance document states that fluctuations in the condition of water bodies can occur as a result of short-duration human activities, such as construction or maintenance works. If the condition of each affected water body is adversely affected for only a short period of time and recovers within a short period of time without the need for any restoration measures, such fluctuations will not constitute deterioration of status and the application of Article 4.7 will not be required. No definition is given in the guidance of 'short period of time'. However, the frequencies mentioned for the monitoring programmes (WFD Annex V 1.3.4 and 2.2.3) can serve as an indication. For groundwater bodies identified as being at risk of failing to achieve environmental objectives under Article 4, the frequency of measurement should be sufficient to assess the impact of abstractions and discharges on the groundwater level.
- 5.3.7 Monitoring will take place during construction to assess the localised effects of dewatering. Those elements associated with temporary construction dewatering, where water levels will recover when dewatering ceases, are at low risk of causing objective non-compliance, and are not considered further in this document.
- 5.3.8 Where dewatering will continue during operation (not temporary) there is the potential for deterioration. Furthermore, where dewatering may result in a falling trend in groundwater

quality (for example by mobilising historical contamination), this is not considered to be a temporary effect because groundwater quality may not recover within a short period of time.

5.3.9 For groundwater, no effects were identified which result in a high risk of change in status of a quality element from good to poor at the water body scale. There is however the potential for deterioration where an element is at poor status, as discussed in the following section.

5.4 Water bodies at risk in the lowest class

Surface water bodies

5.4.1 Of the 61 surface water bodies assessed, four had a quality element in its lowest class and an adverse effect associated with that quality element as a result of the scheme after mitigation is considered. These water bodies are summarised in Table 2.

Table 2: water bodies with a quality element at 'bad status' which would be adversely affected by one or more scheme elements

Water body	WFD Quality element at 'bad' status	Adverse effect summary	Impact mechanism(s)
Tetchwick Brook, Source to Ray and tributaries (WFD water body ID - GB106039030070)	Macroinvertebrates	Localised or temporary effect - No risk	Culverts - affecting habitat locally on the tributaries of the water body but would not affect overall quality element status at a water body scale
<ul style="list-style-type: none"> East Litchfield catchment - tributary of Tame (GB104028047020⁴ Black-Bourne Brook from source (confluence) to R Tame (GB104028047000) Langley Brook from Source to Middleton Hall Catch (GB104028046890) 	Phosphate	Localised or temporary effect - No risk	Cutting - flow depletion as a result of cutting affecting groundwater flow to watercourse (resulting in lower dilution of phosphate resident in water body)

5.4.2 For all four water bodies, a localised or temporary adverse effect on the quality element is possible, but with no risk of overall water body non-compliance. In all four cases, the effect is localised around the scheme element and would not be observable at a water body scale to constitute a deterioration. No water bodies have a bad status quality element with a low, high or certain risk of objective non-compliance.

Groundwater bodies

5.4.3 There are eleven elements where this ruling could apply i.e. where the element status is poor and an adverse effect has been defined. These elements occur across seven groundwater

⁴ It should be noted that this water body will be removed from the Cycle 2 RBMP process and is now part of water body GB104028047050

bodies (i.e. some water bodies have more than one quality element affected), where a poor element is identified as set out in the following subsections.

Mid Chilterns Chalk (GB40602G601200)

5.4.4 The water balance (low risk) and surface water (high risk) tests are classified as poor for the current quantitative status, with the Drinking Water Protection Areas (DWPAs) test (certain effect) classified as poor for the current chemical (quality) status.

5.4.5 The Colne Valley viaduct and Chiltern bored tunnel scheme elements have been identified as having a certain high risk effect on the DWPAs test for this water body, with the Chiltern tunnel identified as having a potential high risk effect on the surface water quantitative test.

Warwickshire Avon – PT Sandstone Warwick/Avon Combined (GB40901G300700)

5.4.6 The water balance (high risk) and surface water (low risk) tests are classified as poor for the current quantitative status. The current qualitative status is good.

5.4.7 The Stonehouse cutting scheme element has been identified as having a potential high risk effect on the quantitative water balance test.

Warwickshire Avon – Coal Measures Coventry (GB40902G302200)

5.4.8 The water balance (low risk) and surface water (high risk) tests are classified as poor for the current quantitative status, with the saline/other intrusions test (no risk) classified as poor for the current chemical status.

5.4.9 The Glasshouse Wood cutting (CFA18) and Crankley Road cutting (CFA18) had been identified as having a potential high risk to the quantitative surface water test, through a lowering of groundwater levels and reduction in contributions to surface water bodies affecting the ecological status.

5.4.10 For the Glasshouse Wood cutting water taken from the Finham Brook catchment is to be returned to the Avon catchment, creating a slight impact on baseflow in Finham Brook. However, Finham Brook currently has a moderate hydrology status with flows unable to support Good ecological potential due to abstraction, as such there will be a low risk of deterioration to the poor status identified for the groundwater body as a whole.

5.4.11 For the Crankley Road cutting water abstracted is to be returned within the surface water catchment of the Canley Brook. This water body currently has a moderate hydrology status with flows unable to support Good ecological potential due to abstraction. While there could be possible adverse impacts to baseflow for a stretch of the brook, there will be a low risk of deterioration to the poor status identified for the groundwater body as a whole.

Tame Anker Mease – Secondary Combined (GB40402G990800)

5.4.12 The DWPAs (high risk) test is classified as poor for the current chemical status. The current quantitative status is good.

- 5.4.13 The Diddington cutting (CFA23/24) and Bickenhill cutting (CFA24) scheme elements have been identified as having a potential high risk effect on the DWPA's test.

Chiltern Chalk Scarp (GB40601G604100)

- 5.4.14 The water balance (high risk) test is classified as poor for the current quantitative status. The current chemical status is good.

- 5.4.15 The Wendover north cutting (CFA10) scheme element has been identified as having a potential high risk effect on the water balance test.

Upper Bedford Ouse Oolite Principal (GB40501G402300)

- 5.4.16 The saline/other intrusions (no risk) test is classified as poor for the current chemical status. The current quantitative status is good.

- 5.4.17 No scheme elements were identified as posing a risk to the poor status elements

Tame Anker Mease – PT Sandstone Birmingham Lichfield (GB40401G301000)

- 5.4.18 The water balance (high risk) and surface water (low risk) tests are classified as poor for the current quantitative status, with the saline/other intrusions (no risk) and DWPA's (low risk) tests classified as poor for the current chemical status.

- 5.4.19 Swinfen cutting (CFA21 and CFA22) has been identified as having a potential high risk on the quantitative surface water test through a lowering of groundwater levels and reduction in contributions to surface water bodies affecting the ecological status due to temporary dewatering followed by permanent groundwater control.

- 5.4.20 Abstracted water is to be returned to the relevant surface water catchments via attenuation ponds, with the exception that some water may be transferred out of the East Litchfield catchment. The East Litchfield currently has a Moderate hydrology status with flows unable to support Good ecological potential and as such there will be a low risk of deterioration to the poor status identified for the groundwater body as a whole.

- 5.4.21 Combined impacts of all design elements in this groundwater body have the potential to have an adverse high risk effect on the water balance test taking into account the existing abstraction pressures. These impacts are predicted to be localised and temporary.

- 5.4.22 As stated above, where the effect is temporary this does not constitute deterioration of status.

- 5.4.23 There are four water bodies where a potential risk of objective failure related to one or more tests has been identified. These are set out in Table 3.

Table 3: Groundwater bodies potentially requiring an Article 4.7 derogation

Water body	Scheme Element	WFD Quality element at risk (and current element classification)	Primary Impact mechanism
Chiltern Chalk Scarp	Wendover north cutting (CFA10)	Water balance (poor).	The cutting extends below the water table and dewatering will be required during construction and operation. Water abstracted during dewatering will be returned to surface water (Stoke Brook) 1 km downstream from identified springs and at the edge of the groundwater body; there is no suitable discharge point further upstream. As such there may be an adverse effect on the water balance of the groundwater body.
Mid Chilterns Chalk	Colne Valley viaduct (CFA7)	Drinking Water Protected Areas (DrWPAs). (Poor).	The viaduct is within a designated DrWPA, and a Source Protection Zone (SPZ) 1 (associated with 3 Public Water Supply [PWS] abstractions) and private abstractions. There are landfills and existing poor quality groundwater in the vicinity. Piling may potentially create new preferential pathways within and between shallow and bedrock aquifers affecting water quality. Turbidity or fluids used in construction may also influence water quality. As such temporary but potentially significant impacts on water quality at the public water supply boreholes are possible.
	Chiltern bored tunnel (CFA8, CFA9)	Drinking Water Protected Areas (DrWPAs). (Poor). Qualitative surface water (Poor)	Tunnelling and shaft construction have the potential to have moderate impact on groundwater quality at nearby PWS / SPZ due to migration of fluids and turbidity. As for the Colne Valley viaduct the effect would be temporary but significant unless mitigation is in place. Tunnelling may influence groundwater- surface water interactions due to influence on local fracturing.
Tame Anker Mease – Secondary Combined	Diddington cutting (CFA23/24) Bickenhill cutting (CFA24)	Drinking Water Protected Area (DrWPAs) (Poor).	The cuttings cross areas of landfill with poor groundwater quality. The risks include the lowering of groundwater levels and a reduction in groundwater contributions to groundwater abstractions by permanent groundwater control; a risk of damming of groundwater flow leading to a reduction in groundwater contributions; and mobilisation of poor quality groundwater by dewatering.
Warwickshire Avon – PT Sandstone	Stonehouse cutting (CFA18)	Water balance (poor)	The cutting is 5 m deep and into the Bromsgrove Sandstone at the southern end. Water intersected from the PT Sandstone Warwick/Avon Combined water body is to be returned to

Water body	Scheme Element	WFD Quality element at risk (and current element classification)	Primary Impact mechanism
Warwick/Avon Combined			ground via an attenuation pond next to River Avon within the Warwickshire Avon – Coal Measures Coventry water body. As such there will be a potential reduction in water availability in the PT Sandstone water body.

5.5 WFD compliance assessment review summary

- 5.5.1 The review of water has concluded that, in light of the ruling, impacts on WFD objectives could result from scheme impacts for five surface water bodies and four groundwater bodies. Certainty regarding the level of risk posed to deterioration in quality elements for these water bodies cannot be provided until further detailed design of the Proposed Scheme element (and associated mitigation measures) is developed, and/or further detailed information regarding the baseline condition of the affected water body is gathered.
- 5.5.2 Derogations are required until such time that it can be shown through detailed design that there is no deterioration of the water body (or no impact on future Status) as a result of the scheme. It should be noted that the development of Article 4.7 statements has been undertaken on a precautionary basis as in most instances, detailed design of scheme elements and their associated mitigation will be sufficient to reduce impacts on quality elements at risk of deterioration and as such, deterioration of water body status will be unlikely as a direct result of the implementation of HS2 in the future.

5.6 Article 4.7 derogation process

- 5.6.1 Article 4.7 of the WFD directs that Member States will not be in breach of the Directive when failure to meet its environmental objectives is the result of either new modifications to the physical characteristics of a water body, or as a result of new human sustainable development on the proviso that the modifications or new development proposed are compliant with four key conditions. In so doing, Article 4.7 provides a means whereby a derogation for a proposed modification or sustainable development may be granted where it meets these four conditions.
- 5.6.2 In light of the ruling and the presumption of the precautionary approach, the Article 4.7 process can also be applied when potential water body impacts *may* prevent achievement of the WFD's environmental objectives.
- 5.6.3 The four conditions that must be met for proposed modifications or new development are set out below and explained in further detail in the proceeding subsections:

- Test (a) - all practical steps are taken to mitigate the adverse impact on the status of the body of water (*practical steps to mitigate adverse impact*);
- Test (b) - the reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years (*reporting Article 4.7 in the RBMP*);
- Test (c) - the reasons for those modification or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 are outweighed by the benefits of the new modification or alterations to human health, to the maintenance of human safety or to sustainable development (*overriding public interest*), and
- Test (d) - the beneficial objectives served by those modifications or alterations of the water body cannot, for reasons of technical feasibility or disproportionate cost, be achieved by other means, which are a significantly better environmental option (*Alternative modifications*).

5.6.4 The EC exemption guidance has been used to define in more detail how the derogation process and requirements of the conditions should be interpreted within the specific context the Proposed Scheme. This is detailed within Appendix A. It is important to note for test (c), the first part of the test (overriding public interest) has been used to determine compliance with this condition of Article 4.7.

5.6.5 The remainder of the report presents detail on how the Article 4.7 condition tests are met for the water bodies affected, with the subsequent subsection explaining the geographic scale at which the tests have been applied.

Reporting condition test statements

5.6.6 The EC exemption guidance recognises that different scales (national, basin, sub-basin, water body) may be appropriate for different assessments or different aspects of the same assessment. The Article 4.7 condition test statements have therefore been provided in two separate scale; those that are met at a route wide scale (section 6) and those which need to be considered at a water body location scale (Appendices B and C).

5.6.7 The first condition test – *practical steps to mitigate adverse impact* – is addressed for each water body where a single scheme element, or combination of scheme elements along a route section has resulted in a high risk of deterioration of one or more WFD quality element.

5.6.8 The second condition test- *reporting Article 4.7 in the RBMP* – is addressed at a route-wide level as this test relates to the process by which the scheme derogations would be reported within the RBMP process.

5.6.9 The third condition test - *overriding public interest* – is also addressed route-wide as this test only applies to the scheme as a whole as opposed to individual scheme elements, as clearly,

the scheme as a whole would not be viable without all of the scheme elements considered together.

5.6.10 The fourth condition - *alternative modifications* - is applied at both scales:

- **Route-wide:** consideration of alternatives to a high speed rail option within the UK's long-term travel and transport plan; and, alternative 'strategic' high speed route options (between London and the West Midlands) to that currently proposed for the Proposed Scheme;
- **Water body scale:** consideration of alternative route section options along the preferred strategic route for the Proposed Scheme; this includes different vertical alignments and minor differences to the horizontal alignment within a given route section which would lead to different scheme elements and hence modifications to water bodies.

6 Condition tests statements

6.1 Practical steps to mitigate

- 6.1.1 This section relates to test (a) under Article 4.7 of the WFD. Practical steps to mitigate adverse impact is inherently included in the Environmental Impact Assessment and WFD compliance assessment process (as detailed in the Environmental Statement), both of which specifically detail mitigation measures.
- 6.1.2 Water body and location-specific mitigation measure details are provided for each water body where WFD standards could be derogated, in Appendix B.

6.2 Reporting Article 4.7 in the RBMP

- 6.2.1 This section relates to test (b) under Article 4.7 of the WFD.
- 6.2.2 Should the Proposed Scheme be constructed, HS2 will work with the Environment Agency to include the water body modifications in the third update of the Thames, Anglian and Humber RBMPs (due to be published in 2021).

6.3 Overriding public interest

- 6.3.1 This section relates to test (c) under Article 4.7 of the WFD. As set out in Appendix A, there are two parts to this specific condition test, either one of which must be met to demonstrate compliance with the condition. The first part of this test (the reasons for those modification or alterations are of overriding public interest) has been used to determine compliance with this derogation condition for HS2.
- 6.3.2 A case for the overriding public interest of the Proposed Scheme has been presented as part of the documentation⁵ required to demonstrate compliance with Article 53 of the Habitats Regulations. The case for Imperative Reasons of Overriding Public Interest (IROPI) as required under the Habitats Regulations was set out in that documentation and the evidence presented has been accepted by Natural England as sufficient to demonstrate imperative reasons of overriding public interest in relation to the Habitats Regulations. The relevant sections of the documentation have been summarised in this paper, and included in full in Appendix D.
- 6.3.3 In preparing this paper, agreement was reached with the Environment Agency that the definition of 'overriding public interest' as it relates to both the Habitats Directive (as set out in Appendix D) and the WFD is the same.

⁵ Habitats Regulations - Imperative Reasons of Overriding Public Interest (IROPI) and absence of satisfactory alternatives (route wide) for HS2 Phase 1" document (HS2-HS2-EV-REP-000-000004)

- 6.3.4 The case for demonstrating that there are no satisfactory alternatives to the Proposed Scheme at the strategic and route-wide scale is presented in Appendix C.
- 6.3.5 The Habitats Regulation documents present Government's view that a high speed railway is required to facilitate economic growth which is safer, greener and improves the quality of life in our communities, as well as meeting the future demand for travel and reduce crowding on existing rail networks. Evidence is provided to demonstrate that high speed railway is the only feasible way of improving the transport network to cope with future demand.
- 6.3.6 Evidence demonstrating the need for the Proposed Scheme is presented in the documents setting out the Strategic Case⁶ and the Economic Case for HS2⁷. The Habitats Regulations IROPI document provides a detailed summary of these cases, evidence that the project would enhance capacity and connectivity between major cities and evidence that HS2 would generate substantial economic growth.

6.4 Alternative modifications

- 6.4.1 This section, along with the route specific alternatives detailed in Appendix B of this report, addresses test (d) under Article 4.7 of the WFD.
- 6.4.2 Prior to developing proposals for a high speed rail network, other alternative ways of creating additional travel capacity were considered. The Strategic Case presents reasons why such alternatives to a new north-south railway were discounted. Strategic alternatives to high speed rail were considered and included 'do nothing', use higher prices to reduce demand for travel, improve communications technology, expand aviation capacity, improve road capacity, and enhance the existing classic rail capacity. Government concluded that there were no feasible alternative ways of achieving its objectives other than to construct a new high speed rail network
- 6.4.3 Alternative options were considered for the route of the proposed high speed rail network between London and the West Midlands. In 2009 HS2 Ltd prepared a list of route options and sub-option for sifting, selection and refinement. Where possible these routes followed the main transport corridors whilst avoiding urban areas and environmentally sensitive locations. The process for assessing these options is set out in the Alternatives Report in the hybrid Bill Environmental Statement⁸.
- 6.4.4 The selection criteria used in the sift process were engineering and construction feasibility; high level cost estimates; environmental, social and spatial considerations; and demand – mainly focused on journey time benefits⁹.

⁶ Department for Transport (2013), *The Strategic Case for HS2*

⁷ High Speed Two (2013), *The Economic Case for HS2*

⁸ HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: Alternatives Report (CT-002-000) November 2013, pp 60-65

⁹ High Speed Rail London to the West Midlands and Beyond, HS2 Ltd, December 2009, p 93

- 6.4.5 This sift process resulted in six main corridors and one hybrid route being short-listed for more detailed consideration. These alternative route options were considered against a number of sustainability criteria. These included the effects on surface water bodies and groundwater bodies.
- 6.4.6 A full summary of the Strategic Case, the strategic alternatives and high speed rail route alternatives is provided in Appendix C and summarises how all reasonable alternatives were considered in developing the Proposed Scheme option.

7 Conclusions and next steps

7.1 Conclusion

7.1.1 The review undertaken and reported within this paper has determined that the ruling affects the Proposed Scheme WFD compliance assessments in two key areas:

- Where there is higher level of uncertainty in the level of risk posed to five surface water bodies. Scheme elements affecting these water bodies 'may' cause deterioration as defined by the ruling and hence derogations under Article 4.7 of the WFD are needed for these water bodies until such time as detailed design, or further environmental investigations remove the uncertainty; and
- Where a combination of scheme elements may lead to a 'any deterioration' in quality groundwater body elements which are in the lowest class (poor status) for four groundwater bodies, this could be deemed to be a failure of WFD objectives in light of the ruling and derogations are also needed for these water bodies.

7.1.2 A review of the requirements of the Article 4.7 in relation to the Proposed Scheme have been reported and used alongside the EC guidance document on exemptions to prepare Article 4.7 derogation statements for the nine affected water bodies. The Statements have been presented at a route wide and water body scale to address the Article 4.7 derogation conditions.

7.1.3 The statements demonstrate that, for the current design status of the Proposed Scheme, the conditions can be met sufficient to allow a derogation under Article 4.7 of the Directive, thereby demonstrating that the scheme remains compliant with the WFD in light of the implications of the ruling made by the CJEU in relation to the Bund case.

7.2 Next steps

7.2.1 The WFD compliance assessment and compliance process for the detailed design and delivery of the Proposed Scheme will be iterative. As further information is gathered and mitigation measures develop through the detailed design process, this is likely to negate the need for the preparation of detailed Article 4.7 derogations on several of the at risk water bodies.

7.2.2 The Proposed Scheme delivery process will include a series of iterative WFD compliance assessments undertaken at each key stage in the design process to ensure continued compliance with WFD objectives.

7.2.3 The key next steps of the WFD compliance process include:

- Undertaking of pre-construction WFD surveys to improve baseline condition understanding, steer the design of scheme elements and appropriate mitigation and provide appropriate evidence to aid in the decision making process and ensure the Article 4.7 justification is appropriate.

- Seeking to eliminate and reduce adverse effects on the supporting quality elements of affected water bodies, and to deliver enhancements, where reasonably practicably, as part of detailed design.
- Iteratively update the WFD compliance assessment (in consultation with the Environment Agency) as understanding of the potential impacts associated with the individual scheme elements develop at each stage of design, in order to improve and develop the mitigation measures.
- To support the consenting process, form a comprehensive audit trail and provide evidence for compliance with the WFD objectives.

7.2.4 It should be noted that the Environment Agency are the competent authority for assessing WFD and that compliance (and derogations) will have to be maintained post Royal Assent either up until construction or until such time as it can be demonstrated that there will be no deterioration of the water body. The Environment Agency will determine compliance (including derogations) at the point in time when they consider the granting of consent for work affecting a water body, which is set out in the protective provisions associated with the hybrid Bill.

Appendix A – Applying Article 4.7 to HS2

Scale of assessment

The EC exemption guidance recognises that different scales (national, basin, sub-basin, water body) may be appropriate for different assessments or different aspects of the same assessment. For HS2, the application of the Article 4.7 conditions will need Article 4.7 and the Proposed Scheme.

The EC exemption guidance sets out some key issues and definitions of terms within Article 4.7 of the Directive which are of relevance to the application of the process to the Proposed Scheme to be applied at different scales owing to the large geographic extent of the scheme and its potential impacts on water bodies (see section 0 for further details).

Additionally, the EC exemption guidance sets out the geographic water body scale for which the definition of deterioration applies. The guidance states that if the resulting development is not causing a deterioration of status on the water body scale, then Article 4.7 does not have to be used. This reaffirms the position taken throughout this WFD compliance assessment review that, in light of the ruling, deterioration (or prevention of good status/potential) must be considered to have the potential to occur at the water body level as opposed to any given location within a water body.

Temporary effects

The EC exemption guidance document on derogations to the environmental objectives confirms that temporary effects do not constitute a deterioration in status and hence article 4.7 is not applicable.

The EC exemption guidance does not define temporary effects; therefore, for the purposes of this assessment, temporary effects have been defined as those effects which would not persist for more than half of a RBMP cycle period (less than 3 years). However, it should be noted that the EC guidance pre-dates the ruling. Therefore, should updated guidance be produced either by Defra, the Environment Agency or the European Union which defines this in further detail, then the route wide WFD compliance assessment and any required derogations will be prepared or updated to reflect this.

Articles 4.8 and 4.9

The use of the article 4.7 exemptions is allowed only when they guarantee at least the same level of protection as existing Community legislation (as set out in Article 4.8). The ES (and subsequent SESs' and AP ESs') have concluded that there are no significant effects predicted on water based sites protected under other legislation such as the Habitats Directive or the Countryside and Rights of Way Act.

Article 4.9 of the Directive sets out that article 4.7 derogations should not be applied where they result in non-compliance in other WFD water bodies within the same River Basin District (RBD). The assessment methodology applied for the Proposed Scheme considered the potential deterioration of a scheme element on downstream water bodies and concluded that no indirect effects would result in a water body downstream being at high risk of objective non-compliance

Condition test detail

First condition test: Practical steps to mitigate adverse impact

This condition test sets out that, in order to for an Article 4.7 derogation to be possible, it must be demonstrated that all practicable steps have to be taken to mitigate the adverse impact on the status of the water body. The EC exemption guidance states that the meaning of mitigation as it is set out in this condition relates to measures which “aim to minimise or even cancel the adverse impact on the status of the body of water”, and it does not refer to compensatory measures “which aim is to compensate in another body of water the ‘net negative effects’ of a project and its associated mitigation measures”.

Further, the EC exemption guidance sets out the use of “steps” requires a wide range of measures in all phases of development to be set out, including “maintenance and operation conditions, facilities’ design, restoration and creation of habitats”.

In terms of how much mitigation needs to be reasonably considered, the EC exemption guidance sets out that the wording “all practicable steps”, when compared to the use of “practicable” in other legislation, “suggests those mitigation measures should be technically feasible; do not lead to disproportionate costs; and are compatible with the new modification or sustainable human development activity.”

Second condition test: Reporting Article 4.7 in the RBMP

Under Article 4.7 (b), there is a reporting obligation that where modifications or alterations to a water body require exemption derogation (to the no deterioration objective, and/or the future status objective) the reasons for those modifications and alterations are specifically set out and explained in the RBMP required under Article 13 and the objectives are reviewed every six years.

The EC exemption guidance sets out that this does not mean that “Member States must wait until the publication of the River Basin Management Plan before allowing a new physical modification or new sustainable development activity to proceed. In many cases projects will be developed within the RBMP six year cycle.” The EC exemption guidance goes on to state “If a modification or alteration goes ahead in the middle of a river basin planning cycle, the reason for that modification or alteration must be set out in the subsequent (update of the) RBMPs”

Third condition test: Overriding public interest

The third condition test has two parts, either one of which needs to be met in order for an Article 4.7 derogation to be possible:

- The reasons for those modification or alterations are of overriding public interest;
- The benefits to the environment and to society of achieving the objectives... are outweighed by the benefits of the new modification or alterations to human health, to the maintenance of human safety or to sustainable development;

The first part of test (overriding public interest) has been used to determine compliance with this derogation condition for HS2.

The overriding public interest concept is also used in the Habitats Directive (92/43/EEC) as well as other EC law. The EC exemption guidance refers to the European Commission's "Methodological guidance on the provisions of Article 6.3 and 6.4 of the Habitats Directive 92/43/EEC: Assessment of plans and projects significantly affecting Natura 2000 sites" which provides high level definition of when a scheme should be considered as reasonably constituting "overriding public interest". In the case of HS2, it refers to the following situations the project could be considered to be "indispensable within the framework of":

- Actions or policies aiming to protect fundamental value for citizen's lives (health, safety, environment);
- Fundamental policies for the state and the society; and
- Carrying out activities of an economic or social nature, fulfilling specific obligations of public services.

Fourth condition test: Alternative modifications

In applying derogations under Article 4.7 it is necessary to "demonstrate that the beneficial objectives served by the modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option."

The EC exemption guidance sets out that the 'means' or 'alternatives' could involve alternative locations, different scales or alternative processes. This requires a demonstration of the alternatives considered for Phase One of HS2 at different stages of the scheme conception and planning, including:

- Alternatives to a high speed rail option within the UK's long-term travel and transport plan and its role in building the balanced, dynamic and low-carbon economy that is essential for future prosperity (including a 'do nothing' option);
- Alternative 'strategic' high speed route options (between London and the West Midlands) to that currently proposed for the Proposed Scheme; and
- Alternative route section options along the preferred strategic route for the Proposed Scheme; this includes different vertical alignments and minor differences to the horizontal alignment within a given route section.

Appendix B –Water body specific condition statements

Surface water bodies

Stoke Brook Aylesbury (GB106039030320)

The Stoke Brook Aylesbury water body is currently of 'Moderate' overall WFD status, with the 'Moderate' status classification limited by Macroinvertebrates and Phosphate. Baseline WFD surveys undertaken for the water body found that the Stoke Brook and its tributaries are heavily shaded supporting low diversity macrophyte communities and poor to good macroinvertebrate diversity.

With the consideration of reasonable mitigation, the Wendover north cutting scheme element was assessed as having the potential to have an adverse impact on the Stoke Brook. Drainage/ dewatering is expected to continue at Wendover north cutting during operation, although the volumes have yet to be determined as they will depend on groundwater levels which have yet to be investigated. The water abstracted to construct the tunnel and cutting will be returned to the Stoke Brook 1 km downstream from identified springs. On a precautionary basis, these impacts have been considered as having a high risk of causing an adverse effect on the macrophyte, macroinvertebrate and phosphate status of the water body by reducing flows and the dilution potential of the watercourse.

The Wendover green tunnel and the associated Wendover north cutting in CFA10 have been identified as having a potential high amber risk with respect to construction dewatering. Drainage/ dewatering is expected to continue at Wendover north cutting during operation, although the volumes have yet to be determined as they will depend on groundwater levels which have yet to be investigated. The water abstracted to construct the tunnel and cutting will be returned to surface water (Stoke Brook) 1 km downstream from identified springs and at the edge of the groundwater body because there is no suitable discharge point further upstream. There could be potential localised disruption to private abstractions from the tunnel. There are no abstractions within 1 km of the north cutting. Track drainage will be discharged to the south of the tunnel. As such there is an adverse effect on the water balance of the groundwater body during construction.

There is a potential for a minor change in the baseflow to nearby springs and associated streams. The impact from the change in baseflows on the Weston Turville Reservoir Site of Special Scientific Interest (SSSI) further downstream is assessed as being negligible as the tributary fed by springs that might be affected by the tunnel only feed into the reservoir during high flow periods. The fen in the Local Wildlife Site at World's End may potentially be influenced by combined effects of the Wendover green tunnel and the Wendover north cutting.

Practical steps to mitigate adverse impact

For each water body at high risk of deterioration, it is necessary to set out all the mitigation measures that have been considered in order to avoid adverse WFD environmental objective impacts, including: avoidance measures through the route optioneering and screening process; assumed mitigation in outline

route alignment design, and assumed mitigation developed as part of the iterative environmental assessment of preferred route alignments

The following mitigation measures have been developed and taken into consideration as part of the assessment of WFD impacts. These mitigation measures are those that are reasonably possible at the current stage of planning and knowledge of baseline conditions to mitigate adverse impacts on water bodies, and are concluded as those that are technically feasible, and not disproportionately costly.

It should also be noted that detailed design of works impacting Stoke Brook will be developed and agreed with the Environment Agency. Detailed design will consider mitigation measures in more depth to ensure adherence to the requirements of the WFD with regards to activities such as river diversions and realignments, culverting, as well as groundwater protection.

Mitigation list for effects in the Stoke Brook

- Further investigation to assess the effect of the change in flows brought about by the construction of Wendover north cutting and implementation of a monitoring regime during construction for sensitive water bodies¹⁰.
- Minimisation of dewatering requirements, including the use of temporary cut-off walls if needed¹¹.
- Sustainable drainage systems (SuDS), where appropriate, are to be provided to encourage water to soak back into the ground, and where drainage or cuttings intercept groundwater flow.¹²
- Intercepted groundwater flow into the Stoke Brook will be transferred approximately 1km downstream of where the headwaters emerge to ensure that there will be minimal disruption to the majority of flow in the Stoke Brook.⁷
- At the headwaters of the Stoke Brook (the upstream 1km near World's End), specific monitoring of groundwater levels and watercourse flows will be used to verify the extent of the effect, if any. Discussions will be held with the Environment Agency on the results of the monitoring to determine if any further mitigation is required. Subject to monitoring outcomes, further mitigation options include measures to discharge intercepted groundwater via local infiltration on the northern side of the Wendover north cutting.⁷
- Monitoring of the realigned Stoke Brook channels will be undertaken in consultation with the Environment Agency prior to, during and post construction, if required, to establish baseline conditions for surface water and groundwater and to confirm the effectiveness of agreed temporary and permanent mitigation measures.¹³
- It will be necessary to obtain approval to enable the discharge of dewatering to soakaway or

¹⁰ HS2 SES3 and AP4 Environmental Statement Volume 5 Technical Appendices: Water Resources (WR-001-000: Annex A and Annex B) 2015

¹¹ HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: Water Resources (WR-001-000) 2013

¹² HS2 London-West Midlands Environmental Statement Volume 2 Community Forum Area report: Dunsmore, Wendover and Halton/No 10 2013

¹³ HS2 London-West Midlands Environmental Statement Volume 2 Community Forum Area report: Stoke Mandeville and Aylesbury/No 11 2013

filtration systems, watercourses, foul sewers or disposal off-site.¹⁴

- The implementation of a surface water or groundwater monitoring plan, particularly in relation to works which may affect aquifers.⁹
- Contractors will be required to undertake risk assessments, as appropriate, associated with excavation work and dewatering impacts on surface water, groundwater and abstractions.⁹

Alternative modifications

The need for the extent and location of Wendover north cutting has been dictated by the currently proposed horizontal and vertical alignment requirements.

The horizontal alignment of this route section was highly constrained by the need to pass to the south of Wendover and to reduce the extent of the route within the Chilterns AONB to the south of the proposed route alignment. These constraints resulted in a narrow corridor through which the preferred route needed to pass.

Several options were considered and proposed for the vertical alignment. The pre-consultation route vertical alignment was higher than the currently proposed alignment, reducing the depth and length of cutting required to the north of Wendover. However, noise and visual impacts on the village of Wendover were challenged and the post-consultation route was altered with a lower vertical alignment through this section.

The extent of possible lowering of the alignment in this location is limited by the need to pass over both the A413 trunk road and the rail line to the south of Wendover, but sufficient lowering was possible to allow the route to pass through a green tunnel alongside Wendover minimising noise and visual impacts to the town. The result of this alignment change was an increased depth and extent of the Wendover north cutting to the north of the town.

The alternative option of lowering the alignment further through a bored tunnel to the south of Wendover would result in a deeper cutting to the north of town which would exacerbate the impact of the cutting on groundwater and spring flows and loss of contributing flows to the Stoke Brook.

The horizontal and vertical route alignment relating the Stoke Brook water body has been optimised to reduce noise and visual impacts, and the effect of interruption to spring flows and groundwater flow. No other reasonable alternatives to the cutting exist within this section of the strategic route alignment chosen.

Padbury Brook (The Twins) (GB105033038210)

The Padbury Brook water body is currently of 'Moderate' overall WFD status, with the 'Moderate' status classification limited by Phosphate ('Moderate'), whilst macroinvertebrates are at 'Good' status and fish at 'High' status. Baseline WFD surveys support the biological status of the water body.

¹⁴ HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: Draft code of construction practice (CT-003-000) 2013

The numerous impacts associated with the culvert, river diversion and viaduct scheme elements throughout the water body catchment have the potential to have a cumulative adverse impact associated with the hydromorphological change, loss of and potential fragmentation of macroinvertebrate and fish habitat within a catchment of high sensitivity. After the consideration of reasonable mitigation, this cumulative impact has a high risk of causing an adverse effect on the macroinvertebrate and fish status at a water body scale due to the number of scheme elements affected and the sensitivity of the receptor.

Practical steps to mitigate adverse impact

The following mitigation measures have been developed and taken into consideration as part of the assessment of WFD impacts. These mitigation measures are those that are reasonably possible at the current stage of planning and knowledge of baseline conditions to mitigate adverse impacts on water bodies, and are concluded as those that are technically feasible, and not disproportionately costly.

It should also be noted that detailed design of works impacting the Padbury Brook will be developed and agreed with the Environment Agency. Detailed design will consider mitigation measures in more depth to ensure adherence to the requirements of the WFD with regards to activities such as river diversions and realignments, culverting, as well as groundwater protection.

Mitigation list for effects on Padbury Brook

- The requirement for temporary works (including watercourse diversions) required during construction will be avoided or reduced, and appropriate measures to reduce impacts on habitats/sites of nature conservation value will be put in place to re-instate or recreate these habitats.
- Where it is not possible to avoid the use of temporary diversions (i.e. diversions which are not to become the new realigned channel), the construction impacts of temporary diversions will be mitigated by constructing the temporary diversion in advance of other activities associated with the construction of the Proposed Scheme and as per the sequence detailed in Section 6.9 ES Volume 1¹⁵.¹⁶
- Where sites/habitats/species of significant ecological value are subject to temporary works appropriate measures will be specified to re-instate or recreate these habitats.
- An assessment of flows and fish passage will be used to inform the detailed design of culverts and river diversions.³¹
- Suggested additional hydromorphological mitigation measures which could be incorporated into detailed design (where practicable) include bank reprofiling (rehabilitation), creation of reed fringes, creation of shallow margins in front of hard defences, recreation of sinuous river channels (re-meandering) where space and gradient allows, recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity),

¹⁵ HS2 London-West Midlands Environmental Statement Volume 1 Introduction to the Environmental Statement and the Proposed Scheme 2013

¹⁶ Padbury Brook WFD Assessment Sheet in HS2 SES and AP2 Environmental Statement Volume 5 Technical Appendices: Water Resources (WR-001-000: Annex A and Annex B) 2015

and use of engineering techniques to assist natural recovery.³⁹

- Where possible, the fragmentation and isolation of habitats, species or features will be avoided so that all retained habitats/species/features continue to be viable. Where there is no option but to cause fragmentation/severance, attempts will be made to maximise the size of the habitat/population/feature which is considered to be of the greatest value.
- The detailed design of all watercourse realignments and crossings will be completed in consultation with the Environment Agency to meet their objectives with respect to hydraulic capacity, flood risk, ecology and hydromorphology. Where culverts are required these will be kept as short as possible. Where reasonably practicable, the permanent channel realignments will be constructed in advance of other activities associated with the construction of the Proposed Scheme. The design mitigation including consideration of design features aligned with the objectives of the WFD (for example use of soft engineering solutions, aquatic marginal planting and the inclusion of natural forms) will ensure that the channels and structures are sufficiently sized to avoid a permanent impact on flow.¹⁷
- Culvert length will be reduced where reasonably practicable and will be designed with invert levels 300mm below the firm bed of the watercourse to negate the impact on flows and sediment transfer. Consideration should be given to providing mitigation for the loss of open channel by means of sensitive design at either end of the culvert in order to retain and, if reasonably practicable, enhance the overall quality of the watercourse. Where there is loss of length due to straightening, the aim, where feasible within hybrid Bill and other constraints, will be to offset this by increasing channel length up or downstream of the culvert to at least match the lost length of channel. Culverts will normally be designed in line with Construction Industry Research and Information Association (CIRIA) and Environment Agency guidance.¹⁸
- Appropriate precautions will be taken when working in the channels of or adjacent to watercourses, realigning watercourses, providing new culverts and or extending culverts, if required, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the EA's General Guide to Prevention of Pollution (PPG 1), Works and maintenance in or near water (PPG5) and Maintenance of structures over water (PPG23)¹⁹ and Control of water pollution from construction sites CIRIA 532.²⁸
- Monitoring will be undertaken in consultation with the Environment Agency prior to, during and post construction, if required, to establish baseline conditions for surface water and groundwater and to confirm the effectiveness of agreed temporary and permanent mitigation

¹⁷ HS2 London-West Midlands Environmental Statement Volume 2 Community Forum Area report: Calvert, Steeple Claydon, Twyford and Chetwode/No 13 2013

¹⁸ HS2 London-West Midlands Environmental Statement Volume 2 Community Forum Area report: Newton Purcell to Brackley/No 14 2013

¹⁹ Since publication of the original scheme ES and the CoCP, the Environment Agency have withdrawn the Pollution Prevention Guidance and only made this available through archive. However, they still represent the most up to date guidance relating to pollution control at the time of producing this report.

measures.²⁹

Alternative modifications

The need for the numerous culverts and river diversions has been dictated by the currently proposed horizontal and vertical alignment requirements.

The horizontal alignment of this route section through the Padbury Brook water body catchment was highly constrained by the need to pass between Twyford and Newton Purcell to the south of the route and Chetwode to the north. The route also follows the route of the disused railway as far as practicable.

The vertical alignment has been selected following consultation to ensure a viaduct and clear span crossing of the main channel of the Padbury Brook whilst minimising height above ground level to subsequently reduce the noise and visual impacts on the settlements of Chetwode, Twyford and Newton Purcell. This alignment equally considers noise and visual impacts and the need to provide the optimal crossing design for the main river channel (and hence reduce morphological and biological impact on the water body as well as minimising flood risk).

To avoid the culverting and minor channel realignment on the tributaries of the Padbury Brook, the route alignment would need to be lowered significantly to a bored tunnel which due to the required length of several kilometres would be disproportionately expensive. No other reasonable alternatives exist.

Ouse (GB105033037880)

The Ouse (upstream of Brackley) water body is currently of 'Good' overall WFD status, with 'Good' status for macroinvertebrates and phosphate, and 'High' status for fish. Baseline data was not collected to support the SES assessment for the main water body or its tributaries due to limited access.

The Brackley south cutting scheme element has the potential to have an adverse impact associated with the interruption of groundwater flows and the subsequent reduction in groundwater spring contribution to flow in a major tributary of the Ouse. Reasonable mitigation has been developed and considered, but the precautionary assessment has concluded that there is a high risk of causing an adverse effect on the fish status of the water body by reducing flows in a tributary which may be used for fish refuge and/or spawning.

Practical steps to mitigate adverse impact

The following mitigation measures have been developed and taken into consideration as part of the assessment of WFD impacts. These mitigation measures are those that are reasonably possible at the current stage of planning and knowledge of baseline conditions to mitigate adverse impacts on water bodies, and are concluded as those that are technically feasible, and not disproportionately costly.

It should also be noted that detailed design of works impacting the Ouse will be developed and agreed with the Environment Agency. Detailed design will consider mitigation measures in more depth to ensure adherence to the requirements of the WFD with regards to activities such as river diversions and realignments, culverting, as well as groundwater protection.

Mitigation list for effects on The Ouse

- The requirement for dewatering will be reduced by including the use of temporary cut-off walls if needed.
- SuDS, where appropriate, are to be provided to encourage water to soak back into the ground, and where drainage or cuttings intercept groundwater flow.³³
- Any groundwater intercepted by the track and land drainage for the Brackley south cutting will be discharged to the River Great Ouse. This arrangement will ensure that, whilst there may be localised changes to the hydrogeological regime, impacts on the flow regime of the minor watercourses will be reduced.³³
- It will be necessary to obtain approval to enable the discharge of dewatering to soakaway or filtration systems, watercourses, foul sewers or disposal off-site.²⁹
- A surface water or groundwater monitoring plan will be implemented, particularly in relation to works which may affect aquifers.²⁹
- Monitoring will be undertaken in consultation with the Environment Agency prior to, during and post construction, if required, to establish baseline conditions for surface water and groundwater and to confirm the effectiveness of agreed temporary and permanent mitigation measures.²⁹
- In particular, the monitoring of fish populations and flow gauging during construction and operation on the Ouse tributary will be required to inform consideration of other mitigation measures such as altering the groundwater discharge location in order to augment flows.²⁹
- Contractors will be required to undertake risk assessments, as appropriate, associated with excavation work and dewatering impacts on surface water, groundwater and abstractions.²⁹

Alternative modifications

The need for the Brackley south cutting for this section of the route has been dictated by the currently proposed horizontal and vertical alignment requirements.

The horizontal alignment of this route section is constrained by the need to pass to the south of Radstone but to the north of Brackley. An initial option was considered with the route passing closer to Brackley but this option did not provide sufficient clearance to allow the route to pass under the A43 to the north east of Brackley.

The vertical alignment is driven by several factors. The crossing of the A43 to the south of the proposed cutting is the key factor. The required clearance to pass under the A43 results in the extent of the Brackley south cutting to the north of the A43.

²⁹ Ouse (upstream of Brackley) WFD Assessment Sheet in HS2 Environmental Statement Volume 5 Technical Appendices: Water Resources (WR-001-000: Annex A and Annex B) 2013

An option was considered to pass over the A43 (thereby removing the need for a cutting), but to achieve the required clearance would require a large embankment structure passing Brackley which would lead to large noise and visual impacts on both Brackley and Radstone.

To avoid the cutting by going lower would require a bored tunnel which, due to the required drop, would require tunnel several kilometres in length to the north and south, making it disproportionately expensive. No other reasonable alternatives exist.

River Blythe from Patrick Bridge to River Tame (GB104028042572)

The River Blythe water body is currently of 'Moderate' overall WFD status, with the 'Moderate' status classification limited by Macrophytes ('Moderate'), whilst macroinvertebrates and fish both at 'High' status. Baseline WFD surveys support the biological status of the waterbody.

The numerous minor impacts associated with the culvert, river diversion, cutting and viaduct scheme elements, throughout both of the River Blythe WFD waterbody catchments, have the potential to have a cumulative adverse impact associated with the hydromorphological change, loss of and fragmentation of fish habitat within two catchments of high sensitivity. This cumulative impact has been considered as having a high risk of causing an adverse effect on the fish status of the River Blythe (from Patrick Bridge to River Tame) water body due to the quantity of scheme elements and the sensitivity of the receptor.

Scheme elements likely to have the most significant adverse impacts include the River Blythe Bypass and Horn Brook culverts, which may lead to the loss of fish habitat and may pose an obstruction to fish migration, and Diddington cutting, which could alter the surface water catchment leading to reduced surface water contributions and subsequently reducing flow in the Hollywell Brook (a tributary of the River Blythe).

Practical steps to mitigate adverse impact

The following mitigation measures have been developed and taken into consideration as part of the assessment of WFD impacts. These mitigation measures are those that are reasonably possible at the current stage of planning and knowledge of baseline conditions to mitigate adverse impacts on water bodies, and are concluded as those that are technically feasible, and not disproportionately costly.

It should also be noted that detailed design of works impacting the River Blythe will be developed and agreed with the Environment Agency. Detailed design will consider mitigation measures in more depth to ensure adherence to the requirements of the WFD with regards to activities such as river diversions and realignments, culverting, as well as groundwater protection.

Mitigation list for effects on the River Blythe and its tributaries

- Hollywell Brook will require a permanent realignment in order to ensure that the length of watercourse beneath the proposed Hollywell Brook underbridge in the Birmingham Interchange station area is reduced as far as is reasonable practicable. Hollywell Brook will be realigned for approximately 330m, and the watercourse will take a perpendicular path underneath the route. Where the route passes over the Hollywell Brook the underbridge will incorporate gaps to allow the influx of natural light to the brook situated below the structure. In consultation with the Environment Agency, consideration will be given to provide a

naturalised channel form and banks around the underbridge although there may be a need to also incorporate erosion protection at specific points.²¹

- Suggested additional hydromorphological mitigation measures which could be incorporated into detailed design (where practicable) include recreation of sinuous river channels (re-meandering) where space allows, and recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity). An area of the upstream section is described as being currently 'over deepened' and would benefit from such improvements.³⁴
- The Environment Agency should be consulted during the detailed design of watercourse modifications (e.g. Hollywell Brook watercourse diversion) to ensure habitat improvements are maximised.³⁴
- Fish rescue will be carried out on any sections that will be dewatered (e.g. Hollywell Brook during construction of watercourse diversion).³⁴
- An assessment of flows and fish passage will be used to inform the detailed design of culverts on the River Blythe Bypass and Horn Brook. Culverts will be regularly maintained and kept in a functional state that allows fish movements.²²
- Monitoring will be undertaken in consultation with the Environment Agency prior to, during and post construction, if required, to establish baseline conditions for surface water and groundwater and to confirm the effectiveness of agreed temporary and permanent mitigation measures.²⁸
- Where possible, the fragmentation and isolation of habitats, species or features will be avoided so that all retained habitats/species/features continue to be viable. Where there is no option but to cause fragmentation/severance, attempts will be made to maximise the size of the habitat/population/feature which is considered to be of the greatest value.
- The requirement for temporary works (including watercourse diversions) required during construction will be avoided or reduced, and appropriate measures to reduce impacts on habitats/sites of nature conservation value will be put in place to re-instate or recreate these habitats.
- Culvert length will be reduced where reasonably practicable and will be designed with invert levels 300mm below the firm bed of the watercourse to negate the impact on flows and sediment transfer. Consideration should be given to providing mitigation for the loss of open channel by means of sensitive design at either end of the culvert in order to retain and, if reasonably practicable, enhance the overall quality of the watercourse. Where there is loss of length due to straightening, the aim, where feasible within hybrid Bill and other constraints,

²¹ HS2 London-West Midlands Environmental Statement Volume 2 Community Forum Area report: Birmingham Interchange and Chelmsley Wood/No 24 2013

²² River Blythe from Patrick Bridge to River Tame WFD Assessment Sheet in HS2 SES and AP2 Environmental Statement Volume 5 Technical Appendices: Water Resources (WR-001-000: Annex A and Annex B) 2015

will be to offset this by increasing channel length up or downstream of the culvert to at least match the lost length of channel. Culverts will normally be designed in line with CIRIA and Environment Agency guidance.²³

- It will be necessary to obtain approval to enable the discharge of dewatering to soakaway or filtration systems, watercourses, foul sewers or disposal off-site.²⁸
- A surface water or groundwater monitoring plan will be implemented, particularly in relation to works which may affect aquifers.²⁸
- Contractors will be required to undertake risk assessments, as appropriate, associated with excavation work and dewatering impacts on surface water, groundwater and abstractions.²⁸
- Appropriate precautions will be taken when working in the channels of or adjacent to watercourses, realigning watercourses, providing new culverts and or extending culverts, if required, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the EA's General Guide to Prevention of Pollution (PPG 1), Works and maintenance in or near water (PPG5) and Maintenance of structures over water (PPG23) and Control of water pollution from construction sites CIRIA 532.²⁸

Alternative modifications

The key factor driving the selection of scheme elements affecting the river Blythe and its tributaries is the selected location of the Interchange station and the horizontal and vertical alignments required.

The location of the interchange station was limited to this location due to the angle of approach required for the route into Birmingham via the delta junction, but also needing to avoid the Birmingham NEC centre, the settlement of Coleshill and avoiding the road infrastructure (M42, A45 and the A452).

The interchange station location, as well as the need to limit noise and visual impacts to Birmingham and Hampton in Arden to the south, drives the vertical alignment for several kilometres to the south of the proposed station which is a key factor in the selection of scheme elements affecting the Blythe catchment. The vertical route alignment needed to be as close to ground level for both station requirements, and to reduce the noise and visual impacts. There was also the need for the route to pass under the A45 to the south of the station and over the M42 to the north.

Given the infrastructure constraints, the need for an interchange station in this location and the need to reduce noise and visual impacts, no other reasonable alternative exist.

Horton Brook (GB106039023040)

The Horton Brook water body is currently of 'Moderate' overall WFD status, with the 'Moderate' status classification limited by Macroinvertebrates ('Moderate'). No baseline WFD surveys have been carried out

²³ HS2 SES and AP2 Environmental Statement Volume 4 Off-route effects 2015

for this water body. The water body is affected by the proposed location of the relocated Heathrow Express Depot at Langley (part of Additional Provision 2)

Due to the lack of WFD baseline data for fish, it is not possible to rule out the potential adverse impact arising as a result of the culvert and river diversion scheme elements and the associated hydromorphological change, obstruction to fish migration, loss of and fragmentation of fish habitat within the catchment. These impacts have been considered as having a high risk of causing an adverse effect on the fish status of the water body due to the lack of baseline data and the uncertainty this creates.

Practical steps to mitigate adverse impact

The following mitigation measures have been developed and taken into consideration as part of the assessment of WFD impacts. These mitigation measures are those that are reasonably possible at the current stage of planning and knowledge of baseline conditions to mitigate adverse impacts on water bodies, and are concluded as those that are technically feasible, and not disproportionately costly.

It should also be noted that detailed design of works impacting the Horton Brook will be developed and agreed with the Environment Agency. Detailed design will consider mitigation measures in more depth to ensure adherence to the requirements of the WFD with regards to activities such as river diversions and realignments, culverting, as well as groundwater protection.

Mitigation list for effects on the Horton Brook

- Ecological surveys will be undertaken to assess the ecological value of the watercourse. Surveys will also inform the detailed design of culverts in order to allow for fish passage.²⁴
- Where possible, the fragmentation and isolation of habitats, species or features will be avoided so that all retained habitats/species/features continue to be viable. Where there is no option but to cause fragmentation/severance, attempts will be made to maximise the size of the habitat/population/feature which is considered to be of the greatest value.
- The requirement for temporary works (including watercourse diversions) required during construction will be avoided or reduced, and appropriate measures to reduce impacts on habitats/sites of nature conservation value will be put in place to re-instate or recreate these habitats.
- Culvert length will be reduced where reasonably practicable and will be designed with invert levels 300mm below the firm bed of the watercourse to negate the impact on flows and sediment transfer. Consideration should be given to providing mitigation for the loss of open channel by means of sensitive design at either end of the culvert in order to retain and, if reasonably practicable, enhance the overall quality of the watercourse. Where there is loss of length due to straightening, the aim, where feasible within hybrid Bill and other constraints, will be to offset this by increasing channel length up or downstream of the culvert to at least match the lost length of channel. Culverts will normally be designed in line with CIRIA and

²⁴ Horton Brook WFD Assessment Sheet in HS2 SES and AP2 Environmental Statement Volume 5 Technical Appendices: Water Resources (WR-001-000: Annex A and Annex B) 2015

Environment Agency guidance.²⁵

- Consideration will be given in the design of all channel works to the objectives of the WFD as described in the RBMP. This may include the use of soft engineering solutions for bank design, and the inclusion of natural forms such as berms or incorporation of a two-stage channel, riffles and pools and marginal planting, where reasonably practicable.³⁸
- Method statements will be agreed in consultation with the Environment Agency to ensure that any temporary impacts on water quality, flow and ecology are acceptable. These will include details of suitable construction sequencing, channel stabilisation, methods for reducing and managing potential pollution events and sediment.³⁸
- Appropriate precautions will to be taken when working in the channels of or adjacent to watercourses, realigning watercourses, providing new culverts and or extending culverts, if required, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the EA's General Guide to Prevention of Pollution (PPG 1), Works and maintenance in or near water (PPG5) and Maintenance of structures over water (PPG23) and Control of water pollution from construction sites CIRIA 532.²⁸

Alternative modifications

The proposal for a new HS2 station at Old Oak Common (OOC) requires the existing First Great Western (FGW) and Heathrow Express Operating Company (HEOC) train maintenance depots currently occupying the land in OOC to be vacated. Network Rail (NR) facilitated a option selection process for a new depot site for Heathrow Express (HEX) was undertaken. During the entire option selection process, key criteria provided the basis of assessment and investigation. The high level key criteria used were: capital cost, operability, property and environmental issues, ability to meet operators requirements, risks, maintainability, buildability, safety, technical feasibility and sustainability.

NR follows a defined project management process called "Governance for Railway Investment Projects" (GRIP) which defines how NR manages and controls projects that enhance or renew the national rail network. The HEX Depot Relocation project has followed the GRIP process since NR was remitted to develop the project in autumn 2012.

The option selection process for locating a new HEX Depot has been through a thorough and extensive process from the start of the project in August 2012 up until May 2015 when the single option was ratified. The explanation of the process used to determine the chosen option can be split into two distinct parts.

Part 1 contains the initial feasibility assessment and initial option shortlisting. This assessment concluded north Pole to be the best of the three options studied and was submitted as part of the HS2 Hybrid Bill to Parliament in November 2013 as it was ranked the best option in GRIP 2, followed closely by Langley as second best. However, following deposit of the Hybrid Bill, the railway industry expressed serious

²⁵ HS2 SES and AP2 Environmental Statement Volume 4 Off-route effects 2015

reservations with the north Pole East Proposal due to critical issues that could not be solved without considerable and permanent impact to the railway operations, including impact on the strategically important Intercity Express Programme (IEP) and critical maintenance activities along the Great Western Main Line (GWML). It was therefore agreed in January 2014 that the option selection process be re-run to identify more suitable sites for the depot that did not have such substantial, irresolvable issues.

Part 2 contains the period between January 2014 and December 2014 when the feasibility assessment, option shortlisting and full GRIP 3 option development was repeated based on the reintroduction of a number of options that were discounted in the original option sifting stage during Part 1. These options were originally discounted due to issues that were deemed difficult to solve, however not unsolvable. The lessons learnt from Part 1 of the process and the greater level of understanding of the projects requirements also allowed previous options to be considered.

A key area of focus during the option selection process was to be able to demonstrate that the GWML could continue to operate reliably and efficiently. Consequently the NR Maintenance requirements were a key criterion throughout the assessment of options. The context of this can be explained through the substantial growth currently being seen on the GWML. The GWML is one Britain's busiest railways and is subject to ever increasing demand from both passenger and freight industries. The increasing demand puts an ever increasing requirement on NR to maintain and operate the infrastructure reliably whilst the amount of infrastructure and assets (new stations, viaducts, routes, tracks) are increasing to meet the demand. NR have agreed to shorten maintenance possession hours to provide for increasing demand and these hours cannot be reduced any further without effects to performance and safety. The relocation of HEx to an alternative site adds a further complication. Train paths are required to get to that new depot, and trains often require access to the depot at times when NR needs to maintain the railway.

In summary, the result of the overall assessment was that Langley was the best option of the 25 assessed. It was agreed that Langley should replace north Pole East within the hybrid Bill through Additional Provision 2 submitted to Parliament in July 2015.

The horizontal alignment at Langley was constrained by the size of the proposed site which is constrained by the GWML to the south, Langley to the west, the Grand Union Canal to the north, and Hollow Hill Lane to the east. The land parcel to the west of Hollow Hill Lane is a dis-used landfill site.

The vertical alignment at the Langley site is driven the by the operational need to keep the route at the same level for connection to the GWML and the need for the depots to be at (or close to ground level). This ensured the required connectivity to the rail line, but also ensured the existing GWML embankment acted as a visual barrier to the settlement area of Langley to the south for the depot buildings. The line also needed to cross Hollow Hill lane to the east of the depot site with sufficient clearance.

Given that Langley is selected as the best operational location through the GRIP process, there are no reasonable alternatives for the route alignment at Langley.

Groundwater bodies

Chilterns Chalk Scarp (GB40601G604100)

The water body currently has a poor quantitative status from the water balance test, with a good qualitative status.

The Wendover green tunnel and the associated Wendover north cutting in CFA10 have been identified as having a potential high amber risk with respect to construction dewatering. Drainage/ dewatering is expected to continue at Wendover north cutting during operation, although the volumes have yet to be determined as they will depend on groundwater levels which have yet to be investigated. The water abstracted will be returned to surface water (Stoke Brook) 1 km downstream from identified springs and at the edge of the groundwater body because there is no suitable discharge point further upstream. As such there is a potential risk to the water balance of the groundwater body.

Practical steps to mitigate adverse impact

The following measures have been proposed within the Environmental Statement and the WFD compliance assessment to mitigate any potential adverse impacts on the water body water balance. These are determined to be technically feasible, and not disproportionately costly.

The Code of Construction Practice (CoCP) will be used with best practice for design, construction and operation to reduce the risks to the GWDTEs. A monitoring regime will be undertaken in consultation the Environment Agency prior to, during and post-construction, if required, to establish baseline conditions for surface water and groundwater and to confirm the effectiveness of agreed temporary and permanent mitigation measures²⁶.

Monitoring will also be implemented to indicate if further mitigation for the private abstractions is required. A schedule of specific monitoring will be undertaken in consultation with the well owners to verify the quality of water is satisfactory for its use²⁷.

Following monitoring the dewatering requirements will be reduced, including the use of temporary cut-off walls where appropriate.

The elevation of the Wendover tunnel relative to the base of the Chalk and Upper Greensand aquifers has been designed such that there will be a minimal change to spring fed streams located to the north of Wendover that feed Weston Turville SSSI.

The discharge point for the abstracted water will avoid sensitive sites such as the Weston Turville Reservoir SSSI. Disposal will be in accordance with Environment Agency pollution prevention guidelines and Environmental Permitting Regulations. Mitigation measures set out in the CoCP will require contractors to obtain the necessary approvals to enable discharge of dewatering and surface water run-off from construction sites to watercourses, to ground or to the public sewer network. This will include response

²⁶ HS2 London-West Midlands Environmental Statement Volume 2 Community Forum Area Report: Dunsmore, Wendover and Halton/No 10 2013

²⁷ HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: CFA10 Dunsmore, Wendover and Halton Water Resources Assessment (WR-002-010) 2013

procedures to be implemented in the event of works affecting groundwater levels or quality with subsequent adverse effects on abstractions, watercourses, water bodies or springs.

Alternative modifications

The requirement for tunnels and consequent dewatering and interruption of groundwater flow is dictated by the vertical alignment of the route. In the Chilterns the route was set low in the landscape to reduce visual and noise effects at Wendover and the AONB. If the tunnel was deeper there would be greater impacts on groundwater and a deeper cut would have resulted at Wendover north cutting.

The vertical alignment was also controlled by the elevation of road crossings.

The vertical alignment and effect on the Chilterns Chalk Scarp water body has therefore been optimised to take into account competing demands. No other reasonable alternatives to the cutting exist within this section of the strategic route alignment chosen.

During the House of Commons Select Committee process, alternative mitigation measures were explored, such as the possibility to re-inject water or tank (seal) the cutting to reduce the effects on the groundwater body and spring flows in particular, should this be necessary.

Mid Chilterns Chalk ([GB40602G601200](#))

The water body currently has a poor quantitative status from the surface water and water balance tests, with a poor qualitative status from the DWPA's test.

The Colne Valley viaduct in CFA7 is within a designated DrWPA, and a SPZ1 (from three PWS abstractions) and private abstractions. There are landfills and existing poor quality groundwater in the vicinity. Piling may potentially create new preferential pathways within and between shallow and bedrock aquifers affecting water quality.

The Chiltern Tunnel within CFA8, and CFA9 is within a designated DrWPA, and a SPZ2 (associated with three PWS abstractions) and private abstractions. There are landfills and existing poor quality groundwater in the vicinity.

Practical steps to mitigate adverse impact

The following measures have been proposed to mitigate any potential adverse impacts on the water body quantitative and qualitative status.

The CoCP and best practice for design (in particular selection of piling techniques and materials in contact with groundwater²⁸), construction and operation will reduce the risks to groundwater quality, and a monitoring regime will be implemented.

²⁸ HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: CFA8 The Chalfonts and Amersham Water Resources Assessment (WR-002-008) 2013

Selection of piling methods for the viaduct piers and retaining walls will avoid creating hydraulic pathways, such as cracks and cavities between the construction and the natural rock and will be selected to avoid creating pathways between the aquifer and shallower surface water and groundwater

A monitoring regime will be undertaken in consultation the Environment Agency prior to, during and post-construction (as part of the requirements of the CoCP), to inform the extent of contamination and whether this could be mobilised or dispersed as a result of construction. Appropriate methods of construction will be developed to manage the risk of mobilising contamination. The monitoring will allow definition of any required mitigation and confirm the effectiveness of agreed temporary and permanent mitigation measures. .

Monitoring of yields and groundwater levels and quality will also take place before, during and after construction until any impacts have stabilised to accepted levels. The monitoring data will be used to define appropriate mitigation, should it be required.

The additional mitigation for the PWS is still to be finalised.

Provision has been made for use of land to install treatment systems for abstracted groundwater at three pumping station sites²⁹:

- Mill End Pumping Station located at the junction of Springwell Road and A412 Uxbridge Road;
- Springwell Lake Pumping Station located between Springwell Lake and the Grand Union Canal; and
- West Hyde Pumping Station located on Copper Mill Lane.

Alternative modifications

The vertical alignment and consequent effects on groundwater are controlled by the alignment of the northolt tunnel exit which was located to reduce effects on residential areas and the requirement to reduce impact on the River Colne floodplain by crossing the valley on a viaduct. The route avoids groundwater source protection zones as far as practicably possible and there are other constraints such as the residential areas of Chalfont St Peters and Chalfont St Giles and vertical alignment at the M25 crossing. The only alternative vertical alignment would be a bored tunnel through this section of the route which due to the length of tunnel required would be disproportionately expensive.

The vertical and horizontal alignment and effect on the Mid Chilterns Chalk water body has therefore been optimised to take into account competing demands. No other reasonable alternatives exist within this section of the strategic route alignment chosen.

Tame Anker Mease – Secondary Combined (GB40402G990800)

The water body currently has a poor qualitative status from the DWPA's test, with a good quantitative status.

²⁹ HS2 London-West Midlands Supplementary Environmental Statement and Additional Provision 4 Environmental Statement Volume 2 Community Forum Area Reports CFA7 Colne Valley (SES3 and AP4 ES 3.2.1.7) 2015

The risks to the water body status are in relation to the lowering of groundwater levels and a reduction in groundwater contributions to surface water bodies, or GWDEs arising from permanent groundwater control, and the impact of intersecting areas of poor groundwater quality. Also, there is a risk of damming of groundwater flow leading to a reduction in groundwater contributions.

Diddington cutting (CFA23/CFA24) crosses Jacksons Brickworks landfill. Poor quality groundwater is known to exist locally. The scheme element is adjacent to the River Blythe (a SSSI) and between two tributaries (Shadow Brook and Hollywell Brook). There is likely to be a limited hydraulic connection via the bedrock aquifer. Track drainage is discharged to an attenuation pond to the southeast and then Shadow Brook.

Bickenhill cutting (CFA24) crosses Middle Bickenhill Lane landfill. Poor quality groundwater is known to exist locally. The scheme element crosses a tributary of the River Blythe (a SSSI). Abstracted water is to be returned to ground via SuDS.

Practical steps to mitigate adverse impact

The following measures have been proposed to mitigate any potential adverse impacts on the water body quantitative and qualitative status.

Section 16 of the CoCP concerning waste water and groundwater best practice measures will be applied, and a monitoring regime will be implemented.

Monitoring will be undertaken in consultation with the Environment Agency prior to, during and post construction, if required, to establish baseline conditions (including groundwater quality) for surface water and groundwater and to confirm the effectiveness of agreed temporary and permanent mitigation measures.

Measures will be implemented, where appropriate, following detailed pre-construction ground investigations³⁰ and may include:

- install cut-off structures around excavations;
- ensure cut-off structures are driven to sufficient depths to meet an underlying strata or zone of lower permeability³¹;
- promote groundwater recharge, such as discharging pumped water to recharge trenches around excavations to maintain baseline groundwater and surface water conditions; and
- incorporate passive bypasses within the design, which could comprise a 'blanket' of permeable material, such as gravel, placed below cuttings or around structures allowing groundwater to bypass the foundations of the viaducts and bridges, without a rise in groundwater levels on the upstream side.

³⁰ HS2 London-West Midlands Environmental Statement Volume 2 Community Forum Area Report: Birmingham Interchange and Chelmsley Wood /No 24 2013

³¹ HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: CFA24 Birmingham Interchange and Chelmsley Wood Water Resources Assessment (WR-002-024) 2013

Alternative modifications

The requirement for cuttings is dictated by the vertical alignment of the route. In the vicinity of the Diddington cutting and Bickenhill cutting the vertical alignment was determined by the elevation of the A45 crossing and by the need to limit visual impact. The horizontal alignment is constrained by the location of the interchange station, the NEC and Coleshill.

The vertical alignment and effect on the Tame Anker Mease – Secondary Combined water body has therefore been optimised to take into account competing demands. No other reasonable alternatives to the cutting exist within this section of the strategic route alignment chosen.

Warwickshire Avon – PT Sandstone Warwick/Avon Combined (GB40901G300700)

The water body currently has a poor quantitative status from the surface water and water balance tests, with a good qualitative status.

The Stonehouse cutting (CFA18) is 5 m deep and into the Bromsgrove Sandstone at the southern end. There is a risk to the water balance status of the water body as the temporary dewatering/ permanent groundwater control will return water to ground via an attenuation pond next to River Avon which is within the neighbouring Warwickshire Avon Coal Measures Coventry groundwater body.

Practical steps to mitigate adverse impact

The following measures have been proposed to mitigate any potential adverse impacts on the water body quantitative and qualitative status.

Sustainable drainage systems (SuDS) such as infiltration trenches will be located where gravity transfer is feasible to facilitate groundwater recharge. Contamination control measures as required by the CoCP will be incorporated.

It may be possible to incorporate additional drainage collection at the southern end where it is within the PT Sandstone water body and to pump and reinject this into the original water body.

Alternative modifications

An open cutting solution through Stoneleigh Park (Stonehouse cutting) was adopted as a result of the consultation comments received. The horizontal alignment adopted at this location will allow the railway to be moved away from:

- Farm buildings at Millburn Grange;
- Dale House Farm listed building; and
- Kenilworth Golf Course

The vertical alignment adopted at this location will:

- Facilitate links over the railway between the two severed areas of Stoneleigh Park; and
- Reduce significantly the height of the Stoneleigh Road diversion

The open cutting has been identified as requiring a short retaining wall on the east side to prevent encroachment of the River Avon floodplain and to protect the Stare Bridge scheduled monument. A trough structure has been utilised to prevent inundation of the cutting by raised groundwater levels associated with flooding.

No other reasonable alternatives exist within this section of the strategic route alignment chosen.

Appendix C – Alternative options

The alternatives considered include 'do nothing', use higher prices to reduce demand for travel, improve communications technology, expand aviation capacity, improve road capacity, and enhance the existing classic rail capacity. The process through which alternative options have been considered has been set out in the hybrid Bill scheme Environmental Statement (ES)³².

The do nothing option

The Strategic Case concludes that the do nothing option is not acceptable because not providing for growing travel demand would not fit with the Government's objectives for economic growth and could significantly constrain the UK's economic potential. Doing nothing would also not be consistent with the 2011 National Infrastructure Plan's aim 'to improve connectivity and capacity between main urban areas and between them and international gateways, to deal with longer term capacity constraints'³³.

In addition to the negative economic effects, the do nothing option would lead to severe individual impacts either crowding people off the network, or allowing the experience to become so unpleasant that people would chose not to travel³⁴.

Increased prices

Higher prices could have been used to reduce demand for rail travel. However, this would have required very significant and highly undesirable price rises and would fail to deliver increased capacity. There would be no increased connectivity between major cities and there would be serious adverse consequences for economic productivity and growth.

Better communications technology

Better communications technology could reduce the need for travel, but over the last decade growth in the economy and in demand for travel have gone hand in hand with advances in technology. There is no evidence, therefore, that better communications technology is a solution in its own right.

Expansion of domestic aviation capacity

The reasons why improvement to domestic air travel was not considered to be a satisfactory alternative to high speed rail are set out in the Environmental Statement Alternatives Report³⁵. The main reasons why domestic air services are not a realistic or acceptable alternative to high speed rail for serving future growth in inter-city travel are set out below.

Air travel is most economically viable for journeys of over 400 miles (640km). For shorter journeys aviation cannot offer door to door journey times comparable to road or rail, due to the time taken for travel to the airport, check in, security etc.

³² HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: Alternatives Report (CT-002-000) November 2013

³³ National Infrastructure Plan 2011 DfT, November 2011 p43 Para 3.36

³⁴ The Strategic Case for HS2 2013 p.66 paras 3.2.2-3.2.3

³⁵ HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: Alternatives Report (CT-002-000) November 2013

The capacity of London's airports is limited and providing for future growth in international travel will be a significant challenge without also serving additional demand from domestic air services.

The carbon emissions per passenger kilometre from air travel are significantly greater than those from high speed rail. Whilst reductions in carbon intensity of air travel per flight up to 2050 are expected, these are likely to be offset in part by the expected growth in passenger miles and hence the number of flights³⁶.

Improved road capacity

The Government has already planned a major investment in national and local roads. However, our roads are also under pressure and Government does not believe that increasing road capacity alone is the solution. Motorways cannot match the speed of high speed rail, and it is difficult to increase the capacity of urban roads as cities are already highly developed and congested.

The Government's current view of strategic road capacity as an alternative to HS2 is explained in the Strategic Case for HS2³⁷. It concludes that although the strategic road network is of vital importance and it has a policy to increase its capacity, it does not believe that increasing road capacity alone is the solution to meeting the transport requirement in future. By 2021, spending on road enhancements will have tripled, but these do not provide the additional capacity needed to allow roads alone to soak up the predicted increase in passenger demand. To put into context the scale of road building that would be required, HS2 will deliver capacity roughly equivalent to two new dual three-lane motorways.

Enhancing the existing classic rail network

The Strategic Case for HS2³⁸ considered the options that were available for upgrading the existing classic network. The alternatives would each offer ways of providing some additional capacity. Some of the upgrade options are likely to be taken forward as part of Network Rail's normal forward planning process to modernise the network. However, they do not deliver satisfactorily against the objectives set for HS2. In particular they:

- Do not provide sufficient additional capacity to meet the long term needs for north-south railway;
- Do not provide significant additional released capacity for commuters and freight on the West Coast Main Line (WCML);
- Fail to offer a robust solution to the problem of resilience and performance, particularly on the WCML which suffers from unacceptably high levels of unreliability;
- Would significantly disrupt services on existing lines as construction work is carried out over a period of many years. In the case of the full Y alternative, there would be large scale disruptive work on the three main north-south lines. Network Rail has estimated that this could result in up to 14 years of service disruption which the Government considers is not

³⁶ UK Aviation Forecasts DfT, January 2013.

³⁷ The Strategic Case for HS2 2013 p67 paras 3.2.9 to 3.2.11

³⁸ Department for Transport (2013), *The Strategic Case for HS2*, Her Majesty's Stationery Office, London

acceptable; and

- Fail to provide the scale of connectivity benefits for the major cities of the Midlands and the north. This, together with limited capacity gains in the longer term for commuters, freight and long distance travel, means that they would not achieve the overarching economic aim set for HS2.

Network Rail's 2011 report³⁹ demonstrated that even very major enhancement packages on the West Coast Main Line would not meet the expected demand over the coming decades. This would delay, rather than eliminate, both the need for new lines and their associated strategic, economic and connectivity benefits, at the cost of significant disruption to passengers.

As explained in the Alternatives Report in the Hybrid Bill Scheme Environmental Statement⁴⁰ the key issue for successive Governments has been the extent to which upgrading existing lines could cost effectively provide the necessary capacity and connectivity to serve growing demand in the middle of the century in pursuit of economic growth and a balanced economy. In 2012 it concluded that "Having reviewed the available evidence on demand forecasts and a range of other issues relating to the alternatives to high speed rail, we consider that even very major programmes of enhancements to existing lines would be unable fully to accommodate forecast demand growth and would lead to unacceptable levels of crowding on many routes⁴¹."

The Strategic Case concluded that the only viable option, therefore, was to build a new railway. A new railway would carry intercity traffic and allow us to get better mixed use out of the existing railway. If we are to build a new railway, there is a choice between a conventional railway and a new high speed railway. A new high speed line would cost 9% more than a conventional railway and, in certain respects, would have higher environmental costs, but the difference in price and the relatively higher environmental impact is, in the Government's view, more than outweighed by the economic benefits to be gained from radically reducing journey times and improving connectivity between our main cities. Given the scale of the investment, therefore, and in terms of the future wellbeing of the country as a whole, a high speed line is preferable to a conventional one.

Strategic high speed route options

For the reasons set out above, Government concluded that there were no feasible alternative ways of achieving its objectives other than to construct a new high speed rail network. The Alternatives Report in the Environmental Statement⁴² explains the process through which alternative strategic routes were considered, and how a 'Y' network linking London, Birmingham, Leeds and Manchester was identified as the best option.

³⁹ Network Rail (2011), *Review of Strategic Alternatives to HS2*.

⁴⁰ HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: Alternatives Report (CT-002-000) November 2013

⁴¹ High Speed Rail: Investing in Britain's Future – Decisions and Next Steps (Cm.8247) DfT, January 2012 p 17 para 6.

⁴² HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: Alternatives Report (CT-002-000) November 2013, pp 18-23

In January 2009 the publication of Britain's Transport Infrastructure: High Speed Two⁴³ set out the Government's vision for the way forward for development of a high speed rail network and established HS2 Ltd to undertake this work. HS2 Ltd were tasked, in respect of the Proposed Scheme, to develop:

- a proposed route for HS2, with any options as appropriate;
- options for a Heathrow International Interchange station on the GWML, with an interchange also with Crossrail;
- options for access to central London and the other cities served;
- options for linking with HS1 and the existing rail network, including the potential for services to continental Europe;
- options for providing an intermediate parkway station between London and the West Midlands. Any such station should not be detrimental to the overall business case, and should support economic and spatial strategies; and
- financing and construction proposals.

In addition, in March 2009, the remit was extended " to provide advice on the potential development of a high speed line beyond the West Midlands, at the level of broad 'corridors'...[and] to consider in particular the potential for HS2 to extend to the conurbations of Greater Manchester, West Yorkshire, the north East and Scotland⁴⁴".

In 2009/10 a high level sustainability appraisal was undertaken of the three potential networks. The analysis was undertaken in relation to four priority issues. These were reducing greenhouse gasses and combating climate change; natural and cultural resources and environmental enhancement; creating sustainable communities; and sustainable production and consumption. A key reason for choosing the 'Y' option over other options was the major engineering complexities and potentially significant impact on the natural environment of other options that would require construction of links across the Pennines.

For Phase One, HS2 Ltd was tasked with developing a proposed route between London and the West Midlands. Alternative route options were considered against four sustainability principles⁴⁵. These were reducing greenhouse gas emissions and combating climate changes; natural resource protection and environmental enhancement; creating sustainable communities; and sustainable consumption and production. Locations of water bodies and abstractions associated with them were considered as part of this process⁴⁶. Routes considered during 2009 followed existing transport corridors wherever possible in order to reduce environmental effects. Particular consideration was given to effects on the Chilterns Area of Outstanding Natural Beauty (AONB) which is the only AONB affected by the Phase One route options. It contains a high density of ancient woodlands and other features of natural importance.

⁴³ Department for Transport (2009), *Britain's Transport Infrastructure: High Speed Two*, Her Majesty's Stationery Office, London.

⁴⁴ Remit letter from Lord Adonis to Sir David Rowlands; (2009), www.hs2.org.uk; Accessed: July 2013

⁴⁵ Department for Transport (2011) *Review of HS2 London to West Midlands Route Selection and Speed: A report to Government by HS2*

⁴⁶ HS2 London to the West Midlands Appraisal of Sustainability Appendix 1 – The Appraisal Process. February 2011.

In order to function as a high speed railway, the route has to conform to stringent design standards. In order to comply with the required standards for design speed and passenger comfort there is very limited ability to curve the route or to move the railway up or down from the horizontal in any given location. This means that there is limited ability to avoid individual receptors that may contain protected species (e.g. a pond or a group of mature trees).

Viability of the project and hence the ability to deliver the objectives of the project, depends also on cost being affordable. For this reason some alternative options have been rejected, for instance placing the whole or indeed the majority of the route in tunnel. Such a design would have had lesser effects on protected species, but the cost would be such that it would not be funded by Parliament, and hence would not be a satisfactory alternative.

Having eliminated those options that did not meet the need for the reasons stated above, the remaining options that were considered further are described below.

Alternative routes considered

For Phase One, HS2 was tasked with developing a proposed route between London and the West Midlands. In 2009 HS2 prepared a long list of numerous route options and sub-option for sifting, selection and refinement. Where possible these routes followed the main transport corridors whilst avoiding urban areas and environmentally sensitive locations. The process for assessing these options is set out in the Alternatives Report in the Environmental Statement⁴⁷

The selection criteria used in the sift process were engineering and construction feasibility; high level cost estimates; environmental, social and spatial considerations; and demand – mainly focused on journey time benefits⁴⁸.

This sift process resulted in six main corridors and one hybrid route being short-listed for more detailed consideration. These alternative route options were considered against a number of sustainability criteria. These included the effects on surface water bodies and groundwater bodies. A review of the route selection process was provided in a subsequent review⁴⁹.

Routes considered are shown in Figure 3. They were presented for public consultation. The Government's preferred option was route 3, which forms the basis of the current proposal. The alternative options considered were as follows:

- Route 1 - M40 Route 1 - M40 corridor;
- Route 2 - Chiltern Line corridor via High Wycombe;
- Route 3 – A413 Arterial Valley;
- Route 4 – West Coast Main Line (WCML) Corridor;

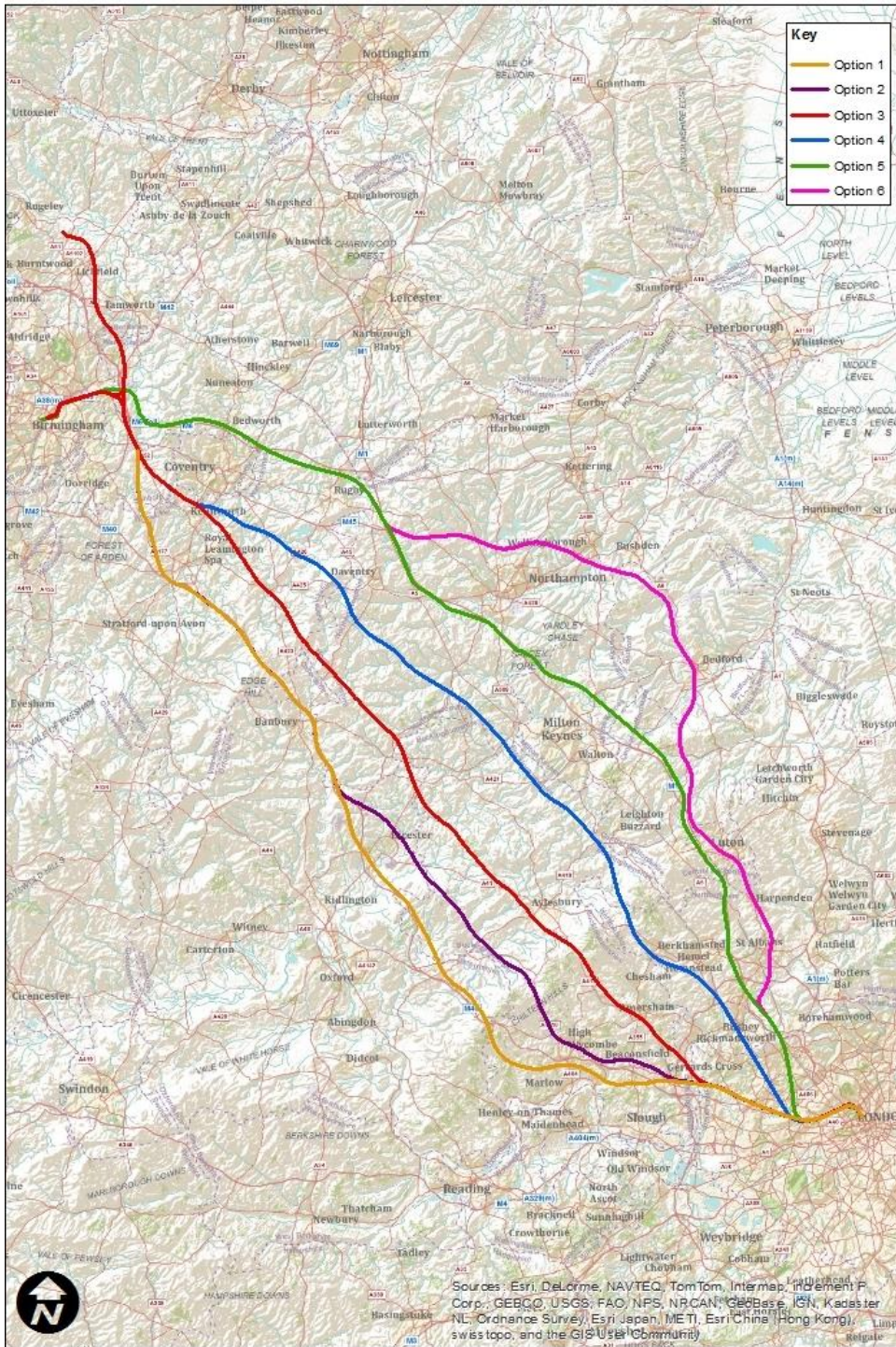
⁴⁷ HS2 London-West Midlands Environmental Statement Volume 5 Technical Appendices: Alternatives Report (CT-002-000) November 2013, pp 60-65

⁴⁸ High Speed Rail London to the West Midlands and Beyond, HS2 Ltd, December 2009, p 93

⁴⁹ Department for Transport (2012) Review of HS2 London to West Midlands Route Selection and Speed

- Route 5 – M1 Corridor; and
- Route 6 – Midlands Main Line (MML) Corridor.

Figure 3: Alternative Strategic route options 1-6



The alternative options either did not meet the needs or were prohibitively expensive and were therefore not considered to be satisfactory. The reasons are set out below.

Route Corridor 1 - M40 corridor

The M40 passes through comparatively hilly terrain, and would require much of the route to be in tunnel or viaduct, making the project financially unviable. It was the most expensive option and had the longest journey times. Given the geometry of the M40, little of the route would have been sufficiently close to the motorway to be described as within its corridor.

This was not pursued because it was found to perform least well in comparison with the other options, with major adverse impacts on landscape, biodiversity and water resources. It would have passed at surface across approximately nine miles of the Chilterns AONB, as well as passing close to the Cotswolds AONB for around five and a half miles. The route considered, whilst having some limited stretches theoretically capable of 250mph (400kph), was largely designed to lower speeds to achieve a balance between impacts and benefits, hence it did not meet the need.

Route Corridor 2 - Chiltern Line corridor via High Wycombe

The route tested was a surface alignment in this corridor, and concluded it was not viable as it would require a large number of residential and commercial property demolitions, and many properties would be affected by the additional noise resulting from a combined conventional and high speed rail service. Adopting a tunnelled option for this corridor would introduce significant additional cost and direct the route on the surface through the Chilterns AONB past Bradenham towards Princes Risborough.

Route Corridor 4 - WCML Corridor

This corridor provided a shorter route across the Chilterns AONB but would need to be served by a 17 mile long tunnel from London which would be prohibitively expensive. The nature of a long tunnel carries with it certain requirements, for example ventilation shafts at regular intervals and additional arrangements for safe, emergency evacuation. Such a route would mean a substantially longer connection to Heathrow, further increasing costs.

Although this route option provided the shortest section through the Chilterns it was concluded that its alignment would have greater impacts in a number of areas, including to biodiversity.

Route Corridor 5 - M1 Corridor

This corridor provided a more northerly and therefore less direct route between London and the West Midlands. Variants of it would travel through significantly built up areas, particularly around Luton, Milton Keynes and Northampton, resulting in a longer route and large numbers of property demolitions, or mitigation in the form of extensive tunnelling. Conversely, avoiding these areas would have led to the route no longer following the motorway corridor. A corridor close to Hemel Hempstead was considered but not pursued given that it would cross a greater length of the Chilterns AONB than the more favourable WCML option.

Route Corridor 6 - Midlands Main Line (MML) Corridor

This corridor required a very long tunnel from London before continuing through Luton and Bedford, and provided the most northerly and therefore least direct route option between London and Birmingham. Impacts on properties were considered to be significant, along with noise and severance impacts on a series of heavily populated towns and villages. This option was not pursued on this basis.

Preferred route corridor

This left Route Corridor 3 - A413 Arterial Valley as the route option that best met the design requirements. This corridor followed a long, broad valley across the Chilterns between the Chalfonts and Wendover that would, through a combination of surface and tunnel sections, provide a route that was economical and performed well as a high speed railway. This corridor crossed a greater length of the Chilterns AONB but did so largely in either tunnel or cutting. Few properties would be directly affected by the route or receive operational noise due to tunnelling and positioning to avoid settlements. This option performed well and was taken forward in the consultation route option. None of the alternative options that were assessed were considered to represent satisfactory alternatives.

Vertical alignment considerations

It can be seen from the above that one of the key issues considered in determining the most appropriate route was the amount of tunnelling that would be required. The need for tunnels arises either as a result of topographic considerations or the need to reduce impacts on key receptors such as large conurbations.

The viability of the project depends at least in part of the need to avoid excessive tunnelling, hence the reason why this was a key feature in the selection of feasible routes.

Even if it were practicable in engineering terms to place the entire route in tunnel to reduce the impacts on European Protected Species and other biodiversity receptors it would be, prohibitively expensive, and therefore is not a satisfactory alternative.

A high speed railway cannot include steep gradients. In general, this means that the vertical alignment is constrained in many places by the need to pass over rivers and canals, the need to tunnel beneath the larger hills, and the maximum design gradient that can be accommodated.

For the above reasons, it is not feasible to include tunnelled sections along much of the route. In places where there are deep cuttings, cut and cover tunnels have been provided in certain places where there are particular receptors that benefit from this approach. However, cut and cover tunnels require greater land-take during construction than cuttings, such that more habitat loss is unavoidable. For this reason they are generally not the preferred option where there are biodiversity receptors such as ancient woodland or trees that support bat roosts.

Appendix D – Habitats Regulations – Imperative Reasons of Overriding Public Interest

Introduction

High Speed Two (HS2) Phase One will involve the construction of a new railway approximately 230km (143 miles) in length between London and the West Midlands (LWM), and will include:

- an upgraded and expanded Euston station to provide an interchange with London Underground, commuter and other National Rail services;
- a connection to HS1, the high speed railway from London to the Channel Tunnel;

Phase 2 of the project would continue the railway north to Leeds and Manchester. Phase 1 is being progressed as a Hybrid Bill, submitted in November 2013. Prior to Royal Assent it must be demonstrated that the Bill is compliant with legislation. One such item of legislation is the Conservation of Habitats and Species Regulations 2010 (the Habitats Regulations), which transposes EC Directive 1992/43 on the Conservation of Natural Habitats and Wild Fauna and Flora (the Habitats Directive) into law in England. This document forms part of the case to demonstrate compliance with this item of legislation.

The Habitats Regulations require designation of the most important sites for habitats and species as Special Areas of Conservation (SACs). Sites classified as Special Protection Areas (SPAs) under the EC Wild Birds Directive EC 2009/147 are also protected by the provisions of the Habitats Regulations. The regulations also provide strict protection to rare and vulnerable species. Before a plan or project that may affect an SAC or SPA can be approved, it must be demonstrated that it complies with the requirements of the Habitats Regulations. If any species that are specially protected by the Habitats Regulations would be disturbed by the proposed development, licences must be obtained to allow derogation.

The environmental effects of the proposed scheme are reported in the Environmental Statement which accompanies the Hybrid Bill submitted to Parliament in November 2013. It confirms that there would be effects on a number of species that are given strict protection by Regulation 41.

In order to comply with the Habitats Regulations, the project therefore needs to demonstrate that it can satisfy the tests for derogation from strict protection for species listed on Schedule 2 of the Regulations (i.e. those species on Annex IV of the Habitats Directive that occur in the UK). Regulation 53 sets out certain activities for which a licence can be issued. Of relevance to HS2, Regulation 53(2)(e) confirms that such licences may be granted for the purpose of 'preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment'. Regulation 53(g) further specifies that such a licence can only be granted when a) there is no satisfactory alternative, and b) the action will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

The purpose of this part of document is to demonstrate that HS2 LWM has imperative reasons of overriding public interest. It therefore forms part of the documentation required to demonstrate compliance with the Habitats Regulations in order to derogate from strict protection as identified in Article 53 of the Regulations. Information to demonstrate absence of satisfactory alternatives at the local level and measures proposed to ensure that the conservation status of the species concerned will be maintained are set out in separate documents.

The need for HS2

Overview

The UK's long-term travel and transport challenges were reviewed in the Eddington Transport Study in December 2006⁵⁰. In response to this report the Government concluded that in the longer-term (post 2020s) further investment would be needed to serve growing demand and it committed itself to long-term transport planning to serve this demand. It set up the National Networks Strategy Group in October 2008 to consider the infrastructure requirements for future growth, focusing on how best use of existing networks and longer term solutions for strategic corridors, including new rail lines. HS2 Ltd was set up as a consequence of this in January 2009 with an initial remit to consider and provide advice to Government on a new high speed line from London to the West Midlands.

The Government's vision for the UK's transport system is set out in the Coalition Agreement⁵¹ and the Department for Transport's (DfT) Business Plan (2010-2015)⁵². The Government's view is that, by improving the links that help to move goods and people around, and by targeting investment in new projects that promote growth, transport can help to build the balanced, dynamic and low-carbon economy that is essential for future prosperity.

The National Infrastructure Plan⁵³ includes 40 priority projects that include HS2.

Government's role is to build a stronger, more balanced economy capable of delivering lasting growth and widely shared prosperity⁵⁴. Transport plays a key role in this.

In that context, the objectives are:

- To provide sufficient capacity to meet long term demand, and to improve resilience and reliability across the network; and
- To improve connectivity by delivering better journey times and making travel easier.

Any solution must:

⁵⁰ The Eddington Transport Study. The case for action: Sir Rod Eddington's advice to Government, HM Treasury & DfT, December 2006

⁵¹ Her Majesty's Government 2010, *The Coalition: our programme for government*.

⁵² Department for Transport (2012)¹ *Department for Transport Business Plan (2010-2015)*. Her Majesty's Stationery Office, London.

⁵³ The National Infrastructure Plan, October 2010 and updated in December 2012, <https://www.gov.uk/government/organisations/infrastructure-uk/series/national-infrastructure-plan>

⁵⁴ Her Majesty's Government 2013, *The Coalition: together in the national interest: Mid-term Review*

- Minimise disruption to the existing network;
- Use proven technology that we know can deliver the desired results;
- Be affordable and represent good value to the taxpayer: and
- Minimise impacts on local communities and the environment.

Government expects that HS2 will significantly increase capacity on the rail network, reducing journey times and enhancing connectivity, and regards it as a key element of their vision for sustainable economic growth.

The economic case

The updated case for HS2 is set out in the Strategic Case for HS2⁵⁵ and the Economic Case for HS2⁵⁶ reports.

Costs and benefits appraised over a 67 year period for the full network from 2026 (the opening of Phase One) to 2092 (60 years after the opening of Phase Two) show that the project will deliver an estimated £70 billion of benefits. The standard benefit cost ratio, estimated in line with the Department of Transport's WebTAG guidance is 2.3 (including wider economic impacts).

Phase One, LWM, is estimated to deliver benefits of £28 billion with a benefit-cost ration including wider economic impacts of 1.7.

HS2 would be expected to benefit people making commuting, leisure and other personal journeys and will substantially reduce inter-city passengers' journey times. As well as valuing these journey time savings, the economic case for HS2 also values reductions in crowding, improvements in service frequency, improvements in reliability and the safety and environmental impacts of reduced car use.

Further economic benefits would accrue by HS2 effectively bringing cities closer together and by encouraging agglomeration. Such impacts are also taken into account in the Economic Case for HS2.

The new railway stations would be the catalyst for new commercial enterprise and, over time, would stimulate opportunities for businesses to relocate and prosper at Euston as part of the over-site station development; at Old Oak Common where an interchange station would influence the development of the Park Royal Opportunity Area; in the West Midlands where the interchange station would support the development and connections with the National Exhibition Centre (NEC) and airport, and at Curzon Street in central Birmingham where HS2 passengers would have immediate access to the city centre's new proposed commercial quarter as well as its existing facilities.

HS2 will be the biggest infrastructure project in Europe. Our most up to date estimates indicate that while HS2 is being built it will create 24,600 full-time equivalent jobs, excluding jobs in the supply chain⁵⁷. Other

⁵⁵ Department for Transport (2013), *The Strategic Case for HS2*.

⁵⁶ High Speed Two (2013), *The Economic Case for HS2*.

⁵⁷ Temple ERM for HS2 Ltd, 2013, High Speed Rail: Consultation on the Route from the West Midlands to Manchester, Leeds and Beyond – Sustainability Report, Volume 1.

published analysis, using alternative methodologies, has estimated that at its peak HS2 will create 50,000 jobs⁵⁸.

As HS2 replaced some of the existing fast services on the WCML, space would be created on the WCML to allow new services for towns and cities between London and the West Midlands and additional commuter, local and regional services as well as opportunities for freight services. This would offer further stimulation to business.

The redevelopment of Euston station has been recognised by the Mayor of London and Camden Council as a potential catalyst for the regeneration of the Euston area as a whole.

Enhancing capacity and connectivity

The Government's objectives for a new north-south high speed rail network are:

- To provide sufficient capacity to meet long term demand, and to improve resilience and reliability across the network; and
- To improve connectivity by delivering better journey times and making travel easier.

Demand for inter-regional travel within the UK, including levels of rail patronage, has been increasing in recent years. The number of passenger miles travelled on the national rail network increased from 20 billion in 1992/93, to 36 billion in 2012/13. In terms of the number of rail passenger journeys, there has been an increase from 976 million in 2002/03 to 1,502 million in 2012/13. This represents a 54% increase in demand in a 10 year period and is equivalent to an annual year-on-year growth rate of 4.4%. Intercity journeys increased by 65% over the same period, with journeys increasing from 77 million to 128 million. This is a 5.2% annual year-on-year growth rate. Over the same period, gross domestic products grew by 43% or 3.6% per year. This trend in passenger growth has been evident since the 1980s, reflecting rising levels of population and economic activity, and is predicted to continue despite advances in information and communications technology⁵⁹.

The 2007 White Paper: *Delivering a Sustainable Railway* predicted that rail patronage would double by 2030, and identified London-Birmingham-Manchester as one of the first routes likely to require interventions beyond the WCML upgrade underway at that time.

Network Rail's New Lines Study tested the assumptions about future demand and set out the strategic business case for new high speed lines. This work predicted that the demand for travel between London, Birmingham, Manchester and Edinburgh would increase by more than 90% between 2007 and 2030.

The Britain's Transport Infrastructure – High Speed Two report⁶⁰ confirmed that between 1997/8 and 2007/8 rail passenger miles increased by an average of 3.5% per annum and rail passenger journeys by an average of 3.8%, with the annual rate of increase becoming steeper over time. The report indicated that

⁵⁸ Albion Economics (for Greengauge 21) 2013 HS2 Jobs Analysis, http://www.greengauge21.net/wp-content/uploads/HS2Jobs_Report_Final_photo-refs.pdf

⁵⁹ <https://dataportal.orr.gov.uk>

⁶⁰ Department for Transport (2009) Britain's Transport Infrastructure High Speed Two.

whilst macro-economic influences are important, this demand continues to be driven by underlying factors such as improvements to journey times and reliability, coupled with the disbenefits of using other modes of transport.

Work undertaken by Network Rail in 2008/9 concluded that the WCML, Midland Main Line (MML), ECML and Chiltern Main Line (CML) would be at or near capacity by 2020. The most critical constraints would be reached initially on the WCML, despite its recent upgrade, followed by the MML and ECML (taking account of planned incremental upgrades). Recent work has confirmed the likelihood of critical capacity constraints developing on the WCML.

The critical prognosis for the WCML is a key influence both on the overall case for HS2 and on the more immediate benefits of Phase One. As well as carrying passengers between the major cities, the WCML is a very significant carrier of commuters into the capital and other major cities, and handles over 40% of the country's rail freight, making it the busiest mixed use railway line in Europe. Despite a major (£9 billion) upgrade over the last 10 years, and partly because of the success of the service improvements that have followed, it has reached its capacity.

The WCML carries passenger services of every type, including long distance intercity, inter-regional and commuter passenger services and freight. Congestion on the WCML has a noticeably detrimental effect on the reliability of intercity and commuter services, which regularly fail to meet their performance target and are below the national average.

Extra capacity provided in recent years has filled up more quickly than expected. Since being upgraded, the WCML has seen trip growth of 36% between 2006 and 2009⁶¹.

HS2 will enable passengers to travel from London to Birmingham in forty-nine minutes rather than one hour twenty-four minutes today, and from London to Manchester in one hour, eight minutes rather than the two hours, eight minutes it takes today. The country will be transformed with many more people being brought to within one hour of London and two thirds of the population brought to within two hours.

HS2 will provide new links between regional cities, and will directly connect eight of the ten largest cities in Britain: London; Manchester; Liverpool; Glasgow; Edinburgh; Newcastle; Sheffield and Leeds. At the heart of the rail network north of London, Birmingham will also have the potential to connect Bristol, Wales and the South West to the other core cities.

People will be able to meet their work commitments, make new contacts, find new jobs, and spend their time more productively when travelling. The evidence shows that people place a premium on being able to get to places quickly⁶². HS2 will broaden the options available to people in terms of where to live, where to locate their business and how to travel.

⁶¹ Department for Transport (2011), *Economic Case for HS2*.

⁶² Wardman M, Batley R et al (2013), *Valuation of Travel time Savings for Business Passengers*, ITS Leeds,

Scotland will benefit from high speed services from Edinburgh and Glasgow as soon as Phase One opens. Phase Two is expected to reduce journey times by up to an hour without the need to change trains, benefitting the Scottish economy.

HS2 will also improve international connectivity. It will directly serve Manchester and Birmingham airports. The planned interchange at Old Oak Common will offer a connection on to services direct to Heathrow Airport: and the potential also remains, pending decisions after the Airports Commission's report and the strength of the supporting evidence, to provide a direct link in Phase Two from the Midlands and the North to Heathrow Airport. The HS1/ HS2 link will allow the possibility of direct trains from the HS2 network to the continent.

Generating growth

The efficient movement of people and goods is fundamental to the productive potential of an economy. Improvements in transport infrastructure enable the economy to grow by increasing the efficiency of labour and business markets through a reduction in the barriers to trade created by distance and congestion.

Improved connectivity can deliver benefits by making an area more accessible, resulting in a greater concentration of workers and firms. These benefits can help to re-balance the economy by stimulating growth in the regions. Because of its high inherent capacity, its ability to provide centre-to-centre routes and the wide range of connections it offers with other modes of transport, rail is a particularly effective means of moving large numbers of people over a range of distances.

The potential for high speed rail to facilitate improved economic growth, through benefits to agglomeration, competition and labour markets, is an important consideration for the Government. HS2 will link the majority of Britain's biggest cities, including its second and third cities, Birmingham and Manchester, increasing the productive potential of regional economies and providing an opportunity to increase their contribution to the UK economy.

HS2 will be the biggest infrastructure project in Europe and will have a significant impact on jobs, both directly and through its supply chain, particularly in engineering and construction. The new high speed rail stations have the potential to boost local economic growth in the short-term and to facilitate longer-term benefits by acting as a catalyst for local regeneration, as is the case with HS1.

The Y network reflects the Government's objective of ensuring that the regional economic benefits of high speed rail travel are distributed as widely as possible. Recent analysis presented in the Economic Case indicates that the economic benefits of HS2 to the regions, particularly the Midlands and the North, will be greater than those to London.

The two interchange stations incorporated within the Proposed Scheme will ensure that the connectivity benefits are spread beyond London and Birmingham. In addition, the Proposed Scheme includes a link to HS1, allowing direct access to the European rail network, which will enable HS2 to reinforce access to external destinations and markets.

Summary of imperative reasons of overriding public interest

HS2 is an infrastructure project of national importance that will generate economic benefits for many of the UK's major cities. It is a key element of the Government's vision for the UK's transport system. Without the Proposed Scheme there are predicted to be severe constraints on the capacity of the existing railway network, both in terms of intercity passenger services and freight.

Government expects that HS2 will significantly increase capacity on the rail network, reducing journey times and enhancing connectivity, and regards it as a key element of their vision for sustainable economic growth.

HS2 will generate a substantial number of new jobs (section 2.2.7)

Table 1 below summarises the imperative reasons of overriding public interest using Natural England's standard format.

Table 1: Summary of IROPI test		
	"Imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment." Provide brief statements to demonstrate how in your view the proposed activity meets the purpose, and detail the evidence that supports the statements. Such weight needs to be given to the proposed activity as to outweigh the nature conservation interest.	
Q1	What need is the proposed activity designed to meet?	
	Statement	The creation of a high speed railway will meet the Government's vision of a transport system which is an engine for economic growth, which is safer, greener and improves quality of life in our communities. Phase One of HS2, will tackle demand and congestion on the southern section of the West Coast Main Line (WCML) – the busiest railway in Europe.
	Evidence	The January 2012 Command Paper ⁶³ set out the case for HS2. It explains why Government believes that a step-change is needed in the capacity and performance of Britain's rail network to support economic growth, and why the construction of a high speed rail network between London and Birmingham, Manchester and Leeds is the best way of achieving this step-change.

⁶³ High Speed Rail: Investing in Britain's Future – Decisions and Next Steps, DfT, January 2012.

<p>Q2</p>	<p>How was the need identified? For example, is there a legislative requirement for the activity at a European, national or regional level? Or if the need was identified by the Local Authority, your evidence may include relevant extracts or quotes from the Regional Spatial Strategy or Local Development Framework.</p>	
	<p>Statement</p>	<p>Sections 2.3 and 2.4 above set out the evidence base that shows why high speed railway is needed. The various studies cited have shown that demand for train travel is increasing rapidly and is predicted to increase substantially in the future, that this demand cannot be met through upgrade to existing track, that a high speed railway would increase connectivity both within England and internationally, and that the proposed project would facilitate and support economic growth.</p>
	<p>Evidence</p>	<p>The January 2012 Command Paper explains why the Government concluded that HS2 was necessary. It is needed to create crucial space on crowded routes; the problem of crowded railways will only get worse as demand increases unless capacity is increased. By taking long distance services off existing lines, HS2 will also free up vital space on Britain's freight routes.</p> <p>The ability to make fast and efficient journeys between the UK's productive urban centres is vital to business, as it is to communities. Rail is well suited to many inter-urban markets as it can provide rapid and reliable travel into the heart of city centres. This is reflected in the very substantial increases in demand for inter-city rail travel seen over recent decades. The number of inter-city journeys made on the UK's rail network more than doubled between 1994 and 2009 and continued rising even through the recent recession.</p> <p>The increasing economic importance of Britain's major urban centres is likely to strengthen the role of these links in supporting productivity and growth. Recent research has provided no indication of any slowing in the pattern of increasing demand for inter-city rail travel. These trends will place increasing pressure on the rail network. If we fail to provide sufficient capacity for efficient and rapid journeys then the economy will suffer. In particular, the towns and cities of the Midlands and the North, which already consider their economic prospects to be constrained by poor connectivity, will be further hindered by future capacity pressures and isolation from other key centres of economic activity. High speed rail offers an opportunity to secure major economic benefits for these</p>

	<p>towns and cities, and to open up opportunities for valuable regeneration, new jobs and inward investment.</p> <p>While other countries, such as France, Germany and Japan, have already invested heavily in new high speed links and networks to enhance capacity and performance on key inter-urban routes, the UK has focused on incremental improvements to existing lines. In fact, until the opening of the HS1 line to the Channel Tunnel in 2007, there had been no significant new line built in the UK since Victorian times. The previous major line to be built was the Great Central Railway in 1899 – 108 years earlier.</p> <p>These incremental investments on existing lines have provided valuable, but ultimately limited, enhancements to capacity and connectivity, often at a cost of substantial disruption to passengers whilst works take place. And continuing demand growth is set to outstrip the capacity gains that have been achieved. Network Rail has forecast that by the mid-2020s all capacity for additional or lengthened services on the recently modernised WCML will have been exhausted.</p> <p>Having considered the evidence submitted in consultation, the Government continues to support the development and delivery of a new national high speed rail network, as set out in the Coalition’s Our Programme for Government, which stated that:</p> <p>“We will establish a high speed rail network as part of our programme of measures to fulfil our joint ambitions for creating a low carbon economy. Our vision is of a truly national high speed rail network for the whole of Britain.”</p> <p>A new high speed rail network will support economic growth for the long-term. It is also, vitally, the right solution for passengers. Incidents of overcrowding are already intensifying, and this contributes to the growing challenge the rail network faces of providing a reliable service to passengers. Crowding is initially forecast to be most severe on suburban and commuter services but with growing problems on inter-city services. As well as providing a significant boost to inter-city capacity, HS2 will also potentially enable a significant increase in commuter services to a range of towns and cities across the UK by releasing capacity on the conventional network as long-distance trains and passengers switch to the new line</p>
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		<p>The Case for HS2 is also set out in the document 'The Strategic case for HS2⁶⁴. This sets out the alternatives that were examined for enhancing travel capacity, and explains why Government confirmed that its preferred option was a high speed rail network.</p>
<p>Q3</p>	<p>Through what process of scrutiny has the proposal been subject, if any? (For example, Public Inquiry, public meetings, consultations or similar?) Was the presence of European Protected Species considered at the planning stage? Your evidence may include copies of minutes.</p>	
	<p>Statement</p>	<p>Reasons why high speed rail was identified as the only feasible way of improving the transport network to cope with future demand are set out in answer to question 2 above. Having established that a high speed rail network was required, the Government then consulted on alternative routes.</p> <p>An appraisal of sustainability was carried out to determine the best route option and the proposed route for phase one was taken to various consultation events in order to give the public and local authorities to respond to the route. A draft Environmental Statement was also submitted for consultation in May 2013 and consultation events were held along the route. This document included a draft assessment of all protected species with initial mitigation where this had been identified. Responses to the consultation have been received and considered in the submission of the formal Environmental Statement and hybrid bill. The consultation included meetings and correspondence with each of the local wildlife trusts along the route, which included detailed consideration of impacts on protected species. A number of meetings were also held with Natural England specialists</p> <p>The project has been submitted to Parliament as a Hybrid Bill, together with an Environmental Statement. Comments on the Environmental Statement will be considered by Parliament, and a report will be prepared to identify the main points raised by consultees. The Bill will be scrutinised by a Parliamentary Select Committee, which will make recommendations to Parliament before members decide whether to approve the project.</p>

⁶⁴ Department for Transport (2013), The Strategic Case for HS2

	Evidence	A consultation document on the preferred route and alternative options considered was issued in February 2011 ⁶⁵ . The Proposed Scheme was modified to take account of some of the concerns raised. A further consultation was undertaken in 2013, when the draft Environmental Statement was issued. The consultation responses were published with the formal Environmental Statement ⁶⁶ . Significant additional mitigation for effects on European Protected Species was added after the draft ES was published, including further areas to act as great crested newt receptor sites and additional structures to facilitate movement of bats across the railway. Two additional sections of tunnel were added in locations where this was a realistic option. Together, these measures have significantly reduced the effects of the Proposed Scheme on European Protected Species.
D3.4	How does the proposed activity meet the identified need?	
	Statement	HS2 would achieve the Government’s objectives to provide sufficient capacity to meet long term demand, to improve resilience and reliability across the railway network, and to improve connectivity by delivering better journey times and making travel easier.
	Evidence	The evidence is presented in the documents setting out the strategic case for HS2 ⁶⁷ . The economic case is set out in section 2.2. Evidence that the project would enhance capacity and connectivity between major cities is presented in section 2.3. Section 2.4 sets out the evidence that HS2 would generate substantial economic growth.

⁶⁵ Department for Transport (2011) High Speed Rail: Investing in Britain’s Future Consultation.

⁶⁶ London-West Midlands Environmental Statement Volume 5 Technical Appendices – Draft Environmental Statement Consultation Summary Report (C7-008-000), DfT November 2013

⁶⁷ Department for Transport (2013), The Strategic Case for HS2