

A417 Missing Link
TR010056

6.5 Habitats Regulations Assessment:
Screening report

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APFP Regulation 5(2)(g)
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Procedure) Regulations 2009

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**The Infrastructure Planning
(Applications: Prescribed Forms
and Procedure) Regulations 2009**

A417 Missing Link

Development Consent Order 202[x]

**6.5 Habitats Regulations Assessment:
Screening report**

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1 Introduction

1.1 Purpose of this document

- 1.1.1 This report provides the outcomes of the screening stage of the Habitats Regulations Assessment (HRA) of the implications of the A417 Missing Link (the scheme) upon European sites protected by the Conservation of Habitats and Species Regulations 2017 (known as the Habitats Regulations 2017). This report follows the methodology within Design Manual for Roads and Bridges (DMRB) *LA 115 Habitats Regulations assessment*¹, The Planning Inspectorate (PINS) *Advice Note 10 Habitats Regulations Assessment*², and *Guidance: Habitats regulations assessments: protecting a European site*³.
- 1.1.2 The purpose of this report is to identify any aspects of the scheme that would lead to a likely significant effect (LSE) upon any European site, either alone or in combination with other plans/ projects. Under the Habitats Regulations 2017 an effect is likely if: it cannot be excluded, in that it is capable of having an effect, on the basis of objective information; and it is likely to undermine the site's conservation objectives.

1.2 Scheme description

- 1.2.1 The scheme would provide 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417. The new dual carriageway would connect the Existing A417 Brockworth bypass with the existing dual carriageway A417 south of Cowley. The new dual carriageway would be completed in-line with current trunk road design standards. The section to the west of the existing Air Balloon roundabout would follow the Existing A417 corridor, but to the south and east of the Air Balloon roundabout, the corridor would be offline, away from the existing road corridor.
- 1.2.2 The scheme would also include:
- A new crossing near Emma's Grove for walkers, cyclists and horse riders, including disabled users, which would accommodate the Cotswold Way National Trail. A new junction would be incorporated at Shab Hill, providing a link from the A417 to the A436 (towards the A40 and Oxford), and to the B4070 (for Birdlip and other local destinations).
 - A new 37m wide multi-purpose crossing to provide essential mitigation for bats and an enhancement opportunity of ecology and landscape integration. The public will also further benefit as the crossing would accommodate the Gloucestershire Way and provide an improved visitor experience.
 - A new junction near Cowley, replacing the existing Cowley roundabout, making use of an existing underbridge to provide access to local destinations. The use of the existing underbridge would allow for all directions of travel to be made.

¹ Highways England (2019) Design Manual for Roads and Bridges, Sustainability and Environment Appraisal LA 115 Habitats Regulations assessment

² The Planning Inspectorate (2017) Advice Note Ten – Habitats Regulations Assessment relevant to Nationally Significant Infrastructure Projects

³ Department for Environment, Food & Rural Affairs, Natural England, Welsh Government, and Natural Resources Wales (2021) *Guidance: Habitats regulations assessments: protecting a European site*. <https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site> [Accessed March 2021]

- The Existing A417 between the existing 'Air Balloon roundabout' and 'Cowley roundabout' would be detrunked for its entire length. Some lengths of the existing road would be converted into a route for walkers, cyclists and horse riders including disabled users. Other sections would be retained as lower-class public roads, maintaining local access for residents. Some of the route would provide replacement common land.

Physical land-take of the scheme

- 1.2.3 The extent of land use requirements during construction and operation are defined by permanent and temporary land-take requirements. These are shown within the Development Consent Order (DCO) Boundary on the General Arrangement drawings in General Arrangement and Section Plans (Document Reference 2.6). These are set out and justified in the Statement of Reasons (Document Reference 4.1) accompanying the DCO Application.
- 1.2.4 Permanent land-take is required to construct, operate and maintain the scheme and includes the footprint of all the proposed highway infrastructure, earthworks and drainage works, also includes the areas for environmental mitigation, such as landscape planting and areas of habitat replacement. Further details on the essential landscaping areas are shown on the Environmental Statement (ES) Figure 7.11 Environmental Masterplans (Document Reference 6.3).
- 1.2.5 Temporary land-take is required to assist the contractor in the construction of the scheme, including working areas, site compounds and topsoil storage areas, and can also be required for the construction of part of the works with a permanent easement right acquired for operation and maintenance.

Programme and construction activities

- 1.2.6 Following examination, PINS will make a recommendation to the Secretary of State, who will then decide whether to grant a DCO.
- 1.2.7 If the DCO is granted, construction is expected to start in early 2023 and the scheme is expected to be open to traffic in 2026. However, Highways England may be in a position to commence preparatory works in late 2022, subject to the consents and approvals set out in the Consents and Agreements Position Statement (Document Reference 7.2) having been obtained.
- 1.2.8 The preparatory works delivered under the DCO would consist of:
- Archaeological investigation and ground investigation works including trial pits.
 - Remedial work in respect of any contamination or other adverse ground conditions.
 - Ecological surveys and mitigation works.
 - Site set up works (including the erection of temporary fencing and provision of access points), top-soil stripping and stockpiling for access points and compounds. The spatial extent of these site set up works would be limited to those areas identified as construction compounds on the General Arrangement Plans (Document Reference 2.6a), and access points to those compounds from the public highway.
- 1.2.9 The preparatory works will progress in accordance with the controls set in ES Appendix 2.1 Environmental Management Plan (EMP) (Document Reference 6.4). Implementation of the measures described in the EMP will ensure that there

are no significant environmental effects resulting from preparatory works taking place.

1.2.10 The construction activities for the scheme would be typical of a major highway scheme and consist of the following:

- Preparatory works
- Establishment of site compounds, laydown areas and facilities
- Vegetation clearance
- Statutory utility diversions
- Bulk earthworks
- Drainage works
- Construction of bridge structures including piling
- Road pavements works
- Landscape and planting works

1.3 Legislative context

- 1.3.1 The Habitats Regulations 2017 sets out the stages of assessment which must be undertaken to determine if a development project could significantly harm the designated features of a European site. European sites comprise Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). *Guidance: Habitats regulations assessments: protecting a European site* states that proposed SACs, potential SPAs, areas secured as sites compensating for damage to a European site, and wetlands of international importance designated under the Ramsar Convention (Ramsar sites) are afforded the same protection as European sites in terms of the HRA required of any proposals that may affect them.
- 1.3.2 Regulation 63 of the Habitats Regulations 2017 states that any plan or project not directly connected with, or necessary to, the management of a European site, but which would be likely to have a significant effect on such a site, either individually or in combination with other plans or projects, must be subject to appropriate assessment of its implications for the European site in view of its conservation objectives.
- 1.3.3 If a LSE to a European site is identified, the Applicant (Highways England for this scheme) must provide such information as the competent authority may reasonably require for the purposes of the assessment, or to enable it to determine whether an appropriate assessment is required. *PINS Advice Note 10 Habitats Regulations Assessment*² states that 'the relevant secretary of state is the competent authority for the purposes of the Habitats Directive and the Habitats Regulations in relation to applications for Nationally Significant Infrastructure Projects (NSIPs).'
- 1.3.4 Regulation 63 of the Habitats Regulations 2017 states that consent should only be granted for a plan or project once the relevant competent authority has ascertained that that it will not adversely affect the integrity of European sites.
- 1.3.5 Where an appropriate assessment has been carried out and it concludes that a plan or project would adversely affect the integrity of a European site, consent will only be granted if there are no alternative solutions and there are imperative reasons of overriding public interest (IROPI) for the development and compensatory measures have been secured.

1.3.6 The staged process of undertaking the above requirements of the legislation is referred to as a Habitats Regulations Assessment (HRA), set out within DMRB *LA 115 Habitats Regulations assessment*¹ and PINS *Advice Note 10 Habitats Regulations Assessment*² (with three stages: screening, appropriate assessment and derogation also set out in *Guidance: Habitats regulations assessments: protecting a European site*³). The applicant's role at each stage is summarised as follows:

- **Screening (Stage 1)** – determination of whether there is potential for elements of a project to give rise to significant adverse impacts on the conservation objectives of the qualifying features (interest features) of the European site, alone or in combination with other plans/ projects, i.e. will the project have a 'likely significant effect' (LSE) on the European site.
- **Informing the Appropriate Assessment (Stage 2)** – where there are LSE or there is uncertainty as to whether LSE would occur, report on and provide evidence of examination of adverse effects on the integrity of a European site to inform the competent authority to undertaking the appropriate assessment.
- **Assessment of Alternatives (Stage 3)** – formal assessment and reporting of alternative solutions shall be undertaken where the SIAA concludes that there are adverse impacts of greater than negligible magnitude or contains insufficient information on any impact.
- **Assessment of IROPI (Stage 4)** – where the alternative solutions assessment reports that there are no alternative solutions to the project and this has been agreed with the relevant statutory environmental body (SEB) an assessment of IROPI shall be undertaken.
- **Assessment of compensatory measures** - where IROPI are established and reported an assessment of compensatory measures shall be compiled and on measures to compensate for the negative impact of the project. This should be used as basis for consultation with SEB to seek their representation on the sufficiency of the compensatory

1.4 Scope of this report

1.4.1 This scope of this report is to identify relevant European sites that could potentially be impacted by the scheme and to consider whether there are LSE upon these sites or not, or whether there is sufficient uncertainty as to whether LSE would occur. This is intended to provide the information required by the competent authority for the HRA screening (Stage 1). A separate Statement to Inform Appropriate Assessment (SIAA) (Stage 2) has been prepared (Document Reference 6.5).

1.4.2 In accordance with PINS *Advice Note 10 Habitats Regulations Assessment*², this report includes:

- A detailed description of the development, processes, timings, and method of work proposed as part of the NSIP (see section 1.2 and section 3.4 screening matrices – description of project).
- Details of the methodology used to determine which European sites should be included within the assessment, including definition of and justification for the scope of the assessment (see section 2.4).
- A plan and description of the European site(s) potentially affected, including a description of all qualifying features (see Appendix B and section 3.4 screening matrices – characteristics of European site(s)).

- An appraisal of the potential effects resulting from the construction and operation of the project (e.g. noise) and the likely significant effect on the European site(s) and qualifying features (e.g. disturbance to bird species) (see section 3.4 screening matrices – initial assessment).
- An outline and interpretation of the baseline data collected to inform the findings (see section 3.4 screening matrices – initial assessment).
- An appraisal of the effects of any other plans or projects which, in combination with the scheme, might be likely to have a significant effect on the European site(s) (see section 2.5 and section 3.4 screening matrices – initial assessment).
- A statement which specifies whether the DCO Boundary of the project overlaps into devolved administrations or other European Economic Area (EEA) States and map(s) (see section 3.3 and Appendix B).
- A statement which identifies (with reasons) whether significant effects are considered to be likely in respect of European sites in devolved administrations or within other EEA States (see section 3.4 screening matrices – initial assessment).
- Evidence of agreement between Highways England and all relevant SNCBs on the scope, methodologies, interpretation, and conclusions of the screening assessment (see section 3.4 screening matrices – initial assessment and no LSE report).

1.4.3 The content of this report draws upon information gathered as part of the Environmental Impact Assessment (EIA) of the scheme and should be read in conjunction with the Environmental Statement (ES) (Document Reference 6.2).

1.5 Competent expert

- 1.5.1 All ecologists working on this scheme are members of (at the appropriate level) the Chartered Institute of Ecology and Environmental Management (CIEEM) and follow their code of professional conduct (CIEEM, 2019) when undertaking ecological work.
- 1.5.2 The SIAA technical reviewer is a Chartered Ecologist (CEcol) and Full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM). They have a First-Class BSc (Hons) degree in Zoology from the University of Sheffield (2004). They have worked as a professional ecologist since 2005, with particular focus on the assessment and mitigation of the ecological impacts of development across a wide range of sectors. Full details of relevant scheme experience are provided in ES Appendix 1.2 Competent expert evidence (Document Reference 6.4).

2 Screening assessment methodology

2.1 Standards and guidance

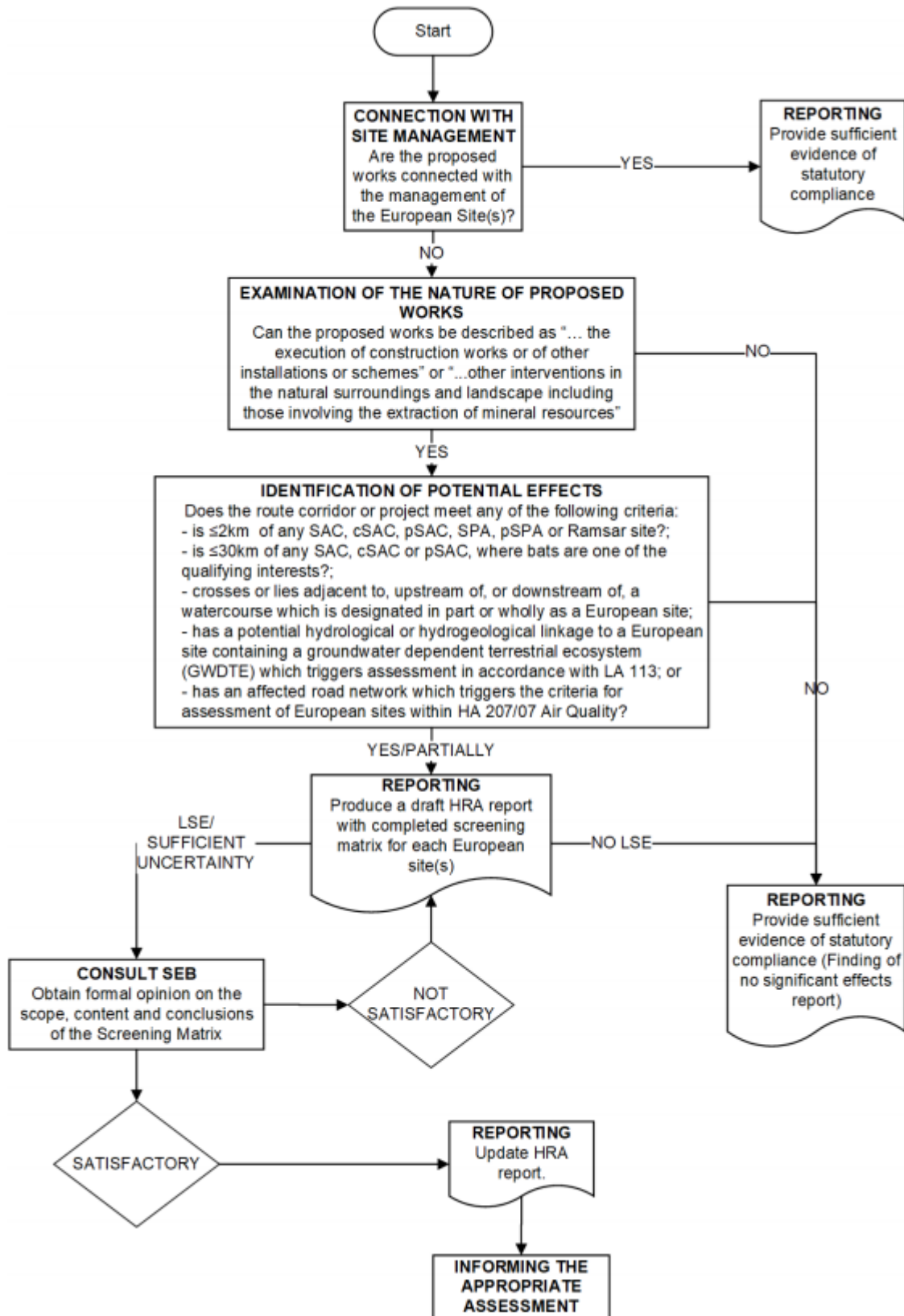
2.1.1 The HRA screening has been carried out using the following:

- Design Manual for Roads and Bridges (DMRB), Sustainability and Environment Appraisal, *LA 115 Habitats Regulations assessment*¹
- The Planning Inspectorate (PINS) *Advice Note 10: Habitats Regulations Assessment relevant to nationally significant infrastructure projects* (version 8, November 2017)²
- *Guidance: Habitats regulations assessments: protecting a European site*³

2.1.2 The HRA follows the process within DMRB *LA 115 Habitats Regulations assessment*¹ and is outlined in Extract 2-1 HRA screening process. This corresponds with that in PINS *Advice Note 10 Habitats Regulations Assessment*². The PINS Screening Matrices required by this note are included at Appendix C.

2.1.3 In accordance with DMRB *LA 115 Habitats Regulations assessment*¹, this screening report includes completed screening matrices for all European sites which meet the screening criteria. The screening matrices support a conclusion that either there is an absence of LSE, that there are LSE, or that sufficient uncertainty remains as to whether LSE would occur. The screening matrices form the bulk of this report (tables 1 to 6) and follow the format from Appendix A of DMRB *LA 115 Habitats Regulations assessment*¹.

2.1.4 Appendix B of DMRB *LA 115 Habitats Regulations assessment*¹ sets out a template for a finding of no significant effects report matrix (Screening). This matrix has been completed for each European site for which the screening assessment has concluded that there is an absence of LSE. The finding of no significant effects report matrices are provided within Appendix D of this report.



Extract 2-1 HRA screening process

Source DMRB LA 115 Habitats Regulations assessment¹

2.2 Determination of connection with site management

2.2.1 The first step in the HRA screening process is to consider whether the works are connected with or necessary to the management of a European site. Plans and projects which are directly connected with or necessary to the management of a European site may be exempt from the HRA process. The plan or project must be entirely connected with or necessary to the achievement of the site's conservation objectives. Such works should include those that are:

- For conservation purposes.
- Management which is 'directly connected with or necessary' to the site.
- Solely conceived for the conservation management of a site and not direct or indirect consequences.

2.3 Examination of the nature of proposed works

2.3.1 Where the works proposed are not in connection with site management, the next step is to consider whether the proposed works are defined as a 'project' under EU Directive 2014/52/EU⁴, namely whether the scheme can be described as 'the execution of construction works or of other installations or schemes', or 'other interventions in the natural surroundings and landscape including those involving the extraction of mineral resources'.

2.4 Scoping of European sites

2.4.1 The European sites included within the scope of this HRA screening have been identified in accordance with DMRB *LA 115 Habitats Regulations assessment*¹ screening criteria. These criteria state that European sites shall be included within the screening where the scheme meets any of the following:

1. Is within 2km of a European site or functionally linked land.
2. Is within 30km of a SAC, where bats are noted as one of the qualifying interests.
3. Crosses or lies adjacent to, upstream of, or downstream of, a watercourse which designated in part or wholly as a European site.
4. Has a potential hydrological or hydrogeological linkage to a European site containing a groundwater dependent terrestrial ecosystem (GWDTE) which triggers the criteria for assessment of European sites in accordance with DMRB *LA 113 Road Drainage and the Water Environment*.
5. Has an affected road network (ARN) which triggers the criteria for assessment of European sites in DMRB *LA 105 Air Quality*.

2.5 Identification of likely significant effects (LSE)

2.5.1 An assessment has been made as to whether the scheme could have LSE upon the European sites that are included within the scope of the screening. LSE are assessed with reference to the conservation objectives of the interest features of the European site.

2.5.2 Baseline information regarding the location, designation, status, sensitivity and interest features of the European sites has been obtained and reviewed to identify

⁴ Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (2014).

designated habitats and species that may be impacted by the scheme during its construction or operation phase. This has included review of Impact Risk Zones (IRZs), which are a GIS tool developed by Natural England to make a rapid initial assessment of the potential risks posed by development proposals to: Sites of Special Scientific Interest (SSSIs), SACs, SPAs and Ramsar sites. They define zones around each site which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

2.5.3 The identification of potential effects has considered impacts on designated habitats and species of the European sites through aspects of the scheme including:

- Size and scale – road type, location and probable traffic volume.
- Land take – the total area of land that would be temporarily or permanently lost in order to implement the scheme.
- Air quality – changes to air quality as a result of the scheme and the ARN;
- water quality – impacts of pollutants on water quality.
- Hydrology and hydrogeology – arising from excavation requirements or other works.
- Noise and vibration – activities associated with the scheme that could generate noise and vibration to the extent that it could cause disturbance to designated species.
- Recreational pressure – changes in recreational use of European sites enabled by the scheme.

2.5.4 An effect to a European site could be significant if there's:

- A reduction in the amount or quality of designated habitats or the habitats that support designated species.
- A limit to the potential for restoring designated habitats in the future.
- A significant disturbance to the designated species.
- Disruption to the natural processes that support the site's designated features.

2.5.5 Impacts to European sites are 'screened in' for appropriate assessment where there are considered to be LSE arising from the scheme, or there is sufficient uncertainty on the basis of existing data and analysis. In these scenarios, a subsequent SIAA will be produced to provide the information required by the competent authority to undertake an appropriate assessment to determine whether there may be an adverse effect on the integrity of the European site.

2.5.6 The HRA covers the construction and operation phases of the scheme. The scheme is not considered to have a decommissioning stage as it is expected to be in place in perpetuity. Therefore, no decommissioning impacts are discussed in this report.

Mitigation and integral measures

2.5.7 In 2018 a Court of Justice of the European Union ("CJEU") ruling (referred to as the 'People over Wind' ruling)⁵ determined that 'mitigation' (i.e. measures intended to avoid or reduce the harmful effects of projects on European sites) should not be taken into account when forming a view on LSE during HRA screening. This screening report reflects the implications of that judgment and

⁵ People Over Wind and Sweetman v Coillte Teoranta (C-323/17)

does not include mitigation measures that are introduced to avoid harm to the European site or to avoid LSE.

2.5.8 Features that are integral to the design or physical characteristics of the project that is being assessed, for example, the layout, timing and location of a scheme, may be considered at the screening stage⁶.

2.5.9 In accordance with DMRB *LA 115 Habitats Regulations assessment*¹, construction management measures to ensure wider legislative compliance are reported as part of the project description and are taken into account in the screening assessment.

Consideration of in-combination LSE

2.5.10 The potential for the effects of other plans and projects to combine with those associated with the scheme and give rise to LSE on European sites has been assessed as part of the screening process.

2.5.11 In accordance with PINS *Advice Note 10 Habitats Regulations Assessment*², where there is potential for in-combination LSE, information has been gathered from publicly available sources and appraised for the following types of development:

- Projects that are under construction.
- Permitted application(s) not yet implemented.
- Submitted application(s) not yet determined.
- All refusals subject to appeal procedures not yet determined.
- Projects on the National Infrastructure's programme of projects.
- Projects identified in the relevant development plan (the Gloucester, Cheltenham and Tewkesbury Joint Core Strategy).

⁶ <https://www.gov.uk/guidance/appropriate-assessment>.

3 Screening assessment results

3.1 Determination of connection with site management

3.1.1 The scheme does not comprise works that are connected with or necessary to the management of a European site.

3.2 Examination of the nature of proposed works

3.2.1 The scheme is considered to comprise the definition of a project under EU Directive 2014/52/EU⁴ on the basis that it can be described as ‘the execution of construction works or of other installations or schemes’.

3.3 Scoping of European sites

3.3.1 The following European sites meet the screening criteria in section 2.4 and are included in this assessment:

- Cotswold Beechwoods SAC (meets criteria 1 and 5).
- Wye Valley and Forest of Dean Bat Sites SAC (meets criterion 2).
- North Meadow and Clattinger Farm SAC (meets criterion 5).
- Severn Estuary SAC (meets criterion 3).
- Severn Estuary Ramsar site (meets criterion 3).
- Severn Estuary SPA (meets criterion 3).

3.3.2 Citations for the European sites discussed in this report are provided within Appendix A European designated sites citations. Plans indicating the locations of the above listed European sites, the DCO Boundary and the ARN is provided within Appendix B of this report. An additional location plan for the Cotswold Beechwoods SAC is also provided at Appendix B.

3.3.3 The scheme, Cotswold Beechwoods SAC and North Meadow and Clattinger Farm SAC are located entirely within England and their boundaries do not overlap with areas of devolved administrations or with those of other European Economic Area (EEA) States. Both Wye Valley and Forest of Dean Bat Sites SAC, and Severn Estuary SAC, Ramsar site and SPA (which overlap in extent), are partly located within England and the devolved administration of Wales. The screening matrices identify whether LSE will occur in relation to those European sites which fall partly within devolved administrations (as required by PINS *Advice Note 10 Habitats Regulations Assessment*²).

3.4 Identification of likely significant effects (LSE)

3.4.1 The assessment of LSE is set out in screening matrices for each European site below (Tables 1 to 6), in accordance with the reporting requirements of DMRB *LA 115 Habitats Regulations assessment*¹.

Table 1 Screening Matrix: Cotswold Beechwoods SAC

Project Name:	A417 Missing Link	
European Site under consideration:	Cotswold Beechwoods SAC [UK0013658]	
Date:	Author (Name/ Organisation):	Verified (Name/ Organisation):
07/03/2021	Livvy Cropper/ Arup Alys Black/ Arup	Luke Casey/ Arup
Description of Project		
<i>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:</i>		
Size and scale (road type and probable traffic volume)	<ol style="list-style-type: none"> 1) Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417. 2) Provision of a new crossing near Emma's Grove. 3) Provision of a new junction at Shab Hill. 4) Provision of a new 37m wide multi-purpose crossing north of Shab Hill. 5) Provision of a new junction near Cowley. 6) The Existing A417 would be detrunked for its entire length. 7) A more detailed description of the scheme is provided in Section 1.2 of this report. 8) In terms of traffic volumes, Annual Average Daily Traffic (AADT) for the scheme is outlined below: <ul style="list-style-type: none"> • North of Birdlip junction: 35,673 • South of Birdlip junction: 46,918 • Birdlip link road: 4,152 	
Land-take	9) None within the SAC.	
Distance from European Site or key features of the site (from edge of the project assessment corridor)	10) The SAC is 212m from the DCO Boundary and directly adjacent to the ARN.	
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts)	11) No resource requirements from the SAC.	
Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	<p>Water quality</p> <ol style="list-style-type: none"> 12) The SAC is underlain by the same WFD groundwater body and principal aquifer as the scheme which has the potential to cause water pollution to the groundwater of the SAC via the scheme during both construction and operation. 13) The land within the scheme does not drain into watercourses that are within, or connected to, the SAC. No risk of impacts to the supply or quality of surface water of the SAC are identified from construction or operation. <p>Air quality</p> <ol style="list-style-type: none"> 14) The potential for the scheme to affect local air quality at the SAC exists including: through change in traffic flows during construction, as a result of temporary traffic management measures; and/or additional vehicles travelling to and from the construction site transporting materials, plant and labour. The 	

	<p>scheme also has the potential to affect local air quality during operation through changes in annual mean nutrient nitrogen deposition.</p> <p>15) These impacts could result in degradation and loss of habitats for which the SAC is designated.</p>
Excavation requirements (e.g. impacts of local hydrogeology)	<p>16) The scheme and the SAC are within the same hydrogeological setting therefore the potential for impacts to quantity or quality of water at the SAC or impacts to groundwater within the SAC exists during construction as a result of excavations.</p> <p>17) These impacts could result in degradation and loss of habitats for which the SAC is designated.</p>
Transportation requirements	18) See emissions above.
Duration of construction, operation, etc.	19) The duration of the construction works is estimated to be at least 33 months, commencing nine months after the start of environmental preparatory works, giving an overall construction period of 42 months. The scheme is anticipated to be open for traffic in 2026.
Other	20) The provision of the Cotswold Way crossing at Crickley Hill would improve recreational access across the A417 and may increase the number of visitors accessing the SAC. In addition, reduced congestion may result in more visitors from habitats to the north visiting the SAC via car. The potential increased recreational pressure on the SAC could result in degradation and loss of habitats for which the SAC is designated.
<p>Description of Avoidance and/or Mitigation Measures <i>Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:</i></p>	
Nature of proposals	21) No specific mitigation measures to mitigate impacts to the SAC are included in this LSE assessment, in line with case law.
Location	N/A
Evidence for effectiveness	N/A
Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)	N/A
<p>Characteristics of European Site(s) <i>A brief description of the European Site should be produced, including information on:</i></p>	
Name of European Site and its EU code	22) Cotswold Beechwoods SAC [UK0013658]
Location and distance of the European Site from the proposed works	23) The SAC is 212m from the DCO Boundary and directly adjacent to the ARN.
European Site size	24) 590.2ha
Key features of the European Site including the primary reasons for selection and any other qualifying interests	<p>25) Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> • <i>Asperulo-Fagetum</i> beech forests on neutral to rich soils <p>26) Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> • Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Bromeliata</i>).

<p>Vulnerability of the European Site – any information available from the standard data forms on potential effect pathways</p>	<p>27) The Natura 2000 <i>Standard Data Form</i>⁷ identifies the following threats, pressures and activities with high negative effect on the European site:</p> <ul style="list-style-type: none"> • Outdoor sports and leisure activities, recreational activities • Interspecific floral relations • Invasive non-native species • Problematic native species <p>28) The following threats and pressures are taken from the Natural England <i>Site Improvement Plan</i>⁸ (SIP) for the SAC:</p> <ul style="list-style-type: none"> • Invasive species (plants) • Deer • Invasive species (grey squirrel) • Disease (ash dieback) • Public access/disturbance • Changes in species distributions • Air pollution: impact of atmospheric nitrogen deposition
<p>European Site conservation objectives – where these are readily available</p>	<p>29) The conservation objectives⁹ aim to: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the favourable conservation status of its qualifying features, by maintaining or restoring:</p> <ul style="list-style-type: none"> • The extent and distribution of qualifying natural habitats • The structure and function (including typical species) of qualifying natural habitats; and • The supporting processes on which the qualifying natural habitats rely <p>30) In addition, the conservation objectives supplementary advice¹⁰ for beech forests on neutral to rich soils identifies targets that include those relating to recreational pressure (compaction of soil around the root zones of ancient trees), air quality (sensitivity of habitat to changes in air quality and a current exceedance of the critical loads of Nitrogen and acid deposition) and hydrology (changes in water supply having implications for assemblages of plants and animals present). For semi-natural dry grasslands and scrubland facies on calcareous substrates targets identified include air quality (sensitivity of habitat to changes in air quality and Nitrogen and acid deposition currently within maximum limits).</p>
<p>Assessment Criteria</p> <p><i>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site.</i></p>	
<p>Recreational pressure</p> <p>31) The Cotswold Way crossing will reconnect walking and cycling routes along the Cotswold Way National Trail, which was previously severed by the Existing A417 trunk road. This could potentially contribute to increased visitor pressures at the SAC during operation. In addition, reduced congestion may result in more visitors from habitats to the north visiting the SAC via car</p>	

⁷ Natura 2000 Standard Data Form (2015): Cotswold Beechwoods (UK0013658)
<https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0013658.pdf>

⁸ Natural England (2015) Site Improvement Plan: Cotswold Beechwoods (SIP048)
<http://publications.naturalengland.org.uk/file/5734985984114688>

⁹ European Site Conservation Objectives for Cotswold Beechwoods Special Area of Conservation (Site Code: UK0013658)
<http://publications.naturalengland.org.uk/file/6196928853573632>

¹⁰ European Site Conservation Objectives: Supplementary advice on conserving and restoring site features Cotswold Beechwoods Special Area of Conservation Site Code: UK0013658.
<http://publications.naturalengland.org.uk/file/5949473331347456>

<p>which could also increase visitor pressure. Public access/disturbance and recreational activities are listed as a key vulnerability of the SAC and included within the conservation objectives.</p> <p>32) If the project was found to result in an increase in visitors to the SAC, then the potential would exist for in-combination effects with other plans and projects that would also increase visitor numbers.</p> <p>Air quality</p> <p>33) While the European site is over 200m from the DCO Boundary it is directly adjacent to the ARN and as such the potential exists for changes in air quality during operation through increased traffic volumes which could affect the sensitive habitats present. In addition, construction traffic also has the potential to cause changes in air quality during construction. Air quality and specifically the impact of atmospheric nitrogen deposition is a key vulnerability of the SAC and included within the conservation objectives.</p> <p>Water quality</p> <p>34) The SAC is underlain by the same WFD groundwater body and principal aquifer as the scheme which has the potential to cause water pollution to the groundwater of the SAC via the scheme during both construction and operation. In addition, excavations have the potential for impacts to quantity or quality of water at the SAC or impacts to groundwater within the SAC exists during construction. A target of maintaining natural hydrological processes is included in the conservation objectives.</p>	
<p>Initial Assessment in relation to Cotswold Beechwoods SAC</p> <p>The key characteristics and the details of the European Site should be considered in identifying potential impacts.</p> <p><i>Describe any likely changes to the site arising as a result of:</i></p>	
<p>Reduction of habitat area</p>	<p>35) There would be no direct habitat loss within the SAC due to the scheme.</p> <p>Recreational pressure</p> <p>36) Recreational pressures including outdoor sports, leisure activities and recreational activities are identified as a key threat within the Natura 2000 <i>Standard Data Form</i>⁷ and public access/disturbance within the SIP⁸, which has a potential to result in a reduction in habitat area, such as through the loss or damage to ancient trees through excessive soil compaction around the root zones of ancient trees, as identified within the supplementary conservation objectives for the site⁹.</p> <p>37) The Cotswold Way crossing would reconnect walking and cycling routes along the Cotswold Way National Trail, which is severed by the Existing A417 trunk road. Currently pedestrians and cyclists must cross three lanes of traffic at the Air Balloon roundabout, which is hazardous and likely to deter people from using this route. The crossing provided as part of the scheme could encourage higher levels of recreational use of the National Trail. This could potentially increase the number of visitors to the SAC that originate from locations to the north of the A417, particularly from Crickley Hill Country Park.</p> <p>38) The scheme will improve traffic flow on the A417 which could potentially increase visitor numbers to the SAC by vehicle if visitor access routes are dependent on the A417 and current levels of congestion act as deterrent.</p> <p>39) The Cotswold Way crossing and reduction in traffic congestion on the A417 may affect visitor numbers to the SAC and may therefore result in an increase in recreational pressure on the SAC. Further assessment of information on visitor use of the SAC and the Crickley Hill area is needed to predict potential changes and enable an assessment of the significance of potential impacts upon the SAC.</p>

Disturbance to key species	40) The SAC is designated for its habitats. There will therefore be no disturbance to key species.
Habitat or species fragmentation	41) No impact upon the SAC.
Reduction in species density	42) The SAC is designated for its habitats. No reduction in species density is anticipated.
Changes in key indicators of conservation value (water quality, etc.)	<p>Air quality</p> <p>43) Beech forests on neutral to rich soils and semi-natural dry grasslands and scrubland facies on calcareous substrates habitats are considered sensitive to changes in air quality. The critical levels for nitrogen and acid deposition are currently being exceeded for beech forests and are within the maximum limits for semi-natural dry grasslands. Exceedance of these critical values may modify the chemical status of the substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species¹⁰.</p> <p>44) DMRB <i>LA 105 Air Quality</i>¹¹ sets out the steps required in local air quality impact assessment for designated sites during operation. The first step is to determine the ARN. Criteria for this include road alignment will change by 5m or more; or daily traffic flows will change by 1,000 AADT or more; or Heavy-Duty Road Vehicle (HDV) flows will change by 200 AADT or more; or a change in speed band. The SAC is within 200m of the ARN and impacts to it are assessed in ES Chapter 5 Air Quality (Document Reference 6.2), ES Appendix 5.6 Air Quality Operational Phase Impacts and 5.7 Air Quality Construction Phase Impacts (Document Reference 6.4).</p> <p>45) Traffic modelling has identified a combined AADT change of both roads as -4,096 which represents a reduction in traffic volumes as a result of the scheme. A summary of the traffic data relevant to the SAC is provided at Appendix D.</p> <p>46) The ecological modelling transect within the SAC is shown on the European Designated Sites Plan, provided at Appendix B. The traffic modelling includes data from other committed developments and as such, in-combination effects are inherently considered.</p> <p>47) Following guidance in DMRB <i>LA 105 Air Quality</i>, the magnitude of change in annual mean nutrient nitrogen deposition at the designated habitats has been determined. The data on which this analysis is based is presented at Appendix E. During operation, the scheme would result in a reduction in congestion and a reduction in associated traffic emissions. The air quality assessment of changes in annual mean nutrient nitrogen deposition (N/ha/yr) in 2026 at the closest receptor (EA1: 0m from the ARN) is predicted to be -1.1 N/ha/yr, which represents a decrease. At EA2 (10m from the ARN) -0.3 N/ha/yr, at EA3 (20m from the ARN) -0.2 N/ha/yr and at EA4 (30m from the ARN) and EA5 (40m from the ARN) -0.1 N/ha/yr. The decrease can be attributed to a reduction in traffic volumes. As such no significant effects to the designated habitats as a result of the scheme via nitrogen deposition are determined to be likely during operation.</p>

¹¹ Highways England (2019). Design Manual for Roads and Bridges Sustainability and Environment Appraisal LA 105 Air quality (revision 0).

	<p>48) The potential for the scheme to affect local air quality at the SAC during construction has been considered, including: through change in traffic flows during construction, as a result of temporary traffic management measures; and/or additional vehicles travelling to and from the construction site transporting materials, plant and labour.</p> <p>49) The magnitude of change in annual mean nutrient nitrogen deposition have been determined for the construction phase. There is no change predicted (0.00 N/ha/yr) the European site therefore no significant effects to the designated habitats as a result of the scheme via nitrogen deposition are determined to be likely during construction. No other impacts on air quality from construction are likely to affect the SAC due to the distance of the site from the construction footprint.</p> <p>Water quality</p> <p>50) Defining and maintaining the appropriate hydrological regime is identified as being a key step towards achieving the conservation objectives for this site (identified for beech forest on neutral to rich soils habitat type). Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present¹⁰.</p> <p>51) Construction of the scheme will adopt a ground and surface water management plan to prevent the risk of pollution and contamination to ground and surface water, as is required to ensure wider legislative compliance. These measures are described in Annex G Ground and Surface Water Management Plan of ES Appendix 2.1 EMP (Document Reference 6.4) and legislation relevant to general protection of the water environment during construction is described in ES Appendix 13.1 Water Legislative and Policy Framework (Document Reference 6.4). Adoption of these measures will avoid pollution of the general water environment during construction including any groundwater that could be linked to the SAC.</p> <p>52) No impacts on the SAC are anticipated from changes to surface water during operation due to the operational drainage design, including flow volume and quality control measures incorporated into the scheme design to provide a sustainable drainage system (SuDS). As described in Chapter 13 Road Drainage and the Water Environment (Document Reference 6.2), the scheme will comprise a road drainage scheme that will capture pollutants within road run-off and remove pollutants before the treated run-off is discharged. The scheme is will provide a betterment on the existing road drainage system and improve the water quality of receiving waterbodies.</p> <p>53) The hydrogeological conceptual model presented in ES Appendix 13.7 Hydrogeological impact assessment (Document Reference 6.4) identified that the drawdown in groundwater levels associated with cuttings along the scheme does not extend to any groundwater fed systems of the SAC. The assessment of impacts on groundwater dependant terrestrial ecosystems (GWDTE) presented in ES Appendix 13.8 GWDTEs Assessment concludes that there is no linkage between the potential impacts from the road to groundwater levels and the habitats within the SAC that are dependent on springs and seepage from high groundwater levels.</p> <p>54) No changes to the water quality key indicator at the SAC are anticipated as a result of the scheme.</p>
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Climate change	<p>55) ES Chapter 14 Climate (Document Reference 6.2) concludes no significant effects with regards to greenhouse gas emissions during construction or operation of the scheme.</p> <p>56) No significant climate change related effects upon the European site are anticipated as a result of the scheme.</p>
<i>Describe any likely impacts on the European Site as a whole in terms of:</i>	
Interference with the key relationships that define the structure of the site	57) The vegetation structure and composition of key habitats within the SAC has potential to be adversely affected by the potential increases in recreational pressure outlined above. Therefore, there is potential for the scheme to interfere with the relationships that define the structure of the site.
Interference with the key relationships that define the function of the site	58) Increases in recreational pressures outlined above, could result in the loss or degradation of habitats and key species which define the function of the site.
<i>Indicate the significance as a result of the identification of impacts set out above in terms of:</i>	
Reduction of habitat area	59) A significant effect cannot be ruled out at this stage, until further information has been analysed to assess the likelihood of potential increases in visitor numbers/recreational pressures on the SAC.
Disturbance to key species	60) No Likely Significant Effect.
Habitat or species fragmentation	61) No Likely Significant Effect.
Disruption	62) No Likely Significant Effect.
Disturbance	63) No Likely Significant Effect.
Change to key elements of the site (e.g. water quality, hydrological regime, etc.)	64) No Likely Significant Effect.
<i>Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known:</i>	
<p>Recreational Impacts</p> <p>65) The Cotswold Way crossing will reconnect walking and cycling routes along the Cotswold Way National Trail, which was previously severed by the Existing A417 trunk road. This could increase recreational pressure on the SAC due to the increased accessibility as a result of the new structure. The scheme will improve traffic flow on the A417 which could potentially increase visitor numbers to the SAC by vehicle if visitor access routes are dependent on the A417 and current levels of congestion act as deterrent.</p> <p>66) Increased recreational pressure is a key threat to the SAC which could result in the damage or loss of key species within the SAC, such as the loss of ancient trees due to ground compaction affecting their roots. This could result in a reduction in habitat area.</p> <p>67) Further assessment is required on visitor use of the SAC and Crickley Hill to assess the likelihood that an increase in recreational pressure upon the SAC could occur as a result of the scheme. As such, a Statement to Inform Appropriate Assessment has been prepared for this site (Document Reference 6.5).</p> <p>In-combination effects</p> <p>68) No other NSIPs have been identified which have potential to have effects on the SAC.</p> <p>69) A number of major developments are outlined within the Gloucester, Cheltenham and Tewkesbury Joint Core Strategy (JCS) which have been identified as having potential effects on the SAC. A strategic Habitats Regulations Assessment of these proposals identified potential significant effects on the SAC associated with adverse air quality from increased traffic during the operational phase and increased recreational pressure on the SAC. The scheme is not anticipated to result in air quality impacts to the SAC and therefore an in-combination effect would not occur.</p> <p>70) Other plans and projects with potential to result in increased visitor numbers to the SAC are those that would increase residential units in locations where new residents would be likely to travel to</p>	

<p>the SAC for recreational purposes. The Impact Risk Zones (IRZs) for Cotswold Beechwoods SAC identify a 10km radius from the SAC boundary for any residential development with a total net gain in residential units. Proposed new housing developments, including several within the JCS, are within this radius and could result in increased visitor numbers and increased recreational pressure on the SAC. If further assessment of the scheme concluded that it would be likely to result in an increase in visitor pressure on the SAC then potential would exist for in combination effects with other plans and projects that would increase residential units within 10km of the SAC.</p>	
<p>Outcome of screening stage</p>	<p>71) Likely Significant Effect cannot be ruled out on the basis that sufficient uncertainty remains as to the potential for changes in recreational pressure upon the SAC.</p>
<p>Are the appropriate statutory environmental bodies in agreement with this conclusion?</p>	<p>72) Natural England are in agreement with this conclusion. This is documented in Appendix C Natural England Statement of Common Ground of the Statement of Commonality (Document Reference 7.3).</p>

Table 2 Screening Matrix: Wye Valley and Forest of Dean Bat Sites SAC

Project Name:	A417 Missing Link	
European Site under consideration:	Wye Valley and Forest of Dean Bat Sites SAC [UK0014794]	
Date:	Author (Name/ Organisation):	Verified (Name/ Organisation):
07/03/2021	Livvy Cropper/ Arup Alys Black/ Arup	Luke Casey/ Arup
Description of Project		
<i>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:</i>		
Size and scale (road type and probable traffic volume)	<p>73) Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417.</p> <p>74) Provision of a new crossing near Emma's Grove.</p> <p>75) Provision of a new junction at Shab Hill.</p> <p>76) Provision of a new 37m wide multi-purpose crossing north of Shab Hill.</p> <p>77) Provision of a new junction would be included near Cowley.</p> <p>78) The Existing A417 would be detrunked for its entire length.</p> <p>79) A more detailed description of the scheme is provided in Section 1.2 of this report.</p> <p>80) In terms of traffic volumes, Annual Average Daily Traffic (AADT) for the scheme is outlined below:</p> <ul style="list-style-type: none"> • North of Birdlip junction: 35,673 • South of Birdlip junction: 46,918 • Birdlip link road: 4,152 	
Land-take	<p>81) None within the SAC.</p> <p>82) Land-take during construction could result in the loss of functionally linked land for the qualifying bat species.</p>	
Distance from European Site or key features of the site (from edge of the project assessment corridor)	83) The SAC is a composite site and is 21.4km west of the DCO Boundary and 11.3km from the ARN, at the closest point.	
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts)	84) No resource requirements from SAC.	
Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	<p>85) While the broad habitat (broadleaved deciduous woodland) that the qualifying bat species rely on is sensitive to nitrogen deposition¹² no impacts on the SAC from emissions are anticipated due to the distance between the scheme and the designated site.</p> <p>86) Given the distance of the scheme from the SAC, no other emissions are considered likely to impact upon the designated site.</p>	
Excavation requirements (e.g. impacts of local hydrogeology)	87) No impacts upon the SAC are anticipated, given the distance of the scheme from the SAC.	

¹² Information taken from the Air Pollution Information System (www.apis.ac.uk).

Transportation requirements	88) No impacts upon the SAC are anticipated, given the distance of the scheme from the SAC.
Duration of construction, operation, etc.	89) The duration of the construction works is estimated to be at least 33 months, commencing nine months after the start of environmental preparatory works, giving an overall construction period of 42 months. The scheme is anticipated to be open for traffic in 2026.
Other	90) Operation of the scheme could impact the populations of qualifying bat species through increased mortality arising from vehicle collisions.
Description of Avoidance and/or Mitigation Measures <i>Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:</i>	
Nature of proposals	91) No specific mitigation measures to mitigate impacts to the SAC are included in this assessment, in line with case law.
Location	N/A
Evidence for effectiveness	N/A
Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)	N/A
Characteristics of European Site(s) <i>A brief description of the European Site should be produced, including information on:</i>	
Name of European Site and its EU code	92) The Wye Valley and Forest of Dean Bat Sites SAC [UK0014794]
Location and distance of the European Site from the proposed works	93) The SAC is a composite site and is 21.4km south-west of the scheme at the closest point.
European Site size	94) 144.82ha
Key features of the European Site including the primary reasons for selection and any other qualifying interests	<p>95) Annex II bat species that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> • <i>Rhinolophus hipposideros</i> lesser horseshoe bat. • <i>Rhinolophus ferrumquinum</i> greater horseshoe bat. <p>96) This complex of sites on the border between England and Wales contains by far the greatest concentration of lesser horseshoe bat in the UK, totalling about 26% of the national population, estimated at 1001-10000 individuals¹³. It has been selected on the grounds of the exceptional breeding population, and the majority of sites within the complex are maternity roosts. The bats are believed to hibernate in the many disused mines in the area. There are multiple maternity and hibernation roosts within the SAC, with average adult bat counts for monitored roosts in the English part of the SAC from 2000 to 2004 being around a total of 1200 bats¹⁴.</p> <p>97) The SAC also supports a population of greater horseshoe bat in the northern part of its range, with about 6% of the UK</p>

¹³ Natura 2000 Standard Data Form (2015): Wye Valley and Forest of Dean Bat Sites (UK0014794)
<https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0014794.pdf>

¹⁴ European Site Conservation Objectives: Supplementary advice on conserving and restoring site features Wye Valley and Forest of Dean Bat Sites Special Area of Conservation Site Code: UK0014794
<http://publications.naturalengland.org.uk/file/6041981725966336>

	<p>population present, estimated at 251 – 500 individuals¹³. The site contains the main maternity roost for bats in this area at Dean Hall with a count of 424 adult bats recorded in July 2018¹⁴, which are believed to mainly hibernate in the many disused mines in the Forest.</p>
<p>Vulnerability of the European Site – any information available from the standard data forms on potential effect pathways</p>	<p>98) The Natura 2000 <i>Standard Data Form</i>¹³ identified the following threats, pressures and activities with high negative effect on the European site:</p> <ul style="list-style-type: none"> • Human induced changes in hydraulic conditions • Other ecosystem modifications • Outdoor sports and leisure activities, recreational activities <p>99) The following threats and pressures are taken from the Natural England <i>Site Improvement Plan</i>¹⁵ for the SAC:</p> <ul style="list-style-type: none"> • Physical modification • Public access/disturbance • Habitat connectivity
<p>European Site conservation objectives – where these are readily available</p>	<p>100) The conservation objectives¹⁶ aim to: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the favourable conservation status of its qualifying features, by maintaining or restoring:</p> <ul style="list-style-type: none"> • The extent and distribution of the habitats of qualifying species • The structure and function of the habitats of qualifying species • The supporting processes on which the habitats of qualifying species rely • The populations of qualifying species, and • The distribution of qualifying species within the site. <p>101) In addition, the conservation objectives supplementary advice¹⁴ for the European site identifies targets that include maintaining and/or restoring associated satellite and transitional roosts, management of the wider landscape and maintenance of supporting habitat in addition to identifying the sensitivity of the habitats present that support the qualifying species to nitrogen deposition.</p> <p>102) In addition, the core management plan for the site sets out conservation objectives for each qualifying feature and include those relating to disturbance and mortality from vehicle collision, preventing losses of foraging or hibernating habitat and declines in quality of linear features¹⁷.</p>
<p>Assessment Criteria</p>	
<p><i>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site.</i></p>	
<p>103) Where relevant, reference is made to the threats and pressures outlined in the Natural England <i>Site Improvement Plan</i>¹⁵.</p>	

¹⁵ Natural England (2015) Site Improvement Plan: Wye Valley and the Forest of Dean Bat Sites (SIP267)
<http://publications.naturalengland.org.uk/file/5483403396775936>

¹⁶ European Site Conservation Objectives for Wye Valley and Forest of Dean Bat Sites (Site Code: UK0014794)
<http://publications.naturalengland.org.uk/file/5128727537385472>

¹⁷ Core Management Plan Including Conservation Objectives for Wye Valley and Forest of Dean Bat SAC, Countryside Council for Wales
https://www.naturalresources.wales/media/674312/Wye%20Valley%20Bats%20Core%20Plan%20TRK%2031%20Oct%2007%20_A_.pdf

- 104) Supporting habitats for the populations of both qualifying bat species within the SAC are largely not included within the area of the SAC designation. Habitat connectivity has been identified as a key vulnerability at the SAC. The supporting off-site habitats of woodland, fields and hedgerows and additional non-designated roosts all contribute to maintaining the favourable conservation status of the SAC¹⁴. Construction of the scheme has potential to impact the European site through reduction of the area of such functionally linked habitats which could impact the qualifying species using such habitats.
- 105) Operation of the scheme has the potential to impact the European site through increased mortality of bats from the populations of the qualifying species due to vehicle collisions.
- 106) With reference to ES Chapter 15 Cumulative Effects (Document Reference 6.2), one project has been identified with the potential to impact upon lesser horseshoe bats (12/01256/OUT Land at Perrybrook to the North of Brockworth and to the South of the A417 Brockworth for a mixed-use development). If the scheme is likely to impact the lesser horseshoe bat population that is a qualifying interest of the SAC then potential for in combination effects with this development should be considered.

Initial Assessment in relation to Wye Valley and Forest of Dean Bat Sites SAC
 The key characteristics and the details of the European Site should be considered in identifying potential impacts.

Describe any likely changes to the site arising as a result of:

Reduction of habitat area	<p>107) There will be no reduction of habitat area within the SAC.</p> <p>108) The potential for a reduction in functionally linked habitat for each of the bat populations relevant to the SAC is considered below.</p> <p style="text-align: center;">Lesser horseshoe bat</p> <p>109) The SIP identifies a key foraging area of 4km around maternity roosts of both horseshoe bat species within the SAC as critical for the long term survival of the site’s populations, to be met by promoting the uptake of agri-environmental schemes to maintain grazed pasture, hedgerows, woodlands and other important landscape features.</p> <p>110) Lesser horseshoe bats typically forage within 2-3km of their summer roosts, although can travel up to 4km to suitable foraging areas¹⁴. Information on Core Sustainance Zones (CSZ) around communal bat roosts are published by the Bat Conservation Trust (BCT), based on a literature review of the results of multiple radio-tracking studies¹⁸. In reference to planning and development, the CSZ gives an indication of the area surrounding the roost within which development work can be assumed to impact the commuting and foraging habitat of bats using the roosts. The CSZ for lesser horseshoe bats is a 2km radius from communal bat roosts.</p> <p>111) Whilst movements between summer and winter roosts can be up to 22km, winter roosts of lesser horseshoe are usually within 5km of their summer roosts¹⁹. Published monitoring data with the conservation objectives supplementary advice¹⁴ shows that lesser horseshoe numbers in the winter roosts within the SAC exceed the maternity counts from the summer roosts within the SAC¹⁴.</p> <p>112) Lesser horseshoe bats have been frequently recorded within the DCO Boundary during transect and static bat detector surveys. Desk study and extensive bat survey work</p>
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¹⁸ Bat Conservation Trust (2016) Core Sustainance Zones: Determining zone size. Available online at: https://cdn.bats.org.uk/pdf/Resources/Core_Sustainance_Zones_Explained_04.02.16.pdf?mtime=20190219173135

¹⁹ Harris, S., & Yalden, D. (2008). Mammals of the British Isles: handbook. Mammal Society.

	<p>undertaken to inform ES Chapter 8 Biodiversity (Document Reference 6.2) for the scheme has identified multiple lesser horseshoe maternity roosts within 100m of the scheme, including within 10m of the scheme.</p> <p>113) The radio-tracking study undertaken for the scheme tracked the movements of eight lesser horseshoe bats in total over three trapping sessions in July and September 2019 and May 2020. Most of these bats had core home ranges that occurred within the vicinity of the scheme, although some were more widely spread over the general landscape, up to 7.5km from the scheme.</p> <p>114) A disused limestone mine occurs at Birdlip approximately 270m to the south-west of the scheme which is a known winter site for lesser horseshoe bats, used for both mating and hibernation. Over 15 surveys undertaken between October and May from 2009 – 2019 the average count of lesser horseshoe bats at Birdlip mine was three with a peak of 15 in 2019²⁰. Lesser horseshoe bats have also been recorded hibernating in Crickley Hill rock fissures approximately 110m north of the scheme.</p> <p>115) Desk records and survey data demonstrate that habitats within the scheme are used for foraging and commuting by lesser horseshoe, and that habitats in close proximity to the scheme are used as winter roosts. However, there are several breeding populations of lesser horseshoe bat using maternity roosts in much closer proximity to the scheme than the SAC population. Given this finding, the distance of the SAC from the scheme (>21km), and existing published studies on this species, it is not likely that the lesser horseshoe bats using habitats within and in close proximity to the scheme are part of the qualifying population within the SAC. As such the habitats to be impacted within the scheme are not considered to be functionally linked habitats for the lesser horseshoe bat population of the SAC. Therefore, a reduction in area of functionally linked habitats for lesser horseshoe bats is not likely to occur.</p> <p style="text-align: center;">Greater horseshoe bat</p> <p>116) The SIP identifies a key foraging area of 4km around maternity roosts of both horseshoe bat species within the SAC as critical for the long term survival of the site's populations, to be met by promoting the uptake of agri-environmental schemes to maintain grazed pasture, hedgerows, woodlands and other important landscape features</p> <p>117) The CSZ for greater horseshoe bats published by BCT is a 3km radius from communal bat roosts. A Natural England-commissioned Radio tracking study of greater horseshoe bats at Dean Hall, Cinderford (24.6km west of the scheme and part of the SAC) showed that female bats from this colony regularly forage up to 10km from the roost site, significantly further than the CSZ.</p> <p>118) Extensive bat survey work undertaken to inform the ES Chapter 8 Biodiversity (Document Reference 6.2) for the scheme has not identified greater horseshoe bat roosts within 100m of the scheme. Greater horseshoe bats have been infrequently recorded within the DCO Boundary during transect</p>
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²⁰ Ransome (2019) unpublished data

	<p>surveys (1 bat pass) and static bat detector surveys (103 bat passes from 217 survey nights, representing 0.1% of calls).</p> <p>119) Given the distance of the SAC from the scheme (>21km), survey data and existing published studies on this species, it is not likely that greater horseshoe bats use habitats within the DCO Boundary for foraging or commuting during the periods that they are roosting within the maternity or hibernation roosts within the SAC.</p> <p>120) The qualifying bat population also uses roosts outside of the SAC boundary, likely to include a disused limestone mine at Birdlip, approximately 270m to the south-west of the scheme. The potential for the scheme to reduce supporting habitat that is critical to use of this roost is assessed below.</p> <p>121) Over 15 surveys undertaken between October and late April from 2009 – 2019 at the disused limestone mine at Birdlip, the average count of greater horseshoe bats was one with a peak of three in 2012 and 2013²¹. All mature female bats recorded were identified from rings²² to originate from the Woodchester Mansion population, 17.6km south-west of scheme, which is not part of the SAC designation. No bats were found with rings identifying that they originate from the maternity roosts within the SAC.</p> <p>122) The bat trapping undertaken for the scheme caught seven greater horseshoe bats at the disused limestone mine at Birdlip. These comprised one male bat in September 2019 and six pregnant female bats in late May 2020, all of which were ringed. This number of female bats in late May identifies that this is a transitional roost used in the early breeding season, before these bats return to their maternity colonies to give birth.</p> <p>123) The capture of ringed female bats is a useful indicator of use of the roost by the SAC population because female horseshoe bats return to the maternity roost they were born within to breed, unlike males which are typically absent from maternity roosts and disperse more widely. Of the six female greater horseshoe bats captured in May 2020, three originated from the Woodchester Mansion maternity site. The three remaining bats have not been recorded breeding at Woodchester and are likely to originate from Dean Hall maternity roost (Ransome Pers. Comm.), 24.6km west of the scheme and part of the SAC.</p> <p>124) The radio-tracking study undertaken for the scheme tracked two of the female greater horseshoe bats in late May 2020 to sample their movements in relation to the habitats within the scheme boundary. The results of the radio-tracking showed that whilst they frequently crossed the scheme, the core areas²³ of female greater horseshoe bats were largely to the west of the scheme and none of their core areas comprised habitats that will be lost to the scheme.</p> <p>125) In summary, the disused mine at Birdlip is used as a transitional roost in the early breeding season by a small number of female greater horseshoe bats which are assumed</p>
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²¹ Ransome (2019) unpublished data

²² bats with a small identifying ring attached to their forearm which has been attached during a previous capture event and can be used to trace these bats each time they are subsequently captured.

²³ Areas of habitats in which bats are spending most of their time, established through a scientific analysis (objective core analysis method) of the distribution of locations where they were recorded. This method uses the distribution of nearest-neighbour distances, detecting and excluding outlying locations to calculate an objective core area.

	<p>to form part of the qualifying population of the SAC. The count of three female bats likely to be from the SAC would represent approximately 0.7% of the adult population count of the Dean Hall roost within the SAC (424 bats from latest published data from 2018). This transitional usage is likely to last for around 4-6 weeks per year, as long term monitoring of the roost shows that bats from the SAC population are not present between October and late April, and mature females return to their maternity roosts in June to early July¹⁹. The radio-tracking data indicates that the core foraging areas used by these bats whilst based at this roost are not within the scheme boundary.</p> <p>126) It is concluded that a very small number of bats from the SAC use a transitional roost in close proximity to the scheme for a short period in late spring to early summer. Survey evidence does not indicate that these bats rely on foraging habitats within the scheme during this period. Therefore, no reduction in the area of functionally linked habitats is likely to occur as a result of the scheme in relation to the greater horseshoe bat population of the SAC.</p>
<p>Disturbance to key species</p>	<p>127) As concluded above, it is not likely that the lesser horseshoe bats using habitats within and in close proximity to the scheme are part of the qualifying population within the SAC. No risk of mortality to the lesser horseshoe population of the SAC is therefore identified.</p> <p>128) The potential for impacts arising from greater horseshoe bat mortality from road collisions are considered below, in relation to the disused mine roost at Birdlip.</p> <p>129) The closest part of the scheme to the mine is the section of Existing A417 to be detrunked. The scheme will result in the new route of the A417 being relocated more than 1km further from the roost than its current location.</p> <p>130) As described above, it is assumed that half of the six breeding female bats found within the roost originate from the SAC population. Radiotracking of two of these bats showed that they frequently crossed the Existing A417 road corridor to the west of the Air Balloon roundabout, in the vicinity of Dog Lane, to move between foraging areas. This includes crossing both above the road and use of an existing underpass to the far west of the scheme.</p> <p>131) Construction of the scheme will include the removal of woodland vegetation adjacent to the A417 and the widening of the road corridor to the west of the Air Balloon roundabout, which could increase the existing mortality risk to individual bats that are crossing above the road along this section.</p> <p>132) As described above, the proportion of the SAC population crossing the A417 is estimated at 0.7% of the main maternity roost within the SAC and the bats are using this roost for approximately 10% of the year.</p> <p>133) The increased risk of mortality to <1% of the SAC population for a short period each year is considered to represent a negligible impact upon the favourable conservation status of the qualifying population of greater horseshoe bat within the SAC.</p>
<p>Habitat or species fragmentation</p>	<p>134) No habitat or species fragmentation is anticipated.</p>

Reduction in species density	135) No reduction in species density is anticipated.
Changes in key indicators of conservation value (water quality, etc.)	136) None anticipated given distance from the scheme.
Climate change	137) ES Chapter 14 Climate (Document Reference 6.2) concludes no significant effects with regards to greenhouse gas emissions during construction or operation of the scheme. 138) No significant climate change related effects upon the European site are anticipated as a result of the scheme.
<i>Describe any likely impacts on the European Site as a whole in terms of:</i>	
Interference with the key relationships that define the structure of the site	139) Due to the distance of the scheme from the SAC, it is not anticipated that the scheme will cause any impact that will result in a significant effect on the key relationships that define the structure of the site.
Interference with the key relationships that define the function of the site	140) Due to the distance of the scheme from the SAC, it is not anticipated that the scheme will cause an impact that will result in a significant effect on the key relationships that define the function of the site.
<i>Indicate the significance as a result of the identification of impacts set out above in terms of:</i>	
Reduction of habitat area	141) No likely significant effects.
Disturbance to key species	142) No likely significant effects.
Habitat or species fragmentation	143) No likely significant effects.
Disruption	144) No likely significant effects.
Disturbance	145) No likely significant effects.
Change to key elements of the site (e.g. water quality, hydrological regime, etc.)	146) No likely significant effects.
<i>Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known:</i>	
There are no elements of the proposals which are likely to have any significant impacts on the SAC. Impacts on the qualifying bat populations of the SAC would be negligible and no in combination effects with other plans or projects are anticipated.	
Outcome of screening stage	147) No likely significant effects.
Are the appropriate statutory environmental bodies in agreement with this conclusion?	148) Natural England are in agreement with this conclusion. This is documented in Appendix C Natural England Statement of Common Ground of the Statement of Commonality (Document Reference 7.3).

Table 3 Screening Matrix: North Meadow and Clattinger Farm SAC

Project Name:	A417 Missing Link	
Natura2000 Site under consideration:	North Meadow and Clattinger Farm SAC [UK0016372]	
Date:	Author (Name/ Organisation):	Verified (Name/ Organisation):
07/03/2021	Livvy Cropper/ Arup Alys Black/ Arup	Luke Casey/ Arup
Description of Project		
<i>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:</i>		
Size and scale (road type and probable traffic volume)	<p>149) Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417.</p> <p>150) Provision of a new crossing near Emma's Grove.</p> <p>151) Provision of a new junction at Shab Hill.</p> <p>152) Provision of a new 37m wide multi-purpose crossing north of Shab Hill.</p> <p>153) Provision of a new junction would be included near Cowley.</p> <p>154) The Existing A417 would be detrunked for its entire length.</p> <p>155) A more detailed description of the scheme is provided in Section 1.2 of this report.</p> <p>156) In terms of traffic volumes, Annual Average Daily Traffic (AADT) for the scheme is outlined below:</p> <ul style="list-style-type: none"> • North of Birdlip junction: 35,673 • South of Birdlip junction: 46,918 • Birdlip link road: 4,152 	
Land-take	157) None within the SAC.	
Distance from European Site or key features of the site (from edge of the project assessment corridor)	158) The SAC is 21.4km from the DCO Boundary and 23m from the ARN.	
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts)	159) No resource requirements from SAC.	
Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	<p>Water quality</p> <p>160) Construction activities have the potential to generate water-borne pollution. However, there are no hydrological connections between the scheme and the SAC therefore no impacts to surface or groundwater at the SAC during construction are anticipated.</p> <p>161) No impacts on the SAC are anticipated from surface or groundwater emissions from the operational scheme due to the distance between the scheme and the SAC and the absence of hydrological connections.</p> <p>Air quality</p> <p>162) Construction activities have the potential to affect local air quality at the SAC, including: through changes in traffic flows during construction; as a result of temporary traffic management measures; and/or additional vehicles travelling to</p>	

	<p>and from the construction site transporting materials, plant and labour.</p> <p>163) The scheme has the potential to affect local air quality during operation through changes in annual mean nutrient nitrogen deposition. These impacts could result in degradation and loss of habitats for which the SAC is designated.</p>
Excavation requirements (e.g. impacts of local hydrogeology)	164) No impacts upon the SAC are anticipated, given the distance of the scheme from the SAC.
Transportation requirements	165) See emissions above.
Duration of construction, operation, etc.	166) The duration of the construction works is estimated to be at least 33 months, commencing nine months after the start of environmental preparatory works, giving an overall construction period of 42 months. The scheme is anticipated to be open for traffic in 2026.
Other	167) Other impacts upon the SAC such as recreational pressure are not anticipated, due to the distance from the scheme.
<p>Description of Avoidance and/or Mitigation Measures <i>Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:</i></p>	
Nature of proposals	168) No specific mitigation measures to mitigate impacts to the SAC are included in this assessment, in line with case law.
Location	N/A
Evidence for effectiveness	N/A
Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)	N/A
<p>Characteristics of European Site(s) <i>A brief description of the European Site should be produced, including information on:</i></p>	
Name of European Site and its EU code	169) North Meadow and Clattinger Farm SAC [UK0016372]
Location and distance of the European Site from the proposed works	170) The SAC is 21.4km from the DCO Boundary and 23m from the ARN.
European Site size	171) 105.23ha
Key features of the European Site including the primary reasons for selection and any other qualifying interests	<p>172) Annex I habitats that are the primary reason for selection of this site are:</p> <ul style="list-style-type: none"> • Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) <p>173) North Meadow and Clattinger Farm in the Thames Valley in southern England is one of two sites representing lowland hay meadows near the centre of its UK range. As in the case of the Oxford Meadows, this site represents an exceptional survival of the traditional pattern of management and so exhibits a high degree of conservation of structure and function. This site also contains a very high proportion (>90%) of the surviving UK population of fritillary <i>Fritillaria meleagris</i>, a species highly characteristic of damp lowland meadows in Europe and now rare throughout its range, which is present but not a qualifying feature.</p>

<p>Vulnerability of the European Site – any information available from the standard data forms on potential effect pathways</p>	<p>174) The Natura 2000 <i>Standard Data Form</i>²⁴ identified the following threats, pressures and activities with high negative effect on the European site:</p> <ul style="list-style-type: none"> • Pollution to groundwater (point sources and diffuse sources) • Human induced changes in hydraulic conditions • Outdoor sports and leisure activities, recreational activities • Grazing • Other ecosystem modifications. <p>175) The following threats and pressures are taken from the Natural England <i>Site Improvement Plan</i>²⁵ for the SAC:</p> <ul style="list-style-type: none"> • Inappropriate water levels • Habitat fragmentation • Commons management • Public access/disturbance • Water pollution.
<p>European Site conservation objectives – where these are readily available</p>	<p>176) The conservation objectives²⁶ for the SAC aim to: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the favourable conservation status of its qualifying features, by maintaining or restoring:</p> <ul style="list-style-type: none"> • The extent and distribution of qualifying natural habitats • The structure and function (including typical species) of qualifying natural habitats, and • The supporting processes on which qualifying natural habitats rely. <p>177) In addition, the conservation objective supplementary advice²⁷ for lowland hay meadows habitat identifies targets that include those relating to water quality, hydrology and air quality (sensitivity of habitat to changes in air quality with ammonia deposition within the critical load and Nitrogen deposition below although this could be attributable to other factors).</p>
<p>Assessment Criteria</p> <p><i>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site.</i></p>	
<p>178) While the European site is 21.4km from the DCO Boundary it is 23m from the ARN and as such, the potential exists for changes in air quality during through increased traffic volumes which could affect the sensitive habitats present. Air quality is included in the conservation objectives for the site.</p> <p>179) No other elements of the scheme are likely to give rise to impacts on the European Site.</p> <p>180) No other plans and projects have been identified which would act ‘in combination’ with this scheme.</p>	
<p>Initial Assessment in relation to North Meadow and Clattinger Farm SAC</p> <p>The key characteristics and the details of the European Site should be considered in identifying potential impacts.</p>	

²⁴ Nature 2000 Standard Data Form (2015): North Meadow & Clattinger Farm SAC (UK0016372)
<https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0016372.pdf>

²⁵ Natural England Site Improvement Plan: North Meadow & Clattinger Farm (SIP152)
<http://publications.naturalengland.org.uk/file/4896312373805056>

²⁶ European Site Conservation Objectives for North Meadow & Clattinger Farm (Site Code: UK0016372)
<http://publications.naturalengland.org.uk/publication/6299293463871488>

²⁷ European Site Conservation Objectives: Supplementary advice on conserving and restoring site features North Meadow and Clattinger Farm Special Area of Conservation Site Code UK0016372
<http://publications.naturalengland.org.uk/file/5281386043015168>

<i>Describe any likely changes to the site arising as a result of:</i>	
Reduction of habitat area	181) There will be no direct habitat loss within the SAC as a result of the scheme.
Disturbance to key species	182) The SAC is designated for its habitats. There will therefore be no disturbance to key species.
Habitat or species fragmentation	183) No impact upon the SAC is anticipated.
Reduction in species density	184) None anticipated.
Changes in key indicators of conservation value (water quality, etc.)	<p>Air quality</p> <p>185) Lowland hay meadows habitat is considered sensitive to changes in air quality. Overall nitrogen deposition at North Meadow currently falls just below the lower critical load of 20kg N/ha/yr for the qualifying habitat present. Predicted nitrogen deposition at North Meadow for the traffic scenario modelled for the opening year without the scheme (i.e. the 2026 Do-Minimum (DM) scenario) is below critical load at 19.54kg N/ha/yr. Exceedance of the critical load may modify the chemical status of the substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it²⁷.</p> <p>186) DMRB LA 105 Air Quality sets out the steps required in local air quality impact assessment for designated sites during operation. The first step is to determine the ARN. Criteria for this include road alignment will change by 5m or more; or daily traffic flows will change by 1,000 AADT or more; or Heavy-Duty Road Vehicle (HDV) flows will change by 200 AADT or more; or a change in speed band. The SAC is within 200m of the ARN and is assessed in ES Chapter 5 Air Quality (Document Reference 6.2), ES Appendix 5.6 Air Quality Operational Phase Impacts and 5.7 Air Quality Construction Phase Impacts (Document Reference 6.4).</p> <p>187) Traffic modelling has identified a combined AADT change of both roads as 4,063 which represents an increase in traffic volumes as a result of the scheme. A summary of the traffic data relevant to the SAC is provided at Appendix D.</p> <p>188) During operation, the change in deposition is less than 1% of the lowest critical load value. The highest change as a percentage of the lower critical load is 0.1%. Predicted nitrogen deposition at North Meadow for the traffic scenario modelled for the opening year with the scheme (i.e. the 2026 Do-Something scenario) remains below critical load at 19.57kg N/ha/yr. Therefore, no degradation or loss of qualifying habitat via nitrogen deposition during operation is likely as a result of the scheme.</p> <p>189) The predicted changes in nitrogen deposition are considered to be at an imperceptible level. The air quality assessment of changes in annual mean nutrient nitrogen deposition (N/ha/yr) in 2026 at the closest receptor (EN1: 100m from the ARN) is predicted to be 0.02 kg N/ha/yr. At EN2 (110m from the ARN) this change is still predicted to be 0.02 N/ha/yr and remains at this level until EN7 (160m from the ARN) when it drops to 0.01 N/ha/yr. The data on which this analysis is based is presented at Appendix E.</p>

	<p>190) The ecological modelling transect is shown on the European Designated Sites Plan, provided at Appendix B. The traffic modelling includes data from other committed developments and as such, in-combination effects are inherent.</p> <p>191) Following guidance in DMRB <i>LA 105 Air Quality</i>, the magnitude of change in annual mean nutrient nitrogen deposition at the designated habitats has been determined. The guidance notes that where the magnitude of change is less than 0.4 kg N/ha/yr then the effects are considered to be imperceptible and unlikely to be significant.</p> <p>192) The potential for the scheme to affect local air quality at the SAC has been considered, including: through change in traffic flows during construction, as a result of temporary traffic management measures; and/or additional vehicles travelling to and from the construction site transporting materials, plant and labour. These potential emissions are not considered likely to affect the SAC due to the distance of the site from the construction footprint.</p> <p>193) The magnitude of change in annual mean nutrient nitrogen deposition have been determined for the construction phase. There is no change predicted (0.00 N/ha/yr) at the European site therefore no significant effects to the designated habitats as a result of the scheme via nitrogen deposition are likely during construction.</p> <p>194) No other changes in key indicators of conservation value have been identified.</p>
Climate change	<p>195) ES Chapter 14 Climate (Document Reference 6.2) concludes no significant effects with regards to greenhouse gas emissions during construction or operation of the scheme.</p> <p>196) No significant climate change related effects upon the European site are anticipated as a result of the scheme.</p>
<i>Describe any likely impacts on the European Site as a whole in terms of:</i>	
Interference with the key relationships that define the structure of the site	197) Due to the distance of the scheme from the SAC, it is not anticipated that the scheme will cause any impact that will result in a significant effect on the key relationships that define the structure of the site.
Interference with the key relationships that define the function of the site	198) Due to the distance of the scheme from the SAC, it is not anticipated that the scheme will cause an impact that will result in a significant effect on the key relationships that define the function of the site.
<i>Indicate the significance as a result of the identification of impacts set out above in terms of:</i>	
Reduction of habitat area	199) No likely significant effects.
Disturbance to key species	200) No likely significant effects.
Habitat or species fragmentation	201) No likely significant effects
Disruption	202) No likely significant effects
Disturbance	203) No likely significant effects.
Change to key elements of the site (e.g. water quality, hydrological regime, etc.)	204) No likely significant effects
<i>Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known:</i>	
There are no elements of the proposals which are likely to have any significant impacts on the SAC	

Outcome of screening stage	205) No likely significant effects.
Are the appropriate statutory environmental bodies in agreement with this conclusion?	206) Natural England are in agreement with this conclusion. This is documented in Appendix C Natural England Statement of Common Ground of the Statement of Commonality (Document Reference 7.3).

Table 4 Screening Matrix: Severn Estuary SAC

Project Name:	A417 Missing Link	
European Site under consideration:	Severn Estuary SAC [UK0013030]	
Date:	Author (Name/ Organisation):	Verified (Name/ Organisation):
07/03/2021	Simon Fleming/ Arup Alys Black/ Arup	Luke Casey/ Arup
Description of Project		
<i>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:</i>		
Size and scale (road type and probable traffic volume)	<p>207) Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417.</p> <p>208) Provision of a new crossing near Emma's Grove.</p> <p>209) Provision of a new junction at Shab Hill.</p> <p>210) Provision of a new 37m wide multi-purpose crossing north of Shab Hill.</p> <p>211) Provision of a new junction would be included near Cowley.</p> <p>212) The Existing A417 would be detrunked for its entire length.</p> <p>213) A more detailed description of the scheme is provided in Section 1.2 of this report.</p> <p>214) In terms of traffic volumes, Annual Average Daily Traffic (AADT) for the scheme is outlined below:</p> <ul style="list-style-type: none"> • North of Birdlip junction: 35,673 • South of Birdlip junction: 46,918 • Birdlip link road: 4,152 	
Land-take	215) None within the SAC.	
Distance from European Site or key features of the site (from edge of the project assessment corridor)	<p>216) The SAC is approximately 19km west of the DCO Boundary and 3km from the ARN.</p> <p>217) A section of Norman's Brook which runs adjacent to the Existing A417 will be subject to realignment as part of the scheme. This section that would be directly impacted by the scheme is approximately 50km upstream from the Severn Estuary SAC's furthest upstream boundary.</p>	
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts)	218) No resource requirements from SAC.	
Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	<p>Water quality</p> <p>219) Construction activities have the potential to generate water-borne pollution. The scheme and the SAC are underlain by the same WFD groundwater body which has the potential to cause water pollution to the SAC via the scheme.</p>	
Excavation requirements (e.g. impacts of local hydrogeology)	220) The potential for impacts to surface water from dewatering in close proximity to the scheme is identified.	
Transportation requirements	221) No impact upon the SAC is anticipated, given the distance of the scheme from the SAC.	

Duration of construction, operation, etc.	222) The duration of the construction works is estimated to be at least 33 months, commencing nine months after the start of environmental preparatory works, giving an overall construction period of 42 months. The scheme is anticipated to be open for traffic in 2026.
Other	223) Construction of the scheme could decrease the availability of supporting habitat to Annex II species which migrate between the freshwater catchment of the River Severn and the Severn estuary during their life cycle, and changes in species distributions is listed as a threat within the SIP. 224) Other impacts on the SAC are not anticipated, due to the distance from the scheme.
Description of Avoidance and/or Mitigation Measures <i>Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:</i>	
Nature of proposals	225) No specific mitigation measures to mitigate impacts to the SAC are included in this assessment, in line with case law.
Location	N/A
Evidence for effectiveness	N/A
Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)	N/A
Characteristics of European Site(s) <i>A brief description of the European Site should be produced, including information on:</i>	
Name of European Site and its EU code	226) Severn Estuary SAC [UK0013030]
Location and distance of the European Site from the proposed works	227) SAC is 19km west of the scheme. The affected reach of Norman's Brook is approximately 50km upstream from the upstream boundary of the SAC.
European Site size	228) 73,714.11ha
Key features of the European Site including the primary reasons for selection and any other qualifying interests	229) Annex I habitats that are a primary reason for selection of this site: <ul style="list-style-type: none"> • 1130 Estuaries • 1140 Mudflats and sandflats not covered by seawater at low tide • 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) 230) Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: <ul style="list-style-type: none"> • 1110 Sandbanks which are slightly covered by sea water all the time • 1170 Reefs 231) Annex II species that are a primary reason for selection of this site: <ul style="list-style-type: none"> • 1095 Sea lamprey <i>Petromyzon marinus</i> • 1099 River lamprey <i>Lampetra fluviatilis</i> • 1103 Twaite shad <i>Alosa fallax</i> 232) There are no Annex II species present as a qualifying feature, which are not a primary reason for site selection.

	233) Migratory fish (salmon, eel, sea trout and Allis Shad) are listed as a notable species sub feature of the 'estuaries' feature.
<p>Vulnerability of the European Site – any information available from the standard data forms on potential effect pathways</p>	<p>234) The Natura 2000 <i>Standard Data Form</i>²⁸ identified the following threats, pressures and activities with high negative effect on the European site:</p> <ul style="list-style-type: none"> • Other urbanisation, industrial and similar activities • Changes in abiotic conditions • Human induced changes in hydraulic conditions • Outdoor sports and leisure activities, recreational activities • Modification of cultivation practices <p>235) The following threats and pressures are taken from the Natural England <i>Site Improvement Plan</i>²⁹ for the European Site (SAC and SPA):</p> <ul style="list-style-type: none"> • Public access/ disturbance • Physical modification • Impacts of development • Coastal squeeze • Change in land management • Changes in species distributions • Water pollution • Air pollution: impact of atmospheric nitrogen deposition • Marine consents and permits: minerals and waste • Fisheries: Recreational marine and estuary • Fisheries: Commercial marine and estuary • Invasive species • Marine litter • Marine pollution incidents
<p>European Site conservation objectives – where these are readily available</p>	<p>236) The conservation objectives³⁰ aim to: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the favourable conservation status of its qualifying features, by maintaining or restoring:</p> <ul style="list-style-type: none"> • The extent and distribution of the habitats of qualifying species • The structure and function of the habitats of qualifying species • The supporting processes on which the habitats of qualifying species rely • The populations of qualifying species, and • The distribution of qualifying species within the site. <p>237) Further conservation objectives as relate to the maintenance of the favourable conservation status of interest features are set out which include those relating to the extent and distribution of the qualifying habitats in addition to factors such as toxic contaminants in the water column abundance</p>

²⁸ Natura 2000 Standard Data Form (2015): Severn Estuary (UK0013030)
<https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0013030.pdf>

²⁹ Natural England (2015) Site Improvement Plan: Severn Estuary (SIP213)
<http://publications.naturalengland.org.uk/file/4856107648417792>

³⁰ European Site Conservation Objectives for Severn Estuary (Site Code: UK0013030)
<http://publications.naturalengland.org.uk/file/6377265718099968>

	<p>of the notable estuarine species assemblages. In addition, the passage of migratory species should not be impeded³¹.</p>
<p style="text-align: center;">Assessment Criteria</p> <p><i>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site.</i></p>	
<p>238) Where relevant, reference is made to the threats and pressures outlined in the <i>Site Improvement Plan</i>²⁹.</p> <p>239) Construction of the scheme could decrease the availability of supporting habitat to Annex II species which migrate between the freshwater catchment of the River Severn and the Severn estuary during their life cycle, and changes in species distributions is listed as a threat within the SIP.</p> <p>240) Construction activities have the potential to generate water-borne pollution. The scheme and the SAC are underlain by the same WFD groundwater body which has the potential to cause water pollution to the SAC via the scheme.</p> <p>241) The potential for impacts to surface water from dewatering in close proximity to the scheme is identified.</p> <p>242) No other plans and projects have been identified which would act ‘in combination’ with this scheme.</p>	
<p style="text-align: center;">Initial Assessment in relation to Severn Estuary SAC</p> <p style="text-align: center;">The key characteristics and the details of the European Site should be considered in identifying potential impacts.</p> <p style="text-align: center;"><i>Describe any likely changes to the site arising as a result of:</i></p>	
<p>Reduction of habitat area</p>	<p>243) There will be no loss of habitat area within the Severn Estuary SAC.</p> <p>244) The realignment of Norman’s Brook in the upper Severn catchment may lead to the loss of habitats utilised for life stages of fish species. The importance of the habitats present in the affected reach of Norman’s Brook to Annex II fish species listed as primary qualifying features of the Severn Estuary SAC are provided below:</p> <p>245) River Lamprey typically spawn in freshwaters between March and April in medium to large rivers with depths between 20cm and 150cm. Sea Lamprey utilise similar habitat with spawning depth requirements between 13 and 170cm.</p> <p>246) Fish habitat assessment carried out on the affected reach of Norman’s Brook in October 2019 indicates that habitat within Norman’s Brook is unlikely to support life stages of River or Sea Lamprey due to the small size and temporal nature of flow within this waterbody. Furthermore, significant in-stream barriers observed downstream of this reach are anticipated to present as complete barriers to upstream movement of these species.</p> <p>247) Twaite Shad are anadromous³² migrants and spawn in freshwater between April and July. Twaite shad spawn in large slow flowing rivers >10m in width, typically at depths between 15-300cm. The affected reach of Norman’s Brook does not</p>

³¹ Severn Estuary European Marine Site Natural England & the Countryside Council for Wales’ advice given under Regulation 33(2)(a) of the Conservation (Natural Habitats, &c.) Regulations 1994, as amended (2009) <https://naturalresources.wales/media/673887/severn-estuary-sac-spa-and-ramsar-reg-33-advice-from-ne-and-ccw-june-09.pdf>

³² migrate from the sea to freshwater to spawn

	<p>support suitable habitat for any of the life stages of Twaite Shad.</p> <p>248) Consequently, there is not anticipated to be any loss of habitat utilised by these Annex II species and therefore no reduction in area of functionally linked habitat to the SAC.</p> <p>249) Migratory fish species listed as a notable species sub feature of the estuary feature are considered below:</p> <p>250) Atlantic salmon and sea trout are anadromous species which spawn in freshwater between October and December. These species will spawn in the upper reaches of the Severn catchment with salmon spawning depths of 15 - 91 cm (~25 - 50 cm preferred) and trout spawning depths of 6 - 91 cm (~25 - 50 cm preferred). Consequently, Norman's Brook may support spawning at this time of year, however, due to the small size and temporal nature of flow within this waterbody Norman's Brook is anticipated to present sub-optimal habitat for these species. Furthermore, significant in-stream barriers observed downstream of this reach are anticipated to present as complete barriers to upstream movement of these species.</p> <p>251) European eel is a catadromous³³ species which utilises a wide range of habitat in freshwater. Norman's Brook cannot be ruled out as supporting eel on this basis. Furthermore, it cannot be concluded that eel would not be able to pass the in-stream barriers present downstream of the affected reach of Norman's Brook. However, the affected reach of Norman's Brook, approximately 1.1km in length, represents a small proportion of the River Severn catchment which eel may utilise, approximately 0.0005% of the total catchment. As such any potential reduction of functional habitat for eel is concluded to be negligible.</p>
Disturbance to key species	<p>252) Annex II species and the migratory fish assemblage (excluding eel) are not anticipated to be disturbed by the scheme during construction or operation as the habitats within the affected reach of Norman's Brook are not anticipated to support any life stage of these species.</p> <p>253) European eel which may utilise the affected reach of Norman's Brook may be disturbed by the realignment of this reach during construction. However, this represents a negligible proportion of the eel population in the Severn catchment.</p>
Habitat or species fragmentation	<p>254) There will be no loss of or fragmentation of Annex I habitats within the Severn Estuary SAC.</p> <p>255) Annex II species and the migratory fish assemblage (excluding eel) are not anticipated to utilise habitat within the affected reach of Norman's Brook. Consequently, there is not anticipated to be any fragmentation of habitats utilised by these species.</p> <p>256) European eel which may utilise the affected reach of Norman's Brook may be subject to fragmentation by the realignment of this reach during construction. However, this represents a negligible proportion of the eel population in the Severn catchment.</p>
Reduction in species density	<p>257) As habitat within the affected reach of Norman's Brook is not anticipated to be utilised by Annex II species and the migratory fish assemblage (excluding eel), loss of habitat within this</p>

³³ migrate from freshwater to the sea to spawn

	<p>reach is not anticipated to result in any change to recruitment and species density within the SAC.</p> <p>258) European eel which may utilise the affected reach of Norman's Brook may be impacted by temporary habitat loss. However, considering the negligible proportion of catchment which may be affected it is anticipated that there will be negligible effects on species density of eel in the SAC.</p>
Changes in key indicators of conservation value (water quality, etc.)	<p>259) Construction of the scheme will adopt a ground and surface water management plan to prevent the risk of pollution and contamination to ground and surface water, as is required to ensure wider legislative compliance. These measures are described in Annex G Ground and Surface Water Management Plan of ES Appendix 2.1 EMP (Document Reference 6.4) and legislation relevant to general protection of the water environment during construction is described in ES Appendix 13.1 Water Legislative and Policy Framework (Document Reference 6.4). Adoption of these measures will avoid pollution of the general water environment during construction including any surface water or groundwater that could be linked to the SAC.</p> <p>260) No impacts on the SAC are anticipated from changes to surface water during operation due to the operational drainage design, including flow volume and quality control measures incorporated into the scheme design to provide a sustainable drainage system (SuDS). As described in Chapter 13 Road Drainage and the Water Environment (Document Reference 6.2), the scheme will comprise a road drainage scheme that will capture pollutants within road run-off and remove pollutants before the treated run-off is discharged. The scheme is will provide a betterment on the existing road drainage system and improve the water quality of receiving waterbodies.</p> <p>261) A section of Norman's Brook is subject to realignment which necessitates the dewatering of Norman's Brook. No likely impacts upon water quantity or quality at the SAC are anticipated as a result of this operation, due to the localised nature of this impact and the distance from the SAC.</p>
Climate change	<p>262) ES Chapter 14 Climate (Document Reference 6.2) concludes no significant effects with regards to greenhouse gas emissions during construction or operation of the scheme.</p> <p>263) No significant climate change related effects upon the European site are anticipated as a result of the scheme.</p>
<i>Describe any likely impacts on the European Site as a whole in terms of:</i>	
Interference with the key relationships that define the structure of the site	<p>264) Due to construction and operation impacts in the Upper Severn catchment (Norman's Brook) having no or negligible effects on the Annex I habitats, the Annex II species or the migratory fish assemblage of the River Severn SAC, it is not anticipated that the scheme will result in an effect on key relationships that define the structure of the site.</p>
Interference with the key relationships that define the function of the site	<p>265) As outlined above, due to a lack of potential impacts, the proposals are not anticipated to interfere with key relationships that define the function of the site.</p>
<i>Indicate the significance as a result of the identification of impacts set out above in terms of:</i>	
Reduction of habitat area	<p>266) No likely significant effects.</p>
Disturbance to key species	<p>267) No likely significant effects.</p>

Habitat or species fragmentation	268) No likely significant effects.
Disruption	269) No likely significant effects.
Disturbance	270) No likely significant effects.
Change to key elements of the site (e.g. water quality, hydrological regime, etc.)	271) No likely significant effects.
<i>Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known:</i>	
There are no elements of the proposals which are likely to have any significant impacts on the SAC	
Outcome of screening stage	272) No likely significant effects.
Are the appropriate statutory environmental bodies in agreement with this conclusion?	273) Natural England are in agreement with this conclusion.

Table 5 Screening Matrix: Severn Estuary Ramsar

Project Name:	A417 Missing Link	
Natura2000 Site under consideration:	Severn Estuary Ramsar [UK11081]	
Date:	Author (Name/ Organisation):	Verified (Name/ Organisation):
07/03/2021	Simon Fleming/ Arup Alys Black/ Arup	Luke Casey/ Arup
Description of Project		
<i>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:</i>		
Size and scale (road type and probable traffic volume)	<p>274) Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417.</p> <p>275) Provision of a new crossing near Emma's Grove.</p> <p>276) Provision of a new junction at Shab Hill.</p> <p>277) Provision of a new 37m wide multi-purpose crossing north of Shab Hill.</p> <p>278) Provision of a new junction would be included near Cowley.</p> <p>279) The Existing A417 would be detrunked for its entire length.</p> <p>280) A more detailed description of the scheme is provided in Section 1.2 of this report.</p> <p>281) In terms of traffic volumes, Annual Average Daily Traffic (AADT) for the scheme is outlined below:</p> <ul style="list-style-type: none"> • North of Birdlip junction: 35,673 • South of Birdlip junction: 46,918 • Birdlip link road: 4,152 	
Land-take	282) None within the Ramsar.	
Distance from European Site or key features of the site (from edge of the project assessment corridor)	<p>283) The Ramsar is approximately 19km west of the DCO Boundary and 3km from the ARN.</p> <p>284) A section of Norman's Brook which runs adjacent to the Existing A417 will be subject to realignment as a component of the scheme. This section which will subject to direct effects from the scheme is approximately 50km upstream from the Severn Estuary Ramsar's furthest upstream boundary.</p>	
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts)	285) No resource requirement from Ramsar site.	
Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	<p>Water quality</p> <p>286) Construction activities have the potential to generate water-borne pollution. The scheme and the site are underlain by the same WFD groundwater body which has the potential to cause water pollution to the site via the scheme.</p>	
Excavation requirements (e.g. impacts of local hydrogeology)	287) The potential for impacts to surface water from dewatering in close proximity to the scheme is identified.	
Transportation requirements	288) No impact upon the Ramsar site is anticipated, given the distance of the scheme from the site.	

Duration of construction, operation, etc.	289) The duration of the construction works is estimated to be at least 33 months, commencing nine months after the start of environmental preparatory works, giving an overall construction period of 42 months. The scheme is anticipated to be open for traffic in 2026.
Other	290) Operation of the scheme could decrease the availability of supporting habitat to the migratory fish species assemblage which migrate between the freshwater catchment of the River Severn and the Severn estuary during their life cycle. 291) Other impacts on the Ramsar site are not anticipated, due to the distance from the scheme.
Description of Avoidance and/or Mitigation Measures <i>Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:</i>	
Nature of proposals	292) No specific mitigation measures to mitigate impacts to the Ramsar site are included in this assessment, in line with case law.
Location	N/A
Evidence for effectiveness	N/A
Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)	N/A
Characteristics of European Site(s) <i>A brief description of the European Site should be produced, including information on:</i>	
Name of European Site and its EU code	293) Severn Estuary Ramsar [UK11081]
Location and distance of the European Site from the proposed works	294) The Severn Estuary Ramsar is 19.1km west of the scheme. The affected reach of Norman's Brook is approximately 50km upstream from the upstream boundary of the Ramsar.
European Site size	295) 24, 701ha
Key features of the European Site including the primary reasons for selection and any other qualifying interests	296) The qualifying interest features of the Severn Estuary Ramsar site overlap with those of the Severn Estuary SPA and SAC. Changes have been made to the criteria since the original designation of the Severn Estuary Ramsar Site. The latest qualifying criteria (from 2008) are presented on the JNCC website ³⁴ as below: 297) Ramsar criterion 1 - Annex I features present on the pSAC include: <ul style="list-style-type: none"> • Sandbanks which are slightly covered by sea water all the time • Estuaries • Mudflats and sandflats not covered by seawater at low tide • Atlantic salt meadows 298) Ramsar criterion 3 – due to unusual estuarine communities, reduced diversity and high productivity 299) Ramsar criterion 4 – This site is important for the run of migratory fish between sea and river via estuary. Species include: <ul style="list-style-type: none"> • Salmon

³⁴ <https://jncc.gov.uk/jncc-assets/RIS/UK11081.pdf>

	<ul style="list-style-type: none"> • Sea trout • Sea lamprey • River lamprey • Allis shad • Twaite shad • Eel <p>It is also of particular importance for migratory birds during spring and autumn.</p> <p>300) Ramsar criterion 5 – Assemblages of international importance of waterfowl with peak counts in winter.</p> <p>301) Ramsar criterion 6 – Species/ populations occurring at levels of international importance:</p> <ul style="list-style-type: none"> • Tundra swan • Greater white-fronted goose • Common shelduck • Gadwall • Dunlin • Common redshank <p>302) Species/ populations identified subsequent to designation for possible future consideration under Ramsar criterion 6:</p> <ul style="list-style-type: none"> • Lesser black-backed gull • Ringed plover • Eurasian teal • Northern pintail <p>303) Ramsar criterion 8 – The fish of the estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. The following species use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary:</p> <ul style="list-style-type: none"> • Salmon • Sea trout • Sea lamprey • River lamprey • Allis shad • Twaite shad • Eel <p>The site is important as a feeding and nursery ground for many fish species particularly:</p> <ul style="list-style-type: none"> • Allis shad • Twaite shad
<p>Vulnerability of the European Site – any information available from the standard data forms on potential effect pathways</p>	<p>304) The Natura 2000 <i>Standard Data Form</i>²⁸ (for the SAC) identifies the following threats, pressures and activities with a high negative effect on the European site:</p> <ul style="list-style-type: none"> • Other urbanisation, industrial and similar activities • Changes in abiotic conditions • Human induced changes in hydraulic conditions • Outdoor sports and leisure activities, recreational activities • Modification of cultivation practices <p>305) The following threats and pressures are taken from the Natural England <i>Site Improvement Plan</i>²⁹ for the European Site (SAC and SPA):</p>

	<ul style="list-style-type: none"> • Public access/ disturbance • Physical modification • Impacts of development • Coastal squeeze • Change in land management • Changes in species distributions • Water pollution • Air pollution: impact of atmospheric nitrogen deposition • Marine consents and permits: minerals and waste • Fisheries: Recreational marine and estuary • Fisheries: Commercial marine and estuary • Invasive species • Marine litter • Marine pollution incidents
<p>European Site conservation objectives – where these are readily available</p>	<p>306) The conservation objectives³⁰ aim to: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the favourable conservation status of its qualifying features, by maintaining or restoring:</p> <ul style="list-style-type: none"> • The extent and distribution of the habitats of qualifying species • The structure and function of the habitats of qualifying species • The supporting processes on which the habitats of qualifying species rely • The populations of qualifying species, and • The distribution of qualifying species within the site. <p>307) Further conservation objectives as relate to the maintenance of the favourable conservation status of interest features are set out which include those relating to the extent and distribution of the qualifying habitats in addition to factors such as toxic contaminants in the water column and abundance of the notable estuarine species assemblages³⁵.</p>
<p>Assessment Criteria</p> <p><i>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site.</i></p>	
<p>308) Operation of the scheme could decrease the availability of supporting habitat to the migratory fish species assemblage which migrate between the freshwater catchment of the River Severn and the Severn estuary during their life cycle.</p> <p>309) Construction activities have the potential to generate water-borne pollution. The scheme and the SAC are underlain by the same WFD groundwater body which has the potential to cause water pollution to the site via the scheme.</p> <p>310) The potential for impacts to surface water from dewatering in close proximity to the scheme is identified.</p> <p>311) No other plans and projects have been identified which would act ‘in combination’ with this scheme.</p>	
<p>Initial Assessment in relation to Severn Estuary Ramsar</p> <p>The key characteristics and the details of the European Site should be considered in identifying potential impacts.</p> <p><i>Describe any likely changes to the site arising as a result of:</i></p>	

<p>Reduction of habitat area</p>	<p>312) There will be no loss of habitat area within the Severn Estuary Ramsar.</p> <p>313) The realignment of Norman's Brook in the upper Severn catchment may lead to the loss of habitats utilised for life stages of fish species. Migratory fish species listed as criterion two for designation are considered below:</p> <p>314) River Lamprey typically spawn in freshwaters between March and April in medium to large rivers with depths between 20cm and 150cm. Sea Lamprey utilise similar habitat with spawning depth requirements between 13 and 170cm. Fish habitat assessment carried out on the affected reach of Norman's Brook in October 2019 indicates that habitat within Norman's Brook is unlikely to support life stages of River or Sea Lamprey due to the small size and temporal nature of flow within this waterbody. Furthermore, significant in-stream barriers observed downstream of this reach are anticipated to present as complete barriers to upstream movement of these species.</p> <p>315) Twaite Shad and Allis Shad are anadromous migrants and spawn in freshwater between April and July. Twaite shad spawn in large slow flowing rivers >10m in width, typically at depths between 15-300cm. The affected reach of Norman's Brook does not support suitable habitat for any of the life stages of Allis or Twaite Shad.</p> <p>316) Atlantic salmon and sea trout are anadromous species which spawn in freshwater between October and December. These species will spawn in the upper reaches of the Severn catchment with salmon spawning depths of 15 - 91 cm (~25 - 50 cm preferred) and trout spawning depths of 6 - 91 cm (~25 - 50 cm preferred). Consequently, Norman's Brook may support spawning at this time of year, however, due to the small size and temporal nature of flow within this waterbody, Norman's Brook is anticipated to present sub-optimal habitat for these species. Furthermore, significant in-stream barriers observed downstream of this reach are anticipated to present as complete barriers to upstream movement of these species.</p> <p>317) European eel is a catadromous species which utilises a wide range of habitat in freshwater. Norman's Brook cannot be ruled out as supporting eel on this basis. Furthermore, it cannot be concluded that eel would not be able to pass the in-stream barriers present downstream of the affected reach of Norman's Brook. However, the affected reach of Norman's Brook, approximately 1.1km in length, represents a small proportion of the River Severn catchment which eel may utilise, approximately 0.0005% of the total catchment. As such the any potential reduction of functional habitat for eel is concluded to be negligible.</p>
<p>Disturbance to key species</p>	<p>318) The migratory fish assemblage (excluding eel) are not anticipated to be disturbed by the scheme during construction or operation as the habitats within the affected reach of Norman's Brook are not anticipated to support any life stage of these species.</p> <p>319) European eel which may utilise the affected reach of Norman's Brook may be disturbed by the realignment of this reach during construction. However, this represents a negligible proportion of the eel population in the Severn catchment.</p>
<p>Habitat or species fragmentation</p>	<p>320) The migratory fish assemblage (excluding eel) are not anticipated to utilise habitat within the affected reach of</p>

	<p>Norman's Brook. Consequently, there is not anticipated to be any fragmentation of habitats utilised by these species.</p> <p>321) European eel which may utilise the affected reach of Norman's Brook may be subject to fragmentation by the realignment of this reach during construction. However, this represents a negligible proportion of the eel population in the Severn catchment.</p>
Reduction in species density	<p>322) As habitat within the affected reach of Norman's Brook is not anticipated to be utilised by the migratory fish assemblage (excluding eel), loss of habitat within this reach is not anticipated to result in any change to recruitment and species density within the Ramsar.</p> <p>323) European eel which may utilise the affected reach of Norman's Brook may be impacted by temporary habitat loss. However, considering the negligible proportion of catchment which may be affected it is anticipated that there will be negligible effects on species density of eel in the Ramsar.</p>
Changes in key indicators of conservation value (water quality, etc.)	<p>324) Construction of the scheme will adopt a ground and surface water management plan to prevent the risk of pollution and contamination to ground and surface water, as is required to ensure wider legislative compliance. These measures are described in Annex G Ground and Surface Water Management Plan of ES Appendix 2.1 EMP (Document Reference 6.4) and legislation relevant to general protection of the water environment during construction is described in ES Appendix 13.1 Water Legislative and Policy Framework (Document Reference 6.4). Adoption of these measures will avoid pollution of the general water environment during construction including any surface water or groundwater that could be linked to the Ramsar site.</p> <p>325) No impacts to the Ramsar site are anticipated from changes to surface water during operation due to the operational drainage design, including flow volume and quality control measures incorporated into the scheme design to provide a sustainable drainage system (SuDS). As described in Chapter 13 Road Drainage and the Water Environment (Document Reference 6.2), the scheme will comprise a road drainage scheme that will capture pollutants within road run-off and remove pollutants before the treated run-off is discharged. The scheme is will provide a betterment on the existing road drainage system and improve the water quality of receiving waterbodies.</p> <p>326) A section of Norman's Brook is subject to realignment which necessitates the dewatering of Norman's Brook. No likely impacts upon water quantity or quality at the Ramsar site are anticipated as a result of this operation, due to the localised nature of this impact and the distance from the Ramsar site.</p>
Climate change	<p>327) ES Chapter 14 Climate (Document Reference 6.2) concludes no significant effects with regards to greenhouse gas emissions during construction or operation of the scheme.</p> <p>328) No significant climate change related effects upon the European site are anticipated as a result of the scheme.</p>
<i>Describe any likely impacts on the European Site as a whole in terms of:</i>	
Interference with the key relationships that define the structure of the site	<p>329) Due to construction and operation impacts in the Upper Severn catchment (Norman's Brook) having no or negligible effects on the migratory fish assemblage of the River Severn Ramsar, it is not anticipated that the scheme will result in an effect on key relationships that define the structure of the site.</p>

Interference with the key relationships that define the function of the site	330) As outlined above, due to a lack of potential impacts, the proposals are not anticipated to interfere with key relationships that define the function of the site.
<i>Indicate the significance as a result of the identification of impacts set out above in terms of:</i>	
Reduction of habitat area	331) No Likely Significant Effects.
Disturbance to key species	332) No Likely Significant Effects.
Habitat or species fragmentation	333) No Likely Significant Effects.
Disruption	334) No Likely Significant Effects.
Disturbance	335) No Likely Significant Effects.
Change to key elements of the site (e.g. water quality, hydrological regime, etc.)	336) No Likely Significant Effects.
<i>Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known:</i>	
There are no elements of the proposals which are likely to have any significant impacts on the Ramsar site.	
Outcome of screening stage	337) No Likely Significant Effects.
Are the appropriate statutory environmental bodies in agreement with this conclusion?	338) Natural England are in agreement with this conclusion.

Table 6 Screening Matrix: Severn Estuary SPA

Project Name:	A417 Missing Link	
Natura2000 Site under consideration:	Severn Estuary SPA [UK9015022]	
Date:	Author (Name/ Organisation):	Verified (Name/ Organisation):
07/03/2021	Alys Black/ Arup	Luke Casey/ Arup
Description of Project		
<i>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:</i>		
Size and scale (road type and probable traffic volume)	<p>339) Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417.</p> <p>340) Provision of a new crossing near Emma's Grove.</p> <p>341) Provision of a new junction at Shab Hill.</p> <p>342) Provision of a new 37m wide multi-purpose crossing north of Shab Hill.</p> <p>343) Provision of a new junction would be included near Cowley.</p> <p>344) The Existing A417 would be detrunked for its entire length.</p> <p>345) A more detailed description of the scheme is provided in Section 1.2 of this report.</p> <p>346) In terms of traffic volumes, Annual Average Daily Traffic (AADT) for the scheme is outlined below:</p> <ul style="list-style-type: none"> • North of Birdlip junction: 35,673 • South of Birdlip junction: 46,918 • Birdlip link road: 4,152 	
Land-take	346) None within the SPA.	
Distance from European Site or key features of the site (from edge of the project assessment corridor)	<p>348) The SPA is approximately 19km west of the DCO Boundary and 3km from the ARN.</p> <p>349) A section of Norman's Brook which runs adjacent to the Existing A417 will be subject to realignment as a component of the scheme. This section which will subject to direct effects from the scheme is approximately 50km upstream from the Severn Estuary SPA's furthest upstream boundary.</p>	
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts)	350) No resource requirement from the SPA.	
Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	<p>Water quality</p> <p>351) Construction activities have the potential to generate water-borne pollution. The scheme and the SPA are underlain by the same WFD groundwater body which has the potential to cause water pollution to the SPA via the scheme..</p>	
Excavation requirements (e.g. impacts of local hydrogeology)	352) The potential for impacts to surface water from dewatering in close proximity to the scheme is identified.	
Transportation requirements	353) No impact upon the SPA is anticipated, given the distance of the scheme from the SPA.	
Duration of construction, operation, etc.	354) The duration of the construction works is estimated to be at least 33 months, commencing nine months after the start of environmental preparatory works, giving an overall	

	construction period of 42 months. The scheme is anticipated to be open for traffic in 2026.
Other	355) Other impacts on the SPA are not anticipated, due to the distance from the scheme.
Description of Avoidance and/or Mitigation Measures <i>Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:</i>	
Nature of proposals	356) No specific mitigation measures to mitigate impacts to the SPA are included in this assessment, in line with case law.
Location	N/A
Evidence for effectiveness	N/A
Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)	N/A
Characteristics of European Site(s) <i>A brief description of the European Site should be produced, including information on:</i>	
Name of European Site and its EU code	357) Severn Estuary SPA [UK9015022]
Location and distance of the European Site from the proposed works	358) The Severn Estuary SPA is approximately 19km west of the scheme. The affected reach of Norman's Brook is approximately 50km upstream from the upstream boundary of the SPA.
European Site size	359) 24,487.91ha
Key features of the European Site including the primary reasons for selection and any other qualifying interests	360) Internationally important wintering populations of Annex II species: <ul style="list-style-type: none"> • Berwick's Swan 361) Internationally important populations of regularly occurring wintering migratory bird species: <ul style="list-style-type: none"> • Common shelduck • Gadwall • Dunlin • Common redshank • Greater white-fronted goose 362) Internationally important assemblage of waterfowl.
Vulnerability of the European Site – any information available from the standard data forms on potential effect pathways	363) The Natura 2000 <i>Standard Data Form</i> ³⁵ (for the SPA) identifies the following threats, pressures and activities with a high negative effect on the European site: <ul style="list-style-type: none"> • Other urbanisation, industrial and similar activities • Changes in abiotic conditions • Human induced changes in hydraulic conditions • Outdoor sports and leisure activities, recreational activities • Modification of cultivation practices 364) The following threats and pressures are taken from the Natural England <i>Site Improvement Plan</i> ²⁹ for the European Site (SPA and SAC): <ul style="list-style-type: none"> • Public access/ disturbance • Physical modification

³⁵Natura 2000 Standard Data Form (2015): Severn Estuary (UK9015022)
<http://www.jncc.gov.uk/pdf/SPA/UK9015022.pdf>

	<ul style="list-style-type: none"> • Impacts of development • Coastal squeeze • Change in land management • Changes in species distributions • Water pollution • Air pollution: impact of atmospheric nitrogen deposition • Marine consents and permits: minerals and waste • Fisheries: Recreational marine and estuary • Fisheries: Commercial marine and estuary • Invasive species • Marine litter • Marine pollution incidents
<p>European Site conservation objectives – where these are readily available</p>	<p>365) The conservation objectives³⁶ aim to: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the favourable conservation status of its qualifying features, by maintaining or restoring:</p> <ul style="list-style-type: none"> • The extent and distribution of the habitats of qualifying species • The structure and function of the habitats of qualifying species • The supporting processes on which the habitats of qualifying species rely • The populations of qualifying species, and • The distribution of qualifying species within the site. <p>366) Further conservation objectives as relate to the maintenance of the bird populations and supporting habitat in favourable condition are set out which include those relating to the extent and distribution of the supporting habitats and abundance of invertebrates³⁵.</p>
<p>Assessment Criteria</p> <p><i>Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site.</i></p>	
<p>367) A section of Norman’s Brook which runs adjacent to the Existing A417 will be subject to realignment as a component of the scheme. Construction activities have the potential to generate water-borne pollution. The scheme and the SPA are underlain by the same WFD groundwater body which has the potential to cause water pollution to the SPA via the scheme and impact upon the supporting habitats depended upon by the interest features.</p> <p>368) No other plans and projects have been identified which would act ‘in combination’ with this scheme.</p>	
<p>Initial Assessment in relation to Severn Estuary Ramsar</p> <p>The key characteristics and the details of the European Site should be considered in identifying potential impacts.</p> <p><i>Describe any likely changes to the site arising as a result of:</i></p>	
<p>Reduction of habitat area</p>	<p>369) There will be no loss of habitat area within the Severn Estuary SPA.</p>

³⁶ European Site Conservation Objectives for Severn Estuary (Site Code: UK9015022)
<http://publications.naturalengland.org.uk/file/6288530213175296>

Disturbance to key species	370) There will be no disturbance to the qualifying species of the SPA due to the distance from the scheme.
Habitat or species fragmentation	371) No impact identified.
Reduction in species density	372) No impact identified.
Changes in key indicators of conservation value (water quality, etc.)	<p>373) Construction of the scheme will adopt a ground and surface water management plan to prevent the risk of pollution and contamination to ground and surface water, as is required to ensure wider legislative compliance. These measures are described in Annex G Ground and Surface Water Management Plan of ES Appendix 2.1 EMP (Document Reference 6.4) and legislation relevant to general protection of the water environment during construction is described in ES Appendix 13.1 Water Legislative and Policy Framework (Document Reference 6.4). Adoption of these measures will avoid pollution of the general water environment during construction including any surface water or groundwater that could be linked to the SPA.</p> <p>374) The scheme will be constructed in accordance with standard construction good practice to ensure wider legislative compliance in terms of management of ground and surface water management to avoid pollution events during construction. The standard measures included in ES Appendix 2.1 EMP (Document Reference 6.4) are based on the EA's Pollution Prevention Guidelines (PPGs) (withdrawn in 2015), subsequent guidance on GOV.UK, the relevant CIRIA publications and best practice measures outlined in the PPGs replacement series, Guidance for Pollution Prevention (GPPs). No impacts on water quality from construction are likely to occur that would affect the SPA.</p> <p>375) No impacts on the SPA are anticipated from changes to surface water during operation due to the operational drainage design, including flow volume and quality control measures incorporated into the scheme design to provide a sustainable drainage system (SuDS). As described in Chapter 13 Road Drainage and the Water Environment (Document Reference 6.2), the scheme will comprise a road drainage scheme that will capture pollutants within road run-off and remove pollutants before the treated run-off is discharged. The scheme is will provide a betterment on the existing road drainage system and improve the water quality of receiving waterbodies.</p> <p>376) A section of Norman's Brook is subject to realignment which necessitates the dewatering of Norman's Brook. No likely impacts upon water quantity or quality at the SPA are anticipated as a result of this operation, due to the localised nature of this impact and the distance from the SPA.</p>
Climate change	<p>377) ES Chapter 14 Climate (Document Reference 6.2) concludes no significant effects with regards to greenhouse gas emissions during construction or operation of the scheme.</p> <p>378) No significant climate change related effects upon the European site are anticipated as a result of the scheme.</p>
<i>Describe any likely impacts on the European Site as a whole in terms of:</i>	
Interference with the key relationships that define the structure of the site	379) Due to a lack of potential impacts to the water quality at the SPA it is not anticipated that the scheme will result in an effect on key relationships that define the structure of the site.

Interference with the key relationships that define the function of the site	380) Due to a lack of potential impacts to the water quality at the SPA it is not anticipated that the scheme will result in an effect on key relationships that define the function of the site.
<i>Indicate the significance as a result of the identification of impacts set out above in terms of:</i>	
Reduction of habitat area	381) No Likely Significant Effects.
Disturbance to key species	382) No Likely Significant Effects.
Habitat or species fragmentation	383) No Likely Significant Effects.
Disruption	384) No Likely Significant Effects.
Disturbance	385) No Likely Significant Effects.
Change to key elements of the site (e.g. water quality, hydrological regime, etc.)	386) No Likely Significant Effects.
<i>Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known:</i>	
There are no elements of the proposals which are likely to have any significant impacts on the Ramsar site.	
Outcome of screening stage	387) No Likely Significant Effects.
Are the appropriate statutory environmental bodies in agreement with this conclusion?	388) Natural England are in agreement with this conclusion.

4 Conclusions

4.1 Cotswolds Beechwoods SAC

- 4.1.1 It is not possible at this stage to conclude that no likely significant effects exist with regards to recreational pressures on Cotswold Beechwoods SAC.
- 4.1.2 The Cotswold Way crossing will reconnect walking and cycling routes along the Cotswold Way National Trail, which was previously severed by the Existing A417 trunk road. The potential exists for this to contribute to increased visitor pressure at the SAC during operation. In addition, reduced congestion may result in more visitors from habitats to the north visiting the SAC via car which could also increase visitor pressure. Public access/disturbance is listed as a key threat to the SAC within the SIP.
- 4.1.3 Further analysis of how the scheme may affect visitor use of the SAC and Crickley Hill area is required to enable an assessment of whether there would be significant effects on the SAC from the scheme alone, or in combination with other proposals. A Habitats Regulations Assessment: Statement to Inform Appropriate Assessment (Document Reference 6.5) has been prepared to present this further analysis.

4.2 Wye Valley and Forest of Dean Bat Sites SAC

- 4.2.1 It is possible to conclude that no likely significant effects exist in relation to Wye Valley and Forest of Dean Bat Sites SAC.
- 4.2.2 There will be no reduction of habitat area within the SAC. The potential for a reduction of functionally linked habitat has been investigated for the qualifying bat species from the SAC.
- 4.2.3 The lesser horseshoe bats using habitats within and in close proximity to the scheme are not considered to be part of the qualifying population within the SAC.
- 4.2.4 Approximately 0.7% of the greater horseshoe bat population from the SAC crosses the scheme for approximately 10% of the year, due to the occupation of a roost located 270m from the scheme during the early breeding period. Radio-tracking studies demonstrate that the core habitat areas used by these bats are not lost to the scheme. Any increase in collision risk to these bats is unlikely to result in mortality that would impact the favourable conservation status of the SAC population, due to the small proportion of the population present for a short seasonal period each year.
- 4.2.5 As such, no likely significant effects upon the bat populations for which the SAC is designated are identified. Potential effects of the scheme upon the qualifying bat populations are negligible and no potential for in combination effects is identified.

4.3 North Meadow and Clattinger Farm SAC

- 4.3.1 It is possible to conclude that no likely significant effects exist in relation to North Meadow and Clattinger Farm SAC.
- 4.3.2 There will be a negligible increase in nitrogen deposition as a result of the scheme during operation, and no other effects are anticipated, such as from recreational pressure, given the distance of the site from the scheme. Potential

effects of the scheme upon the qualifying habitats are negligible and no potential for in combination effects is identified.

4.4 Severn Estuary SAC

4.4.1 It is possible to conclude that no likely significant effects exist in relation to Severn Estuary SAC.

4.4.2 There will be no change in water quality and no loss of or fragmentation of habitats within the SAC. There will be no significant effects to the migratory fish assemblage within the Severn catchment. Potential effects of the scheme upon the qualifying interests of the SAC are negligible and no potential for in combination effects is identified.

4.5 Severn Estuary Ramsar

4.5.1 It is possible to conclude that no likely significant effects exist in relation to Severn Estuary Ramsar.

4.5.2 There will be no change in water quality and no loss of or fragmentation of habitats within the Ramsar site. There will be no significant effects to the migratory fish assemblage within the Severn catchment. Potential effects of the scheme upon the qualifying interests of the Ramsar site are negligible and no potential for in combination effects is identified.

4.6 Severn Estuary SPA

4.6.1 It is possible to conclude that no likely significant effects exist in relation to Severn Estuary SPA.

4.6.2 There will be no change in water quality and no significant effects to the habitats present upon which the qualifying species depend. There will be no risk of disturbance to the qualifying bird species of the SPA. No potential effects of the scheme upon the qualifying interests of the SPA are identified and no potential for in combination effects is identified.

Appendix A European designated sites citations and standard data forms

A.1 Citation and Standard Data Form for Cotswold Beechwoods SAC

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name:	Cotswold Beechwoods
Unitary Authority/County:	Gloucestershire
SAC status:	Designated on 1 April 2005
Grid reference:	SO898134
SAC EU code:	UK0013658
Area (ha):	585.85
Component SSSI:	Cotswold Commons and Beechwoods SSSI

Site description:

The site consists of ancient beech woodland and unimproved grassland lying over Jurassic limestones at the western edge of the Cotswolds. The woodlands are amongst the most diverse and species-rich of their type while the grasslands typify the unimproved calcareous pastures for which the area is famous.

The woods are structurally varied, including blocks of high forest and some areas of remnant beech coppice. The canopy is dominated by beech *Fagus sylvatica*, with ash *Fraxinus excelsior*, pedunculate oak *Quercus robur* and some areas of sycamore *Acer pseudoplatanus*. Characteristic understorey species include holly *Ilex aquifolium* and yew *Taxus baccata* but regenerating ash, sycamore and beech often accounts for much of the shrub layer. The field layer consists mainly of bramble *Rubus fruticosus* agg., dog's mercury *Mercurialis perennis* and ivy *Hedera helix*. Rare plants include red helleborine *Cephalanthera rubra*, stinking hellebore *Helleborus foetidus*, narrow-lipped helleborine *Epipactis leptochila* and wood barley *Hordelymus europaeus*. The fauna of the woods includes an exceptional variety of invertebrate species, including a rich mollusc fauna.

The unimproved limestone grassland swards are generally dominated by upright brome *Bromopsis erecta*, tor-grass *Brachypodium pinnatum* and sheep's-fescue *Festuca ovina*, with quaking grass *Briza media* and a wide range of other flowering herbs. Typical plants include cowslips *Primula veris*, common bird's-foot-trefoil *Lotus corniculatus*, common rock-rose *Helianthemum nummularium*, wild thyme *Thymus praecox* and field scabious *Knautia arvensis*.

Qualifying habitats: The site is designated under article 4(4) of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- *Asperulo-Fagetum* beech forests. (Beech forests on neutral to rich soils)
- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*). (Dry grasslands and scrublands on chalk or limestone)

This citation relates to a site entered in the Register of European Sites for Great Britain.
 Register reference number: UK0013658
 Date of registration: 14 June 2005
 Signed: [REDACTED]
 On behalf of the Secretary of State for Environment, Food and Rural Affairs



A.2 Citation and Standard Data Form for Wye Valley and Forest of Dean Bat Sites SAC

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name:	Wye Valley and Forest of Dean Bat Sites
Unitary Authority/County:	Gloucestershire, Monmouthshire
SAC status:	English part designated on 1 April 2005 Welsh part designated on 13 December 2004
Grid reference:	SO521107
SAC EU code:	UK0014794
Area (ha):	142.70
Component SSSI:	Blaisdon Hall SSSI, Buckshraft Mine and Bradley Hill Railway Tunnel SSSI, Caerwood and Ashberry Goose House SSSI, Dean Hall Coach House and Cellar SSSI, Devil's Chapel Scowles SSSI, Llangovan Church SSSI, Mwyngloddfa Mynydd-Bach SSSI, Newton Court Stable Block SSSI, Old Bow and Old Ham Mines SSSI, Sylvan House Barn SSSI, Westbury Brook Ironstone Mine SSSI, Wigpool Ironstone Mine SSSI, Wye Valley Lesser Horseshoe Bat Sites SSSI

Site description:

This complex of sites on the border between England and Wales contains by far the greatest concentration of lesser horseshoe bats *Rhinolophus hipposideros* in the UK. In addition the site also supports large numbers of greater horseshoe bats *Rhinolophus ferrumequinum*. The entire site supports an exceptional breeding population of both species as the majority of sites within the complex are maternity roosts. The site also includes several disused mines which are used as hibernation roosts.

Qualifying species: The site is designated under article 4(4) of the Directive (92/43/EEC) as it hosts the following species listed in Annex II:

- Greater horseshoe bat *Rhinolophus ferrumequinum*
- Lesser horseshoe bat *Rhinolophus hipposideros*

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0014794
Date of registration: 14 June 2005
Signed: - [REDACTED]
On behalf of the Secretary of State for Environment, Food and Rural Affairs
The site is also entered in the Register of European sites for Wales, maintained by the National Assembly for Wales.



Wye Valley and Forest of Dean Bat Sites SAC UK0014794
Compilation date: May 2005 Version: 1
Designation citation Page 1 of 1

A.3 Citation and Standard Data Form for North Meadow and Clattinger Farm SAC

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name: North Meadow and Clattinger Farm
Unitary Authority/County: Wiltshire
SAC status: Designated on 1 April 2005
Grid reference: SU014934
SAC EU code: UK0016372
Area (ha): 104.88
Component SSSI: Clattinger Farm SSSI, North Meadow, Cricklade SSSI

Site description:

This site in the Thames Valley represents an exceptional survival of the traditional pattern of management of lowland hay meadows. It contains a very high proportion of the surviving UK population of fritillary *Fritillaria meleagris*, a species highly characteristic of damp lowland meadows in Europe and now rare throughout its range.

Qualifying habitats: The site is designated under article 4(4) of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*).

This citation relates to a site entered in the Register of European Sites for Great Britain.

Register reference number: UK0016372

Date of registration: 14 June 2005

Signed: [REDACTED]

On behalf of the Secretary of State for Environment,
Food and Rural Affairs

A.4 Citation and Standard Data Form for Severn Estuary SAC

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora Citation for Special Area of Conservation (SAC)

Name:	Severn Estuary/ Môr Hafren
Unitary Authority/County:	England: Bristol City, Gloucestershire, Bath & North East Somerset, Somerset, South Gloucestershire. Wales: Bro Morgannwg/Vale of Glamorgan, Caerdydd/Cardiff, Casnewydd/ Newport, Sir Fynwy/ Monmouthshire.
SAC status:	Designated on 10 December 2009
Grid reference:	ST321748
SAC EU code:	UK0013030
Area (ha):	73715.40
Component SSSI:	Upper Severn Estuary SSSI, Severn Estuary SSSI, Bridgwater Bay SSSI.

Site description:

The Severn Estuary lies on the south west coast of Britain at the mouth of four major rivers (the Severn, Wye, Usk, and Avon). The immense tidal range (the second highest in the world) and classic funnel shape make the Severn Estuary unique in Britain and very rare worldwide. This tidal range creates strong tidal streams and high turbidity, producing communities characteristic of the extreme physical conditions of liquid mud and tide-swept sand and rocks.

The Estuary includes a wide diversity of habitats including **Sandbanks** which are slightly covered by sea water all the time, **Mudflats** and **sandflats** not covered by sea water at low tide, **Atlantic salt meadows**, and **Reefs**, which are identified as Annex I habitat types in their own right.

The intertidal zone of mudflats, sand banks, rocky platforms and saltmarsh is one of the largest and most important in Britain. The estuary has a diverse geological setting and a wide range of geo-morphological features, especially sediment deposits. It is important for the interpretation of coastline dynamics and land-forms, and also past changes, in sea level, sediment supply, climate and river flow. The estuary's overall interest depends on its large size, and on the processes and interrelationships between the intertidal and marine habitats and its fauna.

The fluctuating salinity and highly mobile sediments with consequent high turbidity limits the benthic invertebrates of the mud and sandflats to relatively few species. Those which are tolerant of such conditions occur in very high densities on the more stable mudflats. Beds of eel-grass *Zostera* spp. also occur on some mudflats. A greater variety of invertebrates occurs on the intertidal rock platforms, a more stable habitat with rock pools and a relatively high cover of seaweeds.



A.5 Information Sheet for Severn Estuary Ramsar site

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

Joint Nature Conservation Committee

Monkstone House

City Road

Peterborough

Cambridgeshire PE1 1JY

UK

Telephone/Fax: +44 (0)1733 – 562 626 / +44 (0)1733 – 555 948

Email: RIS@JNCC.gov.uk

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DD MM YY

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

Designated: 13 July 1995

3. Country:

UK (England/Wales)

4. Name of the Ramsar site:

Severn Estuary

5. Designation of new Ramsar site or update of existing site:

This RIS is for: Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area:

** Important note: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site included:

Refer to Annex III of the *Explanatory Notes and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

- i) **hard copy** (required for inclusion of site in the Ramsar List): *yes* ✓ -or- *no* ☐;
- ii) **an electronic format** (e.g. a JPEG or ArcView image) *Yes*
- iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** *yes* ✓ -or- *no* ☐;

b) **Describe briefly the type of boundary delineation applied:**

e.g. the boundary is the same as an existing protected area (nature reserve, national park etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The site boundary is the same as, or falls within, an existing protected area.

For precise boundary details, please refer to paper map provided at designation

8. Geographical coordinates (latitude/longitude):

51 13 29 N 03 02 57 W

9. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

Nearest town/city: Bristol

In the south-west of the United Kingdom, between Wales and England

Administrative region: Bro Morgannwg/ Vale of Glamorgan; Caerdydd/ Cardiff; Casnewydd/ Newport; Avon; City of Bristol; Fynwy/ Monmouthshire; Gloucestershire; Gwent; North Somerset; Somerset; South Glamorgan; South Gloucestershire

10. Elevation (average and/or max. & min.) (metres): **11. Area** (hectares): 24662.98

Min.	-4
Max.	17
Mean	0

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The estuary's classic funnel shape, unique in Britain, is a factor causing the Severn to have the second-largest tidal range in the world (after the Bay of Fundy, Canada). This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide swept sand and rock. The species-poor invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders.

A further consequence of the large tidal range is the extensive intertidal zone, one of the largest in the UK, comprising mudflats, sand banks, shingle, and rocky platforms.

Glassworts and annual sea-blite colonise the open mud, with beds of all three species of eelgrass *Zostera* occurring on more sheltered mud and sandbanks. Large expanses of common cord-grass also occur on the outer marshes. Heavily grazed saltmarsh fringes the estuary with a range of saltmarsh types present. The middle marsh sward is dominated by common saltmarsh-grass with typical associated species. In the upper marsh, red fescue and saltmarsh rush become more prominent.

13. Ramsar Criteria:

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

1, 3, 4, 5, 6, 8

14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Ramsar criterion 1

Due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities.

Habitats Directive Annex I features present on the pSAC include:

H1110 Sandbanks which are slightly covered by sea water all the time

H1130 Estuaries

H1140 Mudflats and sandflats not covered by seawater at low tide

H1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

Ramsar criterion 3

Due to unusual estuarine communities, reduced diversity and high productivity.

Ramsar criterion 4

This site is important for the run of migratory fish between sea and river via estuary. Species include Salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla anguilla*. It is also of particular importance for migratory birds during spring and autumn.

Ramsar criterion 8

The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. Salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla anguilla* use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad *Alosa alosa* and twaite shad *A. fallax* which feed on mysid shrimps in the salt wedge.

Ramsar criterion 5

Assemblages of international importance:

Species with peak counts in winter:

70919 waterfowl (5 year peak mean 1998/99-2002/2003)

Ramsar criterion 6 – species/populations occurring at levels of international importance.

Qualifying Species/populations (as identified at designation):

Species with peak counts in winter:

Tundra swan , <i>Cygnus columbianus bewickii</i> , NW Europe	229 individuals, representing an average of 2.8% of the GB population (5 year peak mean 1998/9-2002/3)
Greater white-fronted goose , <i>Anser albifrons albifrons</i> , NW Europe	2076 individuals, representing an average of 35.8% of the GB population (5 year peak mean for 1996/7-2000/01)
Common shelduck , <i>Tadorna tadorna</i> , NW Europe	3223 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3)
Gadwall , <i>Anas strepera strepera</i> , NW Europe	241 individuals, representing an average of 1.4% of the GB population (5 year peak mean 1998/9-2002/3)
Dunlin , <i>Calidris alpina alpina</i> , W Siberia/W Europe	25082 individuals, representing an average of 1.8% of the population (5 year peak mean 1998/9-2002/3)
Common redshank , <i>Tringa totanus totanus</i> ,	2616 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3)

Species/populations identified subsequent to designation for possible future consideration under criterion 6.

Species regularly supported during the breeding season:

Lesser black-backed gull , <i>Larus fuscus graellsii</i> , W Europe/Mediterranean/W Africa	4167 apparently occupied nests, representing an average of 2.8% of the breeding population (Seabird 2000 Census)
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Species with peak counts in spring/autumn:

Ringed plover , <i>Charadrius hiaticula</i> , Europe/Northwest Africa	740 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3)
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Species with peak counts in winter:

Eurasian teal , <i>Anas crecca</i> , NW Europe	4456 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9-2002/3)
Northern pintail , <i>Anas acuta</i> , NW Europe	756 individuals, representing an average of 1.2% of the population (5 year peak mean 1998/9-2002/3)

Contemporary data and information on waterbird trends at this site and their regional (sub-national) and national contexts can be found in the Wetland Bird Survey report, which is updated annually. See www.bto.org/survey/webs/webs-alerts-index.htm.

See Sections 21/22 for details of noteworthy species

Details of bird species occurring at levels of National importance are given in Section 22

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

Atlantic

b) biogeographic regionalisation scheme (include reference citation):

Council Directive 92/43/EEC

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Soil & geology	alluvium, basic, biogenic reef, clay, cobble, gravel, limestone/chalk, mud, neutral, nutrient-rich, peat, sand, sandstone/mudstone, sedimentary, shingle
Geomorphology and landscape	cliffs, coastal, estuary, floodplain, intertidal rock, intertidal sediments (including sandflat/mudflat), islands, lowland, open coast (including bay), pools, subtidal rock (including rocky reefs), subtidal sediments (including sandbank/mudbank), tidal rapids
Nutrient status	eutrophic
pH	circumneutral
Salinity	brackish / mixosaline, saline / euhaline
Soil	mainly mineral
Water permanence	usually permanent
Summary of main climatic features	Annual averages (Cardiff, 1971–2000) (www.metoffice.com/climate/uk/averages/19712000/sites/cardiff.html) Max. daily temperature: 14.3° C Min. daily temperature: 6.8° C Days of air frost: 33.0 Rainfall: 1111.7 mm Hrs. of sunshine: 1518.0

General description of the Physical Features:

The Severn Estuary is a large estuary with extensive intertidal mudflats and sandflats, rocky platforms and islands. Saltmarsh fringes the coast backed by grazing marsh with freshwater ditches and occasional brackish ditches. The seabed is rock and gravel with subtidal sandbanks. The estuary's classic funnel shape, unique in the UK, is a factor causing the Severn to have the second-highest tidal range in the world. This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide-swept sand and rock. A further consequence of the large tidal range is an extensive intertidal zone, one of the largest in the UK.

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

The Severn Estuary is a large estuary with extensive intertidal mudflats and sandflats, rocky platforms and islands. Saltmarsh fringes the coast backed by grazing marsh with freshwater ditches and occasional brackish ditches. The seabed is rock and gravel with subtidal sandbanks. The estuary's classic funnel shape, unique in the UK, is a factor causing the Severn to have the second-highest tidal range in the world. This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide-swept sand and rock. A further consequence of the large tidal range is an extensive intertidal zone, one of the largest in the UK.

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Shoreline stabilisation and dissipation of erosive forces, Sediment trapping

19. Wetland types:

Inland wetland, Marine/coastal wetland

Code	Name	% Area
G	Tidal flats	84.1
H	Salt marshes	4.7
D	Rocky shores	4.7
E	Sand / shingle shores (including dune systems)	4.4
Tp	Freshwater marshes / pools: permanent	1
B	Marine beds (e.g. sea grass beds)	0.9
F	Estuarine waters	0.2

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

The large tidal range leads to strong tidal streams and high turbidity, producing communities characteristic of the extreme physical conditions of liquid mud and tide-swept sand and rock. Broad intertidal flats with areas of unstable sand and muddy flats support high densities of invertebrates. Intertidal rock platforms support a wide variety of invertebrate species. There are large areas of subtidal sand, rock and gravel with a variety of aquatic estuarine communities including *Sabellaria alveolata* reef. Areas of saltmarsh fringe the estuary, mostly grazed with a range of vegetation communities. There are gradual and stepped transitions between bare mudflat to upper marsh and grassland. Main vegetation types are: upper saltmarsh with *Festuca rubra* and *Juncus gerardii*; middle marsh dominated by *Puccinellia maritima* with *Glaux maritima* and *Triglochin maritima*; dense monocultures of *Spartina anglica* at the edge of the mudflats-brackish pools and depressions with *Phragmites australis* and *Bolboschoenus maritimus*.

Ecosystem services

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Nationally important species occurring on the site.**Higher Plants.**

Aster linosyris (nationally rare),
Alopecurus bulbosus, *Althaea officinalis*, *Bupleurum tenuissimum*, *Hordeum marinum*, *Lepidium latifolium*, *Petroselinum segetum*, *Puccinellia rupestris*, *Trifolium squamosum*, *Zostera marina/angustifolia*, *Zostera noltei* (all nationally scarce)

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Birds**Species currently occurring at levels of national importance:****Species regularly supported during the breeding season:**

Herring gull, *Larus argentatus argentatus*, NW 1540 apparently occupied nests, representing an average of 1.1% of the GB population (Seabird Europe and Iceland/W Europe) 2000 Census)

Species with peak counts in spring/autumn:

Little egret , <i>Egretta garzetta</i> , West Mediterranean	17 individuals, representing an average of 1% of the GB population (5 year peak mean 1998/9-2002/3)
Ruff , <i>Philomachus pugnax</i> , Europe/W Africa	12 individuals, representing an average of 1.7% of the GB population (5 year peak mean 1998/9-2002/3)
Whimbrel , <i>Numenius phaeopus</i> , Europe/Western Africa	333 individuals, representing an average of 11.1% of the GB population (5 year peak mean 1998/9-2002/3 - spring peak)
Eurasian curlew , <i>Numenius arquata arquata</i> , N. a. <i>arquata</i> Europe (breeding)	2021 individuals, representing an average of 1.3% of the GB population (5 year peak mean 1998/9-2002/3)
Common greenshank , <i>Tringa nebularia</i> , Europe/W Africa	26 individuals, representing an average of 4.3% of the GB population (5 year peak mean 1998/9-2002/3)
Species with peak counts in winter:	
Eurasian wigeon , <i>Anas penelope</i> , NW Europe	4658 individuals, representing an average of 1.1% of the GB population (5 year peak mean 1998/9-2002/3)
Northern shoveler , <i>Anas clypeata</i> , NW & C Europe	297 individuals, representing an average of 2% of the GB population (5 year peak mean 1998/9-2002/3)
Common pochard , <i>Aythya ferina</i> , NE & NW Europe	1118 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9-2002/3)
Water rail , <i>Rallus aquaticus</i> , Europe	11 individuals, representing an average of 2.4% of the GB population (5 year peak mean 1998/9-2002/3)
Spotted redshank , <i>Tringa erythropus</i> , Europe/W Africa	10 individuals, representing an average of 7.3% of the GB population (5 year peak mean 1998/9-2002/3)

Species Information

Species occurring at levels of international importance on the site.

Fish.

Alosa alosa (IUCN Red data book – threatened; Habitats Directive Annex II, Annex V (S1102)),
Alosa fallax (IUCN Red data book – threatened; Habitats Directive Annex II, Annex V (S1103))
Lampetra fluviatilis (IUCN Red data book – threatened; Habitats Directive Annex II (S1099)),
Petromyzon marinus (Habitats Directive Annex II (S1095))

Nationally important species occurring on the site.

Invertebrates.

Tenellia adspersa (nationally rare); *Corophium lacustre* (nationally scarce); *Gammarus insensibilis* (nationally scarce)

23. Social and cultural values:

Describe if the site has any general social and/or cultural values e.g. fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

- Aesthetic
- Archaeological/historical site
- Environmental education/ interpretation

Fisheries production
 Livestock grazing
 Non-consumptive recreation
 Scientific research
 Sport fishing
 Sport hunting
 Tourism
 Traditional cultural
 Transportation/navigation

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning? No

If Yes, describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

Ownership category	On-site	Off-site
Non-governmental organisation (NGO)	+	+
Local authority, municipality etc.	+	+
National/Crown Estate	+	
Private	+	+
Public/communal	+	+
Other	+	

25. Current land (including water) use:

Activity	On-site	Off-site
Nature conservation	+	+
Tourism	+	+
Recreation	+	+
Current scientific research	+	+
Fishing: commercial	+	+
Fishing: recreational/sport	+	+
Gathering of shellfish	+	
Bait collection	+	
Arable agriculture (unspecified)		+
Grazing (unspecified)	+	+
Permanent pastoral agriculture		+

Hunting: recreational/sport	+	+
Industrial water supply	+	
Industry	+	+
Sewage treatment/disposal	+	+
Harbour/port	+	+
Flood control	+	+
Mineral exploration (excl. hydrocarbons)	+	+
Mining/quarrying	+	+
Transport route	+	+
Urban development		+
Military activities	+	+

26. Factors (past, present or potential) adversely affecting the site’s ecological character, including changes in land (including water) use and development projects:

Explanation of reporting category:

1. Those factors that are still operating, but it is unclear if they are under control, as there is a lag in showing the management or regulatory regime to be successful.
2. Those factors that are not currently being managed, or where the regulatory regime appears to have been ineffective so far.

NA = Not Applicable because no factors have been reported.

Adverse Factor Category	Reporting Category	Description of the problem (Newly reported Factors only)	On-Site	Off-Site	Major Impact?
Dredging	1		+	+	+
Erosion	1		+		+
Recreational/tourism disturbance (unspecified)	1		+	+	

For category 2 factors only.

What measures have been taken / are planned / regulatory processes invoked, to mitigate the effect of these factors?

Is the site subject to adverse ecological change? NO

27. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

Conservation measure	On-site	Off-site
Site/ Area of Special Scientific Interest (SSSI/ASSI)	+	+

National Nature Reserve (NNR)	+	
Special Protection Area (SPA)	+	
Land owned by a non-governmental organisation for nature conservation	+	+
Management agreement	+	+
Site management statement/plan implemented	+	
Other	+	
Management plan in preparation	+	+

b) Describe any other current management practices:

The management of Ramsar sites in the UK is determined by either a formal management plan or through other management planning processes, and is overseen by the relevant statutory conservation agency. Details of the precise management practises are given in these documents.

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

No information available

29. Current scientific research and facilities:

e.g. details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

Contemporary.

Fauna.

Numbers of migratory and wintering wildfowl and waders are monitored annually as part of the national Wetland Birds Survey (WeBS) organised by the British Trust for Ornithology, Wildfowl & Wetlands Trust, the Royal Society for the Protection of Birds and the Joint Nature Conservation Committee.

Wildfowl shooting monitoring. Returns received annually from Wildfowling Clubs.

Completed.

Flora and Fauna.

CCW/EN Marine Intertidal Phase 1 survey of the biotopes of the Severn Estuary in 2003/4 BTO Research report 335 for CCW/EN (November 2003). Low tide distribution of waterbirds of Severn Estuary SPA. Results of 2002/03 WeBS low tide counts and a historical analysis (Burton *et al.* 2003).

WWT Wetlands Advisory Service. Report for CCW (April 2003). Baseline bird monitoring of the River Severn.

Joint Nature Conservation Committee (1997) Subtidal biotope survey at mouth of the River Parrett.

Joint Nature Conservation Committee (1997) Upper estuary intertidal rocky shore survey.

Mettam, C (1997) *Biotopes in the subtidal sandbanks of the Severn estuary*. Report to English Nature

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitor centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

There are fixed interpretation panels and hides at Bridgwater Bay, Newport Wetlands Reserve, Flat Holm LNR and field centre. Interpretation boards at Black Rock.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Activities, Facilities provided and Seasonality.

Walking, dog walking, and birdwatching are concentrated along the sea walls all the year round and on the saltmarsh and sandy beaches.

Bathing, beach recreation, including sand yachting and wind surfing are practised on the sandy beaches, mainly in the summer.

There are boat clubs/marinas in the sub-estuaries with sailing, motor boats, and jet skiing. Angling is carried out from the shore and small boats. There is a certain amount of bait digging. Wildfowling is carried out from September to February all around the Estuary; consents and further management measures are being addressed. There are agreed refuge areas for the birds.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept. of Agriculture/Dept. of Environment, etc.
 Head, Natura 2000 and Ramsar Team, Department for Environment, Food and Rural Affairs,
 European Wildlife Division, Zone 1/07, Temple Quay House, 2 The Square, Temple Quay, Bristol,
 BS1 6EB
 Head, Countryside Division, Welsh Assembly Government, Cathays Park, Cardiff, CF1 3NQ

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Site Designations Manager, English Nature, Sites and Surveillance Team, Northminster House,
 Northminster Road, Peterborough, PE1 1UA, UK / Site Safeguard Officer, International
 Designations, Countryside Council for Wales, Maes-y-Ffynnon, Penrhosgarnedd, Bangor,
 Gwynedd, LL57 2DW

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

Site-relevant references

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A.6 Citation and Standard Data Form for Severn Estuary SPA

EC Directive 79/409 on the Conservation of Wild Birds: Special Protection Area

SEVERN ESTUARY (GLOUCESTERSHIRE, AVON, SOMERSET, SOUTH GLAMORGAN, MID GLAMORGAN, GWENT)

The Severn Estuary is one of the largest estuaries in Britain and it has the second largest tidal range in the world. Its classic funnel shape and south-west orientation makes it susceptible to extreme weather conditions in the east Atlantic. There are large urban developments on the estuary including the cities of Bristol and Cardiff.

The Severn Estuary qualifies under Article 4.1 of the Birds Directive by regularly supporting an internationally important wintering population of Bewick's swan *Cygnus columbianus bewickii*, an Annex 1 species. During the period 1988/89 to 1992/93 a mean peak of 289 birds (1.7% of the north-west European population, 4.1% of the British wintering population) used the estuary.

The Severn Estuary qualifies under Article 4.2 as a wetland of international importance by regularly supporting in winter over 20,000 waterfowl. In the five year period 1988/89 to 1992/93 the average peak count was 68,026 waterfowl comprising 17,502 wildfowl and 50,524 waders.

The Severn Estuary also qualifies under Article 4.2 by regularly supporting in winter internationally important numbers of the following 5 species of migratory waterfowl (average peak means for the period 1988/89 to 1992/93): 3,002 European white-fronted goose *Anser albifrons albifrons* (1.0% NW European, 50.0% British), 2,892 shelduck *Tadorna tadorna* (1.2% NW European, 3.9% British), 330 gadwall *Anas strepera* (2.8% NW European, 5.5% British), 41,683 dunlin *Calidris alpina* (2.9% east Atlantic flyway (EAF), 9.6% British) and 2,013 redshank *Tringa totanus* (1.3% EAF, 2.6% British).

The Severn Estuary also supports nationally important wintering populations of a further 10 species: 3,977 wigeon *Anas penelope* (1.6% British), 1,998 teal *Anas crecca* (2.0% British), 523 pintail *Anas acuta* (2.1% British), 1,686 pochard *Aythya ferina* (3.8% British), 913 tufted duck *Aythya fuligula* (1.5% British), 227 ringed plover *Charadrius hiaticula* (1.0% British), 781 grey plover *Pluvialis squatarola* (3.7% British), 3,096 curlew *Numenius arquata* (3.4% British), 246 whimbrel *N. phaeopus* (4.9% British total) and 3 spotted redshank *Tringa erythropus* (1.5% British).

In addition, during passage periods, the estuary supports nationally important numbers of ringed plover (spring migration: 442 birds (1.4% British passage), autumn migration: 1,573 birds (5.2% British passage)), dunlin (spring: 3,510 birds (1.7% British passage), autumn: 5,500 birds (2.7% British passage)), whimbrel *Numenius phaeopus* (spring: 246 birds (4.9% British passage), autumn: 66 birds (1.3% British passage)) and redshank (autumn: 2,456 birds (2% British passage)).

The Severn Estuary also supports a nationally important breeding population of a migratory species. In 1993 2040 pairs of lesser black-backed gulls *Larus fuscus* bred on the islands of Steep Holm and Flat Holm within the estuary. This represents 2.5% of the British total.

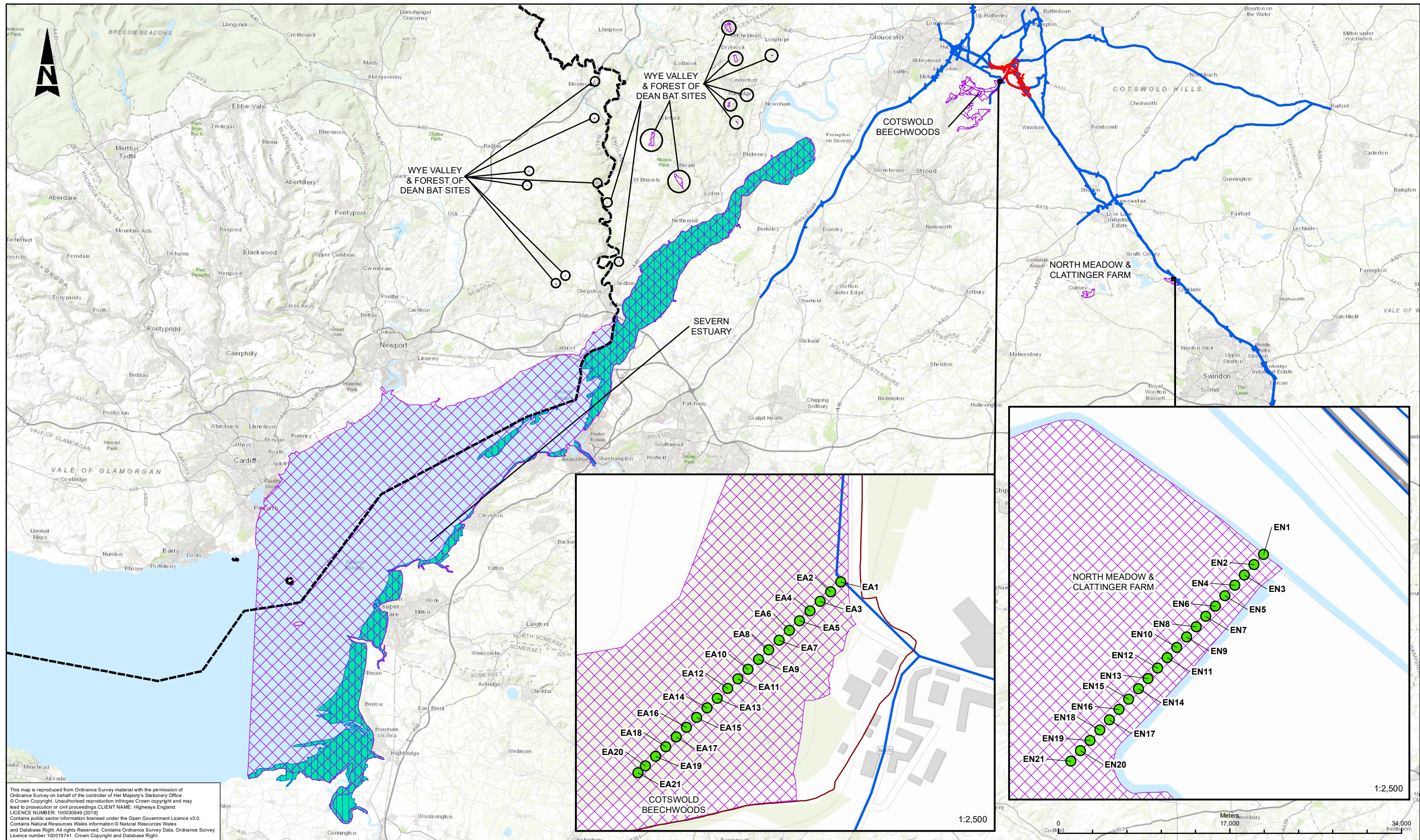
SPA Citation
CAR
December 1993

This citation / map relates to a site entered in
the Register of European sites for Great Britain.
Register reference number: UK0015025
Date: 25 June 1993
Sign: [Redacted]
on behalf of the Secretary of State for the Environment

Appendix B European designated sites plans

B.1.1.1 The following plans are included:

- European Designated Sites Plan
- Cotswold Beechwoods SAC Location Plan



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- LEGEND**
- DCO BOUNDARY
 - AIR QUALITY TRANSECTS - ECOLOGY RECEPTORS
 - SPECIAL AREAS OF CONSERVATION (SAC)
 - RAMSAR
 - SPECIAL PROTECTION AREA (SPA)
 - AFFECTED ROAD NETWORK (ARN)
 - ENGLAND / WALES BOUNDARY

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS (REFERENCE SHALL ALSO BE MADE IN THE DESIGN HAZARD LOG)

CONSTRUCTION			
NONE			
MAINTENANCE / CLEANING			
NONE			
USE			
NONE			
DECOMMISSIONING / DEMOLITION			
NONE			

C01	19/05/21	APPLICATION SUBMISSION (MAY 2021)	KD	LC	JP	SW
Rev.	Date	Description	By	Chk'd	App'd	Auth'd

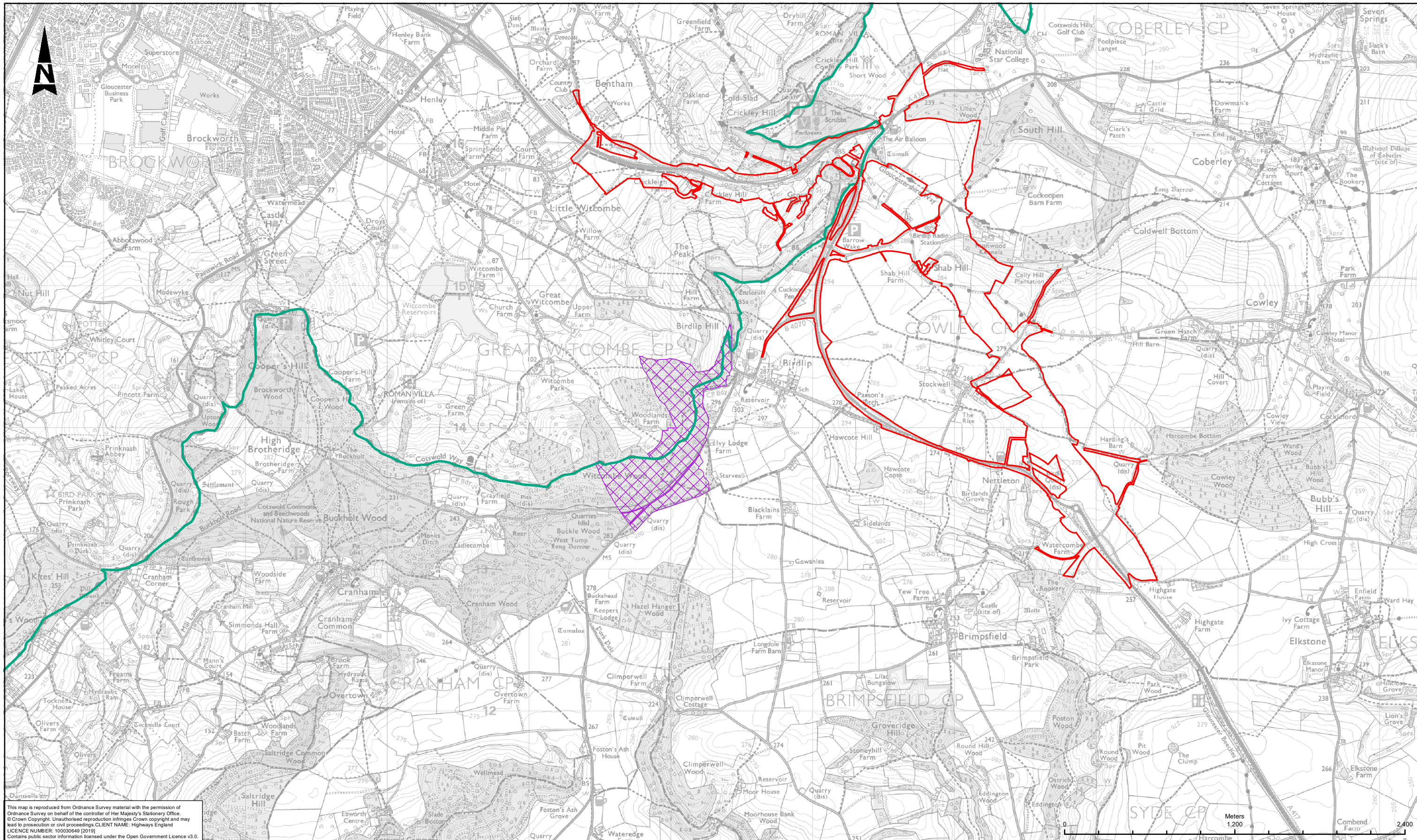
Suitability: A3

Drawing Status: **STAGE COMPLETED**

ARUP

highways england

Project Title: A417 MISSING LINK					
Drawing Title: APPENDIX B EUROPEAN DESIGNATED SITES PLAN (SCREENING)					
Scale: 1:350,000	By: KD	Checked: LC	Approved: JP	Authorised: SW	
Original Size: A3	Date: 19/05/21	Date: 19/05/21	Date: 19/05/21	Date: 19/05/21	Date: 19/05/21
Drawing Number: HE PIN	Originator: ARP	Volume: EGN	Revision: C01		
HE551505 - X_XX_XXXX_X	-DR - LE - 000032				
Location	Type	Role	Number		



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- LEGEND**
- DCO BOUNDARY
 - COTSWOLD WAY
 - COTSWOLD BEECHWOODS SAC

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS (REFERENCE SHALL ALSO BE MADE IN THE DESIGN HAZARD LOG)

CONSTRUCTION			
NONE			
MAINTENANCE / CLEANING			
NONE			
USE			
NONE			
DECOMMISSIONING / DEMOLITION			
NONE			

001	19/05/21	APPLICATION SUBMISSION (MAY 2021)	KD	LC	JP	SW
Rev.	Date	Description	By	Chk'd	App'd	Aud'd

Subtality Drawing Status
A3 STAGE COMPLETED

ARUP

highways england

Project Title
A417 MISSING LINK

Drawing Title
APPENDIX B
COTSWOLD BEECHWOODS SAC
LOCATION PLAN (SIAA)

Scale	1:25,000	By	KD	Checked	LC	Approved	JP	Authorised	SW
Original Size	A3	Date	19/05/21	Date	19/05/21	Date	19/05/21	Date	19/05/21
Drawing Number	HE PIN	Originator	ARP	Volume	EGN	C01			
	HE551505 -		DR - LE - 000033						
	X_XX_XXXX_X								
	Location	Type	Role	Number					

Appendix C PINS Screening Matrices

Potential effects upon the International site(s) which are considered within the submitted HRA screening report are provided in the table below.

Table C-1 Effects considered within the screening matrices

Designation	Effects described in submission information	Presented in screening matrices as
Cotswolds Beechwoods SAC	<ul style="list-style-type: none"> Nitrogen deposition Excavation impacts on local hydrology and hydrogeology Increased visitor numbers due to connection of walking and cycling routes, resulting in habitat degradation 	<ul style="list-style-type: none"> Air quality Water quality Recreational pressure
Wye Valley and Forest of Dean Bat Sites SAC	<ul style="list-style-type: none"> Loss of functionally linked habitat for greater and lesser horseshoe bat foraging and commuting Increased mortality due to vehicle collisions 	<ul style="list-style-type: none"> Habitat loss Disturbance
North Meadow and Clattinger Farm SAC	<ul style="list-style-type: none"> Nitrogen deposition 	<ul style="list-style-type: none"> Air quality
Severn Estuary SAC	<ul style="list-style-type: none"> Ingress of pollutants Loss of functionally linked habitat for sea lamprey, river lamprey and twaite shad. 	<ul style="list-style-type: none"> Water quality Reduction of habitat area
Severn Estuary Ramsar	<ul style="list-style-type: none"> Ingress of pollutants Loss of functionally linked habitat for sea lamprey, river lamprey and twaite shad. 	<ul style="list-style-type: none"> Water quality Reduction of habitat area
Severn Estuary SPA	<ul style="list-style-type: none"> Ingress of pollutants 	<ul style="list-style-type: none"> Water quality

The international sites included within the screening assessment are:

- Cotswolds Beechwoods SAC
- Wye Valley and Forest of Dean Bat Sites SAC
- North Meadow and Clattinger Farm SAC
- Severn Estuary SAC.
- Severn Estuary Ramsar.
- Severn Estuary SPA.

Evidence for, or against, likely significant effects on the European site(s) and its qualifying feature(s) is detailed within the footnotes to the screening matrices in Appendix Table 2 to Appendix Table 6.

Matrix key

- ✓: Likely significant effect cannot be excluded
- X: Likely significant effect can be excluded
- C: Construction
- O: Operation
- D: Decommissioning

Table C-2 Cotswold Beechwoods SAC PINS Matrix

Name of European site and designation: Cotswold Beechwoods SAC												
EU code: UK0013658												
Distance to NSIP: 212m												
European site features	Likely effects of NSIP											
	Air quality			Water quality			Recreational pressure			In combination effects		
Effect	C	O	D	C	O	D	C	O	D	C	O	D
Stage of development												
<i>Asperulo-Fagetum</i> beech forests on neutral to rich soils	X ^{*i}	X ^{*i}		X ^{*ii}	X ^{*ii}		X ^{*iii}	✓ ^{*iii}		X ^{*v}	✓ ^{*v}	
Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Bromeliata</i>).	X ^{*i}	X ^{*i}		X ^{*ii}	X ^{*ii}		X ^{*iii}	✓ ^{*iii}		X ^{*v}	✓ ^{*v}	

*i The magnitude of change in annual mean nutrient nitrogen deposition have been determined for the construction phase and no change is predicted. During operation, the scheme would result in a reduction in congestion and a reduction in associated traffic emissions with the air quality assessment of changes in annual mean nutrient nitrogen deposition in 2026 is predicted to show a decrease as a result of the scheme. As such, no significant effects upon local air quality as a result of the scheme are determined to be likely during construction or operation.

*ii. The SAC is underlain by the same WFD groundwater body and principal aquifer as the scheme which has the potential to cause water pollution to the groundwater of the SAC via the scheme during both construction and operation. The land within the scheme does not drain into watercourses that are within, or connected to, the SAC. No risk of impacts to the supply or quality of surface water of the SAC are identified from construction or operation. Construction of the scheme will adopt a ground and surface water management plan to prevent the risk of pollution and contamination to ground and surface water, as is required to ensure wider legislative compliance. Adoption of these measures will avoid pollution of the general water environment during construction including any surface water or groundwater that could be linked to the site. No impacts on the site are anticipated from changes to surface water during operation due to the operational drainage design, including flow volume and quality control measures incorporated into the scheme design.

*iii There is no potential effect from increased recreational pressure during construction. The Cotswold Crossing will reconnect walking and cycling routes along the Cotswold Way National Trail, which was previously severed by the Existing A417 trunk road. The potential exists for this to contribute to increased visitor pressure at the SAC during operation. In addition, reduced congestion may result in more visitors from habitats to the north visiting the SAC via car which could also increase visitor pressure. Public access/disturbance is listed as a key threat to woodland habitats within the SAC within

the SIP. Further assessment of information on visitor use of the SAC and the Crickley Hill area to the north is needed to predict potential changes and enable an assessment of the significance of potential impacts upon the SAC.

*v If further assessment of the scheme concluded that it would be likely to result in an increase in visitor pressure upon the SAC alone, the potential would exist for in combination effects with other plans and projects such as those that would increase residential units within 10km of the SAC.

Table C-3 Wye Valley and Forest of Dean Bat Sites SAC PINS Matrix

Name of European site and designation: Wye Valley and Forest of Dean Bat Sites SAC									
EU code: UK0014794									
Distance to NSIP: 21.4km									
European site features	Likely effects of NSIP								
Effect	Reduction of habitat area			Disturbance			In combination effects		
Stage of development	C	O	D	C	O	D	C	O	D
Lesser horseshoe bat	X*vi	X*vi		X*viii	X*viii		X*x	X*x	
Greater horseshoe bat	X*vii	X*vii		X*ix	X*ix		X*x	X*x	

*vi Desk records and survey data demonstrate that habitats within the scheme are used for foraging and commuting by lesser horseshoe, and that habitats in close proximity to the scheme are used as winter roosts. However, there are several breeding populations of lesser horseshoe bat using maternity roosts in much closer proximity to the scheme than the SAC population. Given this finding, the distance of the SAC from the scheme (>21km), and existing published studies on this species, it is not likely that the lesser horseshoe bats using habitats within and in close proximity to the scheme are part of the qualifying population within the SAC. As such reduction in area of functionally linked habitats is not likely to occur in relation to the lesser horseshoe bat population of the SAC.

*vii Given the distance of the SAC from the scheme (>21km), survey data and existing published studies on this species, it is not likely that greater horseshoe bats use habitats within the DCO Boundary for foraging or commuting during the periods that they are roosting within the maternity or hibernation roosts within the SAC. It is concluded that a very small number of bats from the SAC use a transitional roost in close proximity to the scheme for a short period in late spring to early summer. Survey evidence does not indicate that these bats rely on foraging habitats within the scheme during this period. Therefore, no reduction in the area of functionally linked habitats is likely to occur as a result of the scheme in relation to the greater horseshoe bat population of the SAC.

*viii Desk records and survey data demonstrate that habitats within the scheme are used for foraging and commuting by lesser horseshoe, and that habitats in close proximity to the scheme are used as winter roosts. However, there are several breeding populations of lesser horseshoe bat using maternity roosts in much closer proximity to the scheme than the SAC population. Given this finding, the distance of the SAC from the scheme (>21km), and existing published studies on this species, it is not likely that the lesser horseshoe bats using habitats within and in close proximity to the scheme are part of the qualifying population within the SAC. No risk of mortality to the lesser horseshoe population of the SAC is therefore identified.

*ix The proportion of the SAC population crossing the A417 is estimated at 0.7% of the main maternity roost within the SAC and the bats are using this roost for approximately 10% of the year. The increased risk of mortality to <1% of the SAC population for a short period each year is considered to represent a negligible impact upon the favourable conservation status of the qualifying population of greater horseshoe bat within the SAC.

*x As there are no elements of the proposals which are likely to have any significant impacts upon the SAC alone no in combination effects with other plans or projects are anticipated.

Table C-4 North Meadow and Clattinger Farm SAC PINS Matrix

Name of European site and designation: North Meadow and Clattinger Farm SAC						
EU code: UK0016372						
Distance to NSIP: 21.4km						
European site features	Likely effects of NSIP					
Effect	Air quality			In combination effects		
Stage of development	C	O	D	C	O	D
Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>)	X*xi	X*xi		X*xii	X*xii	
Fritillary (<i>Fritillaria meleagris</i>)	X*xi	X*xi		X*xii	X*xii	

*xi During operation, the change in deposition is less than 1% of the lowest critical load value. The highest change as a percentage of the lower critical load is 0.1%. Predicted nitrogen deposition at North Meadow for the traffic scenario modelled for the opening year with the scheme (i.e. the 2026 Do-Something scenario) remains below critical load at 19.57kg N/ha/yr. Therefore, no degradation or loss of qualifying habitat via nitrogen deposition during operation is likely as a result of the scheme. The magnitude of change in annual mean nutrient nitrogen deposition have been determined for the construction phase. There is no change predicted (0.00 N/ha/yr) at the European site therefore no significant effects to the designated habitats as a result of the scheme via nitrogen deposition are likely during construction.

*xii As there are no elements of the proposals which are likely to have any significant impacts upon the SAC alone no in combination effects with other plans or projects are anticipated.

Table C-5 Severn Estuary SAC PINS Matrix

Name of European site and designation: Severn Estuary SAC									
EU code: UK0013030									
Distance to NSIP: 19km									
European site features	Likely effects of NSIP								
Effect	Water quality			Reduction of habitat area			In combination effects		
Stage of development	C	O	D	C	O	D	C	O	D
Estuaries	X*xiii	X*xiii		X*xiv	X*xiv		X*xv	X*xv	
Mudflats and sandflats not covered by seawater at low tide	X*xiii	X*xiii		X*xiv	X*xiv		X*xv	X*xv	
Atlantic salt meadows	X*xiii	X*xiii		X*xiv	X*xiv		X*xv	X*xv	
Sandbanks which are slightly covered by sea water all the time	X*xiii	X*xiii		X*xiv	X*xiv		X*xv	X*xv	
Reefs	X*xiii	X*xiii		X*xiv	X*xiv		X*xv	X*xv	
Migratory fish (sea lamprey, river lamprey, twaite shad)	X*xiii	X*xiii		X*xiv	X*xiv		X*xv	X*xv	
Migratory fish (salmon, eel, sea trout, Allis shad)	X*xiii	X*xiii		X*xiv	X*xiv		X*xv	X*xv	

*xiii Construction of the scheme will adopt a ground and surface water management plan to prevent the risk of pollution and contamination to ground and surface water, as is required to ensure wider legislative compliance. Adoption of these measures will avoid pollution of the general water environment during construction including any surface water or groundwater that could be linked to the SAC. No impacts on the SAC are anticipated from changes to surface water during operation due to the operational drainage design, including flow volume and quality control measures incorporated into the scheme design.

*xiv There will be no loss of Annex I habitats within the Severn Estuary SAC. Annex II species and the migratory fish assemblage (excluding eel) are not anticipated to utilise habitat within the affected reach of Norman's Brook as it is suboptimal for life stages and due to its size and temporal flow. Consequently, there is not anticipated to be any loss of functionally linked habitat for these species. European eel utilises a wide range of habitat in freshwater. Norman's Brook cannot be ruled out as supporting eel on this basis. Furthermore, it cannot be concluded that eel would not be able to pass the in-stream barriers present downstream of the affected reach of Norman's Brook. However, the affected reach of Norman's Brook, approximately 1.1km in length, represents a small proportion of the River Severn catchment which eel may utilise, approximately 0.0005% of the total catchment. As such any potential reduction of functional habitat for eel is concluded to be negligible.

*xv As there are no elements of the proposals which are likely to have any significant impacts upon the SAC alone no in combination effects with other plans or projects are anticipated.

Table C-6 Severn Estuary Ramsar PINS Matrix

Name of European site and designation: Severn Estuary Ramsar									
EU code: UK11081									
Distance to NSIP: 19km									
European site features	Likely effects of NSIP								
Effect	Water quality			Reduction in habitat area			In combination effects		
Stage of development	C	O	D	C	O	D	C	O	D
Estuaries	X*xvi	X*xvi		X*xvii	X*xvii		X*xix	X*xix	
Mudflats and sandflats not covered by seawater at low tide	X*xvi	X*xvi		X*xvii	X*xvii		X*xix	X*xix	
Atlantic salt meadows	X*xvi	X*xvi		X*xvii	X*xvii		X*xix	X*xix	
Sandbanks which are slightly covered by sea water all the time	X*xvi	X*xvi		X*xvii	X*xvii		X*xix	X*xix	
Reefs	X*xvi	X*xvi		X*xvii	X*xvii		X*xix	X*xix	
Migratory fish (sea lamprey, river lamprey, twaite shad)	X*xvi	X*xvi		X*xvii	X*xvii		X*xix	X*xix	
Migratory fish (salmon, eel, sea trout, Allis shad)	X*xvi	X*xvi		X*xvii	X*xvii		X*xix	X*xix	
Internationally important populations of waterfowl	X*xviii	X*xviii		X*xviii	X*xviii		X*xix	X*xix	
Assemblage of nationally important populations of waterfowl	X*xviii	X*xviii		X*xviii	X*xviii		X*xix	X*xix	

*xvi Construction of the scheme will adopt a ground and surface water management plan to prevent the risk of pollution and contamination to ground and surface water, as is required to ensure wider legislative compliance. Adoption of these measures will avoid pollution of the general water environment during construction including any surface water or groundwater that could be linked to the site. No impacts on the site are anticipated from changes to surface water during operation due to the operational drainage design, including flow volume and quality control measures incorporated into the scheme design.

*xvii There will be no loss of habitat area within the Severn Estuary Ramsar. The realignment of Norman's Brook in the upper Severn catchment may lead to the loss of habitats utilised for life stages of fish species. However, fish habitat assessment carried out on the affected reach of Norman's Brook in October 2019 indicates that habitat within Norman's Brook is unlikely to support life stages of River or Sea Lamprey due to the small size and temporal nature of flow within this waterbody. Furthermore, significant in-stream barriers observed downstream of this reach are anticipated to present as complete barriers to upstream movement of these species. In addition, the affected reach of Norman's Brook does not support suitable habitat for any of the life stages of Twaite Shad. The realignment of Norman's

Brook in the upper Severn catchment may lead to the loss of habitats utilised for life stages of fish species. However, due to the small size and temporal nature of flow within this waterbody, Norman's Brook is anticipated to present sub-optimal habitat for Atlantic salmon and sea trout. Furthermore, significant in-stream barriers observed downstream of this reach are anticipated to present as complete barriers to upstream movement of these species. In addition, the affected reach of Norman's Brook represents a small proportion of the River Severn catchment which eel may utilise. As such the any potential reduction of functional habitat for eel is concluded to be negligible. The affected reach of Norman's Brook does not support suitable habitat for any of the life stages of Allis Shad.

*xviii There will be no effect on populations of waterfowl due to the distance between the scheme and the Ramsar site.

*xix As there are no elements of the proposals which are likely to have any significant impacts upon the SAC alone no in combination effects with other plans or projects are anticipated.

Table C-7 Severn Estuary SPA PINS Matrix

Name of European site: Severn Estuary SPA									
EU code: UK9015022									
Distance to NSIP: 19km									
European site features	Likely effects of NSIP								
	Water quality			Reduction of habitat area			In combination effects		
Effect	C	O	D	C	O	D	C	O	D
Stage of development									
Internationally important wintering populations (Berwick's swan)	X*xx	X*xx		X*xxi	X*xxi		X*xxii	X*xxii	
Internationally important migratory populations (common shelduck, gadwall, dunlin, common redshank, greater white-fronted goose)	X*xx	X*xx		X*xxi	X*xxi		X*xxii	X*xxii	
Internationally important waterfowl assemblage	X*xx	X*xx		X*xxi	X*xxi		X*xxii	X*xxii	

*xx Construction of the scheme will adopt Annex G Ground and Surface Water Management Plan of ES Appendix 2.1 EMP (Document Reference 6.4) to prevent the risk of pollution and contamination to ground and surface water, as is required to ensure wider legislative compliance. Adoption of these measures will avoid pollution of the general water environment during construction including any surface water or groundwater that could be linked to the SPA. No impacts on the SPA are anticipated from changes to surface water during operation due to the operational drainage design, including flow volume and quality control measures incorporated into the scheme.

*xxi There will be no effect on populations of waterfowl due to the distance between the scheme and the SPA.

*xxii As there are no elements of the proposals which are likely to have any significant impacts upon the SAC alone no in combination effects with other plans or projects are anticipated.

Appendix D No Likely Significant Effects reports

D.1.1.1 The following sites require no significant effects report matrices:

- Wye Valley and Forest of Dean Bat Sites SAC
- North Meadow and Clattinger Farm SAC
- Severn Estuary SAC
- Severn Estuary Ramsar
- Severn Estuary SPA

Table D-1 Wye Valley and Forest of Dean Bat Sites SAC No LSE Report

Project name:	A417 Missing Link	
European Site under consideration:	Wye Valley and Forest of Dean Bat Sites SAC	
Date	Author (Name/Organisation):	Verified (Name/Organisation):
07/03/2021	Livvy Cropper/ Arup Alys Black/ Arup	Luke Casey/ Arup
Name and location of European Site:	Wye Valley and Forest of Dean Bat Sites SAC, Gloucestershire/Monmouthshire, England UK. The SAC is a composite site and is 21.4km south-west of the DCO Boundary and 11.3km from the ARN, at the closest point.	
Description of the project:	<ul style="list-style-type: none"> • Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417. • Provision of a new crossing near Emma's Grove. • Provision of a new junction at Shab Hill. • Provision of a new 37m wide multi-purpose crossing north of Shab Hill. • Provision of a new junction would be included near Cowley. • The Existing A417 would be detrunked for its entire length. • A more detailed description of the scheme is provided in Section 1.2 of this report. • The scheme is shown on Appendix B European designated sites plan. 	
Is the project directly connected with or necessary to the management of the site (provide details):	No	
Are there other projects or plans that together with the project being assessed could affect the site (provide details):	None	
The assessment of significance of effects		
Describe how the project (alone or in combination) is likely to affect the European Site:	<p>There will be no reduction of habitat area within the SAC. Given the distance from the scheme, the survey findings and existing published studies on this species, it is not likely that the lesser horseshoe bats that are regularly foraging and commuting within the scheme form part of the population for which the SAC is designated. Reduction in area of functionally linked foraging and commuting habitat to the SAC for this species is unlikely to occur.</p> <p>While the survey findings indicate that small numbers of greater horseshoe bats from maternity colonies linked to the SAC may forage or commute within the scheme during the early mating season, they will not constitute a significant proportion of the population when considered alongside the overall survey findings, the distance from the scheme and published studies on this species. A significant reduction in the quantity of functionally linked foraging or commuting habitat to the SAC for this species is unlikely to occur.</p>	

Project name:	A417 Missing Link
European Site under consideration:	Wye Valley and Forest of Dean Bat Sites SAC
	The scheme will not fragment the SAC or functionally linked habitat to the SAC important for genetic exchange for greater or lesser horseshoe bats from the SAC populations.
Explain why these effects are not considered significant:	No effects upon the bat populations for which the SAC is designated are identified.
List of agencies consulted: provide contact name and telephone or e-mail address	Hayley Fleming from Natural England provided comments on the draft HRA for the scheme on 21 January 2021 and agreed with the conclusion to screen Wye Valley and Forest of Dean Bat Sites SAC out of further assessment. [REDACTED]
Response to consultation:	Further consultation required.
Data collected to carry out the assessment	
Who carried out the assessment?	Livvy Cropper, Alys Black and Luke Casey (Arup)
Sources of data	Natura 2000 sites map (https://natura2000.eea.europa.eu/), JNCC (https://sac.jncc.gov.uk/), Natural England (https://designatedsites.naturalengland.org.uk/)
Level of assessment completed	HRA Screening
Where can the full results of the assessment be accessed and viewed?	Table 2 Screening Matrix: Wye Valley and Forest of Dean Bat Sites SAC of this report.

Table D-2 North Meadow and Clattinger Farm SAC No LSE Report

Project name:	A417 Missing Link	
European Site under consideration:	North Meadow and Clattinger Farm SAC	
Date	Author (Name/Organisation):	Verified (Name/Organisation):
07/03/2021	Livvy Cropper/ Arup Alys Black/ Arup	Luke Casey/ Arup
Name and location of European Site:	North Meadow and Clattinger Farm SAC, Gloucestershire, England UK	
Description of the project:	<ul style="list-style-type: none"> • Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417. • Provision of a new crossing near Emma's Grove. • Provision of a new junction at Shab Hill. • Provision of a new 37m wide multi-purpose crossing north of Shab Hill. • Provision of a new junction would be included near Cowley. • The Existing A417 would be detrunked for its entire length. • A more detailed description of the scheme is provided in Section 1.2 of this report. • The scheme is shown on Appendix B European designated sites plan. 	
Is the project directly connected with or necessary to the management of the site (provide details):	No	
Are there other projects or plans that together with the project being assessed could affect the site (provide details):	None	
The assessment of significance of effects		
Describe how the project (alone or in combination) is likely to affect the European Site:	There will be no change in nitrogen deposition as a result of the scheme during operation, and no other effects are anticipated such as recreational pressure given the distance of the site from the scheme.	
Explain why these effects are not considered significant:	No effects upon the habitats for which the SAC is designated are identified.	
List of agencies consulted: provide contact name and telephone or e-mail address	Hayley Fleming from Natural England provided comments on the draft HRA for the scheme on 21 January 2021 and agreed with the conclusion to screen North Meadow and Clattinger Farm SAC out of further assessment. [REDACTED]	
Response to consultation:	No further consultation required.	
Data collected to carry out the assessment		
Who carried out the assessment?	Livvy Cropper, Alys Black and Luke Casey (Arup)	
Sources of data	Natura 2000 sites map (https://natura2000.eea.europa.eu/), JNCC (https://sac.jncc.gov.uk/), Natural England (https://designatedsites.naturalengland.org.uk/)	
Level of assessment completed	HRA Screening	
Where can the full results of the assessment be accessed and viewed?	Table 3 Screening Matrix: North Meadow and Clattinger Farm SAC of this report.	

Table D-3 Severn Estuary SAC No LSE Report

Project name:	A417 Missing Link	
European Site under consideration:	Severn Estuary SAC	
Date	Author (Name/Organisation):	Verified (Name/Organisation):
07/03/2021	Livvy Cropper/ Arup	Luke Casey/ Arup
Name and location of European Site:	Severn Estuary SAC, Gloucestershire, England UK	
Description of the project:	<ul style="list-style-type: none"> • Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417. • Provision of a new crossing near Emma's Grove. • Provision of a new junction at Shab Hill. • Provision of a new 37m wide multi-purpose crossing north of Shab Hill. • Provision of a new junction would be included near Cowley. • The Existing A417 would be detrunked for its entire length. • A more detailed description of the scheme is provided in Section 1.2 of this report. • The scheme is shown on Appendix B European designated sites plan. 	
Is the project directly connected with or necessary to the management of the site (provide details):	No	
Are there other projects or plans that together with the project being assessed could affect the site (provide details):	No	
The assessment of significance of effects		
Describe how the project (alone or in combination) is likely to affect the European Site:	There will be no change in water quality and no loss of or fragmentation of habitats within the SAC. There will be no significant effects to the migratory fish assemblage within the Severn catchment.	
Explain why these effects are not considered significant:	The affected reach of Norman's Brook, approximately 1.1km in length, represents a small proportion of the River Severn catchment which eel may utilise, approximately 0.0005% of the total catchment. As such the any potential reduction of functional habitat for eel is concluded to be negligible.	
List of agencies consulted: provide contact name and telephone or e-mail address	Hayley Fleming from Natural England provided comments on the draft HRA for the scheme on 21 January 2021 and agreed with the conclusion to screen Severn Estuary SAC/Ramsar out of further assessment [REDACTED]	
Response to consultation:	No further consultation required.	
Data collected to carry out the assessment		
Who carried out the assessment?	Simon Fleming (Arup)	
Sources of data	Natura 2000 sites map (https://natura2000.eea.europa.eu/), JNCC (https://sac.jncc.gov.uk/), Natural England (https://designatedsites.naturalengland.org.uk/)	
Level of assessment completed	HRA Screening	
Where can the full results of the assessment be accessed and viewed?	Table 4 Screening Matrix: Severn Estuary SAC of this report.	

Table D-4 Severn Estuary Ramsar No LSE Report

Project name:	A417 Missing Link	
European Site under consideration:	Severn Estuary Ramsar	
Date	Author (Name/Organisation):	Verified (Name/Organisation):
07/03/2021	Livvy Cropper/ Arup	Luke Casey/ Arup
Name and location of European Site:	Severn Estuary Ramsar, Gloucestershire, England UK	
Description of the project:	<ul style="list-style-type: none"> • Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417. • Provision of a new crossing near Emma's Grove. • Provision of a new junction at Shab Hill. • Provision of a new 37m wide multi-purpose crossing north of Shab Hill. • Provision of a new junction would be included near Cowley. • The Existing A417 would be detrunked for its entire length. • A more detailed description of the scheme is provided in Section 1.2 of this report. • The scheme is shown on Appendix B European designated sites plan. 	
Is the project directly connected with or necessary to the management of the site (provide details):	No	
Are there other projects or plans that together with the project being assessed could affect the site (provide details):	None	
The assessment of significance of effects		
Describe how the project (alone or in combination) is likely to affect the European Site:	There will be no change in water quality and no loss of or fragmentation of habitats within the Ramsar site. There will be no significant effects to the migratory fish assemblage within the Severn catchment.	
Explain why these effects are not considered significant:	The affected reach of Norman's Brook, approximately 1.1km in length, represents a small proportion of the River Severn catchment which eel may utilise, approximately 0.0005% of the total catchment. As such the any potential reduction of functional habitat for eel is concluded to be negligible.	
List of agencies consulted: provide contact name and telephone or e-mail address	Hayley Fleming from Natural England provided comments on the draft HRA for the scheme on 21 January 2021 and agreed with the conclusion to screen Severn Estuary SAC/Ramsar out of further assessment. [REDACTED]	
Response to consultation:	No further consultation required.	
Data collected to carry out the assessment		
Who carried out the assessment?	Simon Fleming (Arup)	
Sources of data	Natura 2000 sites map (https://natura2000.eea.europa.eu/), JNCC (https://sac.jncc.gov.uk/), Natural England (https://designatedsites.naturalengland.org.uk/)	
Level of assessment completed	HRA Screening	
Where can the full results of the assessment be accessed and viewed?	Table 5 Screening Matrix: Severn Estuary Ramsar of this report.	

Table D-5 Severn Estuary SPA No LSE Report

Project name:	A417 Missing Link	
European Site under consideration:	Severn Estuary Ramsar	
Date	Author (Name/Organisation):	Verified (Name/Organisation):
07/03/2021	Alys Black/ Arup	Luke Casey/ Arup
Name and location of European Site:	Severn Estuary SPA, Gloucestershire, England UK	
Description of the project:	<ul style="list-style-type: none"> • Provision of 3.4 miles (5.5km) of new, rural all-purpose dual carriageway for the A417. • Provision of a new crossing near Emma's Grove. • Provision of a new junction at Shab Hill. • Provision of a new 37m wide multi-purpose crossing north of Shab Hill. • Provision of a new junction would be included near Cowley. • The Existing A417 would be detrunked for its entire length. • A more detailed description of the scheme is provided in Section 1.2 of this report. • The scheme is shown on Appendix B European designated sites plan. 	
Is the project directly connected with or necessary to the management of the site (provide details):	No	
Are there other projects or plans that together with the project being assessed could affect the site (provide details):	None	
The assessment of significance of effects		
Describe how the project (alone or in combination) is likely to affect the European Site:	There will be no change in water quality and no loss of or fragmentation of habitats within the SPA site.	
Explain why these effects are not considered significant:	The affected reach of Norman's Brook, approximately 1.1km in length, represents a small proportion of the River Severn catchment which eel may utilise, approximately 0.0005% of the total catchment. As such the any potential reduction of functional habitat for eel is concluded to be negligible.	
List of agencies consulted: provide contact name and telephone or e-mail address	Hayley Fleming from Natural England provided comments on the draft HRA for the scheme on 21 January 2021 and agreed with the conclusion to screen the European site out of further assessment. [REDACTED]	
Response to consultation:	No further consultation required.	
Data collected to carry out the assessment		
Who carried out the assessment?	Alys Black (Arup)	
Sources of data	Natura 2000 sites map (https://natura2000.eea.europa.eu/), JNCC (https://sac.jncc.gov.uk/), Natural England (https://designatedsites.naturalengland.org.uk/)	
Level of assessment completed	HRA Screening	
Where can the full results of the assessment be accessed and viewed?	Table 6 Screening Matrix: Severn Estuary SPA of this report.	

Appendix E AADT traffic changes

Table E-1 North Meadow and Clattinger Farm SAC AADT Traffic Changes

Traffic changes: 2024

A Q ID	Base, DM, DS IDs	DM AADT	Speed bands																				
			DM AM	DM IP	DM PM	DM OP	DS AADT	DS AM	DS IP	DS PM	DS OP	AADT Change	DM AADT	DM AM	DM IP	DM PM	DM OP	DS AADT	DS AM	DS IP	DS PM	DS OP	
92	65376_65508- Base, DM, DS	23,602	5,704	9,390	5,946	4,339	25,861	6,285	10,471	6,467	4,585	2,259	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed
110	65498_62953	24,363	6,135	9,163	5,835	5,064	26,167	6,592	9,822	6,300	5,423	1,804	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed	High Speed

Combined AADT change of both roads: 4,063

Table E-2 Cotswold Beechwoods SAC AADT Traffic Changes

Traffic changes: 2024

A Q ID	Base, DM, DS IDs	DM AADT	Speed bands																				
			DM AM	DM IP	DM PM	DM OP	DS AADT	DS AM	DS IP	DS PM	DS OP	AADT Change	DM AADT	DM AM	DM IP	DM PM	DM OP	DS AADT	DS AM	DS IP	DS PM	DS OP	
195	26024_26023 Base, DM, DS	7,159	1,973	2,687	2,300	738	3,063	940	1,065	900	388	-4,158	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow

Combined AADT change of both roads: -4,096

Appendix F Air quality modelling results

Table F-1 Air quality modelling results

Receptor ID	Site name	Critical load	Nitrogen deposition (kg N ha ⁻¹ yr ⁻¹)			
			Baseline	2026 DM	2026 DS	Change
EA1	Cotswold Commons and Beechwoods	10-20	32.2	32.5	31.4	-1.1
EA2	Cotswold Commons and Beechwoods	10-20	30.5	30.7	30.4	-0.3
EA3	Cotswold Commons and Beechwoods	10-20	30.2	30.4	30.2	-0.2
EA4	Cotswold Commons and Beechwoods	10-20	30.1	30.2	30.1	-0.1
EA5	Cotswold Commons and Beechwoods	10-20	30.0	30.2	30.1	-0.1
EA6	Cotswold Commons and Beechwoods	10-20	29.9	30.1	30.0	-0.1
EA7	Cotswold Commons and Beechwoods	10-20	29.9	30.1	30.0	-0.1
EA8	Cotswold Commons and Beechwoods	10-20	29.9	30.0	30.0	-0.1
EA9	Cotswold Commons and Beechwoods	10-20	29.8	30.0	30.0	-0.1
EA10	Cotswold Commons and Beechwoods	10-20	29.8	30.0	30.0	0.0
EA11	Cotswold Commons and Beechwoods	10-20	29.8	30.0	29.9	0.0
EA12	Cotswold Commons and Beechwoods	10-20	29.8	30.0	29.9	0.0
EA13	Cotswold Commons and Beechwoods	10-20	29.8	30.0	29.9	0.0
EA14	Cotswold Commons and Beechwoods	10-20	29.8	29.9	29.9	0.0
EA15	Cotswold Commons and Beechwoods	10-20	29.7	29.9	29.9	0.0
EA16	Cotswold Commons and Beechwoods	10-20	29.7	29.9	29.9	0.0
EA17	Cotswold Commons and Beechwoods	10-20	29.7	29.9	29.9	0.0
EA18	Cotswold Commons and Beechwoods	10-20	29.7	29.9	29.9	0.0
EA19	Cotswold Commons and Beechwoods	10-20	29.7	29.9	29.9	0.0
EA20	Cotswold Commons and Beechwoods	10-20	29.7	29.9	29.9	0.0
EA21	Cotswold Commons and Beechwoods	10-20	29.7	29.9	29.9	0.0
EN1	North Meadow, Cricklade	20-30	19.5	19.5	19.6	0.02
EN2	North Meadow, Cricklade	20-30	19.4	19.5	19.5	0.02
EN3	North Meadow, Cricklade	20-30	19.4	19.5	19.5	0.02
EN4	North Meadow, Cricklade	20-30	19.4	19.4	19.5	0.02
EN5	North Meadow, Cricklade	20-30	19.3	19.4	19.4	0.02
EN6	North Meadow, Cricklade	20-30	19.3	19.4	19.4	0.02
EN7	North Meadow, Cricklade	20-30	19.3	19.4	19.4	0.01
EN8	North Meadow, Cricklade	20-30	19.3	19.4	19.4	0.01
EN9	North Meadow, Cricklade	20-30	19.3	19.3	19.3	0.01
EN10	North Meadow, Cricklade	20-30	19.2	19.3	19.3	0.01
EN11	North Meadow, Cricklade	20-30	19.2	19.3	19.3	0.01
EN12	North Meadow, Cricklade	20-30	19.2	19.3	19.3	0.01
EN13	North Meadow, Cricklade	20-30	19.2	19.3	19.3	0.01
EN14	North Meadow, Cricklade	20-30	19.2	19.3	19.3	0.01
EN15	North Meadow, Cricklade	20-30	19.2	19.3	19.3	0.01
EN16	North Meadow, Cricklade	20-30	19.2	19.3	19.3	0.01
EN17	North Meadow, Cricklade	20-30	19.2	19.2	19.3	0.01

Receptor ID	Site name	Critical load	Nitrogen deposition (kg N ha ⁻¹ yr ⁻¹)			
			Baseline	2026 DM	2026 DS	Change
EN18	North Meadow, Cricklade	20-30	19.2	19.2	19.2	0.01
EN19	North Meadow, Cricklade	20-30	19.2	19.2	19.2	0.01
EN20	North Meadow, Cricklade	20-30	19.2	19.2	19.2	0.01
EN21	North Meadow, Cricklade	20-30	19.1	19.2	19.2	0.01