A47 North Tuddenham to Easton Dualling

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6.9 Report to Inform Habitats Regulations Assessment

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REPORT TO INFORM HABITATS REGULATIONS ASSESSMENT

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1. Introduction

1.1. Proposed Scheme Background

1.1.1. The Proposed Scheme for the A47 North Tuddenham to Easton dualling (hereafter referred to as the 'Proposed Scheme') is part of a package of projects to improve journeys on the 185km section of the A47 between Peterborough and Great Yarmouth. Together, the proposals will relieve congestion, improve safety and improve the reliability of journey times for drivers.The proposals include converting single carriageway to dual carriageway and making improvements to junctions across the A47 corridor.

1.1.2. As the Applicant, Highways England is proposing to improve approximately 7.9km of the A47 between North Tuddenham and Easton. The promoter and applicant of the A47 from North Tuddenham to Easton to dual carriageway (now referred to as the 'Proposed Scheme') is Highways England, a government company charged with operating, maintaining and improving England's motorways and major A roads.

1.1.3. The area surrounding the Proposed Scheme is predominantly arable land enclosed by winding country lanes and hedgerows, with pockets of ancient woodland and remnant heath cut through by pastoral river valleys. The broadly flat, rural landscape is an ancient countryside with a long-settled agricultural character. The eastern extents are more gently undulating relative to the broadly flat landscape of the western extents.

1.1.4. In April 2020, the Department of Transport (DfT) published the Road Investment Strategy 2 (RIS2) for 2020-2025. The RIS2 sets out the list of schemes that are to be developed by Highways England over the period covered by the RIS, including the A47 North Tuddenham to Easton dualling.

1.1.5. Highways England, as the strategic highways company and appointed by the Secretary of State must, in exercising its functions and complying with its legal duties and other obligations, act in a manner which it considers best calculated to, among others:

- Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment.
- Conform to the principles of sustainable development.

1.1.6. Key elements of the Proposed Scheme (as shown in Figure 1 (**TR010038/APP/6.9**)) include:

- 9km of new dual carriageway, running to the south of the existing A47 at Hockering and north of the existing A47 at Honingham
- two new junctions where the A47 passes over the local roads: one where Berrys Lane meets Wood Lane (Wood Lane junction) and one where Blind Lane meets Taverham Road (Norwich Road junction)
- removal of the existing roundabout at Easton to create a free-flowing road
- building four bridges for the A47 to pass over or under: the new Mattishall Lane Link Road, the proposed Wood Lane junction, the River Tud and the proposed Norwich Road junction
- Sandy Lane connecting to the A47 via a new side road providing access to Wood Lane junction
- two new lay-bys on the A47, between Fox Lane and the proposed Wood Lane junction, and police observation points
- closure to through traffic of: Church Lane (East Tuddenham), Berrys Lane, Blind Lane and Church Lane (Easton), north the of A47
- widening of the junction of Rotten Row and Church Lane (East Tuddenham)
- converting sections of the existing A47 for local needs, such as
  - converting to a Class B road north of Honigham, with a new cycle track between and the new Dereham Road link road and Honingham roundabout
  - reducing to a single lane in front of St Andrews church, Honingham, with inclusion of passing places, parking places, turning area and security gate
- alterations to existing public rights of way and provision of new segregated routes for walkers and cyclists, including:
  - a new route for walkers and cyclists linking Honingham with St Andrew's Church below the A47 via the proposed Honigham church underpass
  - a new route for walkers and cyclists linking Easton with Lower Easton over the A47 via the proposed Easton footbridge
- new drainage systems, including:
  - new outfalls to the River Tud
  - dry culverts to maintain overland flow paths
  - new attenuation basins, with pollution control devices, to control discharges to local watercourses
- compounds, material storage areas and temporary vehicle parking located within the scheme boundary when construction is taking place
- diverting or installing new utilities infrastructure, such as a high pressure gas pipeline, electricity cables, water pipelines and electronic communications cables

- environmental measures embedded into the Scheme design to reduce the environmental effects and deliver wider benefits, such as noise barriers, low noise road surfaces, permanent mammal crossings and new wetland habitats
- temporary closure of access (exit and entry) to Honingham Lane at the junction with Taverham Road, Weston Road and Telegraph Hill

1.1.7. An application for a Development Consent Order (DCO) for the Proposed Scheme is to be submitted by Highways England under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This report has been prepared in accordance with the Conservation of Habitats and Species Regulations 2017 (as amended) to present information to inform the Habitats Regulations Assessment that will be undertaken by the Secretary of State when determining the DCO application.

1.2. The Habitats Regulations

1.2.1. The Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna ('Habitats Directive') is transposed into English law by The Conservation of Habitats and Species Regulations 2017 (as amended) (hereafter referred to as 'The Habitats Regulations').

1.2.2. Part II, Paragraph 12 of The Conservation of Habitat and Species Regulations 2017 (England and Wales) provides a definition of the term "European Site" which it identifies as including Special Areas of Conservation (SAC) and Special Protection Areas (SPA) as well as candidate / proposed sites (cSAC and pSPA) which are being consulted on or are pending a European Commission decision. However, the Habitats Regulations do not provide statutory protection for pSPAs or to cSACs before they are agreed with the European Commission.

1.2.3. The Habitats Regulations set out the process that must be followed where an application for development consent may have effect on a site of nature conservation importance if a 'European site', hereon referred to as a site within the National Site Network (NSN).

1.2.4. For the purpose of this assessment, NSN sites include: Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Community Importance (SCI), European Marine Sites (EMS) and Wetlands of International Importance designated under the Ramsar Convention (known as Ramsar sites). These also include candidate and possible sites (cSACs and pSACs) as if they have already been classified or designated.

1.2.5. SAC are high-quality conservation sites that have been given strict protection under the Habitats Regulations to conserve rare and vulnerable animals, plants

and habitats (excluding birds) that are listed in Annexes I and II of the Habitats Directive (as amended), which have since been written into the Habitats Regulations.

1.2.6. SPA are strictly protected sites that have been implemented to protect rare and vulnerable bird species and their populations that are listed in Annexes I and II of the Birds Directive, which have since been written into the Habitats Regulations.

1.2.7. EMS are marine areas protected as SACs or SPAs often managed through underlying Site of Special Scientific Interest (SSSI) or Areas of Special Scientific Interest (ASSI). These areas range from subtidal to intertidal and can comprise the entire SAC or SPA or only part of it.

1.2.8. Under Regulation 63 of the Habitats Regulations '*any plan or scheme not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or schemes, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or scheme only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*'.

1.2.9. Ramsar sites are wetlands of international importance that have been designated under the Ramsar Convention (1971). Sites are selected for their international significance relating to all ecology, botany, zoology, limnology or hydrology wetland components. The designation recognises the importance of wetlands as economic, social and environmental entities and the need to conserve them. Any activity that may have significant effects on a Ramsar site requires an Appropriate Assessment. Therefore, they are also considered in this screening assessment.

1.2.10. It is UK Government policy that Ramsar sites are afforded the same level of protection as Natura 2000 sites and so are referred to alongside SAC and SPA sites within this report as NSN sites.

1.2.11. Sites contained within the NSN are designated for both Annex I habitat features and Annex II species. Conservation objectives and targets relate to maintaining the integrity of these features.

2. Habitats Regulations Assessment Methodology

2.1.1. The methodology for producing this Screening report for the Proposed Scheme follows guidance from Planning Inspectorate Advice Note 10 in order for a Habitats Regulations Assessment (HRA) to be undertaken. However, the Design Manual for Roads and Bridges (DMRB) LA 115 Habitats Regulationsassessment (Revision 1) standards have also been adopted to aid the production of this Screening report.

2.1.2. Stage 1 Screening – determines whether a plan or the Proposed Scheme, either alone or in combination with other plans or schemes, is likely to have a significant effect upon a site within the NSN. If the screening process identifies effects to be significant, potentially significant or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2. The process should apply the precautionary principle to ascertain if significant effects are likely. For Stage 1, Planning Inspectorate Advice Note 5 (Ref: 5.1.24) is used in conjunction with Planning Inspectorate Advice Note 10.

2.1.3. Stage 2 Appropriate Assessment – considers the impact on the integrity of sites within the NSN of the Proposed Scheme or plan either alone or in combination with other plans or schemes with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, it assesses the potential mitigation for those impacts.

2.1.4. Stage 3 Assessment where no Alternative Solutions exist and where adverse effects remain – assesses compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the plan or scheme should proceed.

2.1.5. Each stage determines whether the next stage in the process is required, if for example, it is concluded that at the end of Stage 1 there will be no significant effects on sites within the NSN, there is no requirement to proceed to Stage 2.

2.1.6. On the 12 April 2018, a precedent was set by a decision made by the Court of Justice of the European Union (CJEU) in the case of People Over Wind and Sweetman v Coillte Teoranta (C-323/17). The CJEU issued a judgement which ruled that Article 6(3) of the Habitats Directive must be interpreted as meaning that mitigation measures (referred to in the judgment as measures which are intended to avoid or reduce effects) should be assessed within the framework of Appropriate Assessment. As such it is now not permissible to take account of measures intended to avoid or reduce the harmful effects of the plan or project on a European Site at the screening stage. As a consequence, this Screening

report does not take into account mitigation measures, including aspects such as timing restrictions.

2.1.7. This Screening report has been written to support the Environmental Statement (ES) Chapter 8 (Biodiversity (**TR010038/APP/6.1**)), which has been written as part of the Environmental Impact Assessment (EIA). EIA can be defined as an assessment of those consequences of a major project which affect the natural, built and social environment. The Infrastructure Planning (EIA) Regulations 2017 (the EIA Regulations) require an assessment of the effects of certain public and private projects, which are likely to have significant effects on the environment, before development is granted.

2.1.8. The ES is a key part of the application documents submitted by Highways England in support of the DCO application for the Proposed Scheme. The overall purpose of the ES is to provide the Planning Inspectorate, members of the public, statutory consultees with information on the predicted effects of the proposed scheme and to provide stakeholders with an opportunity to provide additional information and comments. All of this is environmental information that the Secretary of State must then take into account before determining the application for the DCO.

2.1.9. The Planning Inspectorate has issued guidance to applicants for DCO in Advice Note 10: Habitats Regulations Assessment relevant to nationally significant infrastructure projects. Advice Note 10 states that when preparing applications for Nationally Significant Infrastructure Projects (NSIPs) under the Planning Act 2008 (as amended), the potential effects upon protected habitats must be considered.

2.1.10. If an NSIP, when taken alone or with existing and known future projects, is likely to affect a European Site, the applicant must provide a report with the application showing the sites that may be affected together with sufficient information to enable the competent authority to make an appropriate assessment, if required.

2.2. Guidance and standards

2.2.1. The screening assessment process which has been used for the production of this Screening report is set out in Planning Inspectorate Advice Note 10, and the Screening matrices are provided in Appendix C of this report.

2.2.2. In addition, screening matrices to satisfy the standards set out in DMRB LA 115 are provided in tabular format in Appendix A of this report.

Determination of connection with site management

2.2.3. This Screening report will assess whether the works are connected with or necessary to the management of an NSN site.

2.2.4. Such works should include those that are:

1) for conservation purposes;

2) management which is 'directly connected with or necessary' to the site; and

3) solely conceived for the conservation management of a site and not direct or indirect consequences of other activities.

2.2.5. The A47 North Tuddenham to Easton Dualling Scheme does not fit any of the above criteria.

Examination of the nature of proposed works

2.2.6. The HRA screening assessment shall include a full description of the proposed works including the programme of works.

2.2.7. The description of the project shall not include mitigation measures that are introduced to avoid harm to the NSN site or to avoid likely significant effects (LSE), but does include embedded elements of design and construction to comply with statutory standards set out by the Environment Agency and Water Framework Directive.

Identification of potential effects on NSN sites

2.2.8. The HRA screening assessment shall include all NSN sites that meet any of the following screening criteria, namely that the development:

1) is within 2km of an NSN site or functionally linked land[1];

2) is within 30km of a SACs, where bats are noted as one of the qualifying interests;

3) crosses or lies adjacent to, upstream of, or downstream of, a watercourse which is designated in part or wholly as a NSN site;

[1] Effect pathways on qualifying interests that are mobile species can extend to land occupied outside of the designated site boundary this is defined as functionally linked land

4) has a potential hydrological or hydrogeological linkage to a NSN site containing a groundwater dependent terrestrial ecosystem (GWDTE) which triggers the assessment of NSN sites in accordance with DMRB LA 113 (Road drainage and the water environment (Revision 1));

5) has an affected road network (ARN) which triggers the criteria for the assessment of NSN sites HA 207 07 (DMRB LA 105 Air quality (Revision 0)).

2.2.9. For the purposes of HRA, where the established risk to GWDTE is assessed to be above negligible, further assessment in accordance with DMRB LA 113 may be required.

2.2.10. Additional NSN sites should be subject to screening where the existence of ecological connectivity between the project and NSN sites is identified beyond the screening criteria above.

Reporting the outcomes of screening

2.2.11. The screening stage of HRA shall be reported within an HRA Screening report which will include completed screening matrices for all NSN sites which meet the screening criteria.

2.2.12. Screening matrices shall set out the conclusion that either:

- there is an absence of LSE; or
- there are LSE.

2.2.13. Where the screening assessment concludes that significant effects are likely (alone or in combination) or that sufficient uncertainty remains then further HRA shall be undertaken and reported in the form of a Statement to Inform Appropriate Assessment (SIAA).

2.2.14. This assessment has been completed using the following standards:

- DMRB LA 115 ‘Habitats Regulations assessment’ Revision 1 (formerly DMRB Volume 11, section 4, part 1 HD44/09 Assessment of Implications (of Highways and/or Roads Schemes) on European Sites (including Appropriate Assessment)) (Ref 5.1.8)

2.2.15. In addition, this assessment has been completed using the following guidance:

- The UK Government’s guidance on the use of the Habitats Regulations Assessment
- The Habitats Regulations Assessment Handbook (Ref 5.1.9)

- The European Commission Managing Natura 2000 sites (the Provisions of Article 6 of the Habitats Directive 92/43/EEC (Ref 5.1.13)).

2.2.16. In addition, Appendix C of this report incorporates guidance set out in Planning Inspectorate Advice Note 10 November 2017 Version 8 (Ref: 5.1.25) and includes the Stage 1 screening matrices which sets out the findings of the DMRB process into the Planning Inspectorate format.

2.2.17. The Planning Inspectorate has issued guidance to applicants for Development Consent Orders in Planning Inspectorate (Advice Note 10: Habitats Regulations Assessment (Ref 5.1.25)) relevant to nationally significant infrastructure projects. The Planning Inspectorate Advice Note 10 states that when preparing applications for Nationally Significant Infrastructure Projects (NSIPs) under the Planning Act 2008 (as amended), the potential effects upon protected habitats must be considered.

2.2.18. If an NSIP, when taken alone or with existing and known future projects, is likely to affect an internationally designated site within the National Site Network (NSN), which includes site such as SACs, SPAs and Ramsar sites, the applicant must provide a report with the application showing the sites that may be affected together with sufficient information to enable the competent authority to make an appropriate assessment, if required.

2.2.19. As required in the Planning Inspectorate Advice Note 10, this Screening report comprises a Stage 1 screening assessment to ascertain whether the Proposed Scheme is likely to have a significant effect on qualifying features of any NSN site either alone or in-combination with other plans and projects. If Stage 1 identifies significant effects that cannot be excluded on the basis of objective information, then a plan or scheme should be considered to have a likely significant effect and taken through to Stage 2 Appropriate Assessment (AA).

2.2.20. As explained in the Planning Inspectorate Advice Note 10, Habitats Regulations Assessment, a set of matrices has been developed to assist the Secretary of State, as the Competent Authority in fulfilling the requirements of the Habitats Directive and the Habitats Regulations in the context of the 2008 Act process. The matrices are intended to clearly present the outcomes at each stage of the process in a standardised tabular form for the benefit of all those involved in the application and examination. The matrices in Appendix C of this Screening report contain the combined outcomes of the process for both the Proposed Scheme and other projects within the Zone of Influence anticipated to result in likely significant effects that would require additional mitigation in response to cumulative effects.

2.2.21. The matrices comprise:

- Screening Matrices (HRA Stage 1: Screening) - which summarise the screening exercise for Likely Significant Effects of the Proposed Scheme on the European Sites and qualifying features considered.

2.3. Assumptions

2.3.1. Construction is likely to commence in approximately January 2023 and occur for the duration of 23 months.

3. Stage 1 screening results

3.1. Background

3.1.1. In May 1992 European Union member states adopted legislation designed to protect the most seriously threatened habitats and species across Europe.

3.1.2. The legislation that protects these sites in the UK is the Conservation of Habitats and Species Regulations 2017 (as amended). Special Protection Areas (SPAs) are protected for for rare and vulnerable bird species and Special Areas of Conservation (SACs) are designated for threated habitats and species. Sites that are approved by the Government and are in the process of being classified – known as candidate Special Areas of Conservation (cSAC) and potential Special Protection Areas (pSPA) are afforded the same level of protection.

3.1.3. Together, SPAs, pSPAs, SACs and cSACs make up the National Site Network (NSN).

3.1.4. In the UK it is government policy that wetlands of international importance - Ramsar sites - are also considered in the Habitats Regulations Assessment process.

3.2. Stage 1 screening: alone

Study area

3.2.1. A study area of 2km from the DCO boundary of the Proposed Scheme was used to identify international sites likely to be affected. A study area of 30km from the Proposed Scheme DCO boundary was used to identify international sites designated for bats. These study areas comply with the definitions provided in DMRB LA 115 (Habitats Regulations Assessment (formerly HD 44/09)) as stated: '*The screening stage of HRA shall be completed for all European sites where a route corridor or project meets any of the following screening criteria:*

- *Is within 2km of a European site or functionally linked land.*
- *Is within 30km of a SACs, where bats are noted as one of the qualifying interests.*
- *Crosses or lies adjacent to, upstream of, or downstream of, a watercourse which is designated in part or wholly as a European site.*
- *Has a potential hydrological or hydrogeological linkage to a European site containing a groundwater.*
- *Dependent terrestrial ecosystem (GWDTE) which triggers the assessment of European sites in accordance with LA 113.*

- *Has an affected road network (ARN) which triggers the criteria for assessment of European sites LA 105.'*

3.2.2. A desk study was undertaken using Multi-Agency Geographic Information for the Countryside (MAGIC) maps to identify any sites within the NSN that could be affected, according to the guidance in section 2.2. From this, it was determined that there is potential for effects pathways to the River Wensum SAC.

3.2.3. Further information on the designated site including the baseline status of the site's features, vulnerabilities and management plans have been derived from documents contained on the Joint Nature Conservation Committee and Natural England websites. This has included the following sources:

- Site Improvement Plan – River Wensum
- River Wensum restoration strategy
- River Wensum SSSI – Exemplar Diffuse Water Pollution Plan and Action Plan
- Paston Great Barn - Site Improvement Plan

3.2.4. The River Wensum SAC is located 1.6km to the north-east of the Proposed Scheme DCO boundary. While this site does not lie within the route corridor, there is potential for effect pathways to exist between the route corridor and the River Wensum SAC through diffuse pollution and changes in drainage affecting watercourses that flow into the River Tud. The downstream confluence of the River Tud and River Wensum is located approximately 7.3km east of the site at its closest extent. The confluence is located at the easternmost unit of the SAC/SSSI (Unit 54) at Hellesdon Mill on the outskirts of Norwich. All further units within the SAC/SSSI are located upstream of this confluence.

3.2.5. Paston Great Barn is located approximately 29.3km north of the Proposed Scheme DCO boundary. The site is designated for a large maternity population of the barbastelle bat *Barbastella barbastellus*, and, whilst this site is far away from the Proposed Scheme, there is potential for effect pathway to exist between the Proposed Scheme, and commuting routes for individual bats that may be part of the population within the SAC.

3.2.6. Appendix D of this Screening report contains a map showing the designated site within the study area.

River Wensum SAC

3.2.7. The River Wensum SAC is a watercourse covering an area of 306.79ha and is also designated as a SSSI. The SAC is recognised as one of the most important

chalk river habitats in the county with over 100 plant species and a rich range of invertebrate fauna.

3.2.8. The overarching conservation objectives for the site are 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;

- the extent and distribution of qualifying natural habitats and habitats of qualifying species;
- the structure and function (including typical species) of qualifying natural habitats;
- the structure and function of the habitats of qualifying species;
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- the populations of qualifying species; and
- the distribution of qualifying species within the site.

3.2.9. According to the latest condition monitoring, the overall River Wensum SAC/ SSSI is considered to be 11% favourable, 47.7% unfavourable – recovering, and 41.25% unfavourable – no change. No river units of the River Wensum are currently in a favourable condition. Unit 54 has been assessed as being in unfavourable condition due to the adverse condition of water pollution from agriculture or runoff, this unfavourable assessment includes all European features present.

3.2.10. A summary of the interest features and their baseline status' have been detailed in Table 3-1 below.

Table 3-1: Interest Features of the River Wensum SAC

Interest Features	Description	Status (Unit level)
Annex I habitats that are a primary reason for selection of this site:		
Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation.	This feature is **present within unit 54 of the River Wensum SAC** comprising *Ranunculus* vegetation variant CB1; Eutrophic lowland river community covering JNCC River types 1a-c & IIa. The present adverse condition of this feature results from a wide range of cited reasons, including the form and function of the river. The feature is particularly sensitive to sedimentation and water quality impacts.	**Unfavourable – no change**.
Annex II species that are a primary reason for selection of this site:		

Interest Features	Description	Status (Unit level)
White-clawed crayfish (*Austropotamobius pallipes*)	This feature is **present within unit 54 of the River Wensum SAC/SSSI**. Consultation with Norfolk Biodiversity Information Service provided historic records of white-clawed crayfish populations, although signal crayfish are known to be present within this section of the SAC. The presence of signal crayfish and crayfish plague is a threat to the white-clawed crayfish and native fish species. Signal crayfish also impact on in-stream macrophytes and damage river banks. White-clawed crayfish are also sensitive to sedimentation impacts, due to the blocking of gravels which they require for refuge, and also to water quality iimpacts. Aquatic Invertebrate surveys undertaken in conjunction with the Proposed Scheme (outside of the SAC) identified a single white-clawed crayfish specimen in the River Tud at TG 0672 11276 in 2019 as an incidental result. This was found amongst several signal crayfish individuals. Targeted white-clawed crayfish surveys were undertaken in 2019 with no white-clawed crayfish found. In 2017 surveys did identify a small population, however, a large number (60+) of white-clawed crayfish are thought to have been translocated from the area in 2018 to a safe Ark site. It is considered likely that the native crayfish population has now been lost from this stretch of the river.	**Unfavourable – no change**
Annex II species present as a qualifying feature, but not a primary reason for selection		
Desmoulin's whorl snail (*Vertigo moulinsiana*)	This feature is **present within unit 54 of the River Wensum SAC/SSSI**. Consultation with Norfolk Biodiversity Information Service provided and one recent record of Desmoulin's whorl snail. Populations of Desmoulin's whorl snail in East Anglia represent a stronghold for this species. The species is listed on Annex II of the European Habitats Directive, detailed within the British Red Data Book as a rare species and are also included on Section 41 of the NERC Act 2006 as a priority species in England. Their range is dependent on suitable bordering riparian habitat which is sensitive to sedimentation and changes in water quality. Aquatic Invertebrate surveys undertaken in conjunction with the Proposed Scheme in 2017 and 2019 (outside of the SAC) did not identify any suitable habitat onsite for Desmoulin's whorl snail.	**Unfavourable – no change**
Brook lamprey (*Lamptera planeri*)	Brook lamprey have been recorded historically in the River Wensum and are considered to be stronghold populations for this species, however their **presence in the relevant SSSI unit is unconfirmed. As a precaution, this species have been presumed to be present** downstream of the River Tud and Wensum confluence. This species is listed on Annex II and V of the Habitats Directive and is a Species of Principal Importance in the UK (NERC Act 2006, Section 41) and is particularly impacted by sedimentation, increased vibration and decreasing water quality which can impact survival rates. Aquatic Invertebrate surveys undertaken in conjunction with the Proposed Scheme in 2017 and 2019.No brook lamprey were noted in the River Tud or its tributaries during surveys undertaken for the Proposed Scheme (surveys undertaken outside of the SAC).	**Unfavourable – no change**
Bullhead (*Cottus gobio*)	Bullhead found relatively commonly in rivers across Norfolk. They have been recorded historically in the River Wensum and are considered to be stronghold populations for this species, however their **presence in the relevant SSSI unit is unconfirmed. As a precaution, this species have been presumed to be present** downstream of the River Tud and Wensum confluence. This species is listed on Annex II and V of the Habitats Directive and is a Species of Principal Importance in the UK (NERC Act 2006, Section 41)	**Unfavourable – no change**.

Interest Features	Description	Status (Unit level)
	and is particularly impacted by sedimentation, increased vibration and decreasing water quality which can impact survival rates. Aquatic Invertebrate surveys undertaken in conjunction with the Proposed Scheme in 2017 and 2019 . Populations of bullhead were identified during surveys undertaken as part of the Proposed Scheme at TG 0672 11276 and TG 1203 1137.	

3.2.11. The River Wensum SAC is located 1.6km to the north-east of the Proposed Scheme DCO boundary. A potential effect pathway exists onsite through the River Tud, which is a tributary of the River Wensum. The confluence of the River Tud and River Wensum downstream is located approximately 7.3km east of the site at its closest extent.

Paston Great Barn SAC

Site description

3.2.12. Paston Great Barn SAC is approximately 0.95ha in size and is the only known example of a maternity roost of barbastelle bats in a building. The site is also designated as a SSSI.

3.2.13. The Barn is a 16th century thatched barn with associated outbuildings. A maternity colony of barbastelles utilises a range of cracks and crevices in the roof timbers for roosting.

Baseline conditions

3.2.14. This area is considered to be one of the best in the United Kingdom for the barbastelle bat. In 2015, the minimum and maximum numbers of individual barbastelle bats recorded to roost in this building were 11 and 50 (respectively).

3.2.15. The building of Paston Great Barn is located approximately 29.3km north of the Proposed Scheme.

3.2.16. The full Stage 1 screening assessment for Paston Great Barn SAC is found in Appendix A of this report in Table A.2.

3.3. Ecological baseline of Proposed Scheme

Background

3.3.1. A previous HRA screening exercise by Amey (Habitats Regulations Assessment A47 North Tuddenham to Easton, Ref No. A47IMPS2-AMY-TE-ZZ-DO-J0054) was undertaken in 2017 for the Proposed Scheme. A screening exercise was carried out under the requirements of the Conservation of Habitats and Species

Regulations 2017 (as amended). The aim of the screening exercise was to determine if the Proposed Scheme had potential to have significant effects on the NSN.

3.3.2. The screening assessment concluded that due to the potential for silt disturbance, pollution from machinery affecting the quality of the water during the construction phase and the building of a bridge impacting the banks, there is potential for significant effects on some of the qualifying species of the River Wensum SAC namely, white-clawed crayfish, bullhead and brook lamprey. The report also indicates that there is the potential for a significant effect on Desmoulins Whorl Snail and further surveys should be undertaken to assess this further.

3.3.3. Following consultation with Natural England (Lead Advisor, Norfolk and Suffolk Team), it was agreed that the Stage 1 screening was preliminary and based on information available and therefore, the screening exercise should be updated as surveys are completed and reviewed as the Proposed Scheme progresses.

3.3.4. In 2017, a desk study was completed using MAGIC mapsfrom which it was determined that there is potential for effects on some of the qualifying features of the River Wensum SAC namely white-clawed crayfish (*Austropotamobius pallipes*), bullhead (*Cottus gobio*) and brook lamprey (*Lampetra planeri*).

General

3.3.5. The existing baseline scenario refers to the conditions that currently exist, as surveyed between 2016 and 2020, in the area within which the Proposed Scheme would be implemented.

3.3.6. In 2016 preliminary ecology surveys were undertaken to inform the requirement for subsequent phase 2 surveys. This preliminary survey was updated on an ad-hoc basis in 2019 during completion of further phase 2 surveys. The surveys relevant to this Screening report are detailed below and summarised in Table 3-2.

Table 3-2 Summary of relevant ecological surveys undertaken

Biodiversity resource	Methodology	Distance from the DCO boundary	Dates of surveys
Phase 1 Habitat Assessment / Preliminary Ecological Appraisal (including invasive species surveys)	JNCC's Handbook for Phase 1 habitat survey - a technique for environmental audit (JNCC, 2010) CIEEM's Guidelines for Preliminary Ecological Appraisal (CIEEM, 2017)	50m	May 2016. Habitat updates recorded during Phase 2 surveys in 2019
Aquatic invertebrates and molluscs	Drake *et al.,* (2007)	50m	June 2017 to October 2017 September 2019
White-clawed crayfish	Peay (2003)	Within DCO boundary	August – September 2017 and 2018 September 2019
Barbastelle bats	Colling (2016) and Elmeros *et al.,* (2016)	Within DCO boundary	June-August 2020

3.3.7. Full results of these surveys undertaken are detailed in ES Chapter 8 (Biodiversity (**TR010038/APP/6.1**)).

Prinicpal habitats

3.3.8. The Phase 1 habitat survey data detailed in ES Chapter 8 (Biodiversity (**TR010038/APP/6.1**)) indicates that the main habitat in the area is arable farmland. There are some areas of woodland to the north of the A47 at Hockering, and at the far west of the Proposed Scheme over the River Tud, and to the south at Honingham.

3.3.9. None of the Annex I habitats that the River Wensum SAC is designated for were found along the Proposed Scheme alignment.

Protected species

3.3.10. Targeted white-clawed crayfish (*Austropotamobius pallipes*) surveys were undertaken along the River Tud in 2017, which identified a small population of white-clawed crayfish alongside a number of non-native signal crayfish (*Pacifastacus leniusculus*).

3.3.11. Further surveys undertaken specifically for white-clawed crayfish in 2019 returned no record of the species within the targeted areas, however, a large number (60+) of white-clawed crayfish are thought to have been translocated

from the area in 2018 to a safe Ark site. It is considered likely that the native crayfish population has now been lost from this stretch of the river.

3.3.12. The signal crayfish population was noted to have increased markedly between the 2017 and 2019 surveys, with larger adults more abundant than in the previous baseline survey.

3.3.13. Aquatic invertebrate surveys, undertaken in conjunction with the Proposed Scheme (outside of the SAC), identified a single white-clawed crayfish specimen in the River Tud at TG 0672 11276 in 2019 as an incidental result. This individual was found amongst several signal crayfish.

3.3.14. The aquatic invertebrate surveys onsite did not identify any suitable habitat on-site for Desmoulin's whorl snail (*Vertigo moulinsiana*).

Other notable species

3.3.15. In addition, *ad hoc* records of invasive species were received throughout 2019 during other Phase 2 surveys. Those species which have been identified on site and are cited on Schedule 9 of the Wildlife and Countryside Act (1981) are:

- Himalayan Balsam (*Impatiens glandulifera*)
- Signal Crayfish (*Pacifastacus leniusculus*)
- Rhododendron (*Rhododendron ponticum*)
- Cotoneaster (*Cotoneaster* spp.)
- Parrot's Feather (*Myriophyllum aquaticum*)
- American Mink (*Mustela vison*)
- Japanese Knotweed (*Fallopia japonica*)
- Chinese Water Deer (*Hydropotes inermis*)
- Muntjack Deer (*Muntiacus reevesi*)
- Ring-necked Parakeet (*Psittacula krameria*)
- Canada Goose (*Branta canadensis*)
- Egyptian Goose (*Alopochen aegyptiacus*)
- Grey Squirrel (*Sciurus carolinensis*)

3.4. Stage 1 screening: in combination

3.4.1. For the purposes of this assessment, developments have been divided into two categories as follows:

- a single project (the Proposed Scheme), which considers numerous different effects impacting a single receptor
- different projects, in combination with the Proposed Scheme.

3.4.2. The assessment of cumulative effects is detailed in ES Chapter 15 (Cumulative Effects Assessment (**TR010038/APP/6.1**)) and is summarised below.

Single project effects

3.4.3. All potential single project effects are presented in Table A.1 in Appendix A of this report. Further details of some potential effects are shown in Appendix B of this report.

Different project effects

3.4.4. The Zone of Influence (ZOI) and shortlist of developments is shown in ES Chapter 15 (Cumulative Effects Assessment (**TR010038/APP/6.1**)) and in Figure 15.1 (**TR010038/APP/6.2**). Assessment follows the methodology in ES Chapter 15. Following a meeting with Norfolk County Council and Broadland District Council in 2020, additional projects that were identified as having the potential to contribute to cumulative effects were added to the scope. These include:

- Norwich Western Link Road
- Proposed waste transfer building at Pips Skips Ltd, Sandy Lane
- Hornsea Project Three Offshore Wind Farm
- Norfolk Vanguard Offshore Wind Farm
- Norfolk Boreas Offshore Wind Farm
- Food Enterprise Park

3.4.5. In addition to the above, South Norfolk Council currently have a planning application outstanding for the development of 890 dwellings around Easton. The ‘Easton Village Growth Location’ also includes plans to extend the primary school, build a new village hall, retail unit and open public spaces.

3.4.6. The in-combination effects assessment has been undertake with reference to Planning Inspectorate Advice Note Seventeen ‘Cumulative Effects Assessment' (2019) (Ref.: 5.1.26) and is shown in in ES Chapter 15 (Cumulative Effects Assessment (**TR010038/APP/6.1**)) and in Figure 15.1 (**TR010038/APP/6.2**).

In-combination effects

3.4.7. Norwich Western Link Road will join onto the Proposed Scheme at the new Wood Lane junction’s northern roundabout. Construction for Norwich Western Link Road is indicatively planned to commence in 2023 until late 2025, however,

the scheme has not yet been submitted for planning and an HRA not yet produced. No Likely Significant Effects (LSE) have been identified as part of the A47 North Tuddenham to Easton Proposed Scheme as a standalone project upon the River Wensum SAC and Paston Great Barn SAC. Details of works for the Norwich Western Link Road are not yet known and as such, the Norwich Western Link Road Scheme will have to take into account the A47 Proposed Scheme as part of their in-combination effects assessment. At this time, we can therefore assume that there will be no in-combination effect with the Norwich Western Link Road.

3.4.8. Waste transfer building at Pips Skips Ltd, Sandy Lane is a standalone low impact construction to the north of the Proposed Scheme. This is a consented development subject to Environment Agency monitoring and oversight to ensure legal compliance with the Water Framework Directiveand The Habitats Regulations. Therefore it is considered that this development would not result in any in-combination impacts with the A47 North Tuddenham to Easton Proposed Scheme causing LSE on the River Wensum SAC.

3.4.9. The effects from proposed works for the three offshore windfarms arise from installing electric cables to support the Hornsea Project Three and increase in construction traffic on the A47 associated to Hornsea Project Three, Norfolk Vanguard and Norfolk Boreas offshore wind farm. The electric cables will be installed through horizontal directional drilling and therefore will cause no effects on the River Wensum SAC. The traffic and transport assessment, in the Case for the Scheme (**TR010038/APP/7.1**), has assessed that traffic levels would not be high enough to result in a significant cumulative effect and therefore, it can be concluded that there will be no in-combination effects from the three offshore wind farm developments.

3.4.10. Food Enterprise Park construction started in 2019 south of the existing A47. Works have been progressing throughout the ecology survey seasons. Consent has been granted with Natural England being satisfied that the development will not have significant adverse impacts on statutory designated site and landscape. Therefore, it is considered that there will be no likely in-combination effects with the Proposed Scheme.

3.4.11. The ‘Easton Village Growth Location’ also includes plans to extend the primary school, build a new village hall, retail unit and open public spaces. In-combination effects are not considered to lead to likely significant effects as Environment Agency maps do not indicate a hydrological connection between the River Tud or Wensum and the proposed development areas.

3.4.12. None of the other sections of the A47 improvements programme are close enough to require a need to consider any potential for an in-combination effect on the River Wensum SAC.

3.5. Limitations

3.5.1. The detailed design stage of the Proposed Scheme is not yet complete. To reduce limitations associated with this, the assessment will consider potential effects based on the precautionary principle.

3.6. Consultation with Natural England

3.6.1. The conclusions of the screening exercise undertaken in February 2020 were discussed with the Natural England Lead Advisor for the Norfolk and Suffolk Team. It was agreed that as the Assessment of Implications on European Sites report produced in 2017 was preliminary and based on information available to date, that the screening exercise should be updated and reviewed as the Proposed Scheme progresses. This Screening report, together with the HRA undertaken in 2017, demonstrates compliance with this advice.

3.6.2. Upon further consultation on the submission of this Screening report, Natural England have confirmed that they are in agreement with the findings of this Screening report that there will be no likely significant effects on any NSN site or Ramsar site.

4. Screening summary and conclusion

4.1.1. The screening assessment identified potential for likely significant effect pathways between the Proposed Scheme at North Tuddenham to Easton on the River Wensum SAC.

4.1.2. Following a review of the potential hazards to the SAC, the works being undertaken and evidence gathered within the environmental statements, a Potential Effects screening matrix was developed in accordance with Planning Inspectorate Advice Note 10 (Table C-2).

4.1.3. As a result of this exercise, it is considered that there are no reasonably foreseeable significant effects on the River Wensum SAC as a result of the Proposed Scheme during construction or operation.

4.1.4. As discussed in the screening matrix presented in Appendix A of this report, the screening process highlighted the main causes of disturbance and changes in the key indicators of conservation value upon the River Wensum SAC. The screening process assessed each potential affect to conclude whether they would cause a likely significant effect on the features associated with sites.

4.1.5. The Stage 1 Screening Assessment therefore concluded that there will be No Likely Significant Effect on the River Wensum SAC from the Proposed Scheme. These findings are summarised in the finding of no significant effects report matrix in line with DMRB LA 115 (Table 4.1) below.

The River Wensum SAC

Table 4.1 The Rivern Wensum SAC conclusion table

Project Name	**A47 North Tuddenham to Easton Dualling**	
European Site under consideration	The River Wensum SAC	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
November 2020	Ishbel Campbell, Sweco	Keith Ross, Sweco
Name and location of European Site:	The River Wensum SAC – Special Area of Conservation (Ref No. UK0012647) Location: 1.6km from the proposed works	
Description of the project:	• The North Tuddenham to Easton section of the A47 is located approximately nine kilometres to the east of Norwich. This 9km of single carriageway forms a part of the main arterial highway route connecting Norwich with Peterborough and Kings Lynn to the west. • Whilst around half of the A47 is already dual carriageway, the North Tuddenham to Easton section is not, with studies having identified that the single carriageway section of the road no longer meets the needs of its users. • Traffic volume is anticipated to increase over the lifespan of the road. This is considered in detail in the Transport Assessment, in the Case for the Scheme (**TR010038/APP/7.1**).	

	• The Development Consent Order (DCO) boundary is provided in Appendix D (Figure 1) of this report. • The Proposed Scheme is categorised as a Nationally Significant Infrastructure Project and therefore requires DCO.
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, see Section 3.4 of this report
The assessment of significance of effects	
Describe how the project (alone or in combination) is likely to affect the European Site.	Pollution of watercourses Air pollution Noise disturbance of SAC features Light disturbance of SAC features Spread of Invasive Non-native Species
Explain why these effects are not considered significant.	No habitats suitable to support qualifying features of the River Wensum SAC, and no qualifying features themselves were found within the respective study areas of the species from the Proposed Scheme during the surveys. **Water Pollution** Construction: There are construction activities planned within 8m of a main river (the River Tud) and its floodplain. As such, consent (in the form of a Flood Risk Activity Permit) will be required from the Environment Agency. In addition to this there are works adjacent to and over ordinary watercourses and adjacent to a watercourse managed by a Norfolk Rivers Internal Drainage Board. As such, consent from the Local Lead Flood Authority and Internal Drainage Board may be required. Operation: During operation, it is intended that the Proposed Scheme would utilise the existing drainage network where applicable. On the new carriageways the road drainage network would include embedded design features where required. In addition, the River Wensum SAC lies approximately 10.6km downstream from where the Proposed Scheme crosses the River Tudd, 7.3km downstream on the River Tud from the Proposed Scheme DCO boundary at Easton, and the Proposed Scheme lies 1.6km south of the River Wensum SAC at its closest point at Easton. Because of this distance any pollutants would be diluted to the extent that there would be **no likely significant effects** on the SAC or the qualifying features. In addition, embedded design and construction elements will be in place as detailed in Appendix B of this Screening report for Road drainage and water environment, and works will follow the monitoring and Drainage Strategy (ES Appendix 13.2 (**TR010038/APP/6.3**)) that will be in place. It is considered that there will be **no likely significant effects** that will occur on the SAC or the qualifying features during construction or operation. **Air pollution** Construction: Air quality modelling shows that during construction, there is no anticipated change in air quality of the River Wensum SAC it was concluded the impact of construction dust would be highly unlikely to trigger a likely significant air quality effect upon the SAC because of the distance of the SAC from the proposed works. As construction activities are programmed to last less than two years, it is unlikely there will be a significant effect on air quality or affect the UK's ability to comply with the Air Quality Directive. Increased traffic flows are expected as a result of the Proposed Scheme. There are no receptors expected to exceed the annual mean NO_2 Air Quality Objective in the opening year scenarios, all modelled receptors have predicted annual mean NO_2 concentrations well

	below the objective. In accordance with DMRB LA 105, no significant effects on non-NSN site ecological receptors have been identified as a result of the Proposed Scheme in place. The modelled receptors for air quality impacts are within 200m of the Proposed Scheme, and the assessment undertaken shows that there will be no likely significant effects upon those sensitive receptors during construction and operation. Furthermore, as the SAC is located approximately 1.6km from the Proposed Scheme at its closest extent (beyond any modelled impact zone for air quality) it can be concluded that there will be no likely significant effects upon the SAC during construction and operation. **Noise disturbance** Construction: A study area encompassing a 30m area from vibration generating activity was considered sufficient to evaluate the potential for significant effects due to vibration at sensitive receptors. Operation: The operational noise study area includes the area within 600m of new road links or road links physically changed or bypassed by the project plus the area within 50m of other roads where there is the potential for moderate or major noise change in the short-term or long-term. Operational vibration was scoped out of the completed assessments in accordance with DMRB LA 111. The SAC is located approximately 1.6km from the Proposed Scheme at its closest extent, far exceeding the expected impact zones for noise and vibration. **Light distrubance** Construction: Construction will predominately take place during daytime, minimising the need for further lighting requirements. Night-time working would be undertaken only when required. Operation: The current lighting design proposes 10m height lighting columns with LED luminaires, located in verges (or at the back of footways where applicable) and oriented perpendicular to the carriageway. Luminaires would be mounted with zero-degree tilt and a minimum as installed luminous intensity of G4, to ensure glare and upward light spill is minimised. The lighting design is currently in consultation with relevant stakeholders and so the design at present represents a worst-case scenario. No new lighting is proposed for the A47 mainline, however, lighting is proposed on the two new junctions with the approach and exit roads being lit to provide approximately five seconds of driving at the expected traffic speed. Therefore, it is considered that night lighting for the scheme will impose no likely significant effects will occur on the River Wensum SAC. **Spread of INNS** It is a legal offence to cause the spread of any INNS in the wild, and therefore construction measures will be undertaken a biosecurity method statement to ensure no INNS are spread in the wild. Therefore with these embedded biosecurity protocols in place, and with the large distances of the SAC to the Proposed Scheme in regards to plant species, it is considered that there will be **no likely significant effects** that will occur on the SAC or the qualifying features during construction or operation as the SAC is 1.6km away from the Proposed Scheme at the closest point.
List of agencies consulted: provide contact name and telephone or e-mail address.	Natural England
Response to consultation	None required

Data collected to carry out the assessment			
Who carried out the assessment	Sources of data	Level of assessment completed	Where can the full results of the assessment be accessed and viewed?
All information on the assessment process and data used for the assessment is set out in the full assessment report.			

Paston Great Barn SAC

4.1.6. The surveys undertaken in June 2020 recorded barbastelle bats at four crossing point locations over the A47, which are Crossing Point 1, 7, 8 and 9. Details of bat survey results are included within the Bat Crossing Point Survey Report (Appendix 8.13 of Chapter 8 (Biodiversity) of the ES) (**TR010038/APP/6.3**) , There are known barbastelle roosts around the Norwich area and , given the extent of available suitable habitat between the SAC and the Proposed Scheme, it is considered likely that barbastelle bats from SAC roosts do not frequent the study area due to the large distance between the SAC and the Proposed Scheme.

4.1.7. Surveys undertaken as part of the Norwich Western Link Road and the Norwich Northern Distributor Road (NNDR) found bat roosts for barbastelle bats to be present in the Hall Hill and Broadway woodlands, and a colony in the Morton area to the west of Norwich. Therefore, it is more likely that these barbastelle bats would be originating from these roosts which are much closer to the Proposed Scheme and the study area, rather than from Paston Great Barn SAC itself.

4.1.8. Research by Zeal et al., (2012) included radiotracking surveys of barbastelle bats. The conclusion of the survey results states that in Devon, UK, non-breeding barbastelle bats travel up to a maximum of 20.4km from their roosting sites, whilst breeding bats (pregnant and lactating) travel a maximum of 8.7km from their roosts. In addition, whilst the River Wensum SAC has suitable foraging grounds for this species, in the form of riverine woodland, it is unlikely that bats from Paston Great Barn SAC will travel to this area. This is because the bats are more likely to forage in the Broads SAC, which lies 11.8km at its nearest point from Paston SAC. The riverine woodland habitat within the Broads SAC lies approximately 20.1km from Paston SAC. In addition, it is likely that the bats from Paston Great Barn SAC will also hibernate at this site and therefore the bats will have winter foraging grounds that are close to the SAC, when winter temperatures a mild enough to allow for winter foraging.

4.1.9. The Stage 1 Screening Assessment therefore concluded that there will be No Likely Significant Effect on Paston Great Barn SAC from the Proposed Scheme. These findings are summarised in the DMRB LA 115 Matrix tables (Table 4.2) below.

Table 4.2 Paston Great Barn SAC conclusion table

Project Name	**A47 North Tuddenham to Easton Dualling**	
European Site under consideration	Paston Great Barn SAC	
Date	**Author (Name/Organisation)**	**Verified (Name/Organisation)**
January 2021	Ishbel Campbell, Sweco	Keith Ross, Sweco
Name and location of European Site:	Paston Great Barn SAC – Special Area of Conservation (Ref No. UK0030235) Location: 29.3km from the Proposed Scheme.	
Description of the project:	• The North Tuddenham to Easton section of the A47 is located approximately nine kilometres to the east of Norwich. This 9km of single carriageway forms a part of the main arterial highway route connecting Norwich with Great Yarmouth to the east. • Whilst around half of the A47 is already dual carriageway, the North Tuddenham to Easton section is not, with studies having identified that the single carriageway section of the road no longer meets the needs of its users. • Traffic volume is anticipated to increase over the lifespan of the road. This is considered in detail in the Transport Assessment, in the Case for the Scheme (**TR010038/APP/7.1**). • The Development Consent Order (DCO) boundary is provided in Appendix D (Figure 1) of this Screening report. • The Proposed Scheme is categorised as a Nationally Significant Infrastructure Project and therefore requires DCO.	
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, see Section 3.5 of this report	
The assessment of significance of effects		
Describe how the project (alone or in combination) is likely to affect the European Site.	Noise disturbance Light disturbance Mortality Air quality Habitat fragmentation	
Explain why these effects are not considered significant.	<u>Noise and Vibration Disturbance</u> An assessment of construction vibration impacts has been undertaken and is detailed in the ES Chapter 11 (Noise and vibration) (**TR010038/APP/6.1**). It is concluded that the Proposed Scheme is not predicted to give rise to any potential significant effects. A baseline noise survey was undertaken in September 2020 to gain an understanding of the existing noise climate within the vicinity of the Proposed Scheme. The findings of the survey have been reviewed against the noise modelling results and it is considered that **no likely significant effects** will occur on Paston Great Barn SAC as it is 29.3km away from the site and therefore outside of the noise assessment zone. Identified receptors of concern in the noise assessment detail in ES Chapter 11 (Noise and vibration) (**TR010038/APP/6.1**) are those located within 600m of the construction works. As effects for operation of the road are not due exceed the SOAEL, from the first year of opening (opening year) and into the long-term, it is considered that any changes in noise and vibration	

	will impose **no likely significant effects** will occur on Paston Great Barn SAC or the population of barbastelle bats during operation. Appendix B (potential effects) gives further information regarding the noise and vibration modelling pertaining to the Proposed Scheme. As effects for operation of the road are not due exceed the SOAEL, from the first year of opening (opening year) and into the long-term, it is considered that any changes in noise and vibration will impose **no likely significant effects** on barbastelle bats from Paston Great Barn SAC. Lighting Construction will take place mainly throughout the daytime, and night lighting will only take place in areas that have had vegetation cleared as part of standard construction best practice. In addition, the increase in night lighting over the Proposed Scheme is not considered to have any significant effects upon Paston Great Barn SAC due to the presence of Norwich providing significant light at night, in addition to the fact that the SAC lies approximately 29.3km to the north of the Proposed Scheme. Therefore, it is considered that night lighting for the Proposed Scheme will impose no likely significant effects on the SAC. Mortality Research by Zeal et al., (2012) included radiotracking surveys of barbastelle bats. The conclusion of the survey results states that in Devon, UK, non-breeding barbastelle bats travel up to a maximum of 20.4km from their roosting sites, whilst breeding bats (pregnant and lactating) travel a maximum of 8.7km from their roosts. In addition, whilst the River Wensum SAC has suitable foraging grounds for this species, in the form of riverine woodland, it is unlikely that bats from Paston Great Barn SAC will travel to this area. This is because the bats are more likely to forage in the Broads SAC, which lies 11.8km at its nearest point from Paston SAC. The riverine woodland habitat within the Broads SAC lies approximately 20.1km from Paston SAC. In addition, it is likely that the bats from Paston Great Barn SAC will also hibernate at this site and therefore the bats will have winter foraging grounds that are close to the SAC, when winter temperatures a mild enough to allow for winter foraging. Surveys undertaken as part of the Norwich Western Link Road and the Norwich Northern Distributor Road found bat roosts for barbastelle bats to be present in the Hall Hill and Broadway woodlands, and a colony in the Morton area to the west of Norwich. Therefore, it is more likely that these barbastelle bats would be originating from these roosts rather than from Paston Great Barn SAC. Therefore, the Proposed Scheme is predicted to have **no likely significant effects** upon the barbastelle bats of Paston Great Barn SAC. Air quality Air quality modelling has been undertaken using the approach outlined in DMRB LA 105, using the Interim HA Long Term Gap Analysis Calculator v1.1, as presented in ES Chapter 5 (Air Quality (**TR010038/APP/6.1)**). The magnitude of change was assessed as small or imperceptible, resulting in no significant effect being predicted in EIA terms. There are no receptors expected to exceed the annual mean NO_2 AQO in the opening year scenarios, all modelled receptors have predicted annual mean NO_2 concentrations well below the objective. In accordance with DMRB LA 105, no significant effects on non-NSN site ecological receptors have been identified as a result of the operation of the Proposed Scheme.Furthermore, the operation of the Proposed Scheme is not predicted to affect compliance with the European Union (EU) Directive on ambient air quality. The assessment has therefore concluded that there will be no significant air quality effects as a result from the operation of the Proposed Scheme and that no likely significant effects will occur on SAC during operation. Appendix B (potential effects) of this Screening report gives further information regarding air quality modelling pertaining to the Proposed Scheme **Groundwater pollution** In addition, none of the likely foraging areas for the barbastelle bats of Paston Great Barn SAC are located where there is a direct hydrological link between the Proposed Scheme and these habitats and therefore it is likely that there will be no likely significant effects of groundwater pollution upon this species from the SAC. **Habitat fragmentation** The surveys undertaken in June 2020 recorded barbastelle bats crossing the A47 at Crossing Points 1, 7, 9 and 9. However, given the extent of available suitable habitat

	between the SAC and the site, it is considered likely that this species does not frequent the area and the above effect pathways will not have a significant effect on the population within the SAC. There are no identified projects within the ZOI anticipated to result in significant effects that would require additional mitigation in response to cumulative effects. Barbastelle bats have been found commuting across the existing A47 to foraging grounds over agricultural areas in the vicinity of the A47. However, given the extent of available suitable habitat between the SAC and the site, it is considered likely that barbastelle bats from the SAC do not frequent the area and the above effect pathways will not have a significant effect on the population within the SAC.		
List of agencies consulted: provide contact name and telephone or e-mail address.	Natural England		
Response to consultation	None required		
Data collected to carry out the assessment			
Who carried out the assessment	Sources of data	Level of assessment completed	Where can the full results of the assessment be accessed and viewed?
All information on the assessment process and data used for the assessment is set out in the full assessment report.			

5. References

5.1.1. Charles, P. Edward, P. (2015) Environmental good practice on site guide (fourth edition), CIRIA, CIRIA C741

5.1.2. Conservation of Habitats and Species Regulations 2017 (as amended). Available from: https://www.legislation.gov.uk/uksi/2017/1012/contents/made

5.1.3. Department for Transport (2020), Road Investment Strategy 2: 2020–2025, Presented to Parliament pursuant to section 3 of the Infrastructure Act 2015, Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872252/road-investment-strategy-2-2020-2025.pdf

5.1.4. Design Manual for Road and Bridges (DMRB) (2009). Volume 11, Section 4, Part 1, HD 44/09. 'Assessment of implications (of highways and/or roads projects) on European sites (including Appropriate Assessment)'.

5.1.5. Design Manual for Road and Bridges (2019) LA 105 Air quality (Revision 0). Available at: https://www.standardsforhighways.co.uk/dmrb/search/10191621-07df-44a3-892e-c1d5c7a28d90

5.1.6. Design Manual for Road and Bridges (2019) LA 111 Noise and vibration (Revision 2). Available at: https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364

5.1.7. Design Manual for Road and Bridges (2020) LA 113 Road drainage and the water environment (Revision 1). Available from: https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727

5.1.8. Design Manual for Road and Bridges (2020) LA 115 Habitats Regulations assessment (Revision 1). Available from: https://www.standardsforhighways.co.uk/dmrb/search/e2fdab58-d293-4af7-b737-b55e08e045ae

5.1.9. DTA Publications (2014). The Habitats Regulations Assessment Handbook. Available at www.dtapublications.co.uk

5.1.10. Environment Agency (2001). Piling and penetrative ground improvement methods on land affected by contamination: Guidance on pollution prevention. National Groundwater and Contaminated Land Centre report NC/99/73. Environment Agency: Bristol.

5.1.11. Environment Agency (2017a) Protect groundwater and prevent groundwater pollution. Available at: https://www.gov.uk/government/publications/protect-groundwater-and-prevent-groundwater-pollution, accessed May 2020

5.1.12. Environment Agency (2017b) Groundwater protection technical guidance. Available at: https://www.gov.uk/government/publications/groundwater-protection-technical-guidance, accessed May 2020

5.1.13. European Commission (2000). 'Managing Natura 2000 Sites' (The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC).

5.1.14. Gaba, A. Hardy, S, Doughty, L. Powrie, W. Selemetas, D. (2017). Embedded retaining walls – Guidance on embedded retaining wall design. CIRIA Report C760.

5.1.15. Habitats Directive and Directive 2009/147/EC. Available from: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:en:PDF

5.1.16. Joint Nature Conservation Committee. UK Protected Sites. Available to view at http://jncc.defra.gov.uk/default.aspx?page=4

5.1.17. Judgment of the Court (Seventh Chamber) of 12 April 2018. Court of Justice of the European Union (CJEU) in the case of People Over Wind and Sweetman v Coillte Teoranta (C-323/17). Reference for a preliminary ruling — Environment — Directive 92/43/EEC — Conservation of natural habitats — Special areas of conservation — Article 6(3) — Screening in order to determine whether or not it is necessary to carry out an assessment of the implications, for a special area of conservation, of a plan or project — Measures that may be taken into account for that purpose

5.1.18. Judgment of the Court (Third Chamber), 11 April 2013. Sweetman v. An Bord Pleanála, Case C-258/11 CJEU judgment. Environment — Directive 92/43/EEC — Article 6 — Conservation of natural habitats — Special areas of conservation — Assessment of the implications for a protected site of a plan or project — Criteria to be applied when assessing the likelihood that such a plan or project will adversely affect the integrity of the site concerned — Lough Corrib site — N6 Galway City Outer Bypass road scheme.

5.1.19. Murnane, E. Heap, A. Swain, A (2006) Control of water pollution from linear construction projects. Site guide. CIRIA, CIRIA C649.

5.1.20. Natural England. Conservation Objectives for European Sites. Available to view at http://publications.naturalengland.org.uk/category/6490068894089216

5.1.21. Natural England. Designated Sites View, information on designated sites. Available to view at https://designatedsites.naturalengland.org.uk/

5.1.22. Westcott, F.J., Smith, J.W.N. and Lean, C.M.B. (2003). Piling in contaminated ground: environmental impacts, regulatory concerns and effective solutions. Engineering Geology, 70, 259-268.

5.1.23. Wildlife and Countryside Act (1981). Available from: https://www.legislation.gov.uk/ukpga/1981/69

5.1.24. THE PLANNING INSPECTORATE (2018). Advice note 5: Section 53 - Rights of Entry (Planning Act 2008). Available to view at https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/04/advice_note_5.pdf

5.1.25. THE PLANNING INSPECTORATE (2017). Advice note 10: Habitats Regulations Assessment relevant to nationally significant infrastructure projects. Available to view at https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/06/Advice-note-10v4.pdf

5.1.26. The Planning Inspectorate (2019) Advice Note Seventeen: Cumulative Effects Assessment Version 2. Available online at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf

5.1.27. Department of Environmental, Food and Rural Affairs (DEFRA) Multi Agency Geographic Information for the Countryside (MAGIC). Available to view at http://www.magic.gov.uk/

Appendix A. DMRB Screening Matrix

Potential effects upon the designated sites which are considered in this assessment are provided below in Table A.1 to be in line with DMRB LA 115 (Habitats Regulations assessment).

The European site included within the screening assessment is the River Wensum SAC.

River Wensum SAC

Table A.1 The River Wensum SAC DMRB screening matrix

Project:	A47 North Tuddenham to Easton Dualling	
European site under consideration	The River Wensum SAC	
Date:	**Author (name/organisation):**	**Verified (Name/Organisation):**
November 2020	Ishbel Campbell, Sweco	Keith Ross, Sweco

Description of project 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:	
• Size and scale (road type and probable traffic volume)	• The North Tuddenham to Easton section of the A47 is located approximately 9km to the east of Norwich. This 9km of single carriageway forms a part of the main arterial highway route connecting Norwich with Peterborough and Kings Lynn to the west. • Whilst around half of the A47 is already dual carriageway, the North Tuddenham to Easton section is not, with studies having identified that the single carriageway section of the road no longer meets the needs of its users. • Traffic volume is anticipated to increase over the lifespan of the road. This is considered in detail in the Transport Assessment, in the Case the Scheme (**TR010038/APP/7.1**). • The Development Consent Order (DCO) boundary is provided in Appendix D (Figure 1) in this Screening report. • The Proposed Scheme is categorised as a Nationally Significant Infrastructure Project and therefore requires DCO.
• Land-take	The DCO boundary is provided in Appendix D (Figure 1) in this Screening report. No land-take is required in the SAC. The Proposed Scheme land-take is currently unknown as designs are still being finalised.
• Distance from the European Site or key features of the site (from edge of the project assessment corridor)	Approximately 1.6km to the north of the Proposed Scheme at the closest point, which is at Easton.
• Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts)	Not applicable as no land-take or resource requirements from the River Wensum SAC are required.
• Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	Construction: Nitrogen dioxide from diesel-powered plant during construction. Proposed works machinery will be diesel / petrol powered, and on-site generators will also be required. Potential for spills during refuelling and machine servicing. Air quality modelling shows that during construction, there is no anticipated change in air quality of the River Wensum SAC. Operation: Ongoing emissions from vehicles usage of the road (no increase in vehicle emissions concluded from air quality modelling). At operation, there is no anticipated change in air quality at River Wensum SAC. The air quality assessment has been undertaken using standardised methodologies and data sets.
• Excavation requirements (e.g. impacts of local hydrogeology)	All excavations are located in the vicinity of the new and existing roads. Excavations will not be deep enough to impact local hydrogeology. All excavated material will be stored in a safe location to prevent rainwater leaching silts into the waterbodies.
• Transportation requirements	Machinery will be transported to and from the site, this will be standard construction equipment of excavators, trucks etc.
• Duration of construction, operation, etc.	Construction is likely to commence in approximately January 2023 and occur for the duration of 23 months.

• Other.	N/A
Description of avoidance and/or mitigation measures Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on*:*	
• Nature of proposals	No mitigation measures required.
• Location	
• Evidence for effectiveness	
• Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)	
Characteristics of European Site(s) A brief description of the European Site should be produced, including information on:	
Name of European Site and its EU code	The River Wensum SAC – Special Area of Conservation (Ref No. UK0012647)
Location and distance of the European Site from the proposed works	The River Wensum SAC – 1.6km from the proposed works
European Site size	The River Wensum SAC – 306.79ha
Key features of the European Site including the primary reasons for selection and any other qualifying interests	Annex I habitats that are a primary reason for selection: • Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. Annex II species that are a primary reason for selection of this site: • White-clawed crayfish (*Austropotamobius pallipes*) Annex II species present as a qualifying feature, but not a primary reason for selection: • Desmoulin's whorl snail (*Vertigo moulinsiana*) • Brook lamprey (*Lamptera planeri*) • Bullhead (*Cottus gobio*)
Vulnerability of the European Site – any information available from the standard data forms on potential effect pathways	Threats to the site include: • Physical modification • Inappropriate weirs, dams and other structures • Siltation • Invasive Species • Water Pollution • Water Abstraction

European Site conservation objectives – where these are readily available	The conservation objectives for the site are 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: • the extent and distribution of qualifying natural habitats and habitats of qualifying species; • the structure and function (including typical species) of qualifying natural habitats; • the structure and function of the habitats of qualifying species; • the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; • the populations of qualifying species; and • the distribution of qualifying species within the site.

Assessment criteria

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.

Single Project

No single receptors or resources were predicted to experience significant cumulative effects as a result of the Proposed Scheme.

In-combination

South Norfolk online planning portal was searched for any new plans or that may act in-combination with the Proposed Scheme. One SAC designated specifically for bats (Paston Great Barn SAC) was identified as part of the desk study and therefore it was deemed appropriate to consider plans and projects within an approximate 30km radius of the site.

None of the other sections of the A47 improvements programme are close enough to consider an in-combination effect on the River Wensum SAC.

Initial assessment

The key characteristics of the site 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	There is to be no reduction in habitat area within the SAC boundary.

Disturbance to key features

Noise and Vibration Disturbance

Construction: A study area of 300m from the closest construction activity was considered sufficient to evaluate the potential for significant effects at noise-sensitive receptors.

A study area encompassing a 30m area from vibration generating activity was considered sufficient to evaluate the potential for significant effects due to vibration at sensitive receptors.

The SAC is located approximately 1.6km from the Proposed Scheme at its closest extent, far exceeding the expected impact zones for noise and vibration.

Operation: The operational noise study area includes the area within 600m of new road links or road links physically changed or bypassed by the project plus the area within 50m of other roads where there is the potential for moderate or major noise change in the short-term or long-term.

The River Wensum SAC/SSSI was considered as part of this study in two existing road crossings, one near Lyng and the other close to Ringland.

The area within approximately 145 metres of Lyng Road is predicted to have a major adverse noise change in the opening year. Further away a moderate adverse impact is predicted with a minor adverse impact predicted in areas approximately 280 metres to the west of Lyng Road. This impact is due to an increase in traffic noise.

The majority of the River Wensum close to Ringland is predicted to have major beneficial impact in the opening year due to the Proposed Scheme. The major beneficial impact reduces to moderate and minor in areas approximately 250 metres to the east of Ringland Road. The major beneficial impact reduces to moderate in areas approximately 400 metres to the east of Ringland Road.

Operational vibration was scoped out of the completed assessments in accordance with DMRB LA 111.

Lighting Disturbance

Construction: Construction will predominately take place during daytime, minimising the need for further lighting requirements. Night-time working would be undertaken when required.

Operation: The current lighting design proposes 10m height lighting columns with LED luminaires, located in verges (or at the back of footways where applicable) and oriented perpendicular to the carriageway. Luminaires would be mounted with zero-degree tilt and a minimum as installed luminous intensity of G4, to ensure glare and upward light spill is minimised.

The lighting design is currently in consultation with relevant stakeholders and so the design at present represents a worst-case scenario. No new lighting is proposed for the A47 mainline, however, lighting is proposed on the two new junctions with the approach and exit roads being lit to provide approximately five seconds of driving at the expected traffic speed. It is anticipated that there will be no likely significant effects upon the SAC as, due to the distance of the SAC from the areas where lighting is proposed, the current light pollution will not be sufficiently augmented by the lighting over the Proposed Scheme.

Air Pollution

During construction, it was concluded the impact of construction dust would be highly unlikely to trigger a likely significant air quality effect upon the SAC. As construction activities are programmed to last less than two years, it is unlikely there will be a significant effect on air quality or affect the UK's ability to comply with the Air Quality Directive, and therefore there it is considered that there will be no likely significant effects upon the SAC.

Increased traffic flows are expected as a result of the Proposed Scheme. There are no receptors expected to exceed the annual mean NO_2 Air Quality Objective in the opening year scenarios, all modelled receptors have predicted annual mean NO_2 concentrations well below the objective. In accordance with DMRB LA 105, no likely significant effects on other sensitive receptors, within 200m of the Proposed Scheme, have been identified as a result of the Proposed Scheme in place.

Furthermore, the SAC is located approximately 1.6km from the Proposed Scheme at its closest extent, beyond any modelled impact zone for air quality. It is considered that there will be no no likely significant effects upon the SAC for air quality.

Water Pollution

During construction, embedded construction elements (detailed in Appendix B of this report for road drainage and water environment) to avoid committing an legal offence by acting in breach of current UK law for pollution prevention and water management will be implemented as part of the Environmental Management Plan (EMP (**TR010038/APP/7.4**)) and will follow guidance for pollution prevention and water management set out in CIRIA guidelines (Charles and Edward, 2015; Gaba *et al.* 2017; Murnane *et al*., 2006) and the Environment Agency's approach to groundwater protection (Environment Agency, 2017a) and groundwater protection guides (Environment Agency, 2017b). Monitoring of local non-designated watercourses, drainage ditches, and groundwaters at risk from pollution will be carried out prior to and during the construction phase. In addition, a temporary surface water drainage strategy shall be incorporated into the EMP (**TR010038/APP/7.4**). This is to prevent increased flood risk to people and property elsewhere, and to manage pollution risks most commonly associated with increased sediment loading.

There are construction activities planned within 8m of a main river (the River Tud) and its floodplain. As such, consent (in the form of a Flood Risk Activity Permit) will be required from the Environment Agency. In addition to this there are works adjacent to and over ordinary watercourses and adjacent to a watercourse managed by a Norfolk Rivers Internal Drainage Board. As such, consent from the Local Lead Flood Authority and Internal Drainage Board may be required. The works are located approximately 7.3km upstream of the confluence of the two rivers and therefore siltation ingress is likely to be heavily diluted by the time it reaches the SAC.

During operation, it is intended that the Proposed Scheme would utilise the existing drainage network where applicable. On the new carriageways the road drainage network would include embedded design and construction elements such as filter drains carrier drains, and kerb and gullies. Drainage channels and combined kerb drains will be used where continuous drainage is required in flatter gradients. These will lead to an infiltration basin, infiltration trenches or soakaways. In addition, the River Wensum SAC lies approximately 10.6km downstream from where the Proposed Scheme crosses the River Tudd, 7.3km downstream on the River Tud from the Proposed Scheme boundary at Easton, and the Proposed Scheme lies 1.6km south of the River Wensum SAC at its closest point at Easton, and as such no likely significant effects are anticipated in any event. With these embedded design and construction elements, and with works following the monitoring and Drainage Strategy (ES Appendix 13.2 (**TR010038/APP/6.3**)) that will be in place, it is considered that there will be **no likely significant effects** that will occur on the SAC or the qualifying features during operation.

<u>Spread of Invasive Non-native Species (INNS)</u>

INNS have been recorded within the study area during the surveys undertaken from 2017 until 2020.

The River Wensum SAC lies approximately 10.6km downstream from where the Proposed Scheme crosses the River Tudd, 7.3km downstream on the River Tud from the Proposed Scheme boundary at Easton, and the Proposed Scheme lies 1.6km south of the River Wensum SAC at its closest point at Easton.

It is a legal offence to cause the spread of any INNS in the wild, and therefore embedded biosecurity protocols will be implemented to ensure no INNS are spread in the wild. Therefore with the large distances of the SAC to the Proposed Scheme in regards to plant species, it is considered that there will be **no likely significant effects** that will occur on the SAC or the qualifying features during operation.

Reduction in species density	There are no habitats in the study are that support *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. None of the species of white-clawed crayfish, Desmoulins whorl snails, bullhead nor brook lamprey was found during the surveys in the River Tud. Therefore, these species have been screened out from further assessment as the Proposed Scheme does not affect any waterbodies that have suitable habitat for supporting this species. No habitats suitable to support qualifying features of the River Wensum SAC, and no qualifying features themselves were found within the respective study areas of the species from the Proposed Scheme during the surveys. No Likely Significant Effect
Changes in key indicators of conservation value (water quality, etc)	No Likely Significant Effect
Climate change	An assessment was undertaken which considered the Proposed Scheme's effect on climate (i.e. increases in carbon emissions) as well as the potential vulnerability of the Proposed Scheme to climate change. The construction, operation and use of the Proposed Scheme is predicted to increase carbon emissions by approximately 596,790 tonnes carbon dioxide equivalent (tCO_2e) over the appraisal period of 60 years (up to 2085). As per DMRB LA114, Proposed Scheme carbon emissions have been compared with the Government's published UK carbon budgets. These budgets currently extend until 2032 and can be compared with 26% of the emissions increase associated with the Proposed Scheme. The remaining 74% of the increase in carbon emissions will occur after 2032 (the end of the last currently published UK carbon budget). Further information on the assessment of materiality can be found in Chapter 14: Climate of the ES (**TR010038/APP/6.1**). The vulnerability of Proposed Scheme assets to projected changes in climate during operation has been assessed, and the Proposed Scheme has been deemed resilient. Therefore, no significant effects as a result of climate change are anticipated.
Describe any likely impacts on the European Site as a whole in terms of:	
Interference with the key relationships that define the structure of the site	There will be no impacts on the River Wensum SAC through the interference with the key relationships which define the structure of the site.
Indicate the significance as a result of the identification of impacts set out above in terms of:	
Reduction of habitat area	As there will be no reduction in the habitat within the SAC it has been concluded that there will be No Likely Significant Effect.
Disturbance to key species	No qualifying species of the River Wensum SAC will be impacted as none detected in study area and therefore No likely Significant Effect is anticipated.
Habitat or species fragmentation	No habitat or species fragmentation will occur as part of the works and therefore it has been concluded there will be no Likely Significant Effect.
Loss	There will be no habitat loss from the proposed works and therefore it was concluded there will be No Likely Significant Effect.
Fragmentation	There will be no fragmentation across the site from the proposed works and therefore it is concluded that there will be No Likely Significant Effect.
Disruption	No Likely Significant Effect
Disturbance	No Likely Significant Effect

Change to key elements of the site (e.g. water quality, hydrological regime etc)	No Likely Significant Effect
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.	
The impacts upon the key habitat and species features from both noise disturbance, pollution and air quality and lighting have been assessed in detail. Evidence from both noise and air quality modelling and the surveys undertaken on site since 2017 have concluded that there will be No Likely Significant Effect on SAC features both during construction and operation.	
Outcome of screening stage (delete as appropriate).	**No Likely Significant Effect**
Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attached relevant correspondence).	Natural England have been consulted regarding this Screening report and have confirmed that Natural England are satisfied with the conclusions that there will be no likely significant effects upon the River Wensum SAC as a result of the Proposed Scheme.

Paston Great Barn SAC

Table A.2 Paston Great Barn Screening Matrix

Project:	A47 North Tuddenham to Easton Dualling	
European site under consideration	Paston Great Barn	
Date:	**Author (name/organisation):**	**Verified (Name/Organisation):**
January 2021	Ishbel Campbell, Sweco	Keith Ross, Sweco

Description of project 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:	
• Size and scale (road type and probable traffic volume)	• The North Tuddenham to Easton section of the A47 is located approximately nine kilometres to the east of Norwich. This 9km of single carriageway forms a part of the main arterial highway route connecting Norwich with Peterborigh and Kings Lynn to the west. • Whilst around half of the A47 is already dual carriageway, the North Tuddenham to Easton section is not, with studies having identified that the single carriageway section of the road no longer meets the needs of its users. • Traffic volume is anticipated to increase over the lifespan of the road. This is considered in detail in the Transport Assessment, in the Case for the Scheme (**TR010038/APP/7.1**). • The Development Consent Order (DCO) boundary is provided in Appendix D (Figure 1) of this Screening report. • The Proposed Scheme is categorised as a Nationally Significant Infrastructure Project and therefore requires DCO.
• Land-take	The DCO boundary is provided in Appendix D (Figure 1) of this Screening report . No land-take is required in the SAC. The Proposed Scheme land-take is currently unknown as designs are still being finalised.
• Distance from the European Site or key features of the site (from edge of the project assessment corridor)	Approximately 29.3km to the Proposed Scheme.
• Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts)	Not applicable as no land-take from Paston Great Barn is required.
• Emissions (e.g. polluted surface water runoff – both soluble and insoluble pollutants, atmospheric pollution)	Construction: Nitrogen dioxide from diesel-powered plant during construction. Proposed works machinery will be diesel / petrol powered, and on-site generators will also be required. Potential for spills during refuelling and machine servicing. Air quality modelling shows that during construction, there is no anticipated change in air quality at the SAC. Operation: Ongoing emissions from vehicles usage of the road (no increase in vehicle emissions concluded from air quality modelling). Air quality modelling shows that in operation, there is no anticipated change in air quality at the SAC due to the distance of the SAC from the Proposed Scheme
• Excavation requirements (e.g. impacts of local hydrogeology)	All excavations are located in the vicinity of the new and existing roads. Excavations will not be deep enough to impact local hydrogeology. All excavated material will be stored in a safe location to prevent rainwater leaching silts into the waterbodies.
• Transportation requirements	Machinery will be transported to and from the Proposed Scheme, this will be standard construction equipment of excavators, trucks etc.
• Duration of construction, operation, etc.	Construction is likely to commence in approximately January 2023 and occur for the duration of 23 months
• Other.	N/A

Description of avoidance and/or mitigation measures *Describe any assumed (plainly established and uncontroversial) mitigation measures, including information on:*	
• Nature of proposals	No mitigation measures included.
• Location	
• Evidence for effectiveness	
• Mechanism for delivery (legal conditions, restrictions or other legally enforceable obligations)	
Characteristics of European Site(s) **A brief description of the European Site should be produced, including information on:**	
Name of European Site and its EU code	Paston Great Barn SAC – Special Area of Conservation (Ref No. UK0030235)
Location and distance of the European Site from the proposed works	Paston Great Barn SAC – 29.3km from the proposed works
European Site size	Paston Great Barn SAC – 0.95ha
Key features of the European Site including the primary reasons for selection and any other qualifying interests	Paston Great Barn SAC – maternity roost of barbastelle bats (refer to Section 3.3)
Vulnerability of the European Site – any information available from the standard data forms on potential effect pathways	The following pressures are those which pose a threat to the FCS of the qualifying feature of the SAC: • Change to site conditions • Wildfire and arson • Offsite habitat availability and management • Public access and human disturbance • Predation. Those that pertain to the Proposed Scheme are: • Change to site conditions • Offsite habitat availability and management • Human disturbance
European Site conservation objectives – where these are readily available	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 (FCS) of its qualifying features, by maintaining or restoring: • 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 • The distribution of qualifying species within the site

Assessment criteria **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.**	
Within the scope of the proposed works we have scoped out all the vulnerabilities except the following: offsite habitat availability and management, human disturbance. Minimising disturbance caused by human activity (Noise) The works will create noise during the construction activities and potential for increased noise during operation. Minimising disturbance caused by human activity (Mortality) The works will increase volume of traffic thereby increasing the risk of mortality of any barbastelles on site. Minimising loss of habitat availability The works will sever existing commuting routes across the road due to road widening. Air Quality Effects from increases in air pollution due to increased traffic volume and/or traffic flow during operation may have an impact on the SAC site features.	
Initial assessment The key characteristics of the site 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	There is to be no reduction in habitat area within the SAC itself. Vegetation clearance will be required for construction however this is restricted to within 15m of the existing road and the DCO boundary. Vegetation suitable to support barbastelle bats commuting across the existing road is being removed.
Disturbance to key features	
Noise and Vibration Disturbance An assessment of construction vibration impacts has been undertaken and detailed in the ES Chapter 11 (Noise and vibration) (**TR010038/APP/6.1**). It is concluded thatthe Proposed Scheme is not predicted to give rise to any potential significant effects. A baseline noise survey was undertaken in September 2020 to gain an understanding of the existing noise climate within the vicinity of the Proposed Scheme. The findings of the survey have been reviewed against the noise modelling results and it is considered that **no likely significant effects** will occur on Paston Great Barn SAC as it is 29.3km away from the site and therefore outside of the noise assessment zone. Identified receptors of concern in the noise assessment detail in the ES Chapter 11 (Noise and vibration) (**TR010038/APP/6.1**) are those located within 600m of the construction works. As effects for operation of the road are not due exceed the SOAEL, from the first year of opening and into the long-term, it is considered that any changes in noise and vibration will impose **no likely significant effects** on Paston Great Barn SAC or the population of barbastelle bats during operation. See below under mortality with respect to the barbastelle bats, considered to be part of other roosts in the Norwich area, currently crossing the A47. Appendix B (**TR010038/APP/6.9**) (potential effects) gives further information regarding the noise and vibration modelling pertaining to the Proposed Scheme. **Lighting Disturbance** Construction: Construction will predominately take place during daytime, minimising the need for further lighting requirements. Night-time working would be undertaken when required. Operation: The current lighting design proposes 10m height lighting columns with LED luminaires, located in verges (or at the back of footways where applicable) and oriented perpendicular to the carriageway. Luminaires would be mounted with zero-degree tilt and a minimum as installed luminous intensity of G4, to ensure glare and upward light spill is minimised. In addition, the increase in night lighting over the Proposed Scheme is not considered to have any significant effects upon Paston Great Barn SAC due to the presence of Norwich providing significant light at night, in addition to the fact that the SAC lies approximately 29.3km to the north of the Proposed Scheme.Therefore, it is considered that night lighting for the Proposed Scheme will impose no likely significant effects will occur on the SAC. The lighting design is currently in consultation with relevant stakeholders and so the design at present represents a worst-case scenario. No new lighting is proposed for the A47 mainline, however, lighting is proposed on the two new junctions with the approach and exit roads being lit to provide approximately five seconds of driving at the expected traffic speed. It is anticipated that there will be no likely significant effects upon the SAC as, due to the distance of the	

SAC from the Proposed Scheme, the current light pollution will not be augmented by the lighting over the Proposed Scheme.

Mortality

Research by Zeal et al., (2012) included radiotracking surveys of barbastelle bats. The conclusion of the survey results states that in Devon, UK, non-breeding barbastelle bats travel up to a maximum of 20.4km from their roosting sites, whilst breeding bats (pregnant and lactating) travel a maximum of 8.7km from their roosts. In addition, whilst the River Wensum SAC has suitable foraging grounds for this species, in the form of riverine woodland, it is unlikely that bats from Paston Great Barn SAC will travel to this area. This is because the bats are more likely to forage in the Broads SAC, which lies 11.8km at its nearest point from Paston SAC. The riverine woodland habitat within the Broads SAC lies approximately 20.1km from Paston SAC. In addition, it is likely that the bats from Paston Great Barn SAC will also hibernate at this site and therefore the bats will have winter foraging grounds that are close to the SAC, when winter temperatures a mild enough to allow for winter foraging.

Surveys undertaken as part of the Norwich Western Link Road and the Norwich Northern Distributor Road found bat roosts for barbastelle bats to be present in the Hall Hill and Broadway woodlands, and a colony in the Morton area to the west of Norwich. Therefore, it is more likely that these barbastelle bats would be originating from these roosts rather than from Paston Great Barn SAC.

Therefore, the Proposed Scheme is predicted to have **no likely significant effects** upon the barbastelle bats of Paston Great Barn SAC.

Air quality

Air quality modelling has been undertaken using the approach outlined in DMRB LA 105, using the Interim HA Long Term Gap Analysis Calculator v1.1, as presented in ES Chapter 5 (Air quality) (**TR010038/APP/6.1**). The magnitude of change was assessed as small or imperceptible, resulting in no significant effect being predicted in EIA terms. There are no receptors expected to exceed the annual mean NO_2 AQO in the opening year scenarios, all modelled receptors have predicted annual mean NO_2 concentrations well below the objective. In accordance with DMRB LA 105, no significant effects on other sensitive receptors and other non-NSN ecological receptors have been identified as a result of the operation of the Proposed Scheme. Furthermore, the operation of the Proposed Scheme is not predicted to affect compliance with the European Union (EU) Directive on ambient air quality. The assessment has therefore concluded that there will be no significant air quality effects as a result from the operation of the Proposed Scheme and that no likely significant effects will occur on the SAC during operation.

In addition, none of the likely foraging areas for the barbastelle bats of Paston Great Barn SAC are located where there is a direct hydrological link between the Proposed Scheme and these habitats and therefore it is likely that there will be no likely significant effects of groundwater pollution upon this species from the SAC.

Appendix B of this Screening report (potential effects) gives further information regarding air quality modelling pertaining to the Proposed Scheme.

Habitat fragmentation

The surveys undertaken in June 2020 recorded barbastelle bats crossing the A47 at Crossing Points 1, 7, 9 and 9. However, given the extent of available suitable habitat between the SAC and the site, it is considered likely that barabatselle bats from the SAC do not frequent the area, and the above effect pathways will not have a significant effect on the population within the SAC.

There are no identified projects within the ZOI anticipated to result in significant effects that would require additional mitigation in response to cumulative effects.

Habitat or species fragmentation	There is to be no habitat loss within the SAC boundary. Vegetation clearance will be minimal, limited only to only within the red line boundary. There will be no large-scale vegetation clearance which will result in no habitat or species fragmentation. However, habitat fragmentation at the existing crossing points of barbastelle bats is likely to affect their commuting routes. However it is highly unlikely that the barbastelle bats recorded during the surveys are part of the population at Paston Great Barn SAC, located approximately 29.3km to the north of the Proposed Scheme.
Reduction in species density	No Likely Significant Effect
Changes in key indicators of conservation value **(water quality, etc)**	No Likely Significant Effect
Climate change	An assessment was undertaken which considered the Proposed Scheme's effect on climate (i.e. increases in carbon emissions) as well as the potential vulnerability of the Proposed Scheme to climate change. The construction, operation and use of the Proposed Scheme is predicted to increase carbon emissions by approximately 596,790 tonnes carbon dioxide equivalent (tCO_2e) over the appraisal period of 60 years (up to 2085). As per DMRB LA114, Proposed Scheme carbon emissions have been compared with the Government's published UK carbon budgets. These budgets currently extend until 2032 and can be compared with 26% of the emissions increase associated with the Proposed Scheme. The remaining 74% of the increase in carbon emissions will occur after 2032 (the end of the last currently published UK carbon budget). Further information on the assessment of materiality can be found in Chapter 14: Climate of the ES (**TR010038/APP/6.1**). The vulnerability of Proposed Scheme assets to projected changes in climate during operation has been assessed, and the Proposed Scheme has been deemed resilient. Therefore, no significant effects as a result of climate change are anticipated.
Describe any likely impacts on the European Site as a whole in terms of:	
Interference with the key relationships that define the structure of the site	There will be no impacts on Paston Great Barn SAC through the interference with the key relationships which define the structure of the site.
Indicate the significance as a result of the identification of impacts set out above in terms of:	
Reduction of habitat area	As there will be no reduction in the habitat within the SAC it has been concluded that there will be No Likely Significant Effect.
Disturbance to key species	No Likely Significant Effect.
Habitat or species fragmentation	No habitat or species fragmentation will occur as part of the works and therefore it has been concluded there will be no Likely Significant Effect.
Loss	There will be no habitat loss from the proposed works and therefore it was concluded there will be No Likely Significant Effect.
Fragmentation	There will be no fragmentation across the site from the proposed works and therefore it is concluded that there will be No Likely Significant Effect.
Disruption	No Likely Significant Effect.
Disturbance	No Likely Significant Effect.

Change to key elements of the site (e.g. water quality, hydrological regime etc)	No Likely Significant Effect.
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.	
The impacts upon the key habitat and species features from both noise disturbance, pollution and air quality and lighting have been assessed in detail. Evidence from both noise and air quality modelling and the surveys undertaken on site since 2017 have concluded that there will be No Likely Significant Effect on SAC features both during construction and operation.	
Outcome of screening stage (delete as appropriate).	**No Likely Significant Effect.**
Are the appropriate statutory environmental bodies in agreement with this conclusion (delete as appropriate and attached relevant correspondence).	Natural England have been consulted regarding this Screening report and have confirmed that they are satisfied with the conclusions that there will be no likely significant effects upon Paston Great Barn SAC as a result of the Proposed Scheme.

Appendix B. Potential effects

All effects that have the potential to affect the River Wensum SAC and Paston Great Barn SAC have been split into either construction or operation effects for the purposes of this Screening report, whilst ES Chapter 8 (Biodiversity (**TR010038/APP/6.1**)) may highlight some of these potential effects as being permanent, as opposed to construction or operation effects.

Air quality

The air quality assessment is detailed in Chapter 5 of the ES (**TR010038/APP/6.1**). Modelling has been undertaken using the approach outlined in DMRB LA 105, using the Interim HA Long Term Gap Analysis Calculator v1.1. A baseline year of 2015 has been modelled in accordance with the baseline traffic data provided.

The air quality chapter ES Chapter 5 (Air quality) (**TR010038/APP/6.1**) details the assessment of the potential air quality effects on the Proposed Scheme.

Road traffic emissions at selected sensitive ecological receptors have been assessed by modelling the change in air quality pollutant concentrations. The model has been compared against local air quality monitoring data and has been used to predict the air quality impacts caused by changes in traffic flows and road alignments as a result of the Proposed Scheme.

During construction, it was concluded the impact of construction dust would be highly unlikely to trigger a significant air quality effect. As construction activities are programmed to last less than two years it is unlikely there would be a significant effect on air quality or affect the UK's ability to comply with the Air Quality Directive.

During operation, the Proposed Scheme is expected to cause both adverse and beneficial effects in emission concentrations at sensitive and ecological receptors. The receptors which are predicted to experience an adverse effect is as a result of the increase in traffic flows due to the Proposed Scheme in place. The receptors experiencing a beneficial effect is due to a diversion of traffic flows away from receptor locations as a result of the Proposed Scheme in place. The assessment has concluded there would be no significant effects on these receptors from the operation of the Proposed Scheme.

Road drainage and water environment

Detailed design and requirements pertaining to road drainage is included in ES Chapter 13 (Road drainage and water environment) (**TR010038/APP/6.1**). The

Environment Agency has been consulted regarding the drainage of the Proposed Scheme.

Important features detailed within the chapter in terms of the water environment include the River Tud, which is the only main river located within the study area. It flows under the existing A47 carriageway at Honingham where it continues in an easterly direction to the north of the A47 before its confluence with the River Wensum. Numerous small ponds and drains are identified within the Proposed Scheme area, with a large number of these being located around the existing A47.

The majority of the study area is underlain by the White Chalk Subgroup bedrock, which outcrops within the study area north of Easton and the eastern extent of the scheme. The White Chalk Subgroup underlying the superficial deposits is designated a Principal Aquifer. Principal Aquifer classifications are given to geological formations that provide water supply and baseflow at a strategic scale. This aquifer provides groundwater flows to the River Wensum.

During construction, best practice methods for pollution prevention and water management will be implemented as part of the EMP (**TR010038/APP/7.4**). Guidance on best practice in relation to pollution prevention and water management is set out in CIRIA guidelines (Charles and Edward, 2015; Gaba et al. 2017; Murnane et al., 2006) and the Environment Agency's approach to groundwater protection (Environment Agency, 2017a) and groundwater protection guides (Environment Agency, 2017b). These legal required elements will ensure temporary impacts on water quality from pollution and sedimentation are minimised. These are further detailed below.

There are construction activities planned within 8m of a main river (the River Tud) and its floodplain. As such, consent (in the form of a Flood Risk Activity Permit) will be required from the Environment Agency. In addition to this there are works adjacent to and over ordinary watercourses and adjacent to a watercourse managed by an Norfolk Rivers Internal Drainage Board. As such, consent from the Local Lead Flood Authority and Internal Drainage Board may be required.

Works within the saturated aquifer may require dewatering, for which consent may need to be obtained from the Environment Agency. Discharging of dewatered volumes may also require a bespoke discharge consent. Embedded treatment measures may be required depending on the quality of water abstracted, and the receiving waterbody.

Construction: Surface water

The potential for surface water impacts to occur as a result of contamination from accidental spillages will be minimised by the following legal required construction elements:

Appropriate storage of construction materials, including bunding of storage tanks, use of silt fencing and covering stockpiles.

Spill kits should be located on sites near to ordinary watercourses or drainage ditches and within the works compounds and staff should be trained in their use.

Emergency response procedures included in the EMP (**TR010038/APP/7.4**) to handle any leakages or spillages of potentially contaminating substances.

No pollution pathways should be created between the construction sites, including material lay down areas, and ordinary watercourses or drainage ditches. In general, site activities are associated with an increased flood risk and negative impacts on surface water receptors (for example by the compaction of soils, pond infilling, alteration of ground elevations and overland flow pathways acting as barriers to flow) a construction-phase drainage system will be implemented. Embedded construction methods shall be implemented to prevent surface water runoff containing suspended sediment reaching main rivers or ordinary watercourses through overland flow during rainfall events. This shall include an appropriate treatment train to prevent accidental spillages reaching groundwater, remove sediment and other contaminants as well as attenuating runoff. This shall be specified as part of a temporary surface water drainage strategy within the EMP. This will also prevent increased flood risk to people and property elsewhere, and manage pollution risks most commonly associated with increased sediment loading.

At this stage the detailed designs for the compounds have not been finalised however, temporary drainage from the main construction compound would typically be collected within a ditch surrounding the compound and redirected to settlement ponds before being discharged to either a surface watercourse or ground. As discharge to a surface watercourse is not feasible, the temporary drainage is likely to discharge to ground. Infiltration features must be suitably designed taking into account the ground conditions. Discharges to groundwater (or sewer and surface water) must only be made with the appropriate consents or permits in place. Any non-compliant discharges would be collected and disposed of offsite at a licensed facility.

It is currently envisaged that surface water monitoring would be required prior to, during and after the construction phase due to the presence of sensitive ecological receptors and sediment sensitive water bodies.

Construction: Groundwater

The construction of all below ground structures should aim to minimise the potential to impact on either groundwater supply or groundwater quality.

The chalk aquifer present onsite is at particular risk from exposure within cuttings. The River Wensum receives baseflow from the underlying Principal Chalk and Secondary Superficial aquifers and could be affected by changes of flow or in water quality in the event of a pollution event.

Works within the saturated aquifer may require dewatering, for which consent may need to be obtained from the Environment Agency. Discharging of dewatered volumes may also require a bespoke discharge consent. Embedded treatment measures may be required depending on the quality of water abstracted, and the receiving waterbody.

A piling risk assessment shall be undertaken prior to the commencement of the works. Environment Agency guidance on minimising pollution risk due to piling should be adhered to (Environment Agency, 2001; and Westcott et al., 2001).

Operation: Surface water

Where possible, existing drainage will be retained at the tie-ins with the existing A47. Filter drains and soakaways may be relocated in some sections on the approaches to junctions at the eastern and western extents of the Proposed Scheme, to maintain the operation of the drainage on the existing A47 and prevent additional surface runoff. Where existing direct discharges to streams are not taking any increased road runoff from the Proposed Scheme, these outfalls would remain in place.

Infiltration rates have been collected from testing undertaken during the ground investigation and infiltration basins are to be considered in the design, which would emulate the existing drainage regime at these locations on the existing A47. Any such infiltration basin would receive surface water discharges from the new road and would maintain existing greenfield discharge rates.

The new mainline carriageway would drain to filter drains and discharge to a detention or infiltration basin located at low points along the route or where necessary for constraints such as structures or river crossings. The drainage

system would provide treatment of the surface water runoff and maintain greenfield discharge rates to receiving watercourses or groundwater.

Natural overland flow and existing ditches and streams to be affected would be intercepted by new ditches and conveyed along natural drainage paths as far as possible. This would involve pipe crossings of the proposed new mainline and sideroads.

At structures, deck drainage and back of wall drainage systems would be provided and would outfall to a drainage system or a suitable soakaway provision. This shall also include the construction of 'dry culverts' or cross drains to maintain natural flood flow pathways where they are intercepted by the Proposed Scheme.

Operation: Groundwater

The piling and in-ground structure designs should be selected to appropriately minimise obstruction of groundwater flows, and thus supply to indirect receptors, and to ensure appropriate methods are incorporated to prevent creation of pathways for artesian groundwater to rise to the surface.

Construction materials should be chosen appropriately to minimise groundwater contamination via direct contact through the life of the scheme.

Noise and Vibration

Identified receptors of concern in the noise and vibration assessments are detailed in the ES, Chapter 11 (Noise and Vibration) (**TR010038/APP/6.1**).

As part of the assessment, a baseline noise survey was undertaken in September 2020 to gain an understanding of the existing noise climate within the vicinity of the Proposed Scheme.

Spread of Invasive Non-native Species

During construction, embedded construction and design methods for preventing the spread of invasive non-native species (INNS) will be implemented in order to avoid a legal offence of causing INNS to spread.

Stands of invasive species within the working area will be fenced off in order to prevent incursions by machinery which could spread soil contaminated with material from invasive species. Signage will be placed on the fencing detailing that the area contains invasive species are present and should not be entered.

Any invasive plants species material and the surrounding contaminated soil is regarded as controlled waste and should be disposed of offsite by a registered waste carrier at a licensed site. The receiving site should be notified of its arrival in order that an area can be prepared away from the landfill liner for its safe disposal.

Vehicles will be kept clean. Any accumulated mud and plant material will be removed before leaving the site using a wheel washer.

If any works are located within an area containing INNS strict biosecurity protocols will be employed as a legal requirement, including washing of any wheels or tracks, boots, clothing and gloves that may have come in contact with invasive species. If entering or working near a watercourse this will include cleaning boots with Virkon (or similar) to ensure the deactivation of any Aphanomyces astaci spores (crayfish plague).

Potential Hazards to European Protected Sites

This section details the potential hazards to the SAC, in particular, those hazards relevant to Unit 54 of the SAC/SSSI downstream of the confluence of the Rivers Tud and Wensum. These potential hazards have been considered alongside the works being undertaken and evidence presented within the environmental statement, to collate the Potential Effects screening matrix (DMRB Table A-1, and Table 4.1) as recommended in the Planning Inspectorate Advice Note 10.

Physical modification

Much of the river channel has been modified by artificial enlargement (over deepening, over widening and straightening). The extent of modification has been identified as part of the river restoration strategy.

Downstream of the confluence between the Rivers Tud and Wensum, the channel widens towards Hellesdon Mill and has been straightened, widened and is managed close to residential areas. This management includes the removal of gravels reducing potential habitat for bullhead who use gravels for spawning and refuge, brook lamprey and white-clawed crayfish.

There will be no physical modification to the channel of the River Wensum SAC as a result of the Proposed Scheme during construction or operation. Therefore, there is no likely foreseeable impact of this potential hazard to the designated site.

Inappropriate weirs, dams and other structures

In-channel structures are adversely impacting flow throughout the SAC by creating impoundment on the river and reducing hydromorphological & ecological connectivity.

Downstream of the River Tud confluence, the focus is on the impounding of the channel, upstream of Hellesdon Mill. The restoration strategy for the River Wensum states that “All works must integrate with the removal of the structure at Hellesdon Mill and associated river works.”

There will be no additional structures created within the boundary of the SAC as part of the proposed works; however, new unsuitably-designed structures constructed outside of the SAC placed in locations could affect groundwater flows into the SAC and as such has been considered within the screening matrix (see Table C-1 and Table 4.1).

Siltation

Chalk streams are naturally alkaline and generally characterised by their low suspended sediment concentrations and loads. Major sediment ingress points have been identified on the upper and lower reaches of the river. Sediment often has nutrients attached, which has detrimental effects on water quality. It also directly affects the habitats of species. Sediment sources in the Wensum are derived from catchment runoff and are linked to field drainage systems/ditch maintenance, erosion, tributary inputs and road drainage.

Within Unit 54 of the SAC/SSSI the lack of natural riparian vegetation, particularly trees, has been noted within the reach which is considered to be exacerbating erosion and sediment ingress.

All of the identified primary and qualifying features of the SAC are particularly sensitive to siltation.

Siltation can lead to a decrease in oxygenation and habitat quality affecting water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation and Desmoulins’s whorl snail. It can also block and effectively cause the loss of fine, clean gravels for spawning and refuge for bullhead, brook lamprey and white-clawed crayfish.

There is the potential for mobilisation of contaminants from surface water runoff into drainage ditches and ponds from road construction activities, such as earthworks, construction dewatering, plant and vehicle washing, thereby increasing sediment loading. This is of particular risk at the locations of bridge

and culvert works. Vibration and erosion (for example as an indirect result of the spread of invasive species) also have potential to increase siltation ingress into the NSN.

The works are located approximately 7.3km upstream of the confluence of the two rivers and therefore siltation ingress is likely to be heavily diluted by the time it reaches the SAC. There are additional risks of siltation associated with poorly designed surface-water drainage during the operational phases of new roads. The hazard has therefore been included within the screening matrix (see DMRB Table C- and 4.1) as a precautionary measure.

Invasive Species

Presence of signal crayfish is a threat to the white-clawed crayfish and native fish species. Signal crayfish also impact on in-stream macrophytes and damage riverbanks.

Invasive plant species compete with native species and reduce biodiversity; they can also exacerbate erosion and sediment ingress affecting all features relevant to the SAC. The primary concern species within the SAC as a whole include Japanese knotweed, Himalayan balsam and signal crayfish.

As these species of primary concern have all been identified within the DCO boundary of the Proposed Scheme, the potential effects of this hazard have been included within the screening matrix (see DMRB Table C- and 4.1 and Planning Inspectorate matrices C-1 and C-2).

Water Pollution

Water quality issues affect all SAC features through reduction of habitat quality. At present, there are adverse impacts on water quality from discharge, pesticides and nutrients entering the river from the catchment.

The adverse impact of water pollution at the reaches of Unit 54, downstream of the works, are largely considered to be due to pollution (eutrophication) from agriculture and runoff (acidification). This is considered to be the key pressure on the SAC at this point of its course.

Uncontrolled construction activities, including the demobilisation of site compounds, increase the risk of a pollution incident from accidental spillages or leakage of fuels, oils, chemicals, wastewater, concrete or cement admixtures used. This is of particular risk at the locations of bridge and culvert works and could cause pollution ingress into the River Tud, although this would be highly diluted by the time flows reached the River Wensum SAC, approximately 7.3km

downstream. On a precautionary basis, this impact has been considered within the screening matrix (see DMRB Table C- and 4.1 and 4.2, and Planning Inspectorate matrices C-1 and C-2).

Water Abstraction

Abstraction is adversely impacting the flow regime of the river. Changes to abstraction licences are required to relieve pressure on the river.

Downstream of the confluence between the Rivers Tud and Wensum, the River Wensum flows are adversely affected downstream of the Costessey Public Water Supply. This is the only section of the SAC which is currently not meeting targets in relation to water flow.

Works within the aquifer may require temporary dewatering in order to lower the water table in areas during construction. If this process is determined to be necessary, it will require consent from the Environment Agency. Discharging of these dewatered volumes may also require a bespoke discharge consent. Embedded treatment measures may be required depending on the quality of water abstracted, and the receiving waterbody. Embedded methods implemented as per the consenting process for these activities will eliminate any reasonably foreseeable risk to the NSN, however, the hazard has been considered within the screening matrix (see DMRB Table C- and 4.1) as a precautionary measure due to potential impacts on pollution and alterations in ground and surface water flows.

Appendix C. Planning Inspectorate Screening Matrix

Screening Matrix

Potential effects upon the designated sites which are considered in this assessment are provided below in Table C.1 to be in line with Planning Inspectorate Advice Note 10.

The European site included within the screening assessment is the River Wensum SAC.

Table C-1: Potential Effects – Effects considered within the screening matrices

Designation	Effects described in submission information	Presented in screening matrices as
River Wensum SAC	• Displacement from construction noise • Displacement from operational noise • Displacement from construction vibration • Invasive species – threat of displacement from habitats/loss of habitats	Displacement
	• Air emissions during construction • Dust from construction • Air emissions from road operation • Light-spill during construction • Lighting during scheme operation	Reduction in air Quality
	• Construction runoff (earth works, compaction, plant and vehicle washing) • Construction dewatering • Siltation arising from operational surface water discharge/runoff • Exacerbation of erosion and therefore sediment ingress due to the spread of invasive species (particularly Japanese knotweed, Himalayan balsam and signal crayfish)	Increased sedimentation
	• Construction spillages - accidental spillages or leakage of fuels, oils, chemicals, wastewater, concrete or cement admixtures used particularly around the construction of bridges over the River Tud and its tributaries and pollution exposure of the chalk aquifer within cuttings. • Construction dewatering • Piling in-ground structures - Surface water discharge and groundwater contamination	Reduced water quality

	• Acidification of water column and substrate through sediment runoff leading to a reduction in habitat quality. • Eutrophication (cumulative impact with sedimentation) leading to oxygen depletion and increased mortality to aquatic life.	
	• Inappropriate weirs, dams and other structures – unsuitable designs • Water abstraction and overland discharge of dewatered areas to facilitate construction	Changes to baseline flow
Paston Great Barn SAC	• Mortality through increased air or ground water pollution	Mortality - pollution
	• Mortality through traffic collision	Mortality - collision
	• Reducing foraging habitat can increase competition for resources and affect survival	Mortality – reduced food sources
	• Increased noise disturbance reducing breeding success	Reduced breeding success - disturbance

The NSN site included within the screening assessment is the River Wensum SAC.

Evidence for, or against, likely significant effects on the NSN site(s) and its qualifying feature(s) is detailed within the footnotes to the screening matrix below in Table C.2.

Matrix Key:

✓ = Likely significant effect **cannot** be excluded
✕ = Likely significant effect **can** be excluded

C = construction
O = operation
D = decommissioning[2]

Where effects are not relevant to a particular feature the matrix cell should are formatted as follows:

[2] It is considered unlikely that the Proposed Scheme would ever be fully decommissioned. As such, no likely significant effects are reasonably foreseeable on any NSN site from decommissioning

Table C-2: The River Wensum SAC Planning Inspectorate screening matrix.

Name of European site and designation: River Wensum SAC																		
EU Code: UK0012647																		
Distance to NSIP: 1.6km overland, 7.3km through effect pathway identified along the River Tud																		
European site features	**Likely effects of NSIP**																	
Effect	Displacement			Decreased air quality			Increased sedimentation			Reduced water quality			Changes to baseline flow			**In-combination effects**		
Stage of Development	***C***	***O***	***D***	***C***	***O***	***D***	***C***	***O***	***D***	***C***	***O***	***D***	***C***	***O***	***D***	***C***	***O***	***D***
Water courses of plain to montane levels with Ranunculion fluitantis and Callitricho-Batrachion vegetation.	X_a	N/A	N/A	X_c	X_c	N/A	$X_{a,d}$	X_d	N/A	$X_{d,e,}$	X_d	N/A	X_f	X_d	N/A	X_g	X_g	N/A
White-clawed crayfish	$X_{a,b}$	X_b	N/A	X_c	X_c	N/A	$X_{a,d}$	X_d	N/A	$X_{d,e,}$	X_d	N/A	X_f	X_d	N/A	X_g	X_g	N/A
Desmoulin's whorl snail	$X_{a,b}$	X_b	N/A	X_c	X_c	N/A	$X_{a,d}$	X_d	N/A	$X_{d,e,}$	X_d	N/A	X_f	X_d	N/A	X_g	X_g	N/A
Brook lamprey	$X_{a,b}$	X_b	N/A	X_c	X_c	N/A	$X_{a,d}$	X_d	N/A	$X_{d,e,}$	X_d	N/A	X_f	X_d	N/A	X_g	X_g	N/A
Bullhead	$X_{a,b}$	X_b	N/A	X_c	X_c	N/A	$X_{a,d}$	X_d	N/A	$X_{d,e,}$	X_d	N/A	X_f	X_d	N/A	X_g	X_g	N/A

The notes containing evidence supporting the above conclusions can be found overleaf corresponding with the relevant letters (^{a,b,c,d}) within the matrix.

a

The spread of INNS present onsite will be prevented through embedded biosecurity protocols (detailed in Appendix B (**TR010038/APP/6.9**)) implemented on a statutory basis in order to prevent the spread of INNS. In addition the distance of the SAC to the proposed works means that it is likely that any spread of INNS will be localised and will not pose any likely significant effects upon the SAC.

b

Noise and vibration effects during construction are considered to be limited to sensitive receptors within 300m and 30m of the Proposed Scheme respectively, as such effects on the primary and qualifying features have been scoped-out as the SAC is approximately 1.6km north-east of the site at its closest extent. Operational vibration effects were also scoped out the assessment as per standard practice guidance. Noise modelling has identified two existing road-crossings within the SAC boundary which would be affected by the operational phase of the proposed works. In summary, these comprise an area near Lyng where there would be a major adverse noise change in the opening year due to an increase in traffic noise, and a major beneficial impact at the majority of the River Wensum close to Ringland. Terrestrial noise from road traffic is not anticipated to translate into significant aquatic noise through attenuation from soil to water, and therefore it is considered that the qualifying features of the River Wensum SAC will not be impacted by this increase in road traffic noise at Lyng. Regardless, the benefits of noise reduction at Ringland cover a much larger area of the SAC compared to that adversely impacted area at Lyng. As such, no adverse likely significant effects of displacement are reasonably foreseeable as a result of noise and vibratory effects during the construction and operational phases of the Proposed Scheme.

c

Details regarding air quality and lighting assessments have been included in Appendix B of this Screening report. Given the distance of the Proposed Scheme from the River Wensum SAC, and lack of impact pathways identified for these factors it is considered there would be no reasonably foreseeable likely significant effect on the SAC from lighting or air quality as a result of the Proposed Scheme.

d

The works are located approximately 7.3km upstream of the confluence of the rivers Tud and Wensum (the effect pathway). Therefore, any unlikely remnants of contaminants or sedimentation that occur are likely to be highly diluted by the time theyreach the River Sensum SAC. Therefore, no likely significant effects are anticipated onto the River Wensum SAC due to water pollution..

e

Due to the distance between the Proposed Scheme and NSN any surface or groundwater pollutants introduced would be highly diluted and dispersed by the time it reached the downstream SAC. In addition, the likelihood of any groundwater pollutants entering the River Tud and Wensum effect pathway is significantly decreased through embedded design. Therefore, no likely significant effects are anticipated onto the River Wensum SAC due to groundwater pollution.

f

If abstraction from the aquifer is required onsite and consent must be sought from the Environment Agency. Any consents granted must include embedded construction and design protocols for minimising pollution and risk to any designated site. This will also be the case for dewatering for which a bespoke consent would be required. As such, as any abstraction and dewatering would have to be agreed with the Environment Agency taking into account the NSN, there is no likely foreseeable impact of this potential hazard to the designated site.

g

There are no identified projects within the ZOI anticipated to result in significant effects that would require additional mitigation in response to cumulative effects.

Paston Great Barn SAC

Table C.3: Screening matrix of the potential likely significant effects upon Paston Great Barn SAC.

Name of European Site and Designation: Paston Great Barn SAC															
EU Code: UK0030235															
Distance to NSIP: approximately 29.3km															
European site features	**Likely effects of NSIP**														
Effect	Mortality - pollution			Mortality - collision			Mortality – reduced food sources			Reduced breeding success – noise disturbance			In-combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Barbastelle bat	✕d	✕d	n/a	✕a-c	✕a-c	n/a	✕a	✕a	n/a	✕a-c	✕a-c	n/a	✕e	✕e	n/a

A

Research by Zeal et al., (2012) included radiotracking surveys of barbastelle bats. The conclusion of the survey results states that in Devon, UK, non-breeding barbastelle bats travel up to a maximum of 20.4km from their roosting sites, whilst breeding bats (pregnant and lactating) travel a maximum of 8.7km from their roosts. In addition, whilst the Yare Valley has suitable foraging grounds for this species, in the form of riverine woodland, it is unlikely that bats from Paston Great Barn SAC will travel to this area. This is because the bats are more likely to forage in the Broads SAC, which lies 11.8km at its nearest point from Paston SAC. The riverine woodland habitat within the Broads SAC lies approximately 20.1km from Paston SAC. In addition, it is likely that the bats from Paston Great Barn SAC will also hibernate at this site and therefore the bats will have winter foraging grounds that are close to the SAC, when winter temperatures a mild enough to allow for winter foraging.

B

The surveys undertaken in June 2020 recorded barbastelle bats at four crossing point locations on A47, at Crossing Points 1, 7, 8 and 9. However, given the extent of available suitable habitat between the SAC and the site, it is

considered likely that this species from the SAC does not frequent the area and the above effect pathways will not have a significant effect on the population within the SAC.

C

Surveys undertaken as part of the Norwich Western Link Road and the Norwich Northern Distributor Road found bat roosts for barbastelle bats to be present in the Hall Hill and Broadway woodlands, and a colony in the Morton area to the west of Norwich. The closest barbastelle roost to the Proposed Scheme is approximately 1.3km north in Foxburrow Plantation which is within the 6km core sustainance zone of this species (Collins, 2016). Therefore, it is more likely that these barbastelle bats would be originating from these roosts rather than from Paston Great Barn SAC.

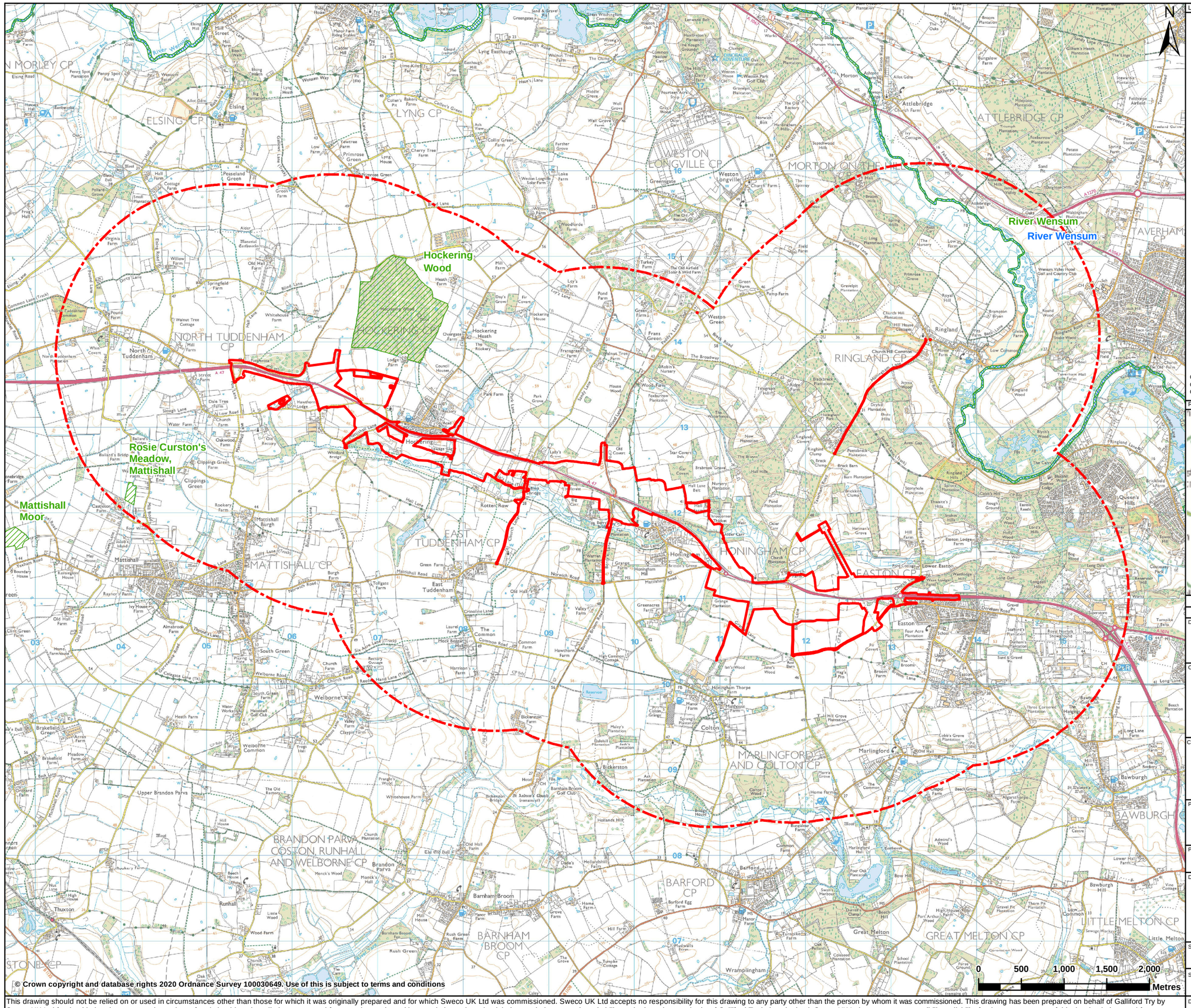
D

Air quality modelling has been undertaken using the approach outlined in DMRB LA 105, using the Interim HA Long Term Gap Analysis Calculator v1.1, as presented in ES Chapter 5 (Air quality) (**TR010038/APP/6.1**). The magnitude of change was assessed as it is considered that there will be no likely significant effect upon the SAC in EIA terms. There are no receptors expected to exceed the annual mean NO_2 AQO in the opening year scenarios, all modelled receptors have predicted annual mean NO_2 concentrations well below the objective. In accordance with DMRB LA 105, no significant effects on the health of other non-NSN ecological receptors have been identified as a result of the operation of the Proposed Scheme. Furthermore, the operation of the Proposed Scheme is not predicted to affect compliance with the European Union (EU) Directive on ambient air quality. The assessment has therefore concluded that there will be no significant air quality effects as a result from the operation of the Proposed Scheme and that no likely significant effects will occur on Paston Great Barn SAC or its Barbastelle bat population during operation. In addition, none of the likely foraging areas for barbastelle bats are located where there is a direct hydrological link between the Proposed Scheme and these habitats and therefore it is likely that there will be no likely significant effects of ground water pollution upon this species.

E

There are no identified projects within the ZOI anticipated to result in significant effects that would require additional mitigation in response to cumulative effects.

Appendix D. Map of designated sites



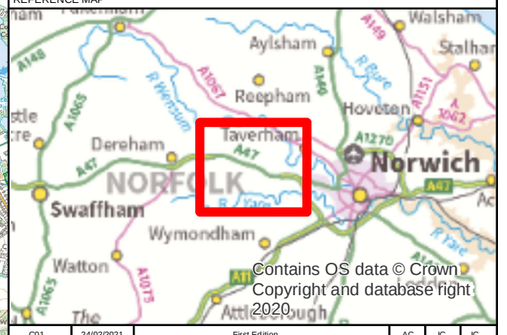
LEGEND

- DCO boundary
- Study area - 2km buffer

International designated sites

- Site of special scientific interest
- Special area of conservation

REFERENCE MAP



REV	DATE	REVISION NOTE	ORG	CHK'D	APP'D
C01	24/02/2021	First Edition	AC	IC	IC

DESIGNER: SWECO

CONTRACTOR: GallifordTry

CLIENT: highways england

PROJECT TITLE: A47 NORTH TUDDENHAM TO EASTON

PROJECT STAGE: PCF STAGE 3

DRAWING TITLE: FIGURE 1 - DESIGNATED SITES
TR010038/APP/6.2

SUITABILITY: FOR INFORMATION

SHEET SIZE	SCALE	STATUS
A3	1:42,115	S2

DRAWING NUMBER: HE551489-GTY-EBD-000-DR-LB-30002