Lower Thames Crossing

6.5 Habitats Regulations Assessment Screening Report and Statement to Inform an Appropriate Assessment

APFP Regulation 5(2)(g)

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

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Lower Thames Crossing

6.5 Habitats Regulations Assessment

Screening Report and Statement to Inform an Appropriate Assessment

List of contents

List of plates

Page number

List of tables

Page number

1 Executive summary

1.1 Introduction

1.1.1 National Highways (the Applicant) has submitted an application under section 37 of the Planning Act 2008 for an order to grant development consent for the A122 Lower Thames Crossing (the Project).

1.1.2 A Habitats Regulations Assessment (HRA) refers to the stages of assessment which must be undertaken in accordance with the Conservation of Habitats and Species Regulations 2017 (as amended), in circumstances where the plan or project that is not directly connected with or necessary to the management of a European site is likely to have a significant effect on that site.

1.1.3 This document comprises the Applicant's information to inform the Habitats Regulations Assessment process. It has been drafted to provide the Secretary of State the information necessary to undertake an appropriate assessment (as required by Regulation 63(1) of the Conservation of Habitats and Species Regulations 2017 (as amended)) as part of the determination process for the Development Consent Order (DCO). This document reports the results of the Stage 1 Screening, determining the likely significant effects on European sites, and the Stage 2 Appropriate Assessment, assessing adverse effects on the integrity of European sites as a result of the Project. The report also explains why the Project does not engage the derogation provisions of the Conservation of Habitats and Species Regulations 2017 (as amended)).

1.1.4 This assessment has been completed using the standard described within Design Manual for Roads and Bridges (DMRB) LA 115 Habitats Regulations Assessment (Highways England, et al., 2020a), which sets out the requirements for assessment and reporting of the implications, from construction, operation and maintenance of highways and/or road projects on European sites. These assessments are compatible with, and incorporate relevant guidance from, Natural England and the Planning Inspectorate's Advice Notes, in particular Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects.

1.2 European sites identified

1.2.1 The screening process identified the following European sites with the potential to be affected by the Project (i.e. conceivable pathways to an effect were identified) which were therefore assessed (see Figure 1):

a. Thames Estuary and Marshes Special Protection Area (SPA)

b. Thames Estuary and Marshes Ramsar site

c. Epping Forest Special Area of Conservation (SAC)

d. North Downs Woodlands SAC

1.3 European sites: no likely significant effect (LSE)

1.3.1 Table 1.1 shows the European sites and effect pathways that were identified and assessed at screening, for which the assessment concluded no LSE as a result of the Project alone and in combination with other plans and projects (i.e. were screened out).

Table 1.1 European sites and potential effect pathways where no LSE identified

European site	Potential effect pathways
Thames Estuary and Marshes Ramsar site	Change in air quality – dust emissions – construction Change in air quality – vehicle emissions- construction Changes in groundwater quality and quantity – tunnel construction and operation Changes in surface water quality and quantity – operation Introduction/spread of Invasive Non-Native Species (INNS) Changes in noise and vibration underwater and above ground as a result of tunnel construction only. Change in recreational pressure – construction and operation (wider visitor pressure) Changes in light levels – construction and operation Changes in visual disturbance (vehicles in eyeline) - operation Vehicle collision Utilities infrastructure collision Climate change
Thames Estuary and Marshes SPA	Change in air quality – dust emissions – construction Changes in groundwater quality and quantity – tunnel construction and operation Changes in surface water quality and quantity – operation Introduction/spread of Invasive Non-Native Species (INNS) Changes in noise and vibration underwater and above ground as a result of tunnel construction only. Change in recreational pressure – construction and operation (wider visitor pressure) Changes in light levels – construction and operation Changes in visual disturbance (vehicles in eyeline) - operation Vehicle collision Utilities infrastructure collision Climate change
North Downs Woodlands SAC	Change in air quality – vehicle emissions – operation

1.4 European sites: LSE cannot be discounted

1.4.1 Table 1.2 shows the European sites and effect pathways that were identified and assessed at screening, for which the assessment concluded that LSE cannot be discounted as a result of the Project alone or in combination and these are considered in the Stage 2 Appropriate Assessment within this report.

Table 1.2 European sites and effects where LSE cannot be discounted

European site	Potential LSE
Thames Estuary and Marshes Ramsar site	Reduction in habitat area (of functionally linked land only) as a result of land take in the terrestrial and aquatic environment (bird qualifying features) Changes in surface water quality and quantity – construction within the Ramsar site (Ramsar criteria 2, 5, and 6) Disturbance to key species (bird qualifying features) within functionally linked land as a result of changes in recreational pressure – operation (Tilbury Fields visitor pressures) Disturbance to key species (bird qualifying features) within the Ramsar site and functionally linked land as a result of changes in noise and vibration – construction works and vehicles, intertidal works only (outfall construction) Disturbance to key species (bird qualifying features) within the Ramsar site and functionally linked land as a result of changes in visual disturbance - construction (people/machines in eyeline) Disturbance to key species (bird qualifying features) within functionally linked land as a result of changes in noise and vibration - operation
Thames Estuary and Marshes SPA	Reduction in habitat area (of functionally linked land only) as a result of land take in the terrestrial and aquatic environment (bird qualifying features) Disturbance to key species (bird qualifying features) within functionally linked land as a result of changes in recreational pressure – operation (Tilbury Fields visitor pressures) Disturbance to key species (bird qualifying features) within functionally linked land as a result of changes in noise and vibration – construction works and vehicles, intertidal works only (outfall construction) Disturbance to key species (bird qualifying features) within functionally linked land as a result of changes in visual disturbance - construction (people/machines in eyeline) Disturbance to key species (bird qualifying features) within functionally linked land as a result of changes in noise and vibration - operation
Epping Forest SAC	Change in air quality – vehicle emissions – operation

1.5 Mitigation measures

1.5.1 In order to avoid adverse effects on the integrity of European sites, the Applicant has committed to the following mitigation measures, which are additional to the integral measures considered within the screening assessment. These measures are secured via the Register of Environmental Actions and Commitments (REAC) (Application Document 6.3) or the Design Principles (Application Document 7.5), to avoid and reduce the potential LSEs on the Thames Estuary and Marshes SPA and the Thames Estuary and Marshes Ramsar site, as identified:

a. RDWE033 sets the standard for water discharged to the Thames Estuary and Marshes Ramsar site to avoid any changes in the receiving water.

b. HR004 and HR005 relate to noise attenuation barriers which minimise the changes in noise in the Thames Estuary and Marshes Ramsar site and functionally linked land associated with the Thames Estuary and Marshes SPA and Ramsar site.

c. HR001, HR002, HR005, HR006, HR011, HR012 relate to timing constraints on specific construction activities and avoid visual disturbance effects during the overwintering period within the Thames Estuary and Marshes Ramsar site and functionally linked land associated with the Thames Estuary and Marshes SPA and Ramsar site.

d. Design Principle S9.02 and S9.18 include commitments to manage visitors within Tilbury Fields which aim to avoid and reduce recreational disturbance of qualifying features using the functionally linked intertidal habitat associated with the Thames Estuary and Marshes SPA and Ramsar site.

e. HR003 relates to timing constraints during severe winter weather and avoids effects on qualifying species using functionally linked land associated with the Thames Estuary and Marshes SPA and Ramsar site.

f. Design Principle S9.13 and HR007 provide enhanced habitat areas to avoid and reduce the effect of habitat loss and disturbance within the functionally linked land associated with the Thames Estuary and Marshes SPA and Ramsar site. HR010 relates to the commitment to ensure a water supply for the habitat created as part of Design Principle S9.13.

1.5.2 The predicted scale of the likely significant effect of nitrogen deposition at Epping Forest SAC (identified at Stage 1 Screening) has been further assessed at Stage 2 Appropriate Assessment and would not result in a consequential risk of a measurable change in the habitats and so would not have an adverse effect on integrity. Therefore, given the inconsequential nature of the effect no mitigation measures are required or proposed by the Applicant. In order to show due regard to the representations of Natural England, potential mitigation measures were investigated on a 'without prejudice' basis and these measures are further discussed below (Section 1.7). The Applicant's 'without prejudice' consideration of the potential for and feasibility of mitigating the effect is reported in an annex to the Statement of Common Ground between Natural England and the Applicant (Annex A, Application Document 5.4.1.6).

1.6 Assessment of effect on integrity

1.6.1 This document reports the assessment of the implications of the Project on the sites' conservation objectives and considered whether the Project would delay or interrupt progress towards achieving the objectives, as required by the Design Manual for Roads and Bridges (DMRB) standard LA 115 (Highways England, et al., 2020) and Planning Inspectorate Advice Note 10 (Planning Inspectorate, 2022).

1.6.2 The assessment concluded that there is sufficient evidence to demonstrate beyond reasonable scientific doubt that the Project (alone and in combination with other plans and projects) would not adversely affect the integrity of the following European sites:

a. Thames Estuary and Marshes Ramsar

b. Thames Estuary and Marshes SPA

c. Epping Forest SAC

1.7 Absence of need for a Stage 3 Derogation

1.7.1 Within this report, the Applicant's competent expert concludes there would be no adverse effects on the integrity of any European site, and accordingly there is no requirement for consideration of derogation at Stage 3. At the time of completion of this report, Natural England does not agree with the conclusion of the Stage 2 Appropriate Assessment in respect of Epping Forest SAC only.

1.7.2 In the event that the competent authority does not agree with the conclusions of the report, there would in any event be no need to employ Stage 3 Derogation of the HRA process as a mitigation measure has been assessed on a 'without prejudice' basis, shown to be feasible and would reduce the impact to below screening thresholds (see Annex A.7 of the Natural England Statement of Common Ground, Application Document 5.4.1.6). Further, Natural England has agreed that the mitigation measure would be appropriate and, if required to be implemented by the competent authority, would avoid any adverse effects on the integrity of Epping Forest SAC, thereby enabling the competent authority to complete the HRA process at Stage 2.

2 Introduction

2.1 Purpose of this document

2.1.1 The Applicant has submitted an application under Section 37 of the Planning Act 2008 for an order to grant development consent for the A122 Lower Thames Crossing project (the Project).

2.1.2 This document comprises the Applicant's information to inform the Habitats Regulations Assessment (HRA). It has been drafted to provide the Secretary of State the information necessary to undertake an appropriate assessment (as per Regulation 63(1) of the Conservation of Habitats and Species Regulations 2017 (as amended)) as part of the determination process for the Development Consent Order (DCO). This document reports the results of the Stage 1 Screening, determining the likely significant effects (LSEs) on European sites, the Stage 2 Appropriate Assessment, assessment of adverse effects on the integrity of a European site(s) as a result of the Project and whether there is a requirement for consideration of derogation at Stage 3 HRA.

2.1.3 This document is part of a suite of documents which accompanies the application to grant development consent. A full description of all the Application Documents is provided in the 'Introduction to the Application' (Application Document 1.3).

2.2 HRA process overview

2.2.1 The Conservation of Habitats and Species Regulations 2017 has been amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, however the wording of the regulations applicable to this assessment is unchanged, with the exception of how the protected site network is referred to (see paragraph 2.2.2). The legislation applicable to HRA process is hereafter referred to as the Habitats Regulations and any specific regulation referred to in this document is a reference to the relevant regulation in the Habitats Regulations.

2.2.2 The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 creates a national site network within the UK which comprises the protected sites already designated under the Conservation of Habitats and Species Regulations 2017. In this report the sites within the national site network have been referred to by their designation (see paragraph 2.2.6) or together as European sites.

2.2.3 A HRA is required under Regulation 63(1) of the Habitats Regulations in certain circumstances. Regulation 63(1) provides as follows:

'A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which—

(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives.'

2.2.4 The Project is not directly connected with or necessary to the management of a European site, and therefore Regulation 63(1) applies.

2.2.5 The HRA process is made up of several stages to fulfil the requirements of Regulations 63, 64 and 68 and these are illustrated in Plate 2.1 (figure 2.3 in DMRB LA 115 (Highways England, *et al*., 2020a) and described as follows:

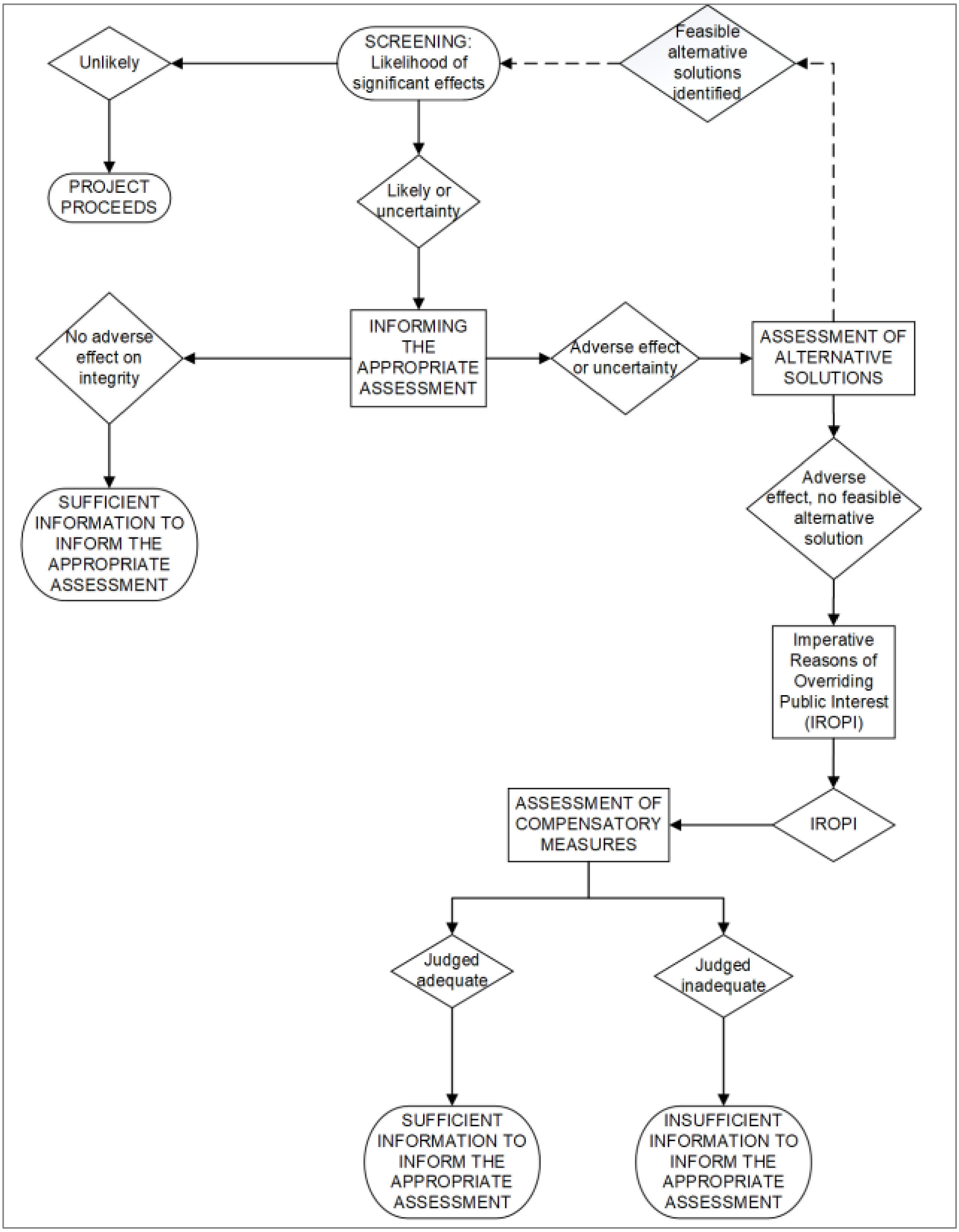
a. Stage 1 Screening, the process to determine if there are any LSE on European sites either alone or in combination with other plans or projects.

b. Stage 2 Appropriate Assessment, to determine whether it can be ascertained, in view of the conservation objectives, that the plan or project (either alone or in combination with other projects and plans) would have any adverse effect on the integrity of a European site. If the potential for adverse effects on the integrity of a European site cannot be ruled out, potential mitigation measures to alleviate those adverse effects should be proposed and assessed. Stages 1 and 2 would provide the information to allow the competent authority to fulfil Regulation 63.

c. Stage 3 Derogations includes the assessment of alternatives, imperative reasons of overriding public interest and compensatory measures. Where it is not possible to rule out no adverse effect on the integrity of a European site, the decision maker may only grant consent if satisfied that there are no alternative solutions; that the plan or project must be carried out for imperative reasons of overriding public interest; and that compensatory measures have been secured. Stage 3 Derogations would provide the information to allow the competent authority to fulfil Regulations 64 and 68 and ensure the overall coherence of the national site network is protected.

2.2.6 European sites include Special Protection Areas (SPAs) and potential SPAs, Special Areas of Conservation (SACs) and proposed SACs, Ramsar sites (listed and proposed) and areas secured as sites compensating for damage to a European site.

Plate 2.1 The HRA process (figure 2.3 in DMRB LA 115 (Highways England, et al., 2020a)



2.3 Standards and guidance used in the assessment

2.3.1 The Project is a Nationally Significant Infrastructure Project (NSIP) and the following National Highways standard and Planning Inspectorate advice has been used in completing this assessment:

a. Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2020a) Design Manual for Roads and Bridges (DMRB) LA 115 Habitats Regulations Assessment

b. Planning Inspectorate (2022) Habitats Regulations Assessment Advice Note 10: Habitats Regulations Assessment relevant to nationally significant infrastructure projects

2.3.2 This assessment has been completed using DMRB LA 115 Habitats Regulations Assessment (Highways England, et al., 2020a), which sets out the requirements for assessment and reporting of the implications, from construction, operation and maintenance of highways and/or road projects on European sites.

2.3.3 The matrices from DMRB LA 115 (Highways England, et al., 2020a) have been completed and are provided in Appendix E. As the Project requires a DCO, a summary table required by the Planning Inspectorate in accordance with its updated Advice Note 10 version 9 (Planning Inspectorate, 2022) has also been completed this is provided in Appendix F. The Applicant discussed the format of the summary table with the Planning Inspectorate and has taken account of the feedback provided by the Planning Inspectorate on the draft summary table provided to them by the Applicant.

2.3.4 The assessment of the effects of changes in air quality on European sites has been carried out in accordance with DMRB LA 115 (Highways England, *et al*., 2020a) and DMRB LA 105 (Highways England, *et al*., 2019).

2.3.5 In completing this assessment, other documents have been used as guidance for specific elements of the process. These are listed as follows:

a. The Planning Inspectorate Advice Note 11: Working with public bodies in the infrastructure planning process Annex H – Evidence Plans for Habitats Regulations Assessments of Nationally Significant Infrastructure Projects, February 2021 (Planning Inspectorate, 2021)

b. The Planning Inspectorate Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects Version 2, August 2019 (Planning Inspectorate, 2019)

c. Design Manual for Roads and Bridges LA 105 Air quality (Highways England, *et al*., 2019)

d. Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001) (Natural England, 2018)

e. Functional linkage: How areas that are functionally linked to European sites have been considered when they may be affected by plans and projects - a review of authoritative decisions. Natural England Commissioned Reports, Number 207 (Chapman & Tyldesley, 2016)

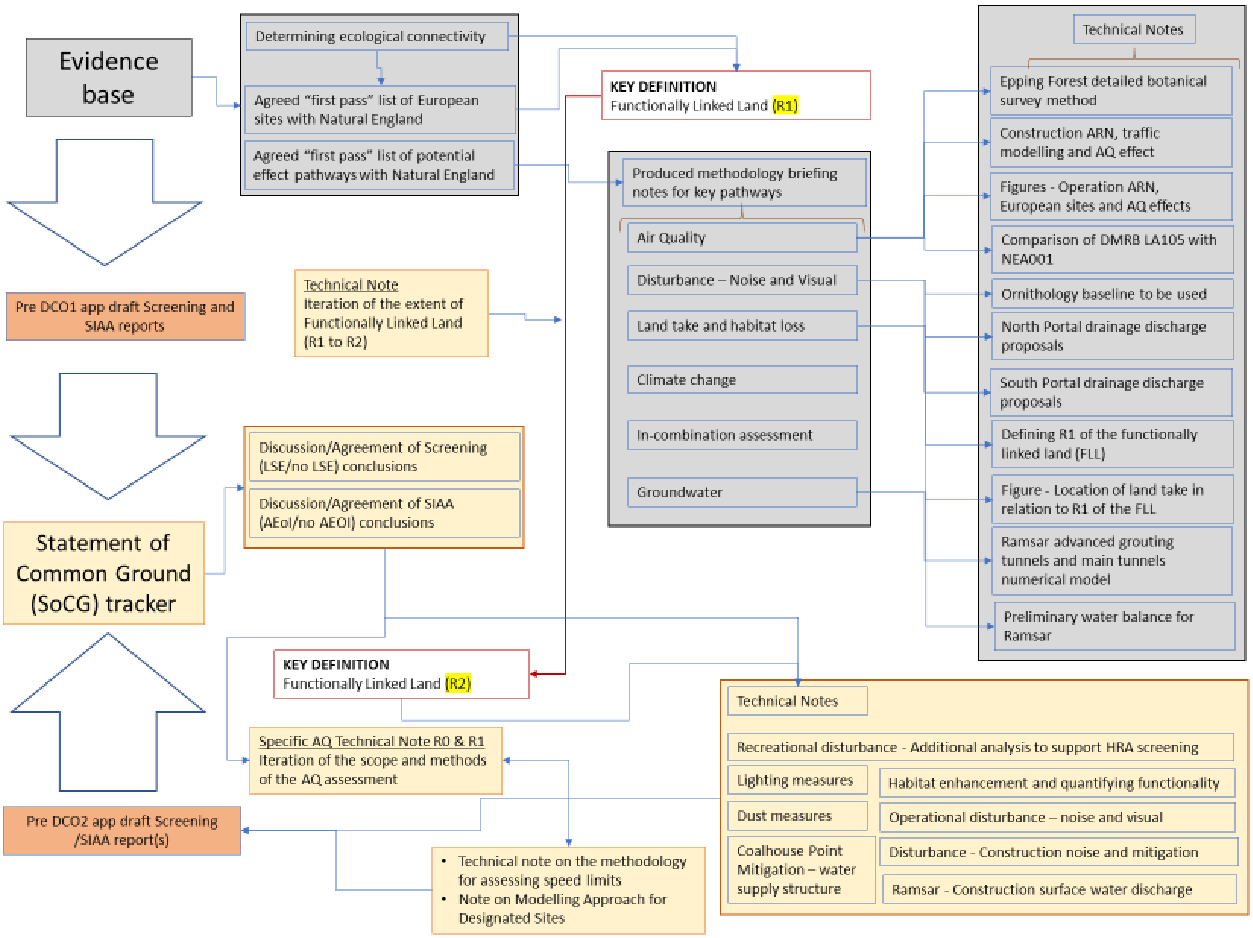
2.4 Evidence plan

2.4.1 An Evidence Plan is required by both DMRB LA 115 and Planning Inspectorate Advice Note 11 Annex H (Planning Inspectorate, 2021) and its use is strongly advised in Planning Inspectorate Advice Note 10 to support the Habitats Regulations Assessment (HRA). It aims to provide certainty on the amount and range of evidence to be collected and help address and agree issues prior to application, supporting robust and streamlined decisions.

2.4.2 While a formal Evidence Plan was not adopted at the start of the Project's HRA process because it began before the current iterations of DMRB LA 115 and Planning Inspectorate Advice Note 11 annex H, substantial consultation with Natural England has been undertaken on the elements of such a plan, including iterations of drafts of an 'Evidence Base', which was a tabulated summary of methodologies and evidence requirements that contained the majority of the elements of a formal Evidence Plan.

2.4.3 The development of the methodologies and evidence requirements has subsequently been documented in a formal Evidence Plan and is included in Appendix C. It sets out the scope of the evidence required and the ongoing iteration that occurred with Natural England in completing this assessment. The flow chart in Plate 2.2 illustrates the key evidence documents used within the consultation to scope, discuss and agree issues with Natural England.

Plate 2.2 Evidence plan – key documents and process



2.5 Scope of the assessment

Data used

2.5.1 The data used in this assessment has been collected for the Project to inform the Environmental Impact Assessment (EIA). The desk-based and field survey requirements were subject to consultation with Natural England via the EIA scoping process as reported within the Inspectorate's Scoping Opinion and the National Highways Response for the Project (ES Appendix 4.1, Application Document 6.3). The field survey methods followed standard good practice guidelines, and specific consultation with Natural England on survey methodologies was carried out, as reported within the ES Chapter 8 Terrestrial Biodiversity and Chapter 9 Marine Biodiversity (Application Document 6.1).

2.5.2 The assessment has used the following sources of evidence when describing the baseline conditions of the receptors potentially affected by the Project.

a. SACs, SPAs and Ramsar site Environmental Systems Research Institute (ESRI) shapefiles (Joint Nature Conservation Committee (JNCC, 2019))

b. SAC and SPA with marine components ESRI shapefiles (JNCC, 2019)

c. SAC and SPA citations – JNCC (https://jncc.gov.uk/) & Natural England Designated Sites View ((Natural England, n.d.)

d. Ramsar site citations – JNCC & Ramsar Sites Information Service (https://rsis.ramsar.org/)

e. Corine Land Cover Habitat Mapping 2018 ESRI shapefile (European Environment Agency and the Joint Research Centre, 2020)

f. Site of Special Scientific Interest Impact Risk Zones ESRI shapefile (Natural England, 2019)

g. Watercourses ESRI shapefile (Ordnance Survey, 2019)

h. Thames Estuary intertidal mudflats map – ESRI shape file (Thames Estuary Partnership, 2003)

i. Intertidal mudflats layer for England – ESRI shape file (Natural England, 2003)

j. British Trust for Ornithology Wetland Bird Survey (WeBS) data relating to the Thames Estuary

k. WeBS Alerts data (Woodward, et al., 2019)

l. Project field survey data – Ornithology survey data as reported in the Environmental Statement (ES) Appendix 8.7 (Application Document 6.3)

m. Project field survey data – Phase 1 Habitat Survey data as reported in ES Figure 8.2 (Application Document 6.2)

n. Project field survey detailed botany data for Epping Forest SAC as described in Appendix D

o. What do we know about the birds and habitats of the North Kent Marshes? (Liley, 2011)

p. Marine Biodiversity baseline information – Desk-based review of literature and third-party development data within the ES Chapter 9 Marine Biodiversity (Application Document 6.1).

q. Responses from consultation with Natural England (see Section 8)

2.5.3 The assessment has used the following sources of evidence when describing the likely changes to the environment as a result of the Project:

a. The predicted changes in Nitrogen (N) deposition as calculated by the Project team according to the methods described in ES Chapter 5: Air Quality (Application Document 6.1)

b. The results of the air quality modelling for the construction phase and specifically the European sites as reported in full within the ES Appendix 5.3: Air Quality Construction Phase Results (Application Document 6.3)

c. The results of the air quality modelling for the operational phase and specifically the European sites as reported in full within the ES Appendix 5.4: Air Quality Operational Phase Results (Application Document 6.3)

d. The predicted noise levels for the construction and operational phases as calculated by the Project team according to the methods described in the ES Chapter 12: Noise and Vibration (Application Document 6.1)

e. The baseline noise levels which are reported in full within the ES Appendix 12.5: Baseline Noise Survey Information (Application Document 6.3)

f. The predicted changes in construction and operational lighting levels are reported in full within ES Appendix 8.15 (Application Document 6.3)

g. The predicted changes in groundwater are reported within the Hydrogeological Risk Assessment (ES Appendix 14.5, Application Document 6.3)

h. The land take calculations have been carried out using the Project Land Plans 5(2)(i) as shown in Volume 2 Book of Plans (Application Document 2.2) and the Phase 1 Habitat survey data as reported in ES Appendix 8.2 Plants and Habitats Technical Appendix (Application Document 6.3)

i. Thames Estuary and Marshes SPA: The Supplementary Advice on Conservation Objectives (Natural England, 2018)

j. European Site Conservation Objectives: Supplementary Advice on conserving and restoring site features. Epping Forest SAC (Natural England, 2019a)

k. European Site Conservation Objectives: Supplementary Advice on conserving and restoring site features. North Downs Woodlands SAC (Natural England, 2019b)

Identifying sites

2.5.4 DMRB LA 115 (Highways England, et al., 2020a) includes the following screening criteria and these have been used to identify the European sites that could potentially be affected by the Project.

a. Is the Project within 2km of a European site or functionally linked land

b. Is the Project within 30km of a SACs, where bats are noted as one of the qualifying interests

c. Does the Project cross or lies adjacent to, upstream of, or downstream of, a watercourse which is designated in part or wholly as a European site

d. Does the Project have 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 DMRB LA 113 (Highways England, et al., 2020c)

e. Does the Project have an affected road network (ARN) which triggers the criteria for assessment of European sites DMRB LA105 (Highways England, et al., 2019)

f. Additional European sites should be subject to screening where the existence of ecological connectivity between projects and European sites is identified beyond the screening criteria.

g. Those European sites with IRZs within the project boundary or footprint should be subject to HRA screening.

2.5.5 The Planning Inspectorate Advice Note 10 (Planning Inspectorate, 2022) states that the list of European sites should be taken as including, all of which have been considered in this report:

a. Special Protection Areas (SPAs) and potential SPAs

b. Special Areas of Conservation (SACs), and proposed SACs

c. Ramsar sites (listed and proposed)

d. Areas secured as sites compensating for damage to a European site

Functionally linked land

2.5.6 When identifying the European sites for the assessment, understanding the connectivity between the Project and sites requires the definition of the functionally linked land.

2.5.7 Functionally linked land has been defined in the Natural England commissioned report 207 (Chapman & Tyldesley, 2016) as follows:

'*The term “functional linkage” refers to the role or “function” that land or sea beyond the boundary of a European site might fulfil in terms of ecologically supporting the populations for which the site was designated or classified. Such land is therefore “linked” to the European site in question because it provides an important role in maintaining or restoring the population of qualifying species at favourable conservation status.*'

2.5.8 The following definitions of functionally linked land and supporting habitat apply to this assessment report. It should be noted that whilst the definitions of functionally linked land and supporting habitat can apply to any mobile designated species features using habitat inside and outside the designated site boundary, for this assessment, the only such designated species features assessed in this assessment are birds associated with the Thames Estuary and Marshes SPA and Ramsar sites and so the definition used is specific to birds:

a. Functionally linked land is habitat used by the birds outside the European site boundary.

b. Supporting habitat is habitat used by the birds within the European site boundary and is defined within the relevant European sites Supplementary Advice (Natural England, 2018).

2.5.9 The agreement on what should be considered as the extent of the functionally linked land, see Figure 2 in Appendix A, has been developed over a number of iterations in close consultation and agreed with Natural England. The Evidence Plan in Appendix C sets out the data and process used to refine the extent of functionally linked land. In summary the extent of functionally linked land was based on Natural England's SSSI impact risk zone (IRZ) associated with road projects. The IRZ was refined in two further steps.

a. Following a review of the Project ornithology data, which found that the European site qualifying features used low lying land below 10m AOD (above ordnance datum), the extent was limited to the area within the IRZ that was below 10m AOD.

b. On discussion with NE the extent was then altered slightly to ensure the habitats around Holehaven Creek SSSI and Tilbury Fort were within the extent of functionally linked land.

Zone of influence

2.5.10 The construction and operation of the Project would result in various changes in the surrounding environment and these changes are termed potential impacts. The area over which those changes would occur is described as the zone of influence (ZoI). The potential impacts and associated ZoI are described in Table 2.1.

Table 2.1 The potential impacts and ZoI at construction and operation

Potential Impact	ZoI
Land take - terrestrial and aquatic (marine) environment - construction	Area within the Order Limits, primarily the northern tunnel entrance compound, A226 Gravesend Road compound, and Milton compound The Project will only be constructed on land that is controlled within the powers of the DCO and so no land take could occur outside the Order Limits.
Vehicle collision with species during operation	Area of new carriageway where species interaction with vehicles is possible
Species collision with overhead utilities infrastructure - operation	Area of overhead utilities realignment where species interaction with changed overhead utilities infrastructure is possible

Potential Impact	ZoI
Change in air quality – dust emissions – construction	Area within the 200m of the Order Limits where dust effects could occur in absence of mitigation Defined by DMRB LA 105 (Highways England, et al., 2019)
Change in air quality – vehicle emissions – construction	Area within 200m of construction phase Affected Road Network (ARN). Defined by DMRB LA 105 (Highways England, et al., 2019)
Change in air quality – vehicle emissions – operation	Areas within 200m of the operational (2030 opening year) ARN Defined by DMRB LA 105 (Highways England, et al., 2019)
Changes in noise and vibration – vehicles – operation	Area within 600m of the Project alignment and existing routes that are bypassed/improved or new routes identified Defined by DMRB LA 111 (Highways England, et al., 2020d)
Changes in noise and vibration – all construction work and associated vehicle movements	Areas within 300m of the Order Limits defined by DMRB LA 111 (Highways England, et al., 2020d). Defined by DMRB LA 111 (Highways England, 2020) as follows: '*The study area for the construction vehicle assessment for the ES will consider any road/route identified within the Transport Assessment as experiencing temporary increases in heavy vehicle movements accounting for a predicted increase in road traffic noise of greater than 1dB during the construction phase. The study area will consider the effects resulting from temporary road closures and diversions where appropriate.*'
Changes in noise and vibration – underwater and above ground – tunnel construction only	Changes within the surrounding area where the Tunnel Boring Machine (TBM) is in operation.
Changes in light levels – construction	Within the Order Limits, primarily construction compounds and work areas, where lighting is used. Areas where light spill is predicted to exceed 0.5lux (see paragraph 4.1.10 and Appendix C)
Changes in light levels – operation	Highway lighting is associated with the main line and junctions across the Project and within the tunnel. The ZoI is limited to the area immediately either side of the highway. Areas where light spill is predicted to exceed 0.5lux (see paragraph 4.1.10 and Appendix C)
Changes in visual disturbance – people/machines in eyeline – construction	Sensitivity to visual disturbance is limited to areas within 300m of the activity (Cutts, et al., 2009; Cutts, et al., 2013).
Changes in visual disturbance –vehicles in eyeline – operation	Sensitivity to visual disturbance is limited to areas within 300m of the Project (Cutts, et al., 2009; Cutts, et al., 2013).
Change in recreational disturbance – construction and operation	Distance from a European site where there is risk of recreational disturbance is limited to 8.1 km north of the River Thames and 6 km south of the River Thames (Essex County Council, 2019; Birdwise North Kent SAMMS Project Board, 2018)

Potential Impact	ZoI
Changes in surface water quality and quantity – construction	The risk is associated with the northern and southern tunnel entrance compounds and associated earthworks areas, where rainfall runoff enters the watercourse network within European sites or associated functionally linked land. It is limited to areas within 500m of the Order Limits as set out in ES Chapter 14 Road Drainage and Water Environment (Application Document 6.1).
Changes in surface water quality and quantity – operation	The Project design is such that no change is anticipated. The Project is to be built with an attenuated road drainage system so discharges will comply with quality and permit standards and chemical composition within Environment Agency agreed parameters. Discharge will be at agreed rates predetermined by the Environment Agency and would be equivalent to greenfield runoff rates. The size and tidal influence of the receiving watercourse will be such that no changes are expected to be perceivable.
Changes in groundwater quality and quantity – tunnel construction and operation	Groundwater modelling outputs are reported within the ES Appendix 14.5 Hydrogeological Risk Assessment (Application Document 6.3) and discussed in further detail within paragraphs 6.2.13 - 6.2.18.
Introduction/spread of Invasive Non-Native Species (INNS) – terrestrial environment	The risk is particularly associated with earthworks areas where non-natives could be spread or introduced with imported material.
Introduction/spread of INNS – marine environment	The risk is particularly associated with the construction of the northern tunnel entrance compound temporary drainage pipeline and outfall within the River Thames intertidal area where non-natives could be spread or introduced by vessel movements.

Determining significance

2.5.11 Following the gathering of information on the Project and the European sites, an assessment has been undertaken to predict the LSEs of the Project on the European sites ‘alone’. To inform this process, all parts of the Project were assessed to see if they could result in LSEs on the European sites. The evidence and rationale used to determine the significance of effect are documented within Appendix C Evidence Plan. The approach to determining significance has been discussed with Natural England and it has accepted the use of this approach in reaching screening conclusions (see SOCG item 2.1.88 Document Reference 5.4.1.6).

2.5.12 An effect is likely to be significant if:

a. It is likely to affect the ability of the European site to achieve its conservation objectives.

b. It is likely to affect the integrity of the European site.

c. On the basis of available objective information, either a) and b) above cannot be discounted.

2.5.13 Where a theoretical pathway exists but there is no conceivable way that this could result in any tangible effect on a qualifying feature of a European site: the assessment has concluded this to be an 'inconsequential effect'. Inconsequential effects include those which are trivial in terms of scale, extent, duration and magnitude. An effect pathway that is considered to be inconsequential should be considered immaterial due to its inconsequential or 'trivial' scale and would not result in a conceivable effect (paragraph 3.16 (1) of Advice Note 10 version 9 (Planning Inspectorate, 2022)) or real risk[1] to the European site's conservation objectives.

2.5.14 An in-combination assessment has been completed for all effect pathways identified. Where an effect was concluded to be inconsequential alone, the Applicant has considered other plans and projects with the same effect to determine whether there may be a likely significant effect in-combination. The Applicant has concluded that there would not be an in-combination effect, as the nature of the inconsequential effect means that it would not act with other plans and projects to cause a conceivable effect (paragraph 3.16 (1) of Advice Note 10 version 9 (Planning Inspectorate, 2022)) or real risk[1] to the European site's conservation objectives.

Air quality assessment

2.5.15 The change in air quality, in particular nitrogen deposition (N deposition), as a result of vehicle emissions (Project construction and operation) has been assessed at all European sites within 200m of the relevant ARN. The air quality model predicts the N deposition as a result of both nitrogen oxides and ammonia emissions from road traffic.

Climate change

2.5.16 The purpose of including climate change in the assessment is to ascertain whether the effects of the Project would be likely to exacerbate expected future consequences of climate change on European sites. The relationship between the Project, European sites and climate change is broadly split as follows:

a. The contribution of the effects of the Project to climate change: This is considered to relate to the contribution to greenhouse gases and is assessed as part of the environmental impact assessment for the Project within the climate topic chapter and air quality effect pathways assessed in the HRA. The Project's contributions to environmental changes that are thought to be causes of climate change are not considered in the HRA assessment as there is no direct pathway leading to an effect on European sites from greenhouse gases.

[1] As stated in the DEFRA Guidance 'Habitats regulations assessments: protecting a European site - a competent authority when assessing a LSE should check if there's a risk or possibility of a significant effect based on the evidence and only consider real not hypothetical risk.' https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site#take-a-precautionary-approach-to-decisions

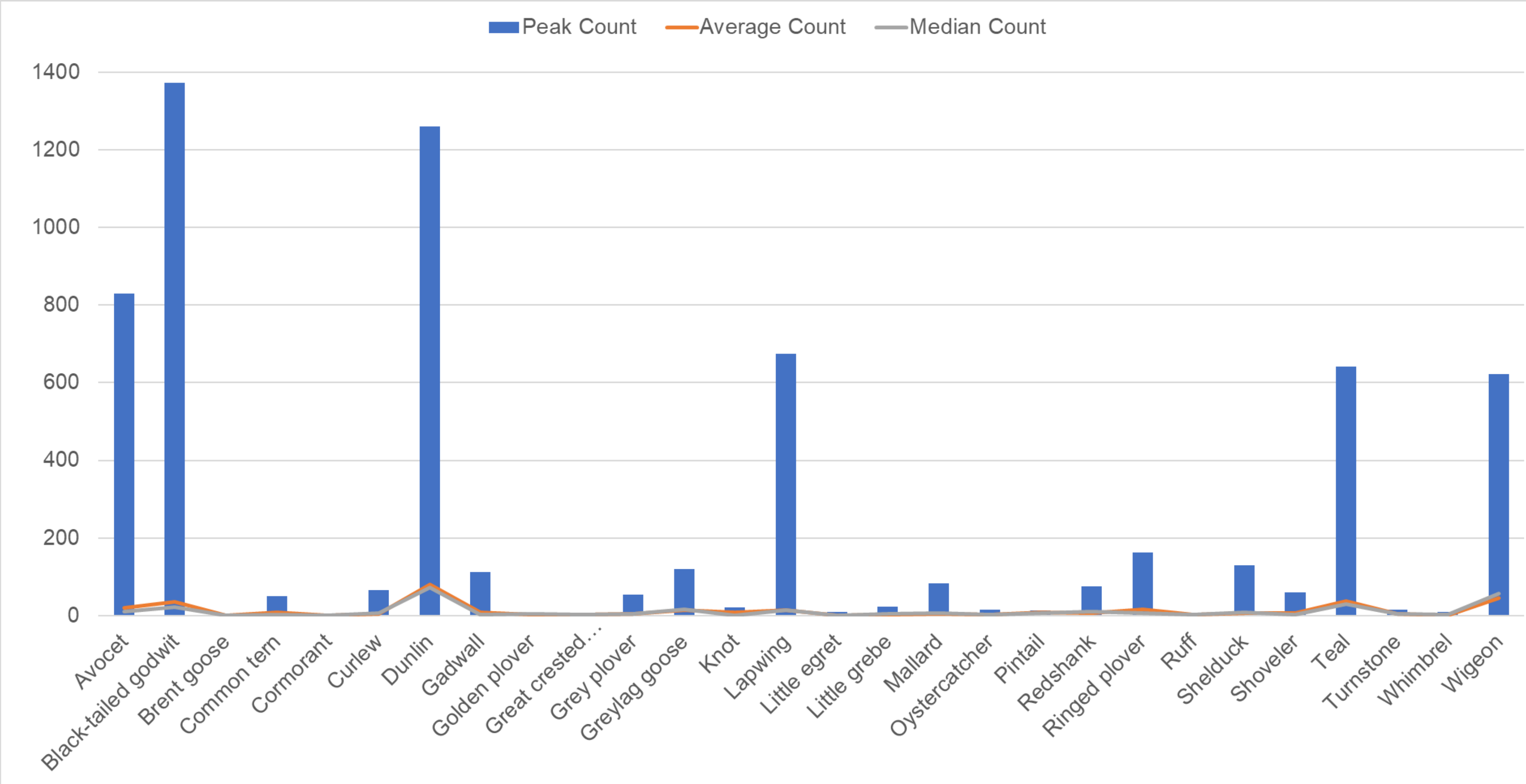
b. The effects of the Project potentially exacerbating the consequences of climate change on European sites: This is considered to relate to exacerbation of consequences of climate change such as coastal squeeze as a result of sea level rise, changes in ecological climate space as a result of global warming and changes in water resource/precipitation as a result of erratic weather patterns.

2.5.17 The assessment is, therefore, specifically focused on the consequences of climate change and whether or not the Project would result in an exacerbation of those effects at European sites.

Use of peak count data

2.5.18 The numbers of birds recorded as part of the over-winter field survey effort for the Project are summarised in Plate 2.3. The graph clearly shows the difference between the peak counts recorded for species, compared to the average (mean) and median counts recorded based on the numbers generally observed on each winter survey visit. This highlights that the use of peak counts, which is standard practice when reporting bird data, provides a worst-case view of bird use of an area (in terms of the potential magnitude of effect) and therefore, when used as the basis of the baseline condition at all times, provides a highly precautionary interpretation of the habitat use, which is used within the assessment in this report.

Plate 2.3 Comparison of peak and average numbers of species, that are qualifying features of a European site, in the functionally linked land within the Project survey area (Apr 2017 – Feb 2020)



2.6 Other consents

2.6.1 The DCO will be the principal consenting mechanism for the Project. At the point of submission, most of the consents and all the powers required will have been included, or addressed, within the DCO as permitted by various provisions of the Planning Act 2008. All of the secondary consents and permits have been listed within the Consents and Agreements Position Statement (Application Document 3.3).

2.6.2 In preparing the DCO application the Applicant has had detailed discussions with the various stakeholders who grant the additional consents and permits and who would act as the competent authority in accordance with regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) in respect of those additional consents and permits. This document provides the information required to allow different competent authorities to consider the LSEs of the project element with respect to the relevant consent or permit.

2.7 Structure of this document

2.7.1 This document comprises eight sections as described below:

a. Section 1 Executive summary

b. Section 2 Introduction

c. Section 3 Background to the Project

d. Section 4 Assessment methodology and assumptions

e. Section 5 European sites potentially affected by the proposals

f. Section 6 Stage 1 Screening

g. Section 7 Stage 2 Appropriate assessment

h. Section 8 Stage 3 Derogation

2.8 Statement of qualification

2.8.1 The lead author is a Chartered Environmentalist and Member of the Chartered Institute of Ecology and Environmental Management. She has over 20 years' experience in consultancy and has written numerous HRA reports for a variety of developments. In recent years she has authored and peer reviewed HRA reports including the Wylfa Newydd Nuclear New Build, A5025 On-line Highway Improvements Scheme, North Devon Link Road, and acted as the competent authority for various planning applications on behalf of Torbay Council.

3 Background to the Project

3.1 Introduction

3.1.1 The Project is described in detail within Chapter 2 of the Environmental Statement (Application Document 6.1) and the supporting Appendix 2.1 Construction Supporting Information (Application Document 6.3).

3.1.2 The description of the Project presented in this chapter focuses on the specific elements that are relevant to this assessment.

3.2 Project elements and timescales

3.2.1 The key Project elements are those contiguous with European sites and within the extent of functionally linked land. The locations of these Project elements within the Order Limits are shown on Figure 3 in Appendix A. Table 3.1 lists those relevant to this assessment along with the assumptions made with regard to the approximate timescales, with the following paragraphs providing a summary of other key assumptions that are relevant to this assessment. Detailed descriptions are provided with the ES Chapter 2 Project Description (Application Document 6.2).

Northern tunnel entrance compound

3.2.2 The area of land, approximately 155 hectares, immediately north of the River Thames and south of the Tilbury Loop railway line, would be used as a construction compound for the tunnelling operation. The more central part of the compound comprises standard infrastructure such as offices, equipment and machinery storage, welfare facilities and some overnight accommodation. The area would also have stockpiles, batching plant, and dewatering and construction drainage water treatment/settlement areas. There would be 24-hour activity/working within this compound whilst the tunnel boring machine (TBM) is in operation. The southern part would receive material from the excavations which would be reprofiled to the final landform (Tilbury Fields) as shown in Figure 2.4 Environmental Masterplan (Application Document 6.2). Palisade fencing or similar, or solid hoarding would be used to secure compound perimeters, and both options would typically be approximately 2.4m in height.

Construction access/haul road

3.2.3 To reduce the overall number of road journeys, equipment and material would arrive at the northern tunnel entrance compound via the Port of Tilbury and its new terminal, Tilbury2. Some of this would also be delivered using the strategic road network, through Tilbury2 and along a new, dedicated access road. The main access to this compound for most traffic, including HGVs, would be from the eastern end of the Port of Tilbury's Substation Road. The main access road would require ground treatment as it traverses several topographical levels and crosses poor ground. This would ensure that the road can withstand the loads and frequencies of HGVs that would be required. These heavy loads would include TBM components, substation components, and pre-cast viaduct components for the Tilbury Viaduct. It has been assumed that the Tilbury2 infrastructure corridor would be used as the primary access for the tunnelling compounds.

Northern tunnel entrance compound temporary drainage pipeline and outfall

3.2.4 Northern tunnel entrance compound temporary drainage pipeline and outfall would be installed as part of the North Portal excavations and the water collected, treated and discharged to the River Thames, west of the existing Tilbury Main outfall, via a pipeline crossing the intertidal mud and a new outfall at mean low water. The new outfall will also discharge the compound site runoff after it has passed through the treatment ponds/lagoons.

3.2.5 The discharge would comprise a pipeline buried within the intertidal zone, terminating at an outfall structure of pre-cast concrete of approximately 2.5m by 4m providing a subtidal discharge point. The discharge pipeline will extend 300m - 400m across the intertidal zone and will require a 2m-wide piled trench, and a working width of approximately 10m resulting in a working footprint of approximately 0.4 hectares. The outfall structure itself will have a footprint of approximately 0.001 hectares.

3.2.6 The installation and decommissioning of the pipeline across the intertidal mudflats would be at low tide (not when the work area is either fully submerged, or partially covered by water where this would result in the transmission through the water column of noise and vibration or the generation of suspended sediments). The work would include piling and be completed from shore to channel from a dumb barge. Construction is estimated to take up to approximately 8 to 12 weeks, with all intertidal work carried out around periods of low water. The workforce would be likely to number five to ten people including those operating the plant required.

Operational tunnel drainage outfall

3.2.7 The tunnel drainage design includes capacity to deal with tunnel wall wash-down water, firefighting water, runoff from vehicles entering from wet weather outside the tunnel, and for any background seepage through the segmental lining joints. Water collected within the tunnel would be treated and stored before being discharged to the River Thames at high tide via an outfall located west of Bowater’s Sluice within the existing flood defence. The outfall would be constructed from the landward side of the flood defence with no works required within the River Thames.

Highways construction works – Tilbury Viaduct north to just south of Hoford Road

3.2.8 These works are in the northernmost part of functionally linked land affected, comprising an area of approximately 77 hectares. The works include the construction of the Tilbury Viaduct, flood compensation areas north of the Tilbury Loop railway line and the earthworks to Hoford road.

3.2.9 The construction site would operate according to the normal working hours that are proposed as 07:00 to 19:00 weekdays and 07:00 to 16:00 Saturday. The Code of Construction Practice (CoCP) (Application Document 6.3) includes the working hours strategy for the Project. Standard earthmoving machinery and plant would be used, and the workforce is expected to be over 100 people during the construction phase.

Drainage discharge and treatment array for the southern tunnel entrance compound

3.2.10 The rainwater runoff from the southern tunnel entrance compound will be collected and treated via a series of settlement lagoons/ponds adjacent to the A226 Gravesend Road compound, before being discharged via a pipeline and outfall on the western ditch 10-20m south of the Thames Estuary and Marshes Ramsar site.

3.2.11 The drainage discharge pipe will be directionally drilled under the Lower Higham Road and the Thames Estuary and Marshes Ramsar site and specialist equipment would be used for this. The assumption is that this would be equivalent in size to a small excavator. The remaining pipeline to the outfall would be buried in a trench across the agricultural land and the assumption is that this would be completed within a working width of 8-10m. The outfall itself would be a pre-cast unit within the ditch bank.

3.2.12 The installation work would be completed during normal construction working hours (07:00 to 19:00 weekdays and 07:00 to 16:00 Saturday, see CoCP (Application Document 6.3)), requiring a small workforce of three to five people and a small excavator or equivalent to dig the settlement treatment array and trenches for the pipework, and lift the precast outfall structure into place.

A226 Gravesend Road compound and Milton compound

3.2.13 The temporary construction compounds accommodate the access shafts that facilitate the construction of the new ground protection tunnel beneath the Thames Estuary and Marshes Ramsar site. Both compounds would operate 24 hours a day. The ground protection tunnel would be completed before the main tunnel TBM drives reach the south side of the River Thames. Once the ground protection tunnel is completed the compounds would remain on standby, with limited/no activity until the main tunnel TBM drive is complete.

3.2.14 Palisade fencing or similar, or solid hoarding would be used during the construction period to secure compound perimeters, and both options would be typically be approximately 2.4m in height. Milton compound is adjacent to the Metropolitan Police firing range and retains the safety bund on its northern edge.

Utilities diversions

3.2.15 Numerous existing utilities, owned by the respective statutory undertakers, will require diversion or protection to allow the Project to be built in accordance with the design and to avoid the impact of the construction works on these assets. Within the functionally linked land the utilities works would occur as part of the pre-enabling works as well as being contiguous with the main construction phase.

3.2.16 The works that would be carried out within the pre-enabling works phase comprise underground works between Tilbury and the northern tunnel entrance compound and are primarily within the existing road or alongside the Tilbury Loop railway line. The work would be completed within 6-12 months and would be likely to involve a small workforce (approximately five to ten people) with standard installation equipment.

3.2.17 The works that would be completed alongside the main construction phase are contiguous with the areas required for the northern tunnel entrance compound and the highways construction works for Tilbury Viaduct and north to Hoford Road. This would involve a specific workforce likely to number approximately five to ten staff for any one diversion with standard installation equipment for the underground or overhead diversions.

Operational road drainage discharge

3.2.18 North of the River Thames the road drainage would be collected, treated and discharged into the Tilbury Main. The tunnel drainage system would include collection, treatment and discharge via a pipeline and outfall to the Thames. The tunnel drainage outfall location is west of the Tilbury Main outfall at Bowater's Sluice and will be constructed in the flood defence from the land ward side. There will be no structures or works occurring within the habitats on the river side of flood defence.

3.2.19 The road drainage south of the River Thames would be collected, treated and discharged to soakaway. None of the drainage infrastructure would be contiguous with any European site or the functionally linked land.

Ecology mitigation areas

3.2.20 These are two parcels of land north and north-west of Coalhouse Fort, totalling approximately 64 hectares, required as mitigation for terrestrial biodiversity (ES Chapter 8, Application Document 6.1). The area would be converted from agricultural land to habitats comprising open mosaic, wet grassland and an area of translocated acid grassland. It provides replacement habitat and a receptor site for translocated species including amphibians (notably GCN), and reptiles and suitable invertebrate habitat to offset that lost as a result of the Project. The new habitat creation would be carried out as early as reasonably practicable in the construction programme as described within Design Principle LSP.23 (Design Principles Application Document 7.5). The creation works would be completed over approximately three to six months. The work is likely to be carried out with standard agricultural machinery, for example small back hoe mounted excavator, tractor-mounted plough and seeding machinery. The work is assumed to require no more than one tractor unit at any one time and involve a small workforce (approximately five to ten people).

Tilbury Fields

3.2.21 The Project shall include a new recreational site at Goshem's Farm, called Tilbury Fields (Work number 5X), which would be created as part of the works within the Northern tunnel entrance compound. It is described within the Design Principles (Application Document 7.5) and shown on the Environmental master plan (ES Figure 2.4, Application Document 6.2).

3.2.22 The design incorporates sculptural earthworks up to a maximum +24.0m AOD, with regular public access, to provide views across the estuary, and maximising biodiversity benefit by linking existing open mosaic habitat areas. Design principles S9.02, S9.18, S9.19 and S9.20 provide the overarching design detail and the Tilbury Fields management area in the outline Landscape and Ecology Management Plan (oLEMP, Application Document 6.7) describes the objectives and requirements of the provision.

3.2.23 This provision aims to encourage visitors to the area and provides links to the Two Forts Way, the footpath that links Tilbury Fort and Coalhouse Fort, as well as a number of informal footpaths and viewing points within the park itself.

Table 3.1 Indicative timeline for Project elements that are relevant to this assessment

Project element	Preliminary Works				Main Works																				Road open			
	2024				2025				2026				2027				2028				2029				2030			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Ecology mitigation areas																												
Tilbury Fields – placing material and final form																												
Early underground utilities diversions																												
Main works underground utilities diversions																												
Northern tunnel entrance compound																												
Set up																												
Operation																												
Tunnelling and fit out																												
Decommissioning (potentially up to end 2030)																												
Northern tunnel entrance compound temporary drainage pipeline and outfall																												
Construction																												
Operation																												
Decommissioning																												
Construction haul road Port of Tilbury to northern tunnel entrance compound																												
Highways construction works – Tilbury Viaduct north to just south of Hoford Road																												

Project element	**Preliminary Works**				**Main Works**																				**Road open**			
	2024				**2025**				**2026**				**2027**				**2028**				**2029**				**2030**			
	Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Drainage discharge and treatment array for southern tunnel entrance compound																												
Construction works																												
Operation (includes compound decommissioning)																												
Decommissioning																												
A226 Gravesend Road compound																												
Set up																												
Ground protection tunnel and access shaft																												
Ground protection works																												
Decommissioning																												
Milton compound																												
Set up																												
Ground protection tunnel and access shaft																												
Ground protection works																												
Decommissioning																												

3.3 Project design and environmental measures

3.3.1 The Project includes a range of environmental commitments as part of the DCO application. The measures discussed in this section are integral to the Project (as described in paragraph 3.3.2 to 3.3.3) and would all be required irrespective of whether any potential effect pathways on European sites were present. The measures have been committed to comply with legislation or minimise environmental effects other than those specifically considered in the HRA. Therefore, all of the measures described in this section have been taken into account within the assessment of LSE.

3.3.2 The measures described in this section would be undertaken irrespective of whether any potential effect pathways on European sites were present and are not proposed primarily to mitigate effects on European sites and therefore are not 'mitigation' for HRA purposes. These measures are considered by the Applicant to be incorporated within the DCO application as described within paragraph 3.15 of Advice Note 10 (Planning Inspectorate, 2022).

3.3.3 Accordingly, this section does not include a full list of environmental commitments in the ES, but only includes those commitments that are integral to the Project that can be considered at the HRA screening stage. The measures would be secured through commitments made within the Design Principles[2] (Application Document 7.5), with features presented on ES Figure 2.4: Environmental Masterplan (Application Document 6.2and through their inclusion in the Register of Environmental Actions and Commitments (REAC). The REAC is provided within the CoCP[3], ES Appendix 2.2 (Application Document 6.3). The relevant REAC commitment reference codes are shown in square brackets.

Change in air quality – dust emissions – construction

Construction

3.3.4 The following measures would be implemented by the Project CoCP to minimise and manage dust at source during the construction phase. The committed measures are all established good practice methods designed to supress dust at source and avoid emission. These methods are considered to be effective at containing dust when used at source and are defined in many

[2] The Design Principles are commitments that will be secured through Requirement 3 in Schedule 2 (Part 1) of the DCO, which states: '*The authorised development must be designed in detail and carried out in accordance with the design principles document and the preliminary scheme design shown on the engineering drawings and sections, and the general arrangement drawings, unless otherwise agreed in writing by the Secretary of State following consultation by the undertaker with the relevant planning authority on matters related to its functions, provided that the Secretary of State is satisfied that any amendments to those documents showing departures from the preliminary scheme design would not give rise to any materially new or materially different environmental effects in comparison with those reported in the environmental statement*.'

[3] Requirement 4 in Schedule 2 (Part 1) of the DCO states that no part of the authorised development (the Project) is to commence until an Environmental Management Plan Iteration 2 (EMP2) (also referred to as the Construction EMP) in accordance with this CoCP has been submitted to and approved in writing by the Secretary of State following consultation with the relevant planning authority to the extent that it relates to the matters relevant to its function.

industry standards for use on construction sites, for example the Environmental good practice on site guide (CIRIA C741) (Charles & Edwards, 2015).

3.3.5 Implement good practice measures to reduce dust during demolition works such as [AQ002]:

a. Soft strip inside buildings before demolition (i.e. retain external walls and windows where safe and practicable to provide a screen against dust).

b. Use water suppression where practicable for dust control, during demolition operations.

c. Avoid explosive blasting, using appropriate manual or mechanical alternatives.

d. Bag and remove any biological debris or damp down such material before demolition.

3.3.6 Implement good practice controls to reduce dust during works, such as [AQ003]:

a. Cover with topsoil and re-vegetate earthworks and exposed areas including soil stockpiles to stabilise surfaces.

b. Use a cover such as hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil.

c. Ensure the specification of the seeding mix used to re-vegetate stockpiles is such that no undesirable or non-target species are introduced to the seedbank.

d. Remove the cover systematically during work to reduce exposure of areas that are not being worked on.

e. Avoid scabbling of concrete from structures by compressed air powered machines, where reasonably practicable.

f. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless required for a particular process, in which case ensure that appropriate additional control measures are in place to prevent escape.

g. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored with suitable emission control systems to prevent escape.

h. For small supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.

3.3.7 Implement good practice controls to reduce track-out during works such as [AQ004]:

a. Use of water-assisted dust sweepers on the access and local roads to remove any material tracked out of the site.

b. Avoid dry sweeping of large areas.

c. Ensure vehicles entering and leaving worksites are securely covered to prevent escape of materials during transport.

d. Inspect haul routes for integrity, instigate necessary repairs and record in site log book.

e. Access gates to be sited at least 10m from receptors e.g. residential properties where practicable.

f. Apply dust suppressants to locations where large volume of vehicles enter and exit the construction site.

3.3.8 Implement good practice controls to manage dust during construction such as [AQ005]:

a. Undertake onsite and offsite inspections to monitor dust.

b. Plan site layout so that machinery and dust-causing activities are located away from receptors, as far as this is reasonably practicable.

c. Erect suitable solid screens or barriers around dusty activities or the site boundary.

d. Avoid site runoff of water or mud, having regard for the drainage maintenance requirements set out in RDWE002.

e. Remove waste materials that have a potential to produce dust from site as soon as reasonably practicable.

f. Cover, seed or fence stockpiles to prevent wind whipping.

g. Cutting/grinding/sawing equipment to use water as dust suppressant or suitable local extract ventilation.

h. Ensure an adequate water supply on the site for effective dust/particulate matter suppression, using recycled water where reasonably practicable.

i. Use enclosed chutes, conveyors and covered skips to reduce escape of dust.

j. Reduce drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment to a practical minimum; and use fine water sprays on such equipment where appropriate.

k. Ensure equipment is readily available onsite to clean up spillages as soon as reasonably practicable after the spill is identified.

l. Reuse and recycle waste to reduce dust from waste materials.

Changes in surface water quality – construction and operation

Construction

3.3.9 The Applicant has committed to a number of measures associated with construction drainage to manage the risks of water pollution during the construction phase. These are described within ES Chapter 2 Project Description (Application Document 6.1).

3.3.10 The Applicant would install drainage systems to remove surface water from worksites and haul roads, and to minimise the impact of runoff on the surrounding environment. Worksite drainage systems would incorporate pollution control systems designed in line with industry good practice guidance.

3.3.11 The methods for removal and treatment include:

a. Discharging directly into an existing sewer using pipework to the nearest sewerage connection point.

b. Sustainable drainage systems – slowing waterflows associated with surface runoff to allow settlement, natural filtration and other treatment before discharging.

c. Disposal of water offsite using tankers – water would be stored onsite in temporary ponds or, where possible, permanent drainage ponds. The water would then be transported by tankers

d. Settlement ponds and lagoons – as (b) above, a temporary or permanent pond would be used for this purpose

e. Filtration system (including mechanical filtration) – aggregate, straw or similar material would be used as a filter.

f. Irrigation of crops and grassland where appropriate.

3.3.12 At the southern tunnel entrance compound, due to the size of the site, rainwater runoff cannot be managed by the methods described in paragraph 3.3.11 alone. Some rainwater would be harvested and used for site processes such as greywater flushing and dust suppression, but the remaining would require discharge to a receiving waterbody. Rainwater falling into the proposed highway and South Portal excavation footprint and material stockpiles would require collection and pumping to ground level for treatment (suspended chalk solids removal) and discharge.

3.3.13 In order to effectively treat the water to meet discharge consent standards, a full collection and management regime would be implemented and be in operation on the site until full reinstatement of the compound area is complete.

3.3.14 A series of ponds/lagoons and weirs would be constructed within the Order Limits for three purposes:

a. To provide a volume of storage for attenuation

b. To encourage gravitational settlement of solid fraction

c. To offer a degree of re-infiltration into the chalk ground

3.3.15 The clean treated water from the final settlement lagoon of the treatment system would be pumped under the Lower Higham Road and into the ditch network which forms part of the Thames Estuary and Marshes Ramsar site. The flow would be regulated to ensure the discharge flow rates are managed at greenfield runoff rates.

3.3.16 At the northern tunnel entrance compound, there would be similar issues as at the southern tunnel entrance compound regarding management of rainwater runoff. The approach described above would be followed for rainwater harvesting and the collection and treatment of water, prior to discharge. As at the southern tunnel entrance compound, a series of treatment ponds/lagoons and weirs would be constructed within the Order Limits. The water from the treatment process in the northern tunnel entrance compound would be pumped into a new outfall pipe and then subsequently discharged into the River Thames.

3.3.17 The following good practice measures would be implemented via the CoCP (ES Appendix 2.2 (Application Document 6.3)) to manage the risks of water pollution during the construction phase. The committed measures are all established good practice methods designed to avoid water pollution. These methods are considered to be effective at managing the risk and are defined in many industry standards for use on construction sites, for example, Control of Water Pollution from Construction Sites (C532) (Masters-Williams, et al., 2001).

3.3.18 Worksite drainage systems would incorporate pollution control systems designed in line with Control of Water Pollution from Construction Sites C532 (Masters-Williams, et al., 2001) or as agreed with the Secretary of State. Surface watercourses and waterbodies near worksites would be regularly inspected for signs of siltation or other forms of pollution in line with CIRIA C741 guidance (Charles & Edwards, 2015); and pumped groundwater, process effluents and construction site runoff would be tested to ensure compliance with discharge consent requirements [RDWE006].

3.3.19 Worksite drainage systems would be inspected and maintained to ensure they continue to operate to their design standard, safeguarding surface and groundwater quality [RDWE002].

3.3.20 Wastewater generated from the compound welfare facilities would be discharged to sewer, subject to the agreements with the utility providers, or in locations where a sewer connection is not reasonably practicable, collected and tankered offsite for disposal at a licensed treatment facility [RDWE005].

3.3.21 The Contractors shall develop a construction phase drainage plan. The plan shall demonstrate how the Contractor would manage surface water runoff across the worksite, including details of how offsite impacts would be prevented. Rainfall runoff from areas where there is a risk of contamination would be managed using temporary drainage systems and would be subject to treatment prior to discharge to any surface watercourse or drain. Rainfall runoff from areas of low contamination risk would be captured and re-used where reasonably practicable e.g. to supply wheel-wash facilities or for dust suppression, to reduce consumptive water use [RDWE006].

3.3.22 Construction site compounds where chemical, waste oils or fuel storage and refuelling activities take place would be managed in line with the following measures [GS004]:

a. Within the construction site compounds, specific areas would be designated for the storage of chemicals, waste oils and fuel and refuelling activities.

b. These designated areas shall not be located within Source Protection Zone 1 (both published SPZ1 or default SPZ1 where a potable water abstraction is identified).

c. These designated areas would be bunded to provide capacity for at least 110% of the largest container and placed on hardstanding to prevent downward migration of contaminants.

d. These designated areas would be designed with drainage to include measures for isolating spillages.

e. Any transfer of fuel or other potentially contaminated liquids would only take place within a designated transfer area.

f. Drip trays would be provided and procedures for emptying developed to reduce the risk of spillages.

3.3.23 To mitigate potential effects on water quality and hydrodynamics within the River Thames, the discharge arrangement described in REAC Ref. RDWE028 would be constructed and operational in advance of the excavation of the North Portal and tunnelling works and would be used as the temporary discharge for treated construction phase effluents. All effluents would receive treatment prior to discharge into the River Thames to ensure compliance with the Environmental Permitting (England and Wales) Regulations 2016 [RDWE023].

3.3.24 Drainage from the northern tunnel entrance compound is proposed to outfall from the north side of the River Thames. The design of the discharge pipeline and outfall to the River Thames would provide for a subtidal, mid-water discharge for effective dilution and dispersal, and to reduce disturbance to the intertidal zone. The discharge infrastructure would be designed in accordance with measures agreed with the Marine Management Organisation (MMO) as detailed in the Deemed Marine Licence (DCO Schedule 15) [RDWE028].

Operation

3.3.25 The measures that avoid changes within the receiving water bodies are embedded within the Project drainage design as shown on the Drainage Plans (Application Document 2.16) and include the following commitments that are relevant to this assessment.

3.3.26 Drainage design would include treatment measures for highway runoff designed in accordance with DMRB CG 501 (Highways England, et al., 2020f) and DMRB CD 532 (Highways England, et al., 2020g) to meet the requirements specified for each outfall to surface watercourses identified in ES Appendix 14.3 Operational Surface Water Drainage Pollution Risk Assessment (Application Document 6.3). Further survey and sampling to define the flow regime and water quality of receiving watercourses would be carried out at proposed points of discharge to inform the detailed design of treatment measures [RDWE025].

3.3.27 The following measures, that are also relevant to this assessment, would be implemented via the Project CoCP to manage the risks of water pollution during the operational phase.

3.3.28 To reduce the potential for scour and associated hydromorphological change, highway drainage outfall headwall arrangements would be set back from the banks of the receiving watercourses and outfall designs would accord with DMRB CD 529 (Highways England, et al., 2020h) [RDWE011].

3.3.29 The tunnel drainage system (refers to operational tunnel) would include provision for the capture and isolation of contaminated waters to prevent pollution of the receiving watercourse. The design would ensure that discharges would be restricted to high tide conditions to maximise available dilution and mixing and to prevent scour/erosion of the intertidal zone [RDWE026].

Change in noise and vibration

Operation

3.3.30 The following measures are included within the Project design and CoCP and aim to minimise the noise from the new road during operation.

3.3.31 For the locations, which includes the new road within the functionally linked land north of the River Thames, identified on ES Figure 12.6 Operational Road Traffic Noise Mitigation (Application Document 6.2) , a surfacing system that has a reported noise Road Surface Influence (RSI_H) of -7.5dB(A) or better in accordance with the Highway Authorities Product Approval Scheme certification system shall be installed. For the locations identified on ES Figure 12.6, a 'Level 3' (i.e. RSI_H -3.5 dB(A) or better), very quiet surfacing material, as defined by Manual Specification for Highways Works Volume 1, Series 0900, Table 9-17, shall be installed on all other new and altered trunk roads and associated slip roads forming part of the Project. [NV013]

3.3.32 For the locations, which includes Muckingford Road within the functionally linked land north of the River Thames, identified on ES Figure 12.6 Operational Road Traffic Noise Mitigation (Application Document 6.2), a 'Level 2' (i.e. RSI_H -2.5dB(A) or better), quieter than hot rolled asphalt surfacing material, as defined by Manual Specification for Highways Works Volume 1, Series 0900, Table 9-17, shall be installed on all new and altered local roads forming part of the Project. [NV013].

3.3.33 ES Figure 12.6: Operational Road Traffic Noise Mitigation (Application Document 6.2) illustrates the measures within the Project design that reduce noise once the road is operational. Earthwork bunds and false cutting would be provided within the functionally linked land at the locations listed in Table 3.2 (relevant locations extracted from Table 12.27, ES Chapter 12 Noise and

Vibration (Application Reference 6.1)). Acoustic barriers [NV011] that will be provided within the functionally linked land are listed in Table 3.3 (relevant locations extracted from Table 12.28, ES Chapter 12, Noise and Vibration (Application Document 6.1)).

Table 3.2 Embedded earthwork elements – operational within functionally linked land

Locations between the North Portal and the A13 junction	False cutting, embankment or cutting height
Flood bunding and protection bund to the portal maintenance access road either side of the Project road	7.83m AOD flood bunding with 9m AOD bund for future fill by Ingrebourne Valley Limited
Project road in tunnel approach structure	Up to 12.8m deep
Project road at Hoford Road in cutting	Up to 8.5m deep
False cuttings along Chadwell St Mary link both sides of the Project	4m above the Project/noise mitigation
Muckingford Road slackened slopes to blend landscaping in with green bridge	Up to 7m high

Table 3.3 Acoustic barriers within functionally linked land

Acoustic barrier location reference	Height	Length	Barrier type	Justification
Station Road (AB1)	2.0m	137m	BS EN 1793-2 Class B2 reflective barrier	Acoustic barrier positioned to protect residential amenity at isolated properties on Station Road/Love Lane to the West of East Tilbury. Design philosophy to reduce noise to a minimum in accordance with national policy. Height of barrier controlled to prevent the introduction of new landscape and visual impacts.
Tilbury Viaduct (AB2 & AB3)	1.0m	667m	Robust bridge parapet for safety reasons, with acoustic attributes	Feature is a robust bridge parapet for safety reasons, with acoustic attributes. Acoustic barrier position provides noise mitigation to outlying residential properties to the western extent of East Tilbury and residential amenity of properties on Low Street Lane. Height of barrier controlled by engineering constraints and to prevent the introduction of new landscape and visual impacts.

Changes in lighting construction and operation

Construction

3.3.34 The Project CoCP sets out the following measures designed to avoid and reduce light pollution during the construction phase.

3.3.35 Site lighting and signage will be provided by the contractors to ensure the safety and security of the construction sites. It will be at the appropriate luminance required to provide safe working conditions. Where needed and appropriate, lighting to site boundaries will be provided, and illumination will be sufficient to provide a safe route for the passing public. Precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas. Where appropriate, lighting will be activated by motion sensors to prevent unnecessary usage.

3.3.36 Site lighting will comply with the Institute of Lighting Professionals Guidance Notes for the Reduction of Obtrusive Light GN01/20 (2020) and the provisions of BS EN 12464 2014 Light and lighting – Lighting of workplaces Part 2 Outdoor workplaces, where applicable.

3.3.37 Lighting will also be designed, positioned and directed to prevent or minimise light disturbance to nearby residents, ecological receptors, as well as motorists and rail and marine operations. This provision will apply particularly to sites where night working or security lighting will be required.

3.3.38 Low-energy fittings shall be used unless otherwise accepted by National Highways. Any site-specific lighting controls will be described in contractors' EMP2s.

Operation

3.3.39 The operational lighting design is described in ES Chapter 2 Project Description (Application Reference 6.1) including the following measures, relevant to this assessment, that would reduce the effect of light spill on the surrounding habitat.

a. Column heights have been kept as low as practicable while still providing a compliant lighting design. Column heights used would vary between 5m and 15m.

b. Luminaires have been selected which emit no light above the horizontal to reduce skyglow and ensure light is only projected to where it is needed.

c. Lighting levels would be linked to the live traffic flow, so that during quiet periods the lighting is dimmed to reduce energy consumption.

d. The lighting columns would be placed in the verges projecting towards the central reserve wherever practicable to reduce light spill into adjacent areas.

Introduction/spread of Invasive Non-Native Species to the terrestrial and marine environment

Construction

3.3.40 The Project CoCP sets out the following measures designed to avoid the introduction /spread of invasive non-native species to the terrestrial and marine environment.

3.3.41 Invasive species would be identified prior to construction and would be removed or treated to prevent their spread, following the Construction Industry Research and Information Association's (CIRIA) guidance in Invasive Species Management for Infrastructure Managers and the Construction Industry (Wade, et al., 2008) [TB005].

3.3.42 A marine biosecurity plan will be prepared and implemented in line with best practice UK guidance (Payne, et al., 2015) ahead of any marine works to prevent the introduction and spread of invasive non-native species (INNS). Where a risk of introducing INNS is identified, then suitable control measures will be implemented, and may include control measures as per the International Maritime Organisation's (IMO) Convention for the Control and Management of Ships' Ballast Water and Sediments (2017). For example, where vessels servicing the development originate from high-risk origins, IMO ballast water exchange and sediment disposal measures would be implemented [MB006].

4 Assessment methodologies and assumptions

4.1 Assessing likely significant effects

4.1.1 The impacts and effects considered in the assessment were developed in a series of methodology briefs and technical notes which were shared with Natural England for comment prior to the production of this report as set out within the Evidence Plan in Appendix C.

4.1.2 Potential interactions (effect pathways) between the European sites and the Project were identified where there was an overlap between the European sites and functionally linked land and the ZoI of the Project, categorised by the potential impacts set out in Table 2.1. Section 6 reviews all of the effect pathways and sets out where there is a potential for LSEs on European sites to occur as a result of the Project.

4.1.3 Potential LSEs have been broadly categorised using the following terminology in line with those described in Table A.4 and assessment criteria in the screening template in A.3 from DMRB LA 115 (Highways England, et al., 2020a). Categories/criteria have been amalgamated in some cases to avoid repetition and/or overlap of consideration of potential effects (e.g. ‘loss’ has been amalgamated with both ‘reduction of habitat’ and ‘reduction in species’). The categories used in this assessment are as follows:

a. Reduction in habitat area/habitat loss/degradation

b. Disturbance to key species

c. Habitat/species fragmentation

d. Reduction in species/species density/species loss

e. Changes to key indicators of conservation value (e.g. water quality)

f. Climate change

4.1.4 Disruption and interference with key relationships that define the structure and function of the site are considered within the assessment of the potential effect pathways listed above.

Mitigation

4.1.5 The Project has been developed to avoid, reduce or offset significant effects on the environment. A number of integral design or embedded measures have been incorporated into the design irrespective of any potential pathways to effects on European sites, as a matter of good practice or to ensure legal compliance, for instance with the Water Framework Directive (WFD) and/or permitting requirements. Such integral measures are considered within the screening assessment as they would happen whether an HRA considered the pathway or not, and form part of the Project design. The integral measures that have been relied upon for the Stage 1 screening assessment have been highlighted within Section 3.3.

Use of thresholds

Changes in air quality

4.1.6 Within the air quality model, before the modelled NOx (nitrogen oxides) concentration is converted to N deposition (modelled road NOx being the basis of generating both road NO_2 (nitrogen dioxide) and NH_3 (ammonia) elements of N deposition), the changes in modelled road NOx between the Do Minimum and Do Something scenarios are reviewed. Where the modelled road NOx changes are less than 1% of the NOx annual mean critical level for all vegetation, of 30μg/m^3, i.e. ≤0.3μg/m^3, they will be classed as imperceptible change and would not be used in the subsequent calculations of road NO_2, road NH_3 and predicted change in N deposition. Further details on the air quality model are set out within the ES Chapter 5, Air Quality (Application Document 6.1).

4.1.7 The air quality N deposition assessment is carried out with respect to the appropriate lower critical load (LCL) for the habitats within 200m of the ARN. The LCLs are set out for each European site on the Site Relevant Critical Loads tab of the Air Pollution Information System[4]. Table 4.1 sets out the LCLs that have been used to assess LSE on each of the European sites identified.

Table 4.1 The relevant lower critical loads used to determine LSE

European site	Habitat within 200m of the ARN	Relevant N critical load class	Lower critical load kg N ha^{-1} yr^{-1}
Thames Estuary and Marshes Ramsar site	Coastal and floodplain grazing marsh	Low and medium altitude hay meadows	20
Epping Forest SAC	w1c5 Beech forests on acid soils (H9120)	Fagus woodland	10
North Downs Woodlands SAC	w1c6 Asperulo-Fagetum Beech Forest (H9130) with yew in the shrub layer	Coniferous woodland	5

4.1.8 The methodology used to determine the potential for the Project to have a LSE as a result of vehicle emissions, follows the flow chart in Figure 2.98 of the DMRB LA 105 (Highways England, *et al*., 2019) up to the 1% LCL threshold. Where the 1% LCL is exceeded, there is potentially an LSE on the European site as a result of the Project alone or in-combination with other plans and projects. Where the 1% LCL is not exceeded then a conclusion of no LSE is reached for the Project alone and further assessment of the Project in-combination with other plans and projects is made to determine if the 1% LCL is exceeded as described in paragraph 4.3.13.

Disturbance

4.1.9 Change in noise and vibration and changes in visual disturbance are considered together within this assessment as the Project elements that result

[4] www.APIS.ac.uk

in these changes require people (visual stimuli) to operate the plant (visual stimuli) that will generate the noise and vibration. The noise and vibration associated with the tunnel boring machines have been separately assessed and do not use these thresholds. European sites and suitable habitat within the extent of functionally linked land that had predicted noise levels of greater than 55dB (Cutts*, et al.,* 2013; Hirvonen, 2001), or a change in noise from the baseline of greater than 3dB, and the areas within 300m (Cutts*, et al.,* 2013) of the Project elements, were identified. These were the areas where there was the potential to disturb qualifying bird species resulting in an LSE.

4.1.10 Changes in lighting have been assessed according to a threshold of 0.5 lux having due regard for advice from Natural England (see Appendix C Evidence Plan) as the level above which sensitive species may be disturbed.

4.1.11 The changes in recreational pressure and subsequent disturbance of qualifying bird species has been identified, following advice from Natural England (see Appendix C Evidence Plan), as areas within 8.1 km of a European site north of the River Thames (Essex County Council, 2019) and areas within 6km of a European site south of the River Thames (Birdwise North Kent SAMMS Project Board, 2018).

Duration

4.1.12 Project impacts such as land take have been assessed with reference to duration, temporary or permanent. The Natural England research report NECR206 Temporary effects: How the longevity of effects has been considered in respect of plans and projects affecting European sites - a review of authoritative decisions (Natural England, 2016) was also reviewed following Natural England's advice, and the definitions described considered appropriate and consistent with the information compiled in NECR206.

4.1.13 In line with consultation advice from Natural England, for the purposes of this assessment land take has been considered to be permanent if the loss of habitat would occur for five years or more, to ensure a highly precautionary assessment. However, for clarity and for a wider understanding of the effect pathways, the following terms have been used when describing the loss of habitat:

a. Permanent – any land take required for more than five years which has been assigned two sub-sets to account for the fact that some of the areas lost will be replaced in the long term:

    i. Permanent – any land take that would be within highways infrastructure or habitats of limited value for the qualifying features being assessed once the Project is operational.

    ii. Semi-permanent – any land take during construction of more than five years, where habitats are lost during construction, but then reinstated or replaced, as per the Project Design Principle LSP.05 and LSP.04 (Application Document 7.5), with habitats of similar value for the qualifying features being assessed.

b. Temporary – any land take during construction of less than five years[5], where habitats are lost, but then reinstated or replaced with habitats of similar utility for the qualifying features being assessed.

4.2 Assessment of effect on the integrity of the European site

Effects as a result of changes in air quality

4.2.1 The methodology used to determine the potential for the Project to result in an adverse effect on integrity continues the flow chart in Figure 2.98 of the DMRB LA 105 (Highways England, *et al*., 2019) from the 1% LCL threshold, that was the threshold used to determine LSE at Stage 1 Screening (paragraph 4.1.8).

Information used to explore the magnitude/significance of the effect

4.2.2 For the European sites identified, the following steps, from Figure 2.98 of DMRB LA 105, were completed to explore the magnitude of the effect.

a. Identify whether the site air quality attribute target is either restore or maintain:
Restore – Use the lowest change in N deposition regardless of background N deposition which would bring about a change of a loss of one species corresponding to the lower critical load range.
Maintain – Use change values to bring about loss of one species corresponding to background N deposition.

b. Identify if the change in N deposition associated with the Project (the Do Something scenario) would lead to the loss of one species.

c. If the change in N deposition is greater than or equal to 0.4kg N $ha^{-1}yr^{-1}$ then it is assumed that the loss of one species could occur and the assessment proceeds to the next step.

d. Undertake detailed site investigation and identify if there are species located in the area where the assessment has determined an increase in N deposition that could lead to loss of one species.

4.2.3 The extent of the habitat potentially affected was predicted using the change in nitrogen deposition model results in Esri Arcpro using the bounding tool to

[5] As there is no specific guidance with regard to the permanence of effects, the Project team discussed the threshold with Natural England. With due regard for Natural England's advice, the Natural England research report on the longevity of effects NECR206 was reviewed in relation to establishing a threshold of permanence, but there is little within the report to provide a definitive steer on a suitable threshold because each assessment requires a case-by-case consideration of several variables. In the absence of a clear steer from the guidance, Natural England's advice has been adopted, specifically that as a precautionary period, five years would be considered the most appropriate threshold for temporary effects.

indicate the area within which nitrogen deposition was predicted to exceed the 1% LCL and $0.4kgNha^{-1}yr^{-1}$ thresholds.

4.2.4 A bespoke National Highways calculation tool has been used to compare the DM NOx total emissions (tonnes) at opening year (2030) with the future predicted changes in NOx emissions for the same ARN link for the DS scenario. The future predictions are calculated for the DS scenario annually from 2030 to 2045. The duration of effect is considered to occur from the opening year until the year the DS total emissions of NOx fall below the DM total emissions at opening year.

4.2.5 Ellenberg indicator values for fertility (Ellenberg N) published for the British vascular plant and bryophyte flora (Hill, et al., 2004; Hill, et al., 2007) were used to analyse the nitrogen sensitivity of the species recorded during the detailed site investigations. The purpose of assigning Ellenberg values is to provide an indication of existing nutrient status and to identify species that are potentially sensitive to nitrogen deposition and therefore could be at risk of loss due to a Project-related increase in nitrogen deposition. Ellenberg values of less than 3 are indicative of species associated with more-or-less infertile sites and are therefore likely to be sensitive to small changes in nitrogen availability. Ellenberg values above 3 were therefore used to indicate species that were not sensitive to nitrogen deposition and therefore unlikely to be lost from additional nitrogen deposition. Further details on the approach to using Ellenberg values to determine the sensitivity of habitats to nitrogen deposition is set out in ES Appendix 8.14 (Application Document 6.3).

4.2.6 The criterion of loss of one species is not used alone to assess effects on integrity. In considering the results of the detailed site investigation, the Applicant has used the following factors to explore the magnitude of the effect on the integrity of the European site:

a. What conditions is the affected habitat currently exposed to (e.g. existing exceedance of critical load)?[6]

b. What is the area and quality of the habitat affected, as a proportion of the qualifying habitat within the European site?

c. Will there be any direct loss of habitat or change to the distribution of such habitats?

d. Are N deposition/NOx operational changes predicted below the current baseline deposition levels? (e.g. due to technological improvements in vehicle emissions between now and the time the Project is operational)?

[6] '*Small contributions of nitrogen deposition from the air have the potential to lead to more significant changes in vegetation composition where a site is below but near to the Critical Load, compared to a site which significantly exceeds a critical load*.' NECR210, Natural England 2016 as referenced in NEA001. '*Habitats that have already been subject to high background nitrogen deposition can develop an effective tolerance to the effects of further deposition*.' NECR210, Natural England 2016 as referenced in NEA001.

4.2.7 Using professional judgement and taking into account the above factors (paragraph 4.2.2 to 4.2.5), will there be a reduction in habitat area that significantly impedes achievement the conservation objectives of the European site? As there are no published or accepted thresholds for any of the factors considered alone, or combinations of thresholds of different factors, as to whether the effects could be considered to be significant, it is necessary for the competent expert (see paragraph 2.8.1) to make a judgement. That judgement is based on considering all of the factors, what is known about them and assessing the likely outcomes for the habitats from those factors.

4.2.8 Natural England have been consulted, through the development the bespoke LTC Operational AQ Technical Note (Appendix C Evidence Plan) on the methods used to provide the information on the various factors that have been used by the Applicant to explore the magnitude/ significance of the effect.

Assessment of effect on integrity

4.2.9 The attributes and targets contained with Natural England's supplementary advice (listed in Table 5.4) was used as a basis for the assessment of the Project's impacts on the integrity of the European sites by identifying whether the magnitude of the effect would be likely to undermine achievement of the target for each attribute.

Effects as a result of land take and disturbance

4.2.10 The following paragraphs describe the approach used to determine how the land take and disturbance as a result of the Project may reduce the functionality of the habitats and whether this effect (habitat loss/disturbance) would result in an adverse effect on the integrity of the European site.

Information used to explore magnitude and significance of the effect

4.2.11 For areas within the functionally linked land, the following data was collated and calculated to provide a measure of the effects on the functionally linked land and the potential contribution of the areas to the populations of the European sites identified.

a. The qualifying features and peak counts present within the functionally linked land, where surveys were completed and specifically within the areas affected by land take and disturbance.

b. The qualifying features' peak count recorded in the functionally linked land and specifically within the land take and disturbance areas was calculated as a percentage of the European site populations. The population sizes for each site were derived from the targets described in the supplementary advice and the latest British Trust for Ornithology (BTO) WeBS Alert data regarding the population trends.

c. The functionality of the areas affected by the Project during construction and operation. The abundance of birds within the functionally linked habitats provides a measure of its functionality[7] and the assessment has been completed using this measure to illustrate how the Project has mitigated the loss and disturbance of functionally linked land during the construction and operational phases.

Quantifying habitat functionality

4.2.12 The measure of functionality of impacted areas has been completed by summing the total number of individuals recorded during Project field surveys (described in paragraphs 5.3.9 to 5.3.18) within the impacted area during the over-winter and passage months (i.e. August to April).

4.2.13 The predicted functionality of the mitigation areas and the other plans and projects identified has been calculated by multiplying the area, in hectares, by the expected abundance per hectare. The expected abundance per hectare was calculated through comparison of the abundance per hectare of exemplar existing habitats that best represented the target habitats in the mitigation proposals. A review of a variety of habitat types and the total numbers of individuals recorded during the Project field surveys provided the abundance per hectare of existing unaffected habitats. Existing unaffected habitats were then identified that best represented the target habitats. For the Coalhouse Point wetland creation, the best exemplar existing habitat was considered to be the habitats around Tilbury Fort, which is a mosaic of open water, scrapes and grasslands. For the change of management of fields to the south of the firing range from arable to grassland, the best exemplar existing habitat was the adjacent grassland fields within the Ramsar to the east. Further detail is presented within the Evidence Plan in Appendix C.

Assessment of effect on integrity

4.2.14 The attributes and targets contained within the supplementary advice were used as a basis for the assessment. Using the data and information collated, the assessment of adverse effects on integrity has been carried out against the 18 attributes of the conservation objectives supplementary advice (listed in Table 5.3), to identify whether the magnitude of the effect would be likely to undermine achievement of the target for each attribute.

4.3 Assessing effects in-combination

4.3.1 An assessment of the Project in-combination with other plans or projects has been completed at Stage 1 screening and Stage 2 appropriate assessment.

4.3.2 At Stage 1 screening the assessment is limited to the European sites and effect pathways where no LSE has been found as a result of the Project alone.

4.3.3 Any interactions between the European sites and the Project where a conclusion of potential LSE alone has been reached, has been considered in combination with other plans and projects at Stage 2 Appropriate Assessment.

[7] The use of this measure of functionality was discussed with Natural England, see Appendix C Evidence Plan

Identifying other plans and projects

4.3.4 The in-combination assessment includes consideration of the reasonably foreseeable plans and projects considered in ES Chapter 16: Cumulative Effects Assessment (CEA) (Application Document 6.1) undertaken for the EIA, amended to ensure compliance for the HRA, for example through refining potential pathways and receptors. The in-combination assessment for air quality effects uses the shortlist of plans and projects derived for the CEA as well as permitting information from the Environment Agency (permitting searches completed in July 2020).

4.3.5 This list of reasonably foreseeable plans and projects is based on Advice Note 17 (The Planning Inspectorate, 2019), with the following types of development considered:

a. Projects that are under construction

b. Permitted application(s) not yet implemented

c. Submitted application(s) not yet determined

d. All refusals subject to appeal procedures not yet determined

e. Projects on the National Infrastructure Commission’s programme of projects

f. Projects identified in the relevant development plans and emerging development plans

4.3.6 Past projects and projects for which potential effects are fully determined were included in the environmental baseline and do not feature in the in-combination assessment. Rejected and withdrawn planning applications were also not included in the in-combination assessment as they are not considered to be reasonably foreseeable developments.

4.3.7 Effects were considered to be potentially acting in combination where there are spatial and temporal overlaps of Project effects with similar effects from other projects on relevant receptors.

Spatial extent used to identify other plans or projects

Changes in air quality

4.3.8 The contribution of changes in traffic from other plans or projects has already been considered with the ‘Effects of the Project alone’ assessment, as the data used within the traffic model includes the predicted changes in traffic from other plans and projects, described as traffic growth in the Traffic Forecasts Non-Technical Summary (Application Document 7.8). That Non-Technical Summary also shows the future developments that have been included in the traffic model.

4.3.9 Therefore, the scope of the in-combination assessment for this effect pathway considers other potential sources of N deposition. Other plans and projects that potentially contribute to N deposition in ways other than traffic (and could be identified via the planning or permitting system) would be broadly limited to industrial processes and intensive agricultural units. Both of these types of development are given permission (at least in part) via Environment Agency permitting.

4.3.10 The search area for other plans or projects that may also contribute to N deposition at these European sites has been defined as follows and is illustrated on Figure 23. The size of search area has been determined based on the advice given by the Environment Agency in 'Risk assessments for your environmental permit' (Environment Agency, 2020) and includes project types within the following distances from where each European site is affected by changes in nitrogen deposition:

a. 15km – coal or oil-fired power stations or >50 megawatt emitters

b. 10km – industrial emissions, e.g. energy generation plants

c. 5km – intensive livestock units

d. 500m – agricultural biomass boilers

Land take

4.3.11 The European site(s) potentially affected by the Project alone have functionally linked land associated with them. Therefore, the area of each European site and its functionally linked land was searched to identify any other plans or projects proposed where the habitat types listed in the supplementary advice could be impacted and therefore have potential to contribute to in combination effects.

Disturbance

4.3.12 Other projects with potential for in-combination effects of disturbance were considered as those with construction activities that could affect the same area as potentially affected by the Project alone. Construction activities from other projects were considered within a precautionary 1km of the Order Limits (i.e. over three times the zone of influence for visual disturbance (300m, based on Cutts *et al* (2013)). The 1km distance was used as sufficient to allow two projects which each may have effects, to have affected areas that are separated by a buffer zone itself at least as wide as their affected areas.

Assessment method

Changes in air quality

4.3.13 The predicted contribution of N deposition has been identified where available for the other plans and projects located within the search area. The combined contribution to N deposition was calculated by summing together the predicted N deposition (kg N $ha^{-1}yr^{-1}$) for each of the projects within the search area and determining the percentage of the critical load for the habitats of each site. The likelihood of an effect of all the projects in combination was determined based on the combined figure with consideration given to the likely sensitivity of the habitats present and in view of the conservation objectives of the European sites.

Land take

4.3.14 The Project land take would affect functionally linked land used by bird features of SPAs and Ramsar sites. The in-combination assessment of land take therefore only includes identification of other projects and plans that would also result in additional land take of suitable habitat within functionally linked land.

4.3.15 The list of projects was reviewed in terms of habitat loss and estimate of the functionality of the habitat. This was assessed against the attributes and targets relating to supporting habitat in the supplementary advice, to provide a measure of likely prevention of achieving the targets and, therefore, having an effect on the integrity of the identified European site.

Disturbance

4.3.16 The timeline of projects taken from the cumulative effects list identified potentially important construction phases as well as noise levels and visual stimuli within the 300m zones.

4.3.17 Any spatial and temporal overlaps were considered in terms of the season, the use of habitats affected, and the activities proposed. The assessment considered the potential effects on the individual birds and the likely proportion of the European site populations affected at any one time and therefore considered whether there would be an adverse effect on integrity.

4.4 Interpretation of case law

4.4.1 In completing this HRA, due regard has been given to the relevant judgments listed in Table 4.2.

Table 4.2 Case law relevant to HRA Stage 1 Screening

Case reference	Name	Summary of ruling
C-258/11	Sweetman v An Bord Pleanála	Article 6(3) of Council Directive 92/43/EEC '*must be interpreted as meaning that a plan or project not directly connected with or necessary to the management of a site will adversely affect the integrity of that site if it is liable to prevent the lasting preservation of the constitutive characteristics of the site that are connected to the presence of a priority natural habitat whose conservation was the objective justifying the designation of the site in the list of sites of Community importance, in accordance with the directive. The precautionary principle should be applied for the purposes of that appraisal.*'
C521-12	Briels v Minister van Infrastructuur en Milieu	Future creation or expansion of the habitat on a different part of the same site is too uncertain to be taken account of at the appropriate assessment stage and is compensatory not mitigation. Competent national authorities could not disguise compensatory measures as mitigation to authorise projects which adversely affect the integrity of a site by avoiding the cumulative process in articles 6(3) and 6(4) of the Habitats Directive.
C-387/15 and C-388/15	Hilde Orleans, Rudi Van Buel, Marina Apers, Denis Malcorps, Myriam Rijssens, Guido Van De Walle v Vlaams Gewest	Article 6(3) of Council Directive 92/43/EEC '*must be interpreted as meaning that measures, contained in a plan or project not directly connected with or necessary to the management of a site of Community importance, providing, prior to the occurrence of adverse effects on a natural habitat type present thereon, for the future creation of an area of that type, but the completion of which will take place subsequently to the assessment of the significance of any adverse effects on the integrity of that site, may not be taken into consideration in that assessment. Such measures can be categorised as 'compensatory measures', within the meaning of Article 6(4), only if the conditions laid down therein are satisfied*.'
C-164/17	Edel Grace, Peter Sweetman v An Bord Pleanála (Ireland)	Article 6 '*must be interpreted as meaning that, where it is intended to carry out a project on a site designated for the protection and conservation of certain species, of which the area suitable for providing for the needs of a protected species fluctuates over time, and the temporary or permanent effect of that project will be that some parts of the site will no longer be able to provide a suitable habitat for the species in question, the fact that the project includes measures to ensure that, after an appropriate assessment of the implications of the project has been carried out and throughout the lifetime of the project, the part of the site that is in fact likely to provide a suitable habitat will not be reduced and indeed may be enhanced may not be taken into account for the purpose of the*

Case reference	Name	Summary of ruling
		assessment that must be carried out in accordance with Article 6(3) of the directive to ensure that the project in question will not adversely affect the integrity of the site concerned; that fact falls to be considered, if need be, under Article 6(4) of the directive.'
C-293/17 and C-294/17	Coöperatie Mobilisation for the Environment UA, Vereniging Leefmilieu v College van gedeputeerde staten van Limburg, College van gedeputeerde staten van Gelderland (C-293/17), Stichting Werkgroep Behoud de Peel v College van gedeputeerde staten van Noord-Brabant (C-294/17)	*Article 6(3) must be interpreted as meaning that a recurring activity, such as the application of fertilisers on the surface of land or below its surface, authorised under national law before the entry into force of that directive, may be regarded as one and the same project for the purposes of that provision, exempted from a new authorisation procedure, in so far as it constitutes a single operation characterised by a common purpose, continuity and, inter alia, the location and the conditions in which it is carried out being the same. If a single project was authorised before the system of protection laid down by that provision became applicable to the site in question, the carrying out of that project may nevertheless fall within the scope of Article 6(2) of that directive.* *Article 6(3) must be interpreted as not precluding national programmatic legislation which allows the competent authorities to authorise projects on the basis of an 'appropriate assessment' within the meaning of that provision, carried out in advance and in which a specific overall amount of nitrogen deposition has been deemed compatible with that legislation's objectives of protection. That is so, however, only in so far as a thorough and in-depth examination of the scientific soundness of that assessment makes it possible to ensure that there is no reasonable scientific doubt as to the absence of adverse effects of each plan or project on the integrity of the site concerned, which it is for the national court to ascertain.* *Article 6(3) must be interpreted as not precluding national programmatic legislation, such as that at issue in the main proceedings, exempting certain projects which do not exceed a certain threshold value or a certain limit value in terms of nitrogen deposition from the requirement for individual approval, if the national court is satisfied that the 'appropriate assessment' within the meaning of that provision, carried out in advance, meets the criterion that there is no reasonable scientific doubt as to the lack of adverse effects of those plans or projects on the integrity of the sites concerned.* *Article 6(3) must be interpreted as precluding national programmatic legislation, such as that at issue in the main proceedings, which allows a certain category of projects, in the present case the application of fertilisers on the surface of land or below its surface and the grazing of cattle, to be implemented without being subject to a permit requirement and, accordingly, to an individualised appropriate assessment of its implications for the sites concerned, unless the objective circumstances make it possible to rule out with certainty any possibility that those projects, individually or in combination with other*

Case reference	Name	Summary of ruling
		projects, may significantly affect those sites, which it is for the referring court to ascertain. *Article 6(3) must be interpreted as meaning that an 'appropriate assessment' within the meaning of that provision may not take into account the existence of 'conservation measures' within the meaning of paragraph 1 of that article, 'preventive measures' within the meaning of paragraph 2 of that article, measures specifically adopted for a programme such as that at issue in the main proceedings or 'autonomous' measures, in so far as those measures are not part of that programme, if the expected benefits of those measures are not certain at the time of that assessment.* *Article 6(3) of Directive 92/43 must be interpreted as meaning that measures introduced by national legislation, such as that at issue in the main proceedings, including procedures for the surveillance and monitoring of farms whose activities cause nitrogen deposition and the possibility of imposing penalties, up to and including the closure of those farms, are sufficient for the purposes of complying with that provision.'*
C–323/17	People Over Wind, Peter Sweetman v Coillte Teoranta (Ireland)	Article 6(3) '*must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site.'*
2017 EWHC 351	Judgment in Wealden District Council v Secretary of State for Communities and Local Government, Lewes District Council and South Downs National Park Authority	It is no longer appropriate to scope out the need for a detailed assessment of an individual project or plan using, for example, the 1000 annual average daily traffic (AADT) increase in the Design Manual For Roads and Bridges (DMRB) or the 1% of the critical level or load used by Defra/Environment Agency without first considering the in-combination impact with other projects and plans.
C-461/17	Holohan *et al* v An Bord Pleanala	*Article 6(3) must be interpreted as meaning that an 'appropriate assessment' must, on the one hand, catalogue the entirety of habitat types and species for which a site is protected, and, on the other, identify and examine both the implications of the proposed project for the species present on that site, and for which that site has not been listed, and the implications for habitat types and species to be found outside the boundaries of that site, provided that those implications are liable to affect the conservation objectives of the site.* *Article 6(3) must be interpreted as meaning that the competent authority is permitted to grant to a plan or project which leaves the developer free to determine subsequently*

Case reference	Name	Summary of ruling
		certain parameters relating to the construction phase, such as the location of the construction compound and haul routes, only if that authority is certain that the development consent granted establishes conditions that are strict enough to guarantee that those parameters will not adversely affect the integrity of the site. *Article 6(3) must be interpreted as meaning that, where the competent authority rejects the findings in a scientific expert opinion recommending that additional information be obtained, the 'appropriate assessment' must include an explicit and detailed statement of reasons capable of dispelling all reasonable scientific doubt concerning the effects of the work envisaged on the site concerned.*
[2019] EWCACiv 1562 (Court of Appeal) [2018] EWHC 2190 (Admin) (Divisional Court)	Langton v Secretary of State for Environment, Food and Rural Affairs	Measures which can properly be characterised as integral features of a plan or project [in Langton the measures in question were the conditions attached to a badger culling licence by Natural England] may be distinguished from 'mitigating or protective' measures as referred to in the *People Over Wind* case and may therefore be taken into account at the 'screening' stage of the HRA process.

5 European sites potentially affected by the proposals

5.1 Site identification (Scoping)

5.1.1 The European sites that have been identified as a result of applying the DMRB LA115 criteria (paragraph 2.5.4) are set out in the following headings, with details of each site set out in Table 5.2.

5.1.2 The Project Order Limits and all of the European sites identified are wholly within England.

Is the Project within 2km of a European site or functionally linked land (see also ecological connectivity and SSSI IRZs)?

5.1.3 The Thames Estuary and Marshes Ramsar site, Thames Estuary and Marshes SPA, North Downs Woodland SAC and Peter's Pit SAC are within 2km, as shown in Figure 1 (Appendix A). However, North Downs Woodland SAC and Peter's Pit SAC are within 2km of the parts of the Order Limits that would be acquired for ecological habitat creation only and these activities will not have any effects outside of the Order Limit boundary and no risk of effects at either SAC. Therefore only the Thames Estuary and Marshes SPA and Ramsar site would be identified.

5.1.4 The zone of influence of the Project includes functionally linked land associated with the Thames Estuary and Marshes SPA and the Thames Estuary and Marshes Ramsar site as shown in Figure 2 (Appendix A).

Is the Project within 30km of a SAC where bats are one of the qualifying features?

5.1.5 There are no sites identified, as shown on Figure 4 (Appendix A).

Does the Project cross or lie adjacent to, upstream of or downstream of a watercourse which is designated in part or wholly as a European site?

Upstream sites

5.1.6 No sites were identified upstream, as shown on Figure 5 (Appendix A).

Downstream sites

5.1.7 The following sites were identified downstream, as shown on Figure 5 (Appendix A):

a. Benfleet and Southend Marshes SPA and Benfleet and Southend Marshes Ramsar site

b. Outer Thames Estuary SPA

c. Thames Estuary and Marshes SPA and Thames Estuary and Marshes Ramsar site

5.1.8 Although European sites have been identified downstream, the Project design is such that the only potential pathway to effect could be via changes in water quality or quantity as a result of Project drainage discharges. However as set out in Table 2.1, the zone of influence for such a pathway would not exceed 500m (as described in ES Chapter 14 Road Drainage and Water Environment (Application Document 6.1)) . Therefore, only the Thames Estuary and Marshes SPA/ Ramsar site would be identified.

Does the Project have 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 DMRB LA 113?

5.1.9 There is a potential hydrological linkage between the Project and the habitats it crosses, which include the Thames Estuary and Marshes Ramsar site.

5.1.10 The Project has collected data from the Thames Estuary and Marshes Ramsar site to establish if any GWDTE are present (ES Appendix 14.5 Hydrogeological Risk Assessment (Application Document 6.3)). The functionally linked land comprises agricultural and intertidal habitat and did not include any GWDTEs.

5.1.11 Table 5.1 summarises the results, which indicated that the Filborough Marshes and Shorne Marshes, see Figure 6 (Appendix A), supported habitats with low groundwater dependency, as defined by the UK Technical Advisory Group for the Water Framework Directive (2014). Therefore, the Thames Estuary and Marshes Ramsar site has been identified as potentially hydrologically or hydrogeologically linked.

Table 5.1 Groundwater dependency scores for the habitat communities recorded on the Filborough and Shorne Marshes (extracted from Table 5.5 in ES Appendix 8.2 (Application Document 6.3)

Communities **Closest National Vegetation Classification community**	**UK (England) groundwater dependency (GW) score**[8]
Filborough Marshes	
Mosaic 1 – Floating A2 *Lemnetum minoris* with development towards A1 *Lemnetum gibbae* in some areas	Not listed
Mosaic 2 - Submerged A5 *Ceratophylletum demersi* and A6 *Ceratophylletum submersi*	Not listed
Mosaic 3 – Emergent S4 *Phragmitetum australis*, S19 *Eleocharis palistris*, and S21 *Scirpus maritimus*	3 - low

[8] The UK Technical Advisory Group (2009) Guidance on the Identification and Risk Assessment of Groundwater Dependent Terrestrial Ecosystems, Annex 1: NVC Plant Communities and Dependency on Groundwater has been used to determine an initial groundwater (GW) dependency rating (1 as high, 2 as moderate, 3 as low and not listed).

Communities **Closest National Vegetation Classification community**	**UK (England) groundwater dependency (GW) score[8]**
Mosaic 4 - Bankside S18 *Caricetum otrubae* and S4 *Phragmitetum australis*	3 - low
Shorne Marshes	
Mosaic 1 - Floating A2 *Lemnetum minoris* with development towards A1 *Lemnetum gibbae* in some areas	Not listed
Mosaic 2 - Submerged A5 *Ceratophylletum demersi*	Not listed
Mosaic 3 - Emergent and Bankside S4a *Phragmites australis*, *Phragmites australis* sub-community, S13 *Typha angustifolia*, S19 *Eleocharispalistris*, S20 *Scirpus lacustris ssp. tabernaemontani*, and S21 *Scirpus maritimus*	3 - low
Mosaic 4 - Ponds 1, 3, 4, and 5 S21c *Scirpus maritimus*, *Agrostis stolonifera* sub-community	3 - low
Mosaic 5 - Pond 2 S21a *Scirpus maritimus, Scirpus maritimus* sub-community, and S4a *Phragmites australis*, *Phragmites australis* sub-community	3 - low
Mosaic 6 - Pond 6 A5 *Ceratophylletum demersi*, A6 *Ceratophylletum submersi* S21a *Scirpus maritimus, Scirpus maritimus* sub-community, S4a *Phragmites australis, Phragmites australis* sub-community, and S20 *Scirpus lacustris ssp. tabernaemontani*	Not listed 3 - low
Mosaic 7 - Pond 7 A5 *Ceratophylletum demersi* S21a *Scirpus maritimus, Scirpus maritimus* sub-community, S4a Phragmites australis, Phragmites australis sub-community; and S20 *Scirpus lacustris ssp. tabernaemontani*	Not listed 3 - low

Does the Project have an Affected Road Network (ARN) which triggers the criteria for assessment of European sites in DMRB LA 105?

5.1.12 A 200m buffer from the operational ARN has been used to identify the following potentially affected sites, as shown in Figure 7 (Appendix A):

a. Epping Forest SAC

b. North Downs Woodlands SAC

c. Thames Estuary and Marshes Ramsar site – The operational ARN is in tunnel where it is within 200m of the Ramsar and so the site could not be affected. Functionally linked land associated with these sites would be within 200m of the ARN, but neither the birds themselves or the functionality of the habitats as foraging and roosting resources for the birds would be sensitive to nitrogen deposition. Therefore, this site is not identified for further assessment as there is no pathway to effect.

5.1.13 A 200m buffer from the construction ARN, as shown in Figure 8 (Appendix A), intersects with the Thames Estuary and Marshes Ramsar site.

Is there ecological connectivity between the Project and other European sites?

5.1.14 The Evidence Plan in Appendix C documents the process that has been used in consultation with Natural England to identify any ecological connectivity between the Project and other European sites. No European sites other than those listed above, were identified.

England National Application Annex to LA 115 E/1 Screening

5.1.15 Those European sites with SSSI Impact Risk Zones (IRZs) within the Order Limits or footprint should be subject to HRA screening.

5.1.16 Figure 9 (Appendix A) illustrates interactions between the Project and the IRZs. The following European sites have been identified:

a. Thames Estuary and Marshes Ramsar site

b. Thames Estuary and Marshes SPA

5.1.17 The details of the European sites that have been identified as a result of applying the screening criteria above, are set out in Table 5.2. The citations for each of the sites identified are included in Appendix B.

Table 5.2 European sites identified

European site name and code	Location and distance	Size (ha)	Key features including the primary reasons for designation and any other qualifying interests	Vulnerability	Conservation objectives
Thames Estuary and Marshes SPA UK9012021	Approximately 0.1km east of the Project	4,802.47 (55.7% marine)	ARTICLE 4.1 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: *Circus cyaneus* 1% of the population in Great Britain five-year peak mean for 1993/94 to 1997/98 *Recurvirostra avosetta* (Western Europe/Western Mediterranean - breeding) 28.3% of the population in Great Britain five-year peak mean for 1993/93 to 1997/98 ARTICLE 4.2 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: *Calidris alpina alpina* (Northern Siberia/Europe/Western Africa) 2.1% of the population five-year peak mean for 1993/94 to 1997/98 *Calidris canutus* (North-eastern Canada/Greenland/Iceland/North-western Europe) 1.4% of the population five-year peak mean for 1993/94 to 1997/98 *Limosa limosa islandica* (Iceland - breeding) 2.4% of the population five-year peak mean for 1993/94 to 1997/98 *Pluvialis squatarola* (Eastern Atlantic - wintering) 1.7% of the population five-year peak mean for 1993/94 to 1997/98 *Tringa totanus* (Eastern Atlantic - wintering) 2.2% of the population five-year peak mean for 1993/94 to 1997/98 On passage the area regularly supports: *Charadrius hiaticula* (Europe/Northern Africa - wintering) 2.6% of the population five-year peak mean for 1993/94 to 1997/98 ARTICLE 4.2 QUALIFICATION (79/409/EEC): An internationally important assemblage of birds. Over winter the area regularly supports: 75,019 waterfowl (five-year peak mean 1991/92-1995/96) Included within JNCC SPA 3rd Review (Stroud, et al., 2016) as a site with boundary review needs for the following species: European white-fronted goose *Anser albifrons albifrons* Lapwing *Vanellus vanellus*	M01 Changes in abiotic conditions I01 Invasive Non-Native Species G01 Outdoor sports and leisure activities, recreational activities M02 Changes in biotic conditions	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • the extent and distribution of the habitats of the qualifying features • the structure and function of the habitats of the qualifying features • the supporting processes on which the habitats of the qualifying features rely • the population of each of the qualifying features • the distribution of the qualifying features within the site. Natural England also provides supplementary advice on conservation objectives for this site (Natural England, 2018).
Thames Estuary and Marshes Ramsar site UK11069	Adjacent to the Project	5,588.59	Ramsar site criterion 2 – The site supports more than 20 British Red Data Book invertebrates and populations of the GB Red Book endangered least lettuce (*Lactuca saligna*), as well as the vulnerable slender hare's-ear (*Bupleurum tenuissimum*), divided sedge (*Carex divisa*), sea barley (*Hordeum marinum*), Borrer's saltmarsh-grass (*Puccinellia fasciculata*), and dwarf eelgrass (*Zostera noltei*).	Dredging Erosion Eutrophication General disturbance from human activities	The Applicant considers that the following SPA conservation objectives are sufficient to support the management of the Ramsar site[9] interests. Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

[9] For Ramsar sites, a decision has been made by Defra and Natural England not to produce Conservation Advice packages, instead focusing on the production of high-level conservation objectives. As the provisions on the Habitats Regulations relating to HRAs extend to Ramsar sites, Natural England considers the Conservation Advice packages for the overlapping European Marine Site designations to be, in most cases, sufficient to support the management of the Ramsar site interests. If there are Ramsar site qualifying features not covered by overlapping European Marine Sites, Natural England will consider the best approach on addressing these (e.g. to produce advice on a feature basis) if there is an operational risk.

European site name and code	Location and distance	Size (ha)	Key features including the primary reasons for designation and any other qualifying interests	Vulnerability	Conservation objectives
			Ramsar site criterion 5 – Assemblages of international importance: Species with peak counts in winter: 45,118 waterfowl (five-year peak mean 1998/99-2002/2003) Ramsar site criterion 6 – Species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species with peak counts in spring/autumn: Ringed plover, *Charadrius hiaticula*, Europe/Northwest Africa 595 individuals, representing an average of 1.8% of the GB population (five-year peak mean 1998/9-2002/3) Black-tailed godwit, *Limosa limosa islandica*, Iceland/W Europe 1,640 individuals, representing an average of 4.6% of the population (five-year peak mean 1998/9-2002/3) Species with peak counts in winter: Grey plover, *Pluvialis squatarola*, E Atlantic/W Africa - wintering 1,643 individuals, representing an average of 3.1% of the GB population (five-year peak mean 1998/9-2002/3) Red knot, *Calidris canutus islandica*, W & Southern Africa (wintering) 7,279 individuals, representing an average of 1.6% of the population (five-year peak mean 1998/9-2002/3) Dunlin, *Calidris alpina alpina*, W Siberia/W Europe 15,171 individuals, representing an average of 1.1% of the population (five-year peak mean 1998/9-2002/3) Common redshank, *Tringa totanus*, 1,178 individuals, representing an average of 1% of the GB population (five-year peak mean 1998/9-2002/3)		• the extent and distribution of the habitats of the qualifying features • the structure and function of the habitats of the qualifying features • the supporting processes on which the habitats of the qualifying features rely • the population of each of the qualifying features • the distribution of the qualifying features within the site.
Epping Forest SAC UK0012720	Approximately 19km west of the Project	1,630.74	Annex I habitats that are a primary reason for selection of this site: 9120 Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*) Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: 4010 Northern Atlantic wet heaths with *Erica tetralix* 4030 European dry heaths Annex II species that are a primary reason for selection of this site: 1083 Stag beetle *Lucanus cervus* Other features present: 1166 Great crested newt *Triturus cristatus*	M02 Changes in biotic conditions H04 Air pollution, air-borne pollutants G01 Outdoor sports and leisure activities, recreational activities J02 Human-induced changes in hydraulic conditions A04 Grazing	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 • the distribution of qualifying species within the site. Natural England also provides supplementary advice on conservation objectives for this site (Natural England, 2019).

European site name and code	Location and distance	Size (ha)	Key features including the primary reasons for designation and any other qualifying interests	Vulnerability	Conservation objectives
North Downs Woodlands SAC UK0030225	Adjacent to the Project	288.58	Annex I habitats that are a primary reason for selection of this site: 9130 *Asperulo-Fagetum* beech forests 91J0 *Taxus baccata* woods of the British Isles *Priority feature Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites)	I01 Invasive Non-Native Species H04 Air pollution, air-borne pollutants G01 Outdoor sports and leisure activities, recreational activities B02 Forest and Plantation management & use	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 the qualifying natural habitats • the structure and function (including typical species) of the qualifying natural habitats • the supporting processes on which the qualifying natural habitats rely. Natural England also provides supplementary advice on conservation objectives for this site (Natural England, 2019).

5.2 Conservation objectives and site integrity

SPA and Ramsar Sites

5.2.1 The conservation objectives used to inform the assessment for each of the European sites are set out within Table 5.2. Natural England has produced supplementary advice on conserving and restoring the site features of each of the SPAs and the attributes that are of relevance to this assessment are summarised in the following paragraphs. Where conservation objectives or targets are not available for the qualifying feature subject to assessment, proxy information has been used from the Standard Data Form for sites within the 'UK national site network of European sites', formerly the Natura 2000 standard form (in the case of the population size targets).

Supplementary advice relating to qualifying bird features

5.2.2 The potential LSEs identified in Section 6 relate to the effects of habitat loss and disturbance on qualifying bird features from the Thames Estuary and Marshes SPA and Ramsar site. Therefore, the attributes summarised in Table 5.3 below are those that relate to the population sizes in the European site and requirements for supporting habitat for the qualifying features. These attributes have targets associated with them and the targets are used as part of the assessment of effects on the integrity of the European sites in Section 7.2.

Supplementary advice relating to air quality

5.2.3 The potential LSEs identified in Section 6 relate to the effects of changes in air quality as a result of construction vehicle emissions on the Thames Estuary and Marshes Ramsar site. The supplementary advice provided by Natural England relating to the air quality attribute was the same for all three European sites identified and had the following target for all qualifying features:

a. Maintain concentrations and deposition of air pollutants at below the site-relevant critical load or level values given for this feature of the site on the Air Pollution Information System

Table 5.3 Summary of the attribute types that apply to each qualifying feature of the Thames Estuary and Marshes SPA

Attribute	Avocet	Black-tailed godwit	Dunlin	Grey plover	Hen harrier	Knot	Reds hank	Ringed plover	Waterbird assemblage
Assemblage of species: abundance									Yes
Assemblage of species: diversity									Yes
Non-breeding population: abundance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Connectivity with supporting habitats	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Disturbance caused by human activity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supporting habitat: conservation measures	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supporting habitat: extent and distribution of supporting habitat for the non-breeding season	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supporting habitat: food availability	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Supporting habitat: landform	Yes	Yes	Yes	Yes		Yes	Yes	Yes	
Supporting habitat: landscape	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Supporting habitat: quality of supporting non-breeding habitat									Yes
Supporting habitat: vegetation characteristics					Yes				
Supporting habitat: vegetation characteristics for nesting							Yes		
Supporting habitat: vegetation characteristics for roosting		Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Note – species all non-breeding (over-wintering) qualifying features unless otherwise specified

SAC sites

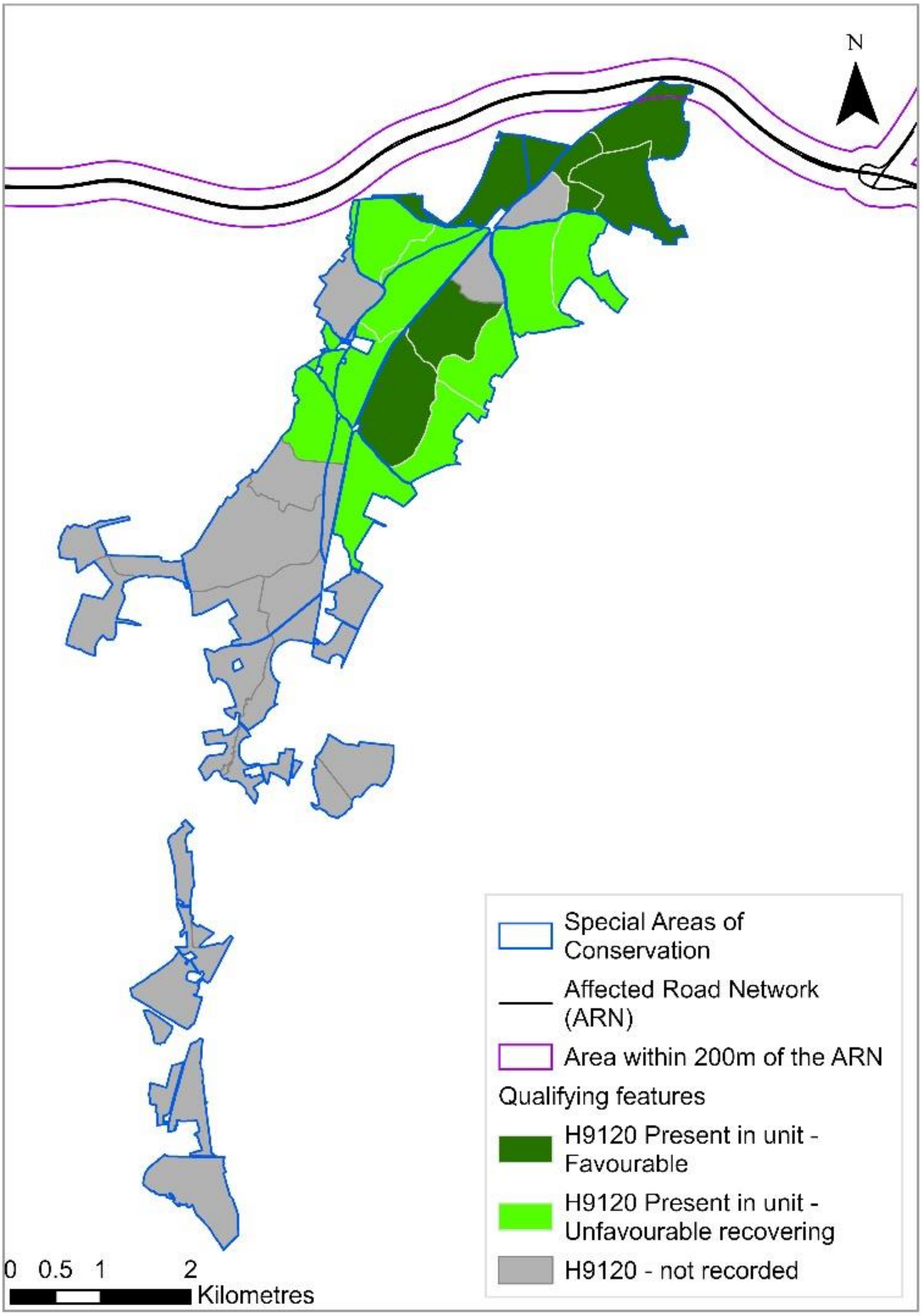
Supplementary advice relating to air quality

5.2.4 The conservation objectives for the Epping Forest and North Downs Woodlands SACs are set out within Table 5.2.

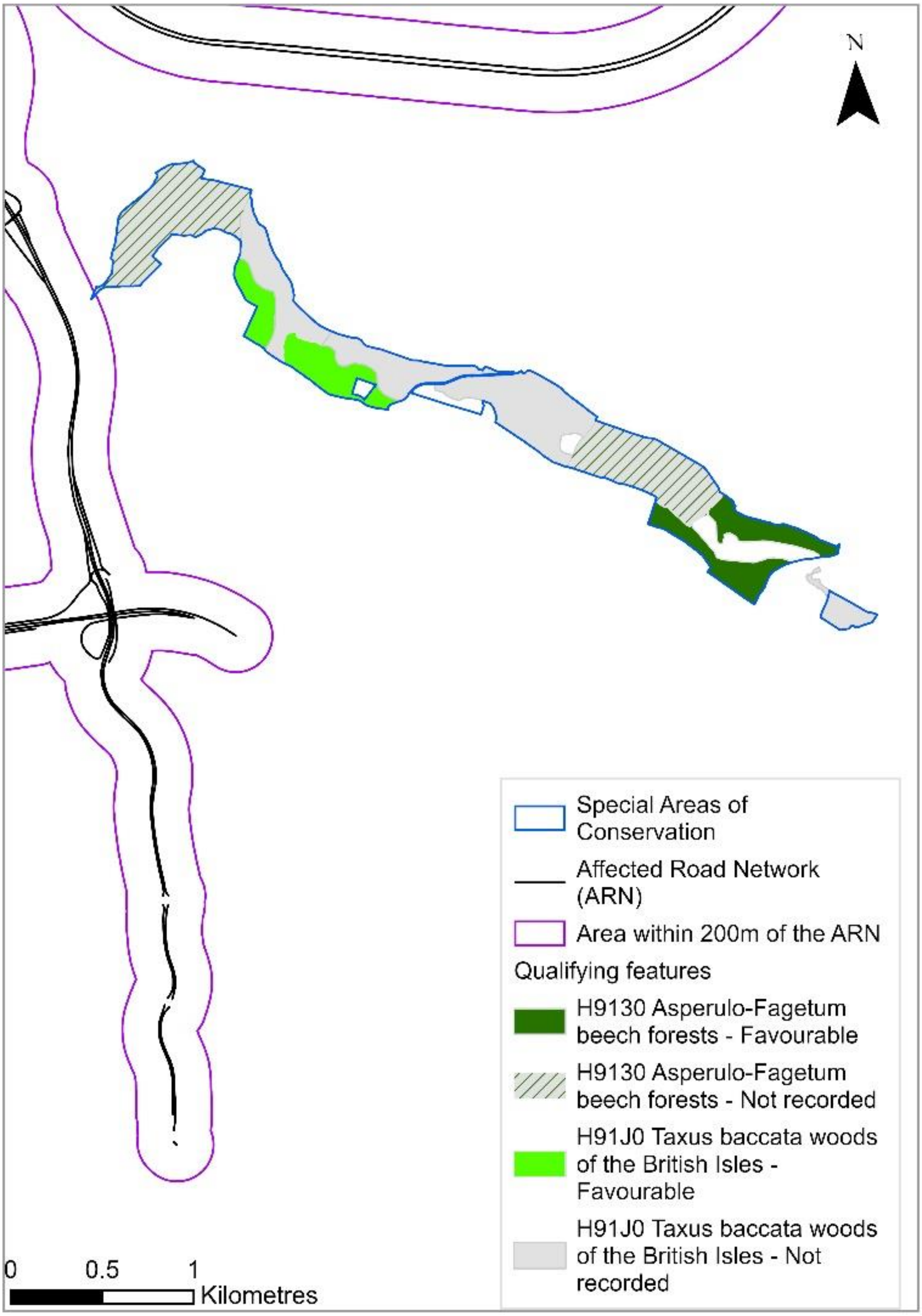
5.2.5 The distribution of the qualifying habitats potentially affected (those within 200m of the ARN, see paragraph 5.1.12) within the European sites are shown in Plate 5.1. These are displayed using the information provided by the Natural England Designated Sites View (Natural England, n.d.) and relate to the SSSI units where the qualifying features have been recorded. Other smaller fragments of the qualifying habitat exist as recorded during field surveys, particularly within the North Downs Woodlands SAC. Figure 7 provides a more detailed view of the areas of each SAC that are within 200m of the ARN.

Plate 5.1 Extent of qualifying features within the European Sites

a. Epping Forest SAC



b. North Downs Woodlands SAC



5.2.6 The survey work completed within the areas potentially affected (see paragraph 5.3.25 to 5.3.29) found that the qualifying features likely to be present were:

a. Epping Forest SAC: H9120. Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*); Beech forests on acid soils and therefore S1083 Stag beetle *Lucanus cervus*

b. North Downs Woodlands SAC: H9130 *Asperulo-Fagetum* beech forests and potentially H91J0 Taxus baccata woods of the British Isles

5.2.7 Natural England has produced supplementary advice (Natural England, 2019a; Natural England, 2019b) on conserving and restoring the site features of each of the SACs, and the attributes that are of relevance to this assessment are set out within Table 5.4.

5.2.8 The potential LSEs identified in Section 6.1 relate to effects of N deposition resulting in habitat loss/degradation. Therefore, the attributes summarised are those that relate to air quality and the targets associated with these attributes are used as part of the assessment of effects on the integrity of the European sites.

Table 5.4 The attributes and targets that apply to this assessment (extracted from Natural England's supplementary advice (Natural England, 2019a; Natural England, 2019b))

Qualifying feature	Attribute and Target	Reason for target
Epping Forest SAC		
H9120. Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*); Beech forests on acid soils	Attribute: Air quality - Supporting processes (on which the feature relies) Target: Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant critical load or level values given for this H9120 woodland feature of the site on the Air Pollution Information System (www.apis.ac.uk).	The annual mean critical levels for NH_3 and critical loads for N deposition are being exceeded for the H9120 woodland feature (and the defined mosaic). In addition to this, site-based evidence indicates that the annual mean critical level for NOx is also being exceeded, notably for areas close to main roads.
S1083 Stag beetle *Lucanus cervus*	Attribute: Air quality - Supporting processes (on which the feature relies) Target: Maintain or, where necessary, restore concentrations and deposition of air pollutants to at or below the site-relevant critical load or level values given for this feature of the site on the	The relevant critical levels and critical loads for the S1083 stag beetle feature at Epping Forest broadly align with the thresholds for the H9120 woodland feature.

Qualifying feature	Attribute and Target	Reason for target
	Air Pollution Information System (www.apis.ac.uk).	
North Downs Woodland SAC		
H9130 *Asperulo-Fagetum* Beech forests on neutral to rich soils	Attribute: Air quality - Supporting processes (on which the feature relies) Target: Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant critical load or level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. N Deposition (kg ha^{-1} yr^{-1}): 25.9 which is above critical loads (kg ha^{-1} yr^{-1}): 10-20
H91J0 *Taxus baccata* woods of the British Isles *Priority feature	Attribute: Air quality - Supporting processes (on which the feature relies) Target: Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant critical load or level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. N Deposition (kg ha^{-1} yr^{-1}): 25.9 which is above critical loads (kg ha^{-1} yr^{-1}): 5-15.

5.3 Baseline conditions

Background

5.3.1 Site baseline conditions are only presented for the qualifying features potentially affected by the Project, i.e. those recorded within the Project ZoI during field surveys. Where sites have only been identified as potentially affected by vehicle emissions (i.e. within 200m of the ARN) then only the baseline pertinent to the assessment of changes in air quality has been included.

5.3.2 The Project field surveys comprised:

a. Ornithology

b. Habitats

5.3.3 The survey locations that are relevant to this HRA are shown on Figure 10. Table 5.5 identifies the survey areas/transects that are within the functionally linked land and the data collected at these locations has been extracted from the wider Project dataset for use within this assessment.

Table 5.5 Survey locations (shown on Figure 10) that are within the functionally linked land

Diurnal surveys	Nocturnal surveys (winter months only)	Intertidal vantage point surveys
Biggin Farm	Bowaters Farm	NE
Bird transect 21 and 22	Chalk	NE2
Bretts Farm	Eastcourt Marshes	NW
Coalhouse Fort	East Tilbury Battery	SE
Coles Farm	Tilbury Fort	SW
East Tilbury Battery	Ingrebourne Valley	
East Tilbury Marshes	East Tilbury jetty at Goshem's Farm	
Filborough Marshes	Mott Farm	
Parsonage Farm	Cole's Farm and scrapheap	
Rochester Bridge		
Shorne Marshes		
Tilbury Fort		
Tilbury Power Station		

5.3.4 A preliminary site walkover was completed at the end of February 2020 within the areas of the European sites potentially affected by changes in air quality, i.e. the areas within 200m of the ARN. The aim of the surveys was to confirm the habitat types and inform the deposition velocity and lower critical load values applicable to the site for input to the air quality model. The walkover was carried out from the road network or PRoW and for some areas it was not possible to clearly see all of the area potentially affected, however the findings of the site walkover are considered a robust basis for assessment. The habitat types have been described in accordance with the UKHab classification system (The UKHab Working Group, 2018) where it was possible to do so.

5.3.5 Detailed site investigations were completed for the European sites where the change in nitrogen deposition was predicted to change by greater than 1% of the lower critical load.

5.3.6 A detailed site investigation for Epping Forest SAC was carried out in May 2020 and the survey report is included in Appendix D. The survey was carried out on three 500m transects with plots spaced at 100m intervals along each transect. The locations of the transects and quadrats are shown in Appendix D Figure 1. The transects were aligned along gradients of modelled N deposition, with origins at the point in the north of the SAC where changes in N deposition were highest. Along each transect, 50m x 50m plots for sampling vegetation were spaced at 100m intervals. Plots along transects one and three were truncated at 400m and 300m, respectively, as plots at these locations would have been, respectively, over a wide track and outside of the SAC.

Thames Estuary and Marshes SPA and Ramsar site

Qualifying species and assemblages

5.3.7 This section presents the baseline conditions of the SPA or Ramsar site qualifying bird species for the area potentially affected by the Project. These include both individual qualifying species and species that make up the assemblage qualifying feature as set out in Table 5.6, and throughout this assessment are referred to as HRA species. HRA species that have been recorded in the functionally linked land (and therefore potentially affected by the Project) are included in the assessment. For the purposes of this assessment the overwinter assemblage has been defined as follows:

a. Overwintering waterfowl – the species that make up the assemblage include all of the overwintering qualifying species and any other waterfowl species for which a European site could be designated, recorded during the winter months (November to March inclusive) in the Project survey area.

5.3.8 Table 5.6 provides a list of the species that have been recorded during the ornithology surveys, whether or not they are a qualifying feature of the European sites and whether or not they are considered to contribute to the overwintering assemblage. Figure 11a-i indicates the numbers and distribution of each of the individual qualifying species and the overwintering assemblage recorded during the ornithology surveys.

Table 5.6 Species recorded within the functionally linked land during Project ornithology surveys (and therefore potentially affected by the Project)

Common name	Scientific name	Peak count recorded during Project ornithology surveys (month)	Individual qualifying feature	Part of overwintering assemblage
Avocet	*Recurvirostra avosetta*	830 (Jan)	Yes (Wi)	Yes
Black-tailed godwit	*Limosa limosa islandica*	1,372 (Aug)	Yes (Wi, Pa)	Yes
Brent goose (dark-bellied)	*Branta bernicla bernicla*	1 (Nov)	No	Yes
Common tern	*Sterna hirundo*	50 (Apr)	No	No
Cormorant	*Phalacrocorax carbo*	6 (Dec)	No	Yes
Curlew	*Numenius arquata*	66 (Jan)	No	Yes
Dunlin	*Calidris alpina alpina*	1,260 (Nov)	Yes (Wi)	Yes
Gadwall	*Anas strepera*	113 (Jan)	No	Yes
Golden plover	*Pluvialis apricaria*	2 (Mar)	No	Yes
Great crested grebe	*Podiceps cristatus*	8 (Jun)	No	Yes
Grey plover	*Pluvialis squatarola*	55 (Nov)	Yes (Wi)	Yes

Common name	Scientific name	Peak count recorded during Project ornithology surveys (month)	Individual qualifying feature	Part of overwintering assemblage
Greylag goose (British/Irish)	*Anser anser*	120 (Jan)	No	Yes
Knot	*Calidris canutus*	21 (Mar)	Yes (Wi)	Yes
Lapwing	*Vanellus vanellus*	675 (Jan)	Yes (Wi**)	Yes
Little egret	*Egretta garzetta*	10 (Nov)	No	Yes
Little grebe	*Tachybaptus ruficollis*	23 (Dec)	No	Yes
Mallard	*Anas platyrhynchos*	84 (Dec)	No	Yes
Oystercatcher	*Haematopus ostralegus*	16 (Aug)	No	Yes
Pintail	*Anas acuta*	13 (Mar)	No	Yes
Redshank	*Tringa totanus*	75 (Apr)	Yes (Wi)	Yes
Ringed plover	*Charadrius hiaticula*	162 (Oct)	Yes (Pa)	Yes
Ruff	*Philomachus pugnax*	2 (Jul)	No	Yes
Shelduck	*Tadorna tadorna*	129 (Dec)	No	Yes
Shoveler	*Anas clypeata*	60 (Feb)	No	Yes
Teal	*Anas crecca*	641 (Dec)	No	Yes
Turnstone	*Arenaria interpres*	16 (Nov)	No	Yes
Whimbrel	*Numenius phaeopus*	10 (Dec)	No	Yes
Wigeon	*Anas penelope*	623 (Nov)	No	Yes
White-fronted goose (European)	*Anser albifrons albifrons*	NOT RECORDED	Yes (Wi**)	Yes
Hen harrier	*Circus cyaneus*	NOT RECORDED	Yes (Wi)	No

** indicates SPA 3rd Review SPAs with boundary review needs (Stroud, et al., 2016)

Wi – Overwinter, Pa – Passage

Project field surveys

5.3.9 Ornithological surveys have been completed for the Project. Where the results of these relate to the SPA and Ramsar site qualifying bird features, they are presented in the following paragraphs.

5.3.10 Figure 10 illustrates the distribution of HRA species recorded during the Project field work. This clearly indicates that the majority of birds were recorded along and either side of the River Thames, within the Thames Estuary and Marshes SPA/Ramsar site and the associated functionally linked land. The intertidal areas recorded the greatest peak counts and diversity of species, with the standing water and wet grassland associated with Tilbury Fort and the RSPB-managed area east of the Metropolitan Police firing range also recording greater species numbers and diversity when compared to agricultural habitats within the functionally linked land.

Intertidal vantage point survey

5.3.11 The intertidal areas on both the north and south sides of the River Thames were subject to intertidal vantage point surveys. Figure 12 shows the location of the vantage points and the distribution of the species recorded in each season. Table 5.7 sets out the peak counts (all vantage points) for each of the HRA species in each season.

Table 5.7 Seasonal peak counts of HRA species recorded during the intertidal vantage point surveys within the Thames Estuary and Marshes SPA/Ramsar site and associated functionally linked land

Species	Peak count per season					
	Br. 2017	Pa. 2017	Wi. 2017/18	Br. 2018	Pa. 2018	Wi. 2018/19
Avocet	59	1	141	42	300	830
Black-tailed godwit	300	28	270	246	590	255
Brent goose			1			
Common tern	1	50		5	35	13
Cormorant	2	2	5	2	2	4
Curlew	13	60	19	6	58	62
Dunlin	1	120	750	2	450	524
Gadwall				3		
Golden plover			2			
Great crested grebe	2		1	1		3
Grey plover		11	41		13	15
Greylag goose	1	2				45
Knot		15	21		1	
Lapwing	3	5	83	3		70
Little egret	2	2	1	1	3	2
Little grebe			1		1	
Mallard	6	3	20	4	7	28
Oystercatcher	5	8	3	3	4	4
Redshank	72	7	42	25	6	52
Ringed plover	15	162	75	9	48	52
Ruff	2					
Shelduck	23	15	30	78	18	129
Shoveler			3	2		11
Teal	12	16	180	142	35	500
Turnstone	8	7	16	1	1	6
Whimbrel	4	3	5	3	2	

Species	Peak count per season					
	Br. 2017	Pa. 2017	Wi. 2017/18	Br. 2018	Pa. 2018	Wi. 2018/19
Wigeon		8	350	6	20	400

Br. – breeding season (April to July, inclusive) Pa. – passage season (August to October, inclusive) Wi. – wintering season (November to March, inclusive)
Blank cells indicate no birds were recorded

5.3.12 The main areas of importance for birds using the intertidal areas within the study area was around the mudflats and saltmarsh south and south-east of Coalhouse Fort (Vantage Point (VP) NE2 on Figure 12 Appendix A).

5.3.13 The mudflats to the east of the site of Tilbury Power Station (VP NW on Figure 12 Appendix A) were also found to have good numbers of HRA species, although much lower compared to those recorded around Coalhouse Fort.

5.3.14 On the Kent side of the River Thames, the mudflats around Shorne Fort (VP SE on Figure 12 Appendix A) had some good numbers of HRA species, although much reduced in comparison with the Essex bank of the Thames.

5.3.15 The mudflats to the north of the Metropolitan Police firing range (VP NW on Figure 12 Appendix A) held no considerable aggregations of birds.

Diurnal and nocturnal surveys

5.3.16 Table 5.8 summarises the seasonal peak counts of HRA species recorded during the diurnal and nocturnal surveys within the functionally linked land. Figure 13 (Appendix A) illustrates the diurnal survey areas and the records of SPA/Ramsar site species by season in relation to the Project Order Limits. Figure 14 (Appendix A) illustrates the nocturnal survey areas and the records of SPA/Ramsar site species (winter survey season only) in relation to the Project Order Limits.

Table 5.8 Seasonal peak counts of SPA/Ramsar site species recorded during the diurnal and nocturnal surveys within the Thames Estuary and Marshes SPA/Ramsar site and associated functionally linked land

Species	Diurnal Peak count per season						Nocturnal Peak count per season	
	Br. 2017	Pa. 2017	Wi. 2017/18	Br. 2018	Pa. 2018	Wi. 2018/19	Wi. 2017/18	Wi. 2018/19
Avocet			6			1	11	14
Black-tailed godwit			36		8	7	20	
Cormorant	2	3	6	3	1	3		
Curlew	2		63	1		46	2	1
Dunlin					10	1	800	320
Gadwall	2		4	7	6	113	3	1
Great crested grebe			1	8				2

Species	Diurnal Peak count per season						Nocturnal Peak count per season	
	Br. 2017	Pa. 2017	Wi. 2017/18	Br. 2018	Pa. 2018	Wi. 2018/19	Wi. 2017/18	Wi. 2018/19
Grey plover							1	2
Greylag goose	23	43	117	12	62	120	5	96
Knot	1							
Lapwing	31	25	520	40	80	675	30	70
Little egret	2	2	2	6	7	10		
Little grebe	4	14	10	4	18	23	12	16
Mallard	30	12	40	12	30	84	20	20
Oystercatcher	3			2		1	1	1
Pintail			13	3		2		
Redshank	60		20	20		25	50	60
Ringed plover					27	16		1
Ruff	1							
Shelduck	8		26	20	6	40	5	10
Shoveler	18	4	42	19	2	60	7	31
Teal	9	6	70	12	18	160	15	60
Whimbrel	1							
Wigeon	3		30			82	35	20

Br. – breeding season (April to July, inclusive) Pa. – passage season (August to October, inclusive) Wi. – wintering season (November to March, inclusive)
Blank cells indicate no birds were recorded

5.3.17 North of the River Thames, the marshes around Tilbury Fort, approximately 1km west of the North Portal construction area, were found to support a sizable nocturnal roost for dunlin and other wading birds, including avocet, black-tailed godwit, redshank and ringed plover. No HRA species were recorded breeding.

5.3.18 South of the River Thames, the Shorne Marshes recorded the most significant numbers of HRA species, including teal, shoveler, curlew, shelduck, redshank and wigeon. The survey on the Metropolitan Police firing range recorded very few species. No HRA species were recorded breeding.

Review of published datasets

Natural England Commissioned Report NECR082

5.3.19 Natural England Commissioned Report NECR082 (Liley, 2011) provided a collation of existing baseline information relating to the Thames Estuary and Marshes, Medway Estuary and Marshes, and The Swale (European sites), summarising the designated interest features, their status and trends, habitat issues and potential threats.

5.3.20 The baseline data collated for the SPA bird features used the British Trust for Ornithology (BTO) WeBS counts which include those presented in Table 5.9. The report highlighted marked declines in some wintering bird species, particularly with the Medway site, where 14 bird species had undergone recent declines of 25% or more. The reasons were not clarified, and the report highlighted the need to complete further work to determine the causes.

BTO WeBS data

5.3.21 Table 5.9 sets out the WeBS count data (for the site qualifying features) for the areas within 2km of the Order limits and that intersect the Thames Estuary and Marshes SPA and Ramsar site.

Table 5.9 WeBS five-year annual peak means for Thames Estuary and Marshes SPA/Ramsar site qualifying features from WeBS count areas

WeBS survey area	Years included within Five-year annual mean peak	Avocet	Black-tailed godwit	Dunlin	Grey plover	Redshank	Ringed plover	Knot
Alpha Pool	2016/17 to 2020/21	1	<1	2	0	45	0	0
Coastguards Pool	2016/17 to 2020/21	0	0	0	0	3	1	0
Higham Bight	2016/17 to 2020/21	107	143	1072	36	42	3	3
Higham Marsh	2016/17 to 2020/21	0	33	<1	0	13	0	0
Redham to Mead	2017/18	0	0	0	0	0	0	0
Shorne Marshes	2016/17 to 2020/21	0	18	<1	0	18	0	0
Gravesend Promenade Offshore	2016/17 to 2020/21	8	201	41	1	163	87	0
Shorne Marshes Offshore	2015/16 to 2019/20	0	0	220	7	48	0	0
Cliffe Creek and Offshore	2014/15 and 2017/18	0	0	0	0	1	0	0

WeBS survey area	**Years included within Five-year annual mean peak**	**Avocet**	**Black-tailed godwit**	**Dunlin**	**Grey plover**	**Redshank**	**Ringed plover**	**Knot**
Lower Hope Point Offshore	2017/18	0	0	104	15	2	0	0
Mid Thames (Tilbury to Mucking)	2016/17 to 2020/21	5705	6910	21409	1194	132	243	65
Stanford Wharf Fisheries	2013/14 to 2015/16	0	0	0	0	0	0	0
Stanford Wharf (realigned)	2013/14 to 2015/16 and 2017/18	28	124	76	24	241	67	0
Thameside Nature Park Mucking	2013/14 to 2015/16 And 2017/18	0	0	0	0	0	0	0

5.3.22 WeBS Alerts report on the site level trends of the qualifying species of SPAs and has been used within this assessment to provide further information on populations of the qualifying species that may be affected by the Project. The WeBS Alerts data (Woodward, et al., 2019) for the Thames Estuary and Marshes SPA is as set out in Table 5.10.

5.3.23 This information provides some insight as to how the population trends at each site compare to that being experienced within the region and UK as a whole and sets the context for the numbers of birds recorded in the baseline field surveys.

Table 5.10 WeBS Alerts: Thames Estuary and Marshes SPA (Woodward, et al., 2019)
Note: red shading (High Alerts) indicates >50% decline and amber (Medium Alerts) shading indicates >25% decline[10]

Species	First winter	Ref winter	Short term % Δ[11]	Medium term % Δ	Long term % Δ	Baseline winter	% Δ since baseline
Avocet	91/92	16/17	14	73	645	95/96	247
Grey plover	91/92	16/17	-41	-4	-18	95/96	-20
Ringed plover	91/92	16/17	43	-37	-56	95/96	-37
Black-tailed godwit	91/92	16/17	3	202	641	95/96	504
Knot	91/92	16/17	-63	20	342	95/96	-12
Dunlin	91/92	16/17	11	15	55	95/96	13
Redshank	91/92	16/17	-39	-49	-61	95/96	-57
Waterbird assemblage	91/92	16/17	-11	14	30	95/96	1

Ramsar site habitats

5.3.24 The area within 200m of the construction ARN intersect the Ramsar site as shown on Figure 8 (Appendix A). The Project Phase 1 habitat surveys indicate that the area within 200m of the construction ARN is poor semi-improved grassland with a network of ditches. The ditches have a variety of emergent, submerged and floating vegetation. The combination of pasture and ditch habitats would constitute coastal and floodplain grazing marsh.

Epping Forest SAC

5.3.25 The SAC is approximately 10 metres south-east of the M25 as shown on Figure 7. All of the plots supported mature broadleaved semi-natural woodland, with two woodland habitat and vegetation types recorded. The woodland nearest the M25 was generally more heavily disturbed by public use with a sparse understory and younger trees and heavily disturbed ground. The boundary between the two was very marked, following the route of a footpath, with younger oak woodland lying to the north and mature mixed woodland in the

[10] The High and Medium Alerts are as reported by the WeBS Alerts (Woodward, et al., 2019) for the Thames Estuary and Marshes SPA are defined within Guidance to interpretation of Wetland Bird Survey Alerts (Austin, et al., 2019) on pages 4 and 5 ad follows:on pages 4 and 5 ad follows:
"*WeBS Alert status is assessed as percentage change on the smoothed abundance trend for short- (5yr) medium- (10yr) and long- (25yr) terms. Additionally, the percentage change is calculated since the midpoint of the baseline period (i.e. the period that site designation was based on). Baseline periods were provided by the country agencies for all SPAs but not for SSSIs/ASSIs. Consequently, the baseline comparison is currently available only for SPAs. Declines in trend abundance of at least 25% but below 50% are flagged as medium-Alerts (coloured Amber), and declines of 50% or greater are flagged as high-Alerts (coloured Red). The percentage change in trend abundance is calculated with reference to the penultimate winter in the available time series (hereafter reference winter) chosen to avoid using the less reliable end-points of the smoothed abundance trend.*"

[11] Upper case letter 'Delta' used to demote change of any changeable quantity in mathematics and science

interior of the site to the south. The majority of plots comprised the UK Habitat Classification type ‘w1c5 Beech forests on acid soils (H9120)’, an Annex I habitat and qualifying feature of Epping Forest SAC.

5.3.26 The Ellenberg values of species recorded during the field survey (see Table 3.2 in Appendix D) did not identify any species likely to be sensitive to N deposition. The qualifying features being assessed are habitat features which are listed as nitrogen-sensitive habitats in the Air Pollution Information System, but no species with an Ellenberg value of less than 3 (indicative of more-or-less infertile sites) were recorded in the affected area. The lack of nitrogen-sensitive species recorded in the survey therefore shows the habitat in this area is not nitrogen sensitive but does not imply the qualifying feature as a whole is not nitrogen sensitive. The survey extent was greater than the 200m as set out in Appendix D. A comparison with areas further away was discussed in the main survey report in Appendix D and no discernible difference along the transects was recorded.

5.3.27 The distribution of the stag beetle feature (S1083) at Epping Forest is considered to broadly align with the distribution of the H9120 woodland feature.

North Downs Woodlands SAC

5.3.28 The SAC is approximately 160 metres east of the A229 as shown on Figure 7 (Appendix A). The woodland block is narrow (approximately 20m wide) and bisected by a sunken lane (The North Downs Way Public Right of Way) comprising bare ground and vegetated banks. The woodland comprises no more than two lines of trees and shrubs at this point of the SAC. The canopy comprised semi-mature coppice ash (*Fraxinus excelsior)* with a shrub layer of scattered ash, yew (*Taxus baccata)* and hazel (*Corylus avellana)*, over a ground flora of abundant ivy (*Hedera helix*) with dog’s mercury (*Mercurialis perennis*), wood melic (*Melica uniflora*), wood false brome (*Brachypodium sylvaticum*), honeysuckle (*Lonicera periclymenum*) and stinking iris (*Iris foetidissima*). The area was relatively heavily disturbed due to presence of the public footpath.

5.3.29 Given the size of this block of woodland and relatively young vegetation, it is difficult to fully assign a community type, however it is contiguous with the remainder of the woodland which was degraded H9130 Asperulo-Fagetum Beech Forest (w1c6). Further away (approximately 500m) from the A229, where the SAC boundary widens, the composition of the woodland had more abundant yew in the shrub layer and wild privet (Ligustrum vulgare). Where areas were of more mature woodland they included a well-spaced canopy of mature beech and ash over a relatively well-developed shrub layer of hazel, wild cherry (Prunus avium), yew and regenerating ash and beech. The ground flora was dominated by ivy and dog’s mercury and the composition was akin to H9130 Asperulo-Fagetum Beech Forest (w1c6).

5.3.30 The Ellenberg values for the species, noted within the area 200m from the ARN, ranged from 5 to 7 and did not include any species likely to be sensitive to N deposition. The qualifying features being assessed are habitat features which are listed as nitrogen-sensitive habitats in the Air Pollution Information System, but no species with an Ellenberg value of less than 3 (indicative of more-or-less infertile sites) were recorded in the affected area. The lack of nitrogen-sensitive species recorded in the survey therefore shows the habitat in this area is not nitrogen sensitive but does not imply the qualifying feature as a whole is not nitrogen sensitive.

5.4 Future changes in baseline conditions

Bird population trends

5.4.1 The populations of qualifying features within the Thames Estuary and Marshes SPA have varied since the site was classified in the 1990s. The percentage change in the populations of the qualifying features has been identified within the British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS) Alerts(Woodward, et al., 2019), based on 2018/19 count data, and Natural England's supplementary advice for each of these sites has set targets to restore or maintain the populations based on the WeBS Alerts information.

5.4.2 The population data for the SPA is considered, by the Applicant, to be the same for the Ramsar sites. The Thames Estuary and Marshes Ramsar site boundary is not coincident with the Thames Estuary and Marshes SPA. The Ramsar site is slightly larger and includes the Shorne and Filborough Marshes, however the population sizes are considered to be the same for both sites for the purposes of this assessment. The qualifying features for the SPA and Ramsar sites are shown in Table 5.11, which indicates where species form part of both designations. The assessment has used the BTO population data including all birds (both qualifying features and not) that are present on each European site.

Table 5.11 Qualifying features of the Thames Estuary and Marshes European sites

European site	Qualifying feature	Overwintering or breeding importance
Thames Estuary and Marshes SPA	Hen harrier	Overwinter
	Avocet	Overwinter
Thames Estuary and Marshes SPA and Ramsar site	Grey plover	Overwinter
	Redshank	Overwinter
	Ringed plover	Overwinter and Passage
	Dunlin	Overwinter
	Knot	Overwinter
	Black tailed godwit	Overwinter SPA Overwinter and Passage Ramsar site
	Waterfowl assemblage	Overwinter

5.4.3 Table 5.12 shows the population sizes and percentage changes for the qualifying features. The estimated current population data have been calculated by multiplying the population size at classification by the percentage change stated in the BTO WeBS Alerts (Woodward, et al., 2019). The estimated current population figure is used within this assessment, as advised within the supplementary advice for the Thames Estuary and Marshes SPA, when investigating the percentage of birds potentially affected by the Project.

Table 5.12 Changes in populations of the qualifying features at Thames Estuary and Marshes SPA/Ramsar site

Qualifying feature All overwintering/passage unless otherwise specified	Population when classified	WeBS Alerts % change since baseline[12]	Estimated current population
Avocet	283	247%	982
Black-tailed godwit	1,699	504%	10,262
Dunlin	29,646	13%	33,500
Grey plover	2,593	-20%	2,074
Knot	4,848	-12%	4,266
Lapwing	3,444	-47%	1,825
Redshank	6,251	-57%	2,688
Ringed plover	1,324	-37%	834
Waterbird assemblage	75,019	1%	75,769

5.4.4 The WeBS data for the each of the estuaries in Table 5.13 is a compilation of the data for the sectors that comprise each estuary site. These sectors include the SPA/Ramsar sites but, unlike the WeBS Alerts data, the counts are not specific to them and generally cover a wider area.

5.4.5 The Thames Estuary WeBS site includes various count sectors that extend from Foulness Point in the east to Tower Bridge, City of London in the west. The Thames Estuary and Marshes SPAs form part of the sectors that make up this WeBS site.

Table 5.13 A comparison of the BTO WeBS five-year average counts (Frost, et al., 2021) for each of the qualifying species

Qualifying feature	Thames Estuary	
	2011/12 – 2014/15	2015/16 – 2019/20
Avocet	2,003 (Sep)	3,463 (Sep)
Black-tailed godwit	5,939 (Nov)	6,564 (Sep)
Dunlin	28,714 (Dec)	23,211 (Jan)
Grey plover	4,316 (Dec)	2,684 (Nov)
Knot	32,785 (Dec)	23,885 (Jan)
Lapwing	12,097 (Jan)	9,442 (Jan)
Redshank	3,227 (Nov)	2,140 (Nov)

[12] WeBS Alerts % change since baseline is calculated by the BTO as the change since the mid-point in the baseline period (baseline winter) (i.e. the period that site designation was based on) to the reference winter for which each alert status is being reported (Woodward, et al., 2019). For the Thames Estuary and Marshes SPA the baseline winter was 1995/96 and reference winter was 2016/17.

Qualifying feature	Thames Estuary	
	2011/12 – 2014/15	2015/16 – 2019/20
Ringed plover	797 (Sep)	699 (Sep)
Waterbird assemblage	169,634	141,686

5.4.6 A review of the WeBS Alerts dataset (Woodward, et al., 2019) showed that the trends in all of the species are comparable with those seen in the region and the UK as a whole. Therefore, the populations within the European site are considered to reflect the overall trend in the number of these species within the region/UK and therefore the factors influencing the populations within the sites themselves, as highlighted within the Site Improvement Plan (Natural England, 2014), are not likely to be the primary factors influencing population stability. The absence of site-specific alerts does not necessarily mean there are no local factors influencing populations, but it does imply that these are not significant at present to trigger alerts.

Air quality trends

5.4.7 Defra indicates that the trend in emissions of nitrogen oxides (NOx) has been decreasing since the 1990s with the introduction of catalytic converters in vehicles and increasingly stringent emission standards, with emission estimates for 2020 indicating a 51% reduction on the 2005 UK emissions total (Dore, et al., 2009). To some extent the reduction in emissions is being matched by a similar trend in nutrient N deposition. Rowe, *et al* (2020) showed that, for SACs in England, the percentage of sites with nutrient N exceedance decreased from 98.5% in 1996 to 94.4% in 2017.

5.4.8 The Thames Estuary and Marshes SPA/Ramsar site is large (4802.47 ha), and the areas within 200m of the operational ARN comprise coastal floodplain grazing marsh habitat. The trends in N deposition at these sites published on the Air Pollution Information System (Centre for Ecology & Hydrology (CEH), 2019) and are generally within the critical loads (20-30$kgha^{-1}yr^{-1}$) for the habitat type.

5.4.9 Both of the SAC sites identified (Epping Forest and North Downs Woodlands) have been exposed to atmospheric N deposition in excess of the critical loads, for the features within 200m of the operational ARN, for many decades as shown in the deposition trends published on the Air Pollution Information System (Centre for Ecology & Hydrology (CEH), 2019). The information recorded during the detailed habitat survey for Epping Forest (Appendix D) appears to support this trend as no nitrogen-sensitive species were recorded within any of the transects surveyed, suggesting that the habitat within that area could have been adversely affected by long-term excess N deposition. Pristine or high-quality examples of the qualifying habitat might be expected to support nitrogen-sensitive species, but the surveys (Appendix D) have shown that the area affected does not.

5.4.10 Both Epping Forest and the North Downs Woodlands SAC citations highlight air quality as a key attribute underpinning the conservation objectives of the sites. The Epping Forest Site Improvement Plan (Natural England, 2016) lists '*air pollution: impact of atmospheric nitrogen deposition*' as the highest priority issue for the site. While air pollution is listed as an issue in the North Downs

Woodlands Site Improvement Plan (Natural England, 2014) it was not the highest priority.

5.4.11 Both Epping Forest and North Downs Woodlands SAC have 'restore' targets for the air quality attribute of the conservation objectives which relate to the concentrations and deposition of air pollutants to at or below the site-relevant critical load or level values. The current trends indicate that progress is being made, however, Rowe *et al* (2020) stated that '*Reducing deposition to below the critical load does not mean that ecosystems immediately recover. There are time lags before chemical recovery takes place, and further delays before biological recovery. The timescales for both chemical and biological recovery, could be very long, particularly for the most sensitive ecosystems*'.

5.4.12 Therefore, the qualifying features at these SACs are unlikely to change significantly in composition based on predicted improvements in air quality alone and this is recognised within the pressures and issues listed and measures proposed in the Site Improvement Plans for both European sites.

6 Stage 1 Screening

6.1 Identifying interactions between the Project and European sites

6.1.1 The construction and operation of the Project would result in a number of changes in the surrounding environment, as set out in Table 2.1. All potential interactions between the Project and the European sites identified in Section 5.1 have been considered and the following sections set out where the interactions identified have potential for LSE, as assessed in Section 6.

Thames Estuary and Marshes SPA

6.1.2 This site was identified because the site itself is within 2km of the Project Order Limits and has functionally linked land within the Project Order Limits and ZoI. Table 6.1 lists the Project impacts, sets out where an actual pathway is present and whether there is potential for LSEs as a result of the Project alone or in-combination with other plans and projects.

Table 6.1 The Project impacts that could result in LSE for Thames Estuary and Marshes SPA

Project impact	Pathway	Effect	Assessment of LSE required?
• Land take – terrestrial and aquatic (marine) environment – construction • Change in air quality – dust emissions – construction • Changes in surface water quality and quantity – construction and operation • Introduction/spread of Invasive Non-Native Species – terrestrial and marine environment	Qualifying features from this European site use functionally linked land that is within the ZoI.	Reduction in habitat area	Yes. The impacts could result in a reduction in habitat area within the functionally linked land used by the qualifying features from this European site. The assessment of LSE is presented in paragraphs 6.2.50 to 6.2.79
• Change in air quality – vehicle emissions – construction and operation • Changes in groundwater quality and quantity – tunnel construction and operation	European site is not within the ZoI.	None	No. There is no pathway to effect on the European site identified for these Project impacts.

Project impact	Pathway	Effect	Assessment of LSE required?
• Vehicle collision with species during operation • Species collision with overhead utilities infrastructure – operation	Qualifying features from this site use functionally linked land that is within the ZoI.	Reduction in species density	Yes. The impacts could result in a reduction in species density of the qualifying features from this European site. The assessment of LSE is presented in paragraphs 6.2.80 to 6.2.86.
• Change in recreational disturbance – construction and operation	European site itself and the functionally linked land are within the ZoI.	Disturbance to key species	Yes. The impacts could result in disturbance, described as recreational disturbance, to key species within this European site and functionally linked land used by the qualifying features from this European site. The assessment of LSE is presented in paragraphs 6.2.38 to 6.2.49.
• Changes in noise and vibration – underwater and above ground – tunnel construction only • Changes in noise and vibration – construction and operation • Changes in visual disturbance – people/machines in eyeline – construction • Changes in visual disturbance –vehicles in eyeline – operation Changes in light levels – construction and operation	Qualifying features from this European site use functionally linked land that is within the ZoI.	Disturbance to key species	Yes. The impacts could result in disturbance to key species within the functionally linked land used by the qualifying features from this European site. The assessment of LSE is presented in paragraphs 6.2.87 to 6.2.115.

Thames Estuary and Marshes Ramsar site

6.1.3 This site was identified in Section 5.1 because the site itself is within 2km of the Project Order Limits, has functionally linked land within the Project Order Limits and ZoI, outside the European site boundary, and it is within 200m of the construction ARN. Table 6.2 lists the Project impacts, sets out where an actual pathway is present and whether there is potential for LSEs as a result of the Project alone or in-combination with other plans and projects.

Table 6.2 The Project impacts that could result in LSE for Thames Estuary and Marshes Ramsar site

Project impact	Pathway	Effect	Assessment of LSE required?
• Change in air quality – dust emissions – construction • Changes in groundwater quality and quantity – tunnel construction and operation • Changes in surface water quality and quantity – construction	European site itself is within the ZoI.	Reduction in habitat area	Yes. The impacts could result in a reduction in habitat area within this European site subsequently affecting all qualifying features (Ramsar criterion 2, 5, 6). The assessment of LSE is presented in paragraphs 6.2.2 to 6.2.21.
• Change in air quality – vehicle emissions – construction	European site itself is within the ZoI.	Reduction in habitat area	Yes. The site itself is within 200m of the construction ARN and the impacts could result in a reduction in habitat area, affecting all qualifying features (Ramsar criteria 2, 5, 6). The assessment of LSE is presented in paragraphs 6.2.119 to 6.2.125.
• Land take – terrestrial and aquatic (marine) environment – construction • Changes in surface water quality and quantity – operation • Introduction/spread of Invasive Non-Native Species – terrestrial and marine environment	Qualifying features from this European site use functionally linked land that is within the ZoI.	Reduction in habitat area	Yes. The impacts could result in a reduction in habitat area within the functionally linked land used by the qualifying bird features (Ramsar criteria 5 and 6) from this European site. The assessment of LSE is presented in paragraphs 6.2.50 to 6.2.79 No pathway to effect has been identified for Ramsar criterion 2 for these Project impacts.

Project impact	Pathway	Effect	Assessment of LSE required?
• Change in air quality – vehicle emissions – operation	European site itself is not within the ZoI.	None	No. There is no pathway to effect on the European site identified for these Project impacts.
• Vehicle collision with species during operation • Species collision with overhead utilities infrastructure – operation	Qualifying features from this site use functionally linked land that is within the ZoI.	Reduction in species density	Yes. The impacts could result in a reduction in species density of the qualifying bird features from this European site. The assessment of LSE is presented in paragraphs 6.2.80 to 6.2.86. No pathway to effect has been identified for Ramsar criterion 2 for these Project impacts.
• Changes in noise and vibration – construction • Changes in noise and vibration – underwater and above ground – tunnel construction only • Changes in light levels – construction • Changes in visual disturbance – people/machines in eyeline – construction	European site itself is within the ZoI.	Disturbance to key species	Yes. The impacts could result in disturbance to key species (birds) within this European site. The assessment of LSE is presented in paragraphs 6.2.22 to 6.2.37 No pathway to effect has been identified for Ramsar criterion 2 for these Project impacts.
• Change in recreational disturbance – construction and operation	European site itself and the functionally linked land are within the ZoI.	Disturbance to key species	Yes. The impacts could result in disturbance, described as recreational disturbance, to key species within this European site and functionally linked land used by the qualifying bird features from this European site. The assessment of LSE is presented in paragraphs 6.2.38 to 6.2.49. No pathway to effect has been identified for Ramsar criterion 2 for these Project impacts.
• Changes in noise and vibration – construction and operation • Changes in noise and vibration – underwater and above ground – tunnel construction only	Qualifying features from this European site use functionally	Disturbance to key species	Yes. The impacts could result in disturbance to key species within the functionally linked land used by the qualifying bird features from this European site.

Project impact	Pathway	Effect	Assessment of LSE required?
• Changes in light levels – construction and operation • Changes in visual disturbance – people/machines in eyeline – construction • Changes in visual disturbance –vehicles in eyeline – operation	linked land that is within the ZoI.		The assessment of LSE is presented in paragraphs 6.2.87 to 6.2.115 No pathway to effect has been identified for Ramsar criterion 2 for these Project impacts.

Epping Forest SAC

6.1.4 This site was identified in Section 5.1 because the site itself is within 200m of the operational ARN. Table 6.3 lists the Project impacts, sets out where an actual pathway is present and whether there is potential for LSEs as a result of the Project alone or in-combination with other plans and projects.

Table 6.3 The Project impacts that could result in LSE for Epping Forest SAC

Project impact	Pathway	Effect	Assessment of LSE required?
• Change in air quality – vehicle emissions – operation	European site itself is within the ZoI	Reduction in habitat area	Yes. The site itself is within 200m of the operational ARN and the impacts could result in a reduction in habitat area. The following qualifying features were identified within 200m of the ARN: • 9120 Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion) • 1083 Stag beetle *Lucanus cervus* The assessment of LSE is presented in paragraphs 6.2.126 to 6.2.131. No pathway to effect has been identified for the other qualifying features of this site as they are not present within 200m of the ARN.

North Downs Woodlands SAC

6.1.5 This site was identified in Section 5.1 because the site itself is within 2km of the Project Order Limits and within 200m of the operational ARN. Table 6.4 lists the Project impacts, sets out where an actual pathway is present and whether there is potential for LSEs as a result of the Project alone or in-combination with other plans and projects. North Down Woodlands is within 2km of the Project Order Limits that have been proposed for ecological mitigation. The habitat creation work proposed would not give rise to any Project impacts that could result in any effects on the North Downs Woodland SAC.

Table 6.4 The Project impacts that could result in LSE for North Downs Woodlands SAC

Project impact	Pathway	Effect	Assessment of LSE required?
• Change in air quality – vehicle emissions – operation	European site itself is within the ZoI	Reduction in habitat area	Yes. The site itself is within 200m of the operational ARN and the impacts could result in a reduction in habitat area. The following qualifying features were identified within 200m of the ARN: • 9130 Asperulo-Fagetum beech forests • 91J0 Taxus baccata woods of the British Isles *Priority feature The assessment of LSE is presented in paragraphs 6.2.132 to 6.2.137. No pathway to effect has been identified for the other qualifying features of this site as they are not present within 200m of the ARN.

6.2 Assessment of LSE

6.2.1 On the basis established in Sections 5.1 and 6.1, the risk of LSE on European sites as a result of this Project alone and in-combination with other projects, is associated with the following pathway groups:

a. Effects on the Thames Estuary and Marshes Ramsar site

   i. Reduction in habitat area as a result of dust emissions, changes in surface water quality and groundwater quality

   ii. Disturbance to key species as a result of changes, during construction only, in noise and vibration, light levels and visual disturbance

b. Effects on the Thames Estuary and Marshes SPA and Ramsar site

   i. Disturbance to key species as a result of changes during construction and operation, in recreational disturbance

c. Effects on functionally linked land associated with the Thames Estuary and Marshes SPA and Ramsar site

   i. Reduction in habitat area as a result of land take, dust emissions, changes in surface water quality/quantity, introduction of Invasive Non-Native Invasive species

   ii. Reduction in species density as a result of vehicle collision and collision with utilities infrastructure

   iii. Disturbance to key species as a result of changes during construction and operation, in noise and vibration, light levels, visual disturbance and recreational disturbance.

d. Changes in air quality from vehicle emissions, effect on European sites identified within 200m of the operational ARN

e. Climate change risks

Thames Estuary and Marshes Ramsar site

Reduction in habitat area

6.2.2 The following Project impacts could result in a reduction in habitat area within the Thames Estuary and Marshes Ramsar site:

a. Changes in air quality – dust emissions – construction

b. Changes in surface water quality and quantity during construction

c. Changes in groundwater quality and quantity – tunnel construction and operation

Change in air quality – dust emissions – construction

Efficacy of committed measures

6.2.3 While no studies of the efficacy of the good practice measures are available in the literature to specifically demonstrate their effectiveness in preventing significant effects on nearby receptors, the measures have been developed over many years by the industry and there is very high confidence in them. The construction industry standards are long-standing and there has been no call or need for updating them in recent years, suggesting that they represent a mature and successful set of guidelines. There is no scientific reason to think that measures that have proved successful on numerous projects in the past, protecting multiple habitat types and people without significant complaint, would not be equally successful at mitigating dust effects on European site habitats.

Effect alone

6.2.4 Changes in air quality as a result of dust emissions could occur during construction of the Project and dust deposition has the potential to reduce the area of habitat available to all qualifying species (Ramsar criteria 2, 5 and 6). Figure 15 shows how the European site and functionally linked land interact with the area potentially affected by dust emissions.

6.2.5 The Project would minimise the dust effects at receptors by managing dust at source as outlined in paragraphs 3.3.5 to 3.3.8. These measures are integral to the Project and would prevent any LSE on the Thames Estuary and Marshes Ramsar site as any pathway to effect would be disrupted.

Effect in-combination

6.2.6 The pathway to effect alone would be disrupted at source, therefore there cannot be a feasible risk of this effect acting in -combination with other plans and projects, so the Project would not conceivably combine with dust effects from other plans or projects to create a significant in-combination effect.

6.2.7 Therefore, a conclusion is reached of no LSE on the Thames Estuary and Marshes SPA and Ramsar site due to construction dust, as a result of the Project alone or in-combination with other plans and projects.

Changes in surface water quality and quantity during construction

Efficacy of committed measures

6.2.8 While no studies of the efficacy of the good practice measures are available in the literature to specifically demonstrate their effectiveness in preventing significant effects on nearby receptors, the measures have been developed over many years by the industry and there is very high confidence in them The construction industry standards are long-standing and there has been no call or need for updating them in recent years, suggesting that they represent a mature and successful set of guidelines. There is no scientific reason to think that measures that have proved successful on numerous projects in the past, protecting multiple habitat types and people without significant complaint, would not be equally successful at avoiding changes in surface water quality and quantity and therefore the subsequent effects on European sites.

Effect alone

6.2.9 There is a potential pathway to effect as a result of the construction site drainage discharge from the southern tunnel entrance compound into the western ditch, as shown on Figure 16. This ditch is part of the Thames Estuary and Marshes Ramsar site, with the Ramsar site boundary located approximately 10-20m downstream from the discharge point. The plants and invertebrates that contribute to the Ramsar criterion 2 are sensitive to changes in water quality and quantity. The bird species that contribute to Ramsar criterion 5 and 6 are considered to be less sensitive to the changes that could occur.

6.2.10 The Project is to be constructed in accordance with integral good practice measures, including a site drainage system with attenuation so that any discharges will comply with quality and permit standards, and at greenfield runoff rates.

6.2.11 The measures are aimed at avoiding changes in surface water quality and quantity at source, disrupting any pathway to effect, therefore the risk of LSE within the Thames Estuary and Marshes Ramsar site is considered to be low. However, during consultation, Natural England advised that although the good practice and project design measures are considered to be effective, the scale of the project and the requirement to discharge directly in to the Ramsar site required more certain controls on the implementation of these measures. Therefore, LSE on the Thames Estuary and Marshes Ramsar site cannot be discounted.

Effect in-combination

6.2.12 As LSE cannot be discounted for the Project alone, the risk of LSE in-combination with other plans and projects also exists. Therefore, it is uncertain whether or not any significant effect, from the Project alone or in-combination with other plans or projects, would result in LSE on the Thames Estuary and Marshes Ramsar site as a result of changes in surface water quality and quantity during construction.

Changes in groundwater quality and quantity – tunnel construction and operation

Effect alone

6.2.13 The Project includes a proposed ground protection tunnel, main tunnel and cross passages, the construction of which have the potential to cause groundwater lowering of the shallow water system at the Thames Estuary and Marshes Ramsar site.

6.2.14 Table 5.1 summarised the results of the surveys (of the Filborough Marshes and Shorne Marshes) within the Thames Estuary and Marshes Ramsar site, and showed that the habitats recorded were categorised, according to the UK Technical Advisory Group on the Water Framework Directive (2014) as having either low or no dependency on groundwater.

6.2.15 The Project Hydrogeological Risk Assessment (ES Appendix 14.5, Application Document 6.3) included a baseline water balance assessment (Annex J of the Hydrological Risk Assessment) for the Thames Estuary and Marshes Ramsar site and found the following:

a. The major source of water to the study area is precipitation and provides between 95% and 98% of the total annual water inputs.

b. Groundwater flow is mostly horizontal and contribution to the system is small with typically <2% of the total water input per month from diffuse shallow groundwater seepage.

c. The Thames and Medway Canal is likely to be a minor contributor to total water inflows as the rate of leakage is generally lower than the conductivity of the surrounding Alluvium.

d. The major outflows of water from the study area are evapotranspiration from the soil and evaporation from surface water ditches.

6.2.16 The Hydrogeological Risk Assessment (ES Appendix 14.5, Application Document 6.3) also includes the modelling of groundwater flows and the predicted drawdown of the water table for the construction of the ground improvement tunnel and main tunnels (Annex J of the Hydrological Risk Assessment).

6.2.17 The predicted changes in groundwater flows and the water table within the Alluvium under the Ramsar site are illustrated on Plate 6.1 and Plate 6.2. The Ramsar site is immediately south of the North Kent Line in both plates and the contours show the drawdown in metres of the ground water table. The predicited changes in the water table under the Ramsar site are negligible (undetectable in the field) as the drawdown is predicted to be less than 0.3m (black line contours on Plate 6.1) which is within the model accuracy limits. The larger drawdown (0.4m) contours are out with the Ramsar site.

Plate 6.1 Predicted drawdown in the water table from the ground improvement tunnel construction (taken from ES Appendix 14.5 annex J Plate 3.4)

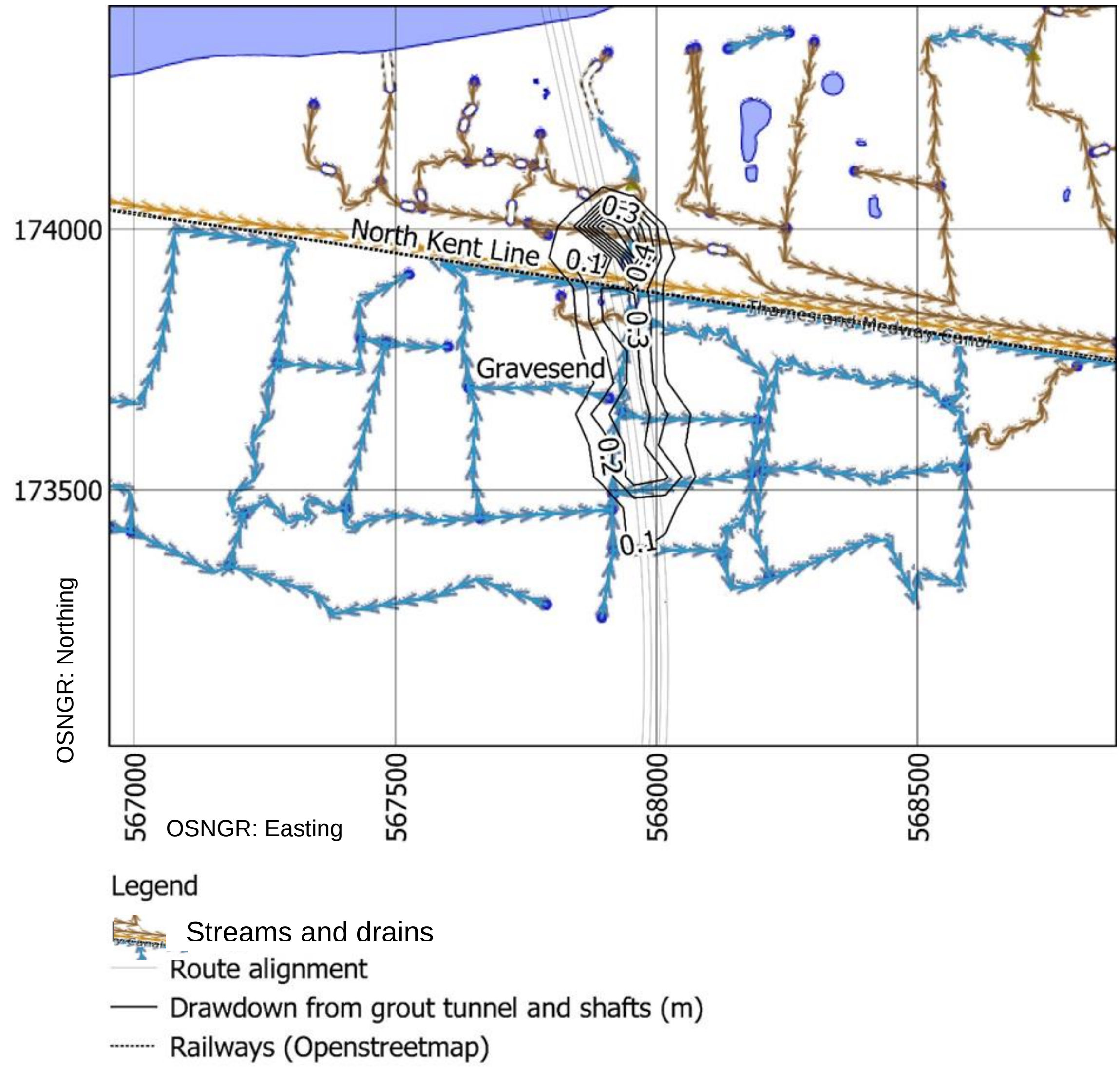
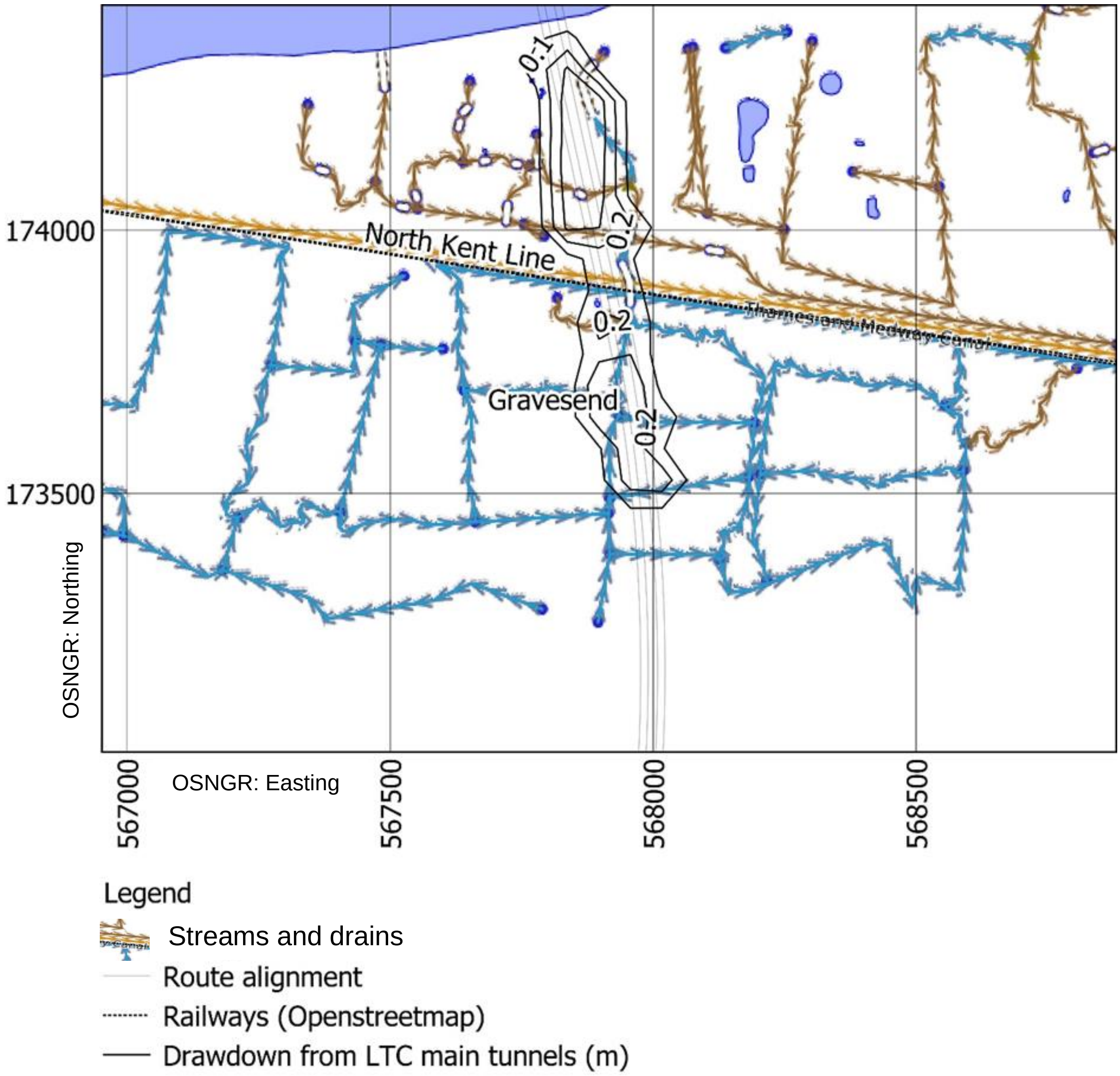


Plate 6.2 Predicted drawdown of the water table from the main tunnel construction (taken from ES Appendix 14.5 annex J Plate 3.6)



6.2.18 The evidence from the groundwater modelling indicates that the proposed tunnels would not result in any material change in groundwater levels and the water balance model shows that the Thames Estuary and Marshes Ramsar site is not dependent on groundwater, therefore it is considered that there is no feasible pathway to effect and no LSEs are predicted to occur as a result of the Project alone.

6.2.19 At the request of Natural England, the following commitment has been included within the REAC:

a. HR008. Surveillance of groundwater levels will be carried out within the Thames Estuary and Marshes Ramsar site in the vicinity of the tunnelling works for the duration of the construction period at borehole locations to be agreed with SoS in consultation with Natural England and Environment Agency. The contractors would complete an annual review, for the period of construction, and first the five years of operation, of the groundwater levels and consult on any implications for qualifying features of the Ramsar site, and any necessary remedial measures with Natural England and the Environment Agency.

Effect in-combination

6.2.20 There is no pathway to effect (paragraph 6.2.18) for the Project alone (construction and operation) therefore, there cannot be a feasible risk of this effect acting in-combination with other plans and projects. Also, the Project tunnelling activities would have no material changes to groundwater and so would not conceivably combine with groundwater effects from other plans or projects to create a significant in-combination effect.

6.2.21 Therefore, a conclusion is reached of no LSE on the Thames Estuary and Marshes Ramsar site due to changes in ground water quality or quantity as a result of the Project alone or in-combination with other plans and projects.

Disturbance to key species

6.2.22 South of the River Thames the majority of Project construction activities would be carried out approximately 500m south of the Ramsar site at the southern tunnel entrance compound, but also at the A226 Gravesend Road and Milton compounds, associated with the construction of the ground protection tunnel; and construction of the surface water drainage treatment system and outfall infrastructure within the western ditch. These activities would result in changes in noise and vibration and visual stimuli, potentially disturbing the qualifying bird features (Ramsar criteria 5 and 6) within the Ramsar site. Figure 17 illustrates the areas disturbed in relation to the Thames Estuary and Marshes Ramsar site.

6.2.23 The use of the TBM under the river itself may result in underwater noise and vibration which could result in disturbance to birds and their prey.

Changes in noise and vibration – underwater and above ground – tunnel construction only

Effect alone

6.2.24 The noise and vibration associated with the construction of the tunnel by the TBM has been modelled using the Rupert Taylor Finite Difference Time Domain model FINDWAVE® (ES Appendix 9.1: TBM Noise and Vibration Assessment, Application Document 6.3) and the detailed discussion of the effects on the River Thames is within ES Chapter 9 Marine Biodiversity (Application Document 6.1). The modelling has been completed using geotechnical data from ground investigations, with details of tunnel lengths and soil parameters used. The intended construction method is for there to be a lag between the construction of the two tunnels, therefore the modelling assumes one TBM for the purposes of calculating levels of underwater noise. The modelling has been undertaken to provide both the sound pressure level as well as particle velocity at the following locations:

a. At a point above the TBM representing worst case

b. At the edge of the mudflats on the north and south of the river above the tunnel alignment

6.2.25 The results of modelling show that the highest levels of underwater noise associated with TBM operations are 130dB re 1µPa (SPL[13]) , at a frequency of 100Hz. This result is from a point in the river directly above the TBM head and represents the worst-case noise level and would decrease with increasing distance. In terms of particle velocity, the worst-case levels from above the TBM head were 0.01mms^{-1} reducing to 0.001mms^{-1} at the edge of the intertidal mudflats.

6.2.26 The noise associated with the TBM would not be perceived beyond the water column, particularly given the background level of noise from shipping (153-158dB re 1µPa [14]), therefore birds are unlikely to react when the TBM is in use. The potential disturbance to invertebrate prey items is also discounted as the changes in particle velocity predicted would not result in any change in prey distribution during the TBM operation. Therefore, it has been concluded that LSE can be ruled out for this effect pathway.

Effect in-combination

6.2.27 The pathway to effect for the Project alone is inconsequential (as defined in paragraphs 2.5.13 and 2.5.14) as the Project alone does not generate under water noise above background levels therefore it would not conceivably combine with underwater noise effects from other plans or projects to create a significant in-combination effect.

6.2.28 Therefore, a conclusion is reached of no LSE on the Thames Estuary and Marshes Ramsar site due to changes in noise and vibration from tunnel construction as a result of the Project alone or in-combination with other plans and projects.

Changes in noise and vibration and visual disturbance – construction works and vehicles

Effect alone

6.2.29 Figure 17 (Appendix A) illustrates the areas where construction work would be visible to birds foraging or roosting and also illustrates the area where changes in noise as a result of Project construction may result in the disturbance of qualifying features within the Thames Estuary and Marshes Ramsar site. The qualifying features have the potential to be disturbed by changes in noise and visual stimuli as a result of the following activities.

a. Activity within the A226 Gravesend Road and Milton compounds

b. Construction of the infrastructure associated with the surface water discharge associated with southern tunnel entrance compound

6.2.30 The habitats recorded in the potentially disturbed areas are agricultural, comprising semi-improved grassland and wet ditches. The qualifying species

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[13] The sound pressure level (SPL) is normally used to characterise noise and vibration of a continuous nature such as drilling, boring, or background sea levels.
[14] Existing baseline for underwater noise is described in the ES Chapter 9 Marine Biodiversity paragraph 9.4.41 to 9.4.45.

using these areas include redshank and various species such as lapwing and mallard that are part of the overwintering waterbird assemblage. The areas where the noise significance and/or visual disturbance thresholds are exceeded (see paragraph 4.1.9) include approximately 56.6 hectares of habitat within the Thames Estuary and Marshes Ramsar site.

6.2.31 It is uncertain whether or not any significant disturbance to the individual birds using the affected habitat areas would result and LSE cannot be discounted.

Effect in-combination

6.2.32 As LSE cannot be discounted for the Project alone, the risk of LSE in-combination with other plans and projects also exists.

6.2.33 Therefore, it is uncertain whether or not any significant disturbance, from the Project alone or in-combination with other plans or projects, would result in LSE on the Thames Estuary and Marshes Ramsar site.

Changes in light levels – construction

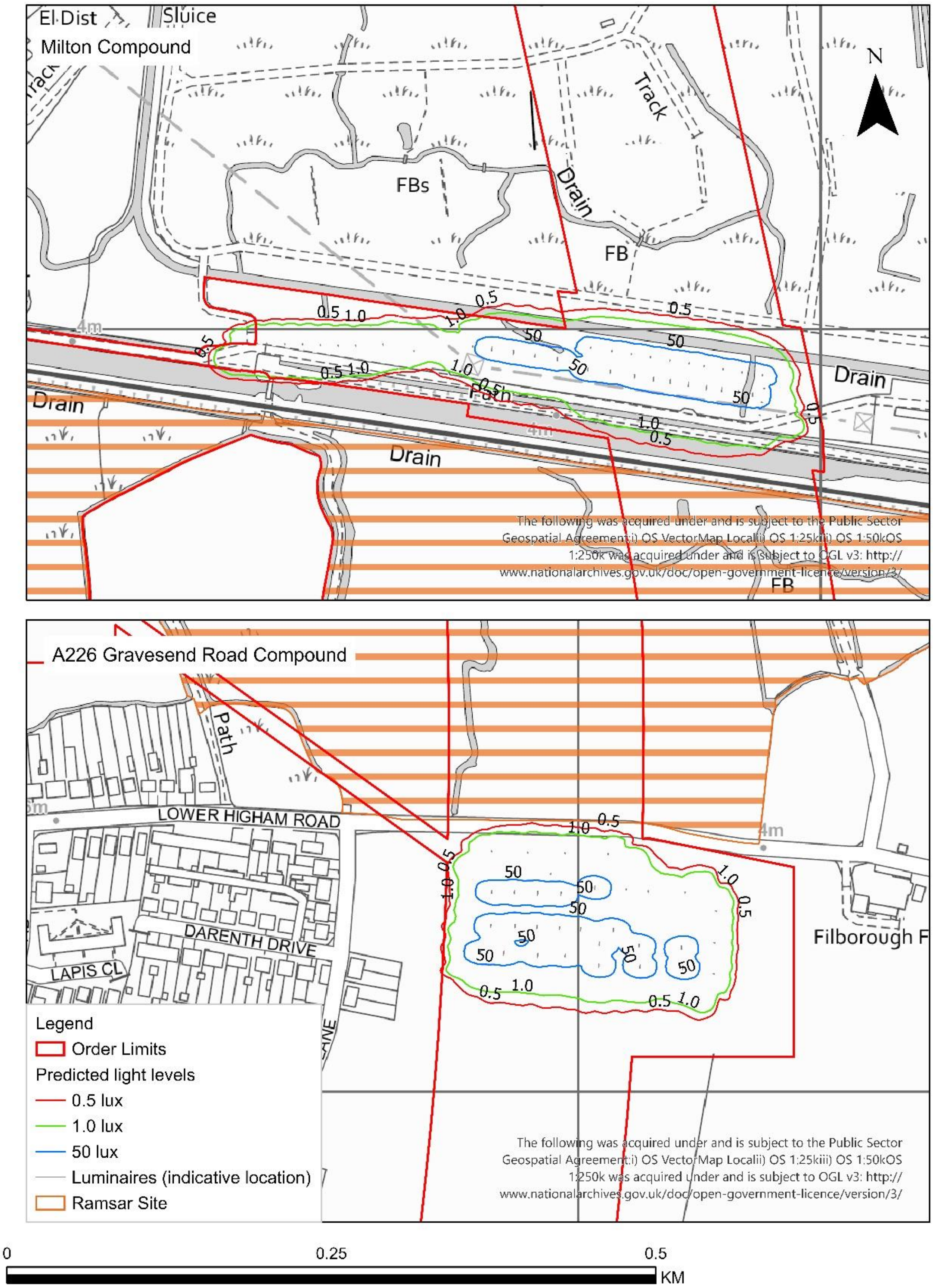
Efficacy of committed measures

6.2.34 While no studies of the efficacy of the committed measures are available in the literature to specifically demonstrate their effectiveness in preventing significant effects on nearby receptors, the measures have been developed over many years by the industry and there is very high confidence in them. The industry standards are long-standing and there has been no call or need for updating them in recent years, suggesting that they represent a mature and successful set of guidelines. There is no scientific reason to think that measures that have proved successful on numerous projects in the past, protecting multiple habitat types and many people without significant complaint, would not be equally successful at mitigating lighting effects on European site habitats.

Effect alone

6.2.35 The Project is committed to minimising and managing light emissions at source on the construction site (see Sections 3.3.34 to 3.3.38). These measures are integral to the Project and would prevent any LSE on the Ramsar site, as any pathway to effect would be disrupted. Plate 6.3 illustrates the predicted lux levels at the A226 Gravesend Road and Milton compounds. The 0.5 lux contour is almost entirely within the Order Limits and no light spill would be perceivable within the Ramsar site. Also, the existence of lighting associated with the various ports and other developments along this part of the River Thames means any construction lighting for this Project would not materially change overall light levels, as shown in the Landscape and Visual Figure 7.18 (Application Document 6.2), viewpoints S38a and N04 which clearly illustrate the 'night-time glow' associated with the river. Therefore, lighting within the construction compounds would not result in any disturbance to birds feeding and roosting in these parts of the Ramsar site.

Plate 6.3 Predicted lux levels from lighting within A226 Gravesend Road compound and Milton compound, extracted from ES Appendix 8.16 Construction and Operational Light Spill Calculations



Effect in-combination

6.2.36 The pathway to effect alone would be disrupted at source, therefore there cannot be a feasible risk of this effect acting in-combination with other plans and projects, so the Project would not conceivably combine with lighting effects from other plans and projects to create a significant in-combination effect.

6.2.37 Therefore, a conclusion is reached of no LSE on the Thames Estuary and Marshes Ramsar site, due to lighting as a result of the Project alone or in-combination with other plans and projects.

Thames Estuary and Marshes SPA and Ramsar site

Changes in recreational disturbance

6.2.38 Recreational disturbance is listed as a vulnerability for the Thames Estuary and Marshes SPA/Ramsar site. The qualifying species for which these European sites are designated are sensitive to human disturbance, in particular to walkers with dogs within intertidal habitats (Liley, et al., 2012; Natural England, 2014). The Project is within 8.1km of the Thames Estuary and Marshes SPA/Ramsar site north of the River Thames and 6km of the Thames Estuary and Marshes SPA/Ramsar site south of the River Thames. The risks of recreational disturbance as a result of the Project have been identified as potentially occurring during construction and operation as follows.

a. Construction phase: The construction of the Project could change the distribution of PRoW users in the locality and result in increases in PRoW use within the Thames Estuary and Marshes SPA/Ramsar site and the functionally linked land associated with it.

b. Operation - wider visitor pressures: Within this part of Essex and Kent the risk of recreational pressures on European sites is recognised as being related to the proximity of residential development to site access points, and the zones of influence for each site have been developed (Essex County Council, 2019; Birdwise North Kent SAMMS Project Board, 2018). The Project objectives do not include facilitation of residential development, however theoretically the Project could provide easier access to the European sites north and south of the River Thames once the road is operational.

c. Operation - Tilbury Fields visitor pressures: The Project will create a recreational site at Tilbury Fields (as described in paragraphs 3.2.21 to 3.2.23). This area of public open space includes a number of PRoWs and landforms from which the public will be able to view the wider landscape including the River Thames. There is potential that the recreational use of this area and linked PRoWs could increase disturbance of the European site features using the adjacent intertidal habitat that is part of the functionally linked land.

Effect alone

Construction

6.2.39 During construction, there is potential that the users of the PRoWs that cross the Project Order Limits would have to change their use of those PRoWs, due to the presence of the construction works, to alternatives in areas that could consequently increase disturbance pressures on the qualifying species using functionally linked land and the Thames Estuary and Marshes SPA/Ramsar site both north and south of the River Thames.

6.2.40 The PRoWs on both sides of the River Thames are likely to be used by the local population (Tilbury, East Tilbury, Gravesend) for dog walking and other daily recreational activities.

6.2.41 The intertidal habitat is considered to be the habitat in which the HRA species are most sensitive to disturbance by walkers and in particular dog walkers. There are existing PRoWs along the seawall/shoreline of both the north and south sides of the River Thames that are crossed by the Order Limits.

6.2.42 To the south of the River Thames, the Order Limits relate to the underground works only; and the PRoW known as the Saxon Shore Way is approximately 300m north of the proposed Milton compound. To the north of the River Thames the Order Limits relate to the northern tunnel entrance compound and the PRoW is immediately adjacent to the part of the compound proposed for depositing the material from the tunnel arisings (Tilbury Fields), and approximately 500m south of the North Portal itself.

6.2.43 Given these PRoWs are likely to be predominantly used by the local population, if the users did not want to walk through the areas disturbed and opted to walk in the opposite direction, it is reasonable to assume that they would not be changing the overall use of other PRoWs, of which they would already be users, so no increase overall would be expected. No change in the route or use of these paths has been predicted as a result of the Project as assessed in ES Chapter 13 Population and Human Health (Application Document 6.1). No material changes in PRoW use within the local area are predicted and subsequently a conclusion of no LSE on the Thames Estuary and Marshes SPA/Ramsar site is reached.

Operation

Wider visitor pressures

6.2.44 The Project provides a new route across the River Thames and could therefore theoretically result in greater visitor numbers to the parts of the Thames Estuary and Marshes SPA/Ramsar site north and south of the river. However, the Project only has junctions with the existing road network at the A2, south of the River Thames and the A13, north of the River Thames with the distance between these approximately 12km. Therefore, any use of the Project by visitors to the SPA/Ramsar site on the ‘other’ side of the River Thames would have to drive at least 12km, and so would be outside the ZoI distances discussed within the Essex and Kent recreational disturbance strategy documents. Therefore, the Project itself would not introduce any additional residential areas into the zone of influence.

6.2.45 Access to open space has been assessed within ES Chapter 13 Population and Human Health (Application Document 6.1) and the Project would provide increased opportunities to access open space as shown on ES Figure 13.4 (Application Document 6.2). With the exception of Tilbury Fields (see paragraph 6.2.47), these improved opportunities, for example Chalk Park, are not within or adjacent to any European sites, nor in areas that would facilitate greater access to habitats used by European site qualifying bird species.

6.2.46 The Project itself would not facilitate an increase in visitor access to European sites or habitats used by European site qualifying bird species, therefore a conclusion of no LSE on the Thames Estuary and Marshes SPA/Ramsar site is reached for this pathway.

Tilbury Fields visitor pressures

6.2.47 The provision of a public park at Tilbury Fields has been designed to encourage visitors to this part of the Thames Estuary and includes a variety of visitor provisions including viewpoints and PRoW. The provision may result in a greater number of visitors using the footpath between Tilbury Fort and Coalhouse Fort with the potential to increase recreational disturbance of the qualifying features using the intertidal habitat that is functionally linked to the Thames Estuary and Marshes SPA and Ramsar site. Therefore, LSE cannot be discounted.

Effect in-combination

6.2.48 With the exception of the recreational disturbance at Tilbury Fields, the Project would not result in any material change in recreational disturbance (the effect alone is inconsequential as defined in paragraphs 2.5.13 and 2.5.14) and so would not conceivably combine with recreational effects from other plans or projects to create a significant in-combination effect. Therefore, a conclusion is reached of no LSE on the Thames Estuary and Marshes Ramsar site due to changes in recreational disturbance (construction and wider visitor pressures) as a result of the Project alone or in-combination with other plans and projects.

6.2.49 The potential for LSE as a result of the recreational disturbance at Tilbury Fields cannot be discounted for the Project alone, and the assessment of effects in-combination with other plans and projects is completed as part of the assessment of effect on integrity of European sites in Section 7.2.

The effect on functionally linked land

Reduction in habitat area

6.2.50 The following Project impacts could result in a reduction in habitat area within the land functionally linked to the Thames Estuary and Marshes SPA/Ramsar site.

a. Land take – terrestrial and aquatic (intertidal) environment – construction

b. Change in air quality – dust emissions – construction

c. Changes in surface water quality and quantity – construction and operation

d. Introduction/spread of Invasive Non-Native Species – terrestrial environment – construction

Land take – terrestrial and aquatic (intertidal) environment – construction

Effect alone

6.2.51 Land within the Order Limits would be acquired to construct the Project. The requirements within the functionally linked land, approximately 285ha north and south of the River Thames, are associated with the following Project elements as shown on Figure 3:

a. A226 Gravesend Road compound, Milton compound and the northern tunnel entrance compound

b. Northern tunnel entrance compound temporary drainage pipeline and outfall

c. Construction of the temporary drainage discharge and treatment array for the southern tunnel entrance compound

d. Construction haul roads, access and utilities diversions contiguous with their respective construction works areas

e. Highway works north of, and including, Tilbury Viaduct

6.2.52 The ecology mitigation areas within functionally linked land would comprise areas of open mosaic habitat for terrestrial invertebrates, great crested newts and reptiles. These areas are currently agricultural land and the work to convert the habitat is not considered as habitat loss and has not been included within the assessment. The habitat changes would not result in any effects on HRA species and would provide the HRA species that currently use the agricultural land with areas of equivalent or better function.

6.2.53 Table 6.5 sets out the land take within the areas of functionally linked land required to construct various Project elements. All of the habitat is currently used for agriculture, except for the areas of spoil immediately north of the River Thames and the intertidal zone.

Table 6.5 Project element land take resulting in habitat loss within the functionally linked land

Project element	Approximate area (ha)	Habitat types present with area lost	Duration of habitat loss
Northern tunnel entrance compound temporary drainage pipeline and outfall	0.4	Intertidal mud	Temporary. The loss is limited to installation/decommissioning of the pipeline, no more than three months and the habitat reforms over a relatively short timescale under the influence of the tide cycle.
A226 Gravesend Road compound	3.91	Cultivated/disturbed land – arable	Temporary. The loss is limited to part of the construction phase, after which the land is reinstated or planted in accordance with the Environmental Masterplan (Figure 2.4, Application Document 6.2).
Milton compound (includes land required for access)	5.06	Other tall herb and fern – ruderal Ditches with running water Hardstanding of existing roadway	
Southern tunnel entrance compound construction drainage discharge pipeline and outfall (includes land required for access)	1.97	Improved grassland Cultivated/disturbed land – arable Ditch with scrub/running water	Semi-permanent. The loss will occur for the whole construction phase after which the land is reinstated.
Southern tunnel entrance compound construction drainage treatment area	5.61	Cultivated/disturbed land – arable	

Project element	Approximate area (ha)	Habitat types present with area lost	Duration of habitat loss
Northern tunnel entrance compound (includes land required for utilities diversions, and access)	197.30	Neutral grassland – semi-improved Poor semi-improved grassland Improved grassland Acid grassland – unimproved Marsh/marshy grassland Swamp/standing water Spoil Cultivated/disturbed land – arable Cultivated/disturbed land – amenity grassland Cultivated/disturbed land – ephemeral/short perennial Hardstanding of existing roadway Scrub	Semi-permanent and permanent. The loss will occur for the whole construction phase with 35.74 hectares permanently lost for operation and the remainder reinstated or planted in accordance with the Environmental Masterplan (Figure 2.4, Application Document 6.2).
Highways construction works	70.96	Improved grassland Poor semi-improved grassland Swamp/standing water Cultivated/disturbed land – arable Cultivated/disturbed land – amenity grassland Cultivated/disturbed land – ephemeral/short perennial	Semi-permanent and permanent. The loss will occur for the whole construction phase with 22.81 hectares permanently lost for operation and the remainder reinstated.

6.2.54 The works in these areas are primarily associated with the tunnel construction and would be completed over the period 2025-2030. A further period of decommissioning of the construction site would occur after the road has opened. The loss of habitat during the construction period is permanent and semi-permanent for the majority of the Project elements listed above.

6.2.55 The areas of temporary land take would be reinstated on completion of any work to the same habitat type. This is secured through inclusion in the Design Principles (Application Document 7.5) and ES Figure 2.4 Environmental Masterplan (Application Document 6.2).

6.2.56 Although considered permanent loss within this assessment, the semi-permanent land take would be reinstated on completion of the Project (as shown on ES Figure 2.4 Environmental Master Plan (Application Document 6.2). Where it is reinstated to agriculture, grassland or wetland habitats it would provide suitable habitat for the HRA species within the functionally linked land in the long term.

6.2.57 The habitats within the functionally linked land affected by the Project land take include agricultural land, intertidal, and spoil. The field survey work recorded qualifying bird species foraging and roosting within these habitats as shown on Figures 19 and 20. The largest numbers of birds were recorded using the intertidal areas over winter. The measure of the functionality of the habitats is described within the Evidence Plan (Appendix C) and uses the abundance of qualifying bird species (as recorded during the Project ornithology field surveys) per hectare as a measure of functionality within any given area. The functionality of the habitats lost for each of the Project elements is shown in Table 6.6.

Table 6.6 Functionality of habitats lost to each Project element

Project Element	Functionality of habitats lost
Northern tunnel entrance compound	2.7
Northern tunnel entrance compound temporary drainage pipeline and outfall	97.0
A226 Gravesend Road compound	0.0 (i.e. no birds recorded using the habitat lost)
Milton compound	2.9
Highways construction works	12.4

6.2.58 The loss of habitat, temporarily and permanently, within the functionally linked land could decrease the availability of foraging, feeding or roosting resources for the qualifying features of the SPA and Ramsar and subsequently affect population success (see conservation objectives relating in Table 5.2). The area of land functionally linked to the SPA and Ramsar site is large, however the use of the whole area is not fully understood therefore the effect of loss of habitat cannot be confidently predicted. Therefore, LSE cannot be discounted for the effects of land take on the Thames Estuary and Marshes SPA and Ramsar site.

Effect in-combination

6.2.59 As LSE cannot be discounted due to the loss of functionally linked land caused by the Project alone, the risk of LSE in-combination with other plans and projects also exists for Thames Estuary and Marshes SPA and Ramsar site.

Change in air quality – dust emissions – construction

Efficacy of committed measures

6.2.60 While no studies of the efficacy of the good practice measures are available in the literature to specifically demonstrate their effectiveness in preventing significant effects on nearby receptors, the measures have been developed over many years by the industry and there is very high confidence in them. The construction industry standards are long-standing and there has been no call or need for updating them in recent years, suggesting that they represent a mature and successful set of guidelines. There is no scientific reason to think that measures that have proved successful on numerous projects in the past, protecting multiple habitat types and many people without significant complaint, would not be equally successful at mitigating dust effects on European site habitats.

Effect alone

6.2.61 Changes in air quality as a result of dust emissions could occur during construction of the Project and dust deposition has the potential to reduce the area of habitat available to qualifying species. Figure 15 shows how the European site and functionally linked land interact with the area potentially affected by dust emissions.

6.2.62 The Project would minimise the dust effects at receptors by managing dust at source as outlined in paragraphs 3.3.4 to 3.3.8. These measures are integral to the Project and would prevent any LSE on the functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar site as any pathway to effect would be disrupted.

Effect in-combination

6.2.63 The pathway to effect from the Project alone would be disrupted at source, therefore there cannot be a feasible risk of this effect acting in-combination with other plans and projects, so the Project would not conceivably combine with dust effects from other plans or projects to create a significant in-combination effect.

6.2.64 Therefore, a conclusion is reached of no LSE on the Thames Estuary and Marshes SPA / Ramsar site due to construction dust as a result of the Project alone or in-combination with other plans and projects.

Changes in surface water quality and quantity

Efficacy of committed measures

6.2.65 The measures are good practice developed over many years by the industry and there is very high confidence in them. The construction industry standards are long-standing and there has been no call or need for updating them in recent years, suggesting that they represent a mature and successful set of guidelines. There is no scientific reason to think that measures that have proved successful on numerous projects in the past, protecting multiple habitat types and people without significant complaint, would not be equally successful at avoiding changes in surface water quality and quantity and therefore the subsequent effects on European sites.

Effect alone

Construction

6.2.66 There is a potential pathway to effect where construction site drainage from the northern tunnel entrance compound discharges into functionally linked land. The size of the compound is such that a full collection and management regime would be implemented prior to discharge to the River Thames. The North Portal tunnel works within the compound would also include dewatering and discharge to the River Thames, see Figure 3.

6.2.67 The Project is to be constructed in accordance with integral good practice measures, including attenuation, settlement and treatment if required so that any discharges will comply with quality and permit standards, and at greenfield runoff rates. Specifically, the measures associated with the site runoff and dewatering discharge from northern tunnel entrance compound are secured via a discharge consent from the Environment Agency.

6.2.68 The measures are aimed at avoiding changes in surface water quality and quantity at source, disrupting any pathway to effect, therefore the risk of effects within functionally linked land is considered inconsequential with no LSE on the Thames Estuary and Marshes SPA and Ramsar site.

Operation

6.2.69 Operational road drainage will discharge within the functionally linked land area at the following locations:

a. Road drainage from the tunnel is discharged to the River Thames south-east of the North Portal

b. Road drainage from the new road between the North Portal and Tilbury Loop rail line is discharged to the West Tilbury Main

6.2.70 The Project design is for a road drainage scheme (see Volume 2 Drainage Plans (Application Document 2.16)) that collects and attenuates road surface runoff and discharges clean water at greenfield runoff rate. The retention ponds are fitted with a shut-off device to enable flows to be staunched in the event of an accidental spillage.

6.2.71 The measures within the design are aimed at avoiding changes in surface water quality and quantity at source, disrupting any pathway to effect, therefore the risk of effects within functionally linked land is considered inconsequential with no LSE on the Thames Estuary and Marshes SPA and Ramsar site.

Effect in-combination

6.2.72 The pathway to effect has been disrupted at source during construction and operation, so there cannot be a feasible risk of this effect acting in-combination with other plans and projects, and the Project itself has an inconsequential effect (as defined in paragraphs 2.5.13 and 2.5.14) so would not conceivably combine with surface water effects from other plans or projects to create a significant in-combination effect.

6.2.73 Therefore, a conclusion is reached of no LSE on functionally linked land of the Thames Estuary and Marshes SPA and Ramsar site, due to changes in surface water quality or quantity during construction and operation, as a result of the Project alone or in-combination with other plans and projects.

Introduction and spread of Invasive Non-Native Species – terrestrial and marine environment

Efficacy of committed measures

6.2.74 The measures have been developed as good practice over many years by the industry and there is very high confidence in them. There is no scientific reason to think that measures that have proved successful on numerous projects in the past, protecting multiple habitat types without significant complaint, would not be equally successful at mitigating the risk of introducing INNS to the terrestrial and marine functionally linked land.

Effect alone

6.2.75 Terrestrial INNS have not been recorded within the Order Limits. The Project includes integral measures [TB005], as set out in paragraph 3.3.41, to identify any area of INNS prior to construction and to remove or treat to prevent their spread, in accordance with standard good practice.

6.2.76 The risk of marine INNS being introduced to functionally linked land (River Thames) is associated with the construction of the Northern tunnel entrance compound temporary drainage pipeline and outfall. The Project includes integral measures [MB006] as set out in paragraph 3.3.42, to manage the introduction of INNS in accordance with standard best practice guidelines such as Natural England's Marine Biosecurity Planning guidance (Payne, et al., 2015) and the International Convention for the Control and Management of Ships' Ballast Water and Sediments (International Maritime Organisation, 2017).

6.2.77 The measures are aimed at avoiding the introduction or spread of INNS by disrupting any pathway to effect, therefore the risk of effects within functionally linked land is considered inconsequential with no LSE on the Thames Estuary and Marshes SPA and Ramsar site.

Effect in-combination

6.2.78 The pathway to effect has been disrupted at source so there cannot be a feasible risk of this effect acting in-combination with other plans and projects and the Project itself has an inconsequential effect (as defined in paragraphs 2.5.13 and 2.5.14) so would not conceivably combine with invasive species effects from other plans or projects to create a significant in-combination effect.

6.2.79 Therefore, a conclusion is reached of no LSE on functionally linked land of the Thames Estuary and Marshes SPA and Ramsar site as a result of the Project alone or in-combination with other plans and projects.

Reduction in species density

Collision of qualifying species with vehicles – operation

Effect alone

6.2.80 The Project includes a number of new road links that would cross habitat potentially used by waders and wildfowl to forage or roost. The operation of the

Project could result in species colliding with vehicles, where the new road creates a barrier between roosts and foraging sites or between summer and winter habitats.

6.2.81 Figure 10 (Appendix A) clearly illustrates that the majority of SPA/Ramsar site bird records are associated with the River Thames and the coastal land immediately adjacent to it. The new road would be in tunnel through this area, and no barrier effects could occur therefore bird strike would be impossible. Where the road is on the surface and within the functionally linked land area, the number of records from surveys (see Figures 12-14 in Appendix A and paragraphs 5.3.9 to 5.3.18) are so few that the population potentially affected would be inconsequential and so the risk of birds colliding with vehicles is inconsequential, giving a conclusion of no LSE for the SPA/Ramsar sites identified.

Effect in-combination

6.2.82 The pathway to effect for the Project alone is inconsequential (as defined in paragraphs 2.5.13 and 2.5.14) and so would not conceivably combine with vehicle collision effects from other plans or projects to create a significant in-combination effect.

6.2.83 Therefore, a conclusion is reached of no LSE on the functionally linked land associated with the Thames Estuary SPA and Ramsar site due the collision of qualifying species with vehicles as a result of the Project alone or in-combination with other plans and projects.

Collision of qualifying species with utilities infrastructure – operation

Effect alone

6.2.84 Proposed utilities and road infrastructure include electricity lines as well as gantries for highway messaging and signage. A number of existing electricity overhead lines would require diversion as part of the Project construction. Literature indicates that birds, in particular large waterbirds, collide with powerlines often resulting in fatal injury (Scottish Hydro-Electric Transmission Ltd and SP Transmission Ltd, 2005). The overhead line diversions are limited to the areas adjacent to the existing infrastructure (see Volume 2 General Arrangement (Application Document 2.5)). There is little or no evidence that highway gantries are a collision risk to waterbirds, however within the functionally linked land the road is within tunnel or cutting and the gantries are not therefore at a height that could result in bird strike, they are also more visible that overhead lines. Therefore, the changes across the habitat used by waterbirds north and south of the River Thames are such that no increased risk of collision is anticipated.

6.2.85 The habitat availability and existence of these risks already within the functionally linked land means the amount of change would not be perceptible in terms of population numbers of the European sites highlighted in Section 5.1. Therefore, a conclusion of no LSE for the SPA/Ramsar sites identified.

Effect in-combination

6.2.86 The pathway to effect for the Project alone is inconsequential (as defined in paragraphs 2.5.13 and 2.5.14) and so would not conceivably combine with infrastructure collision effects from other plans or projects to create a significant in-combination effect. Therefore, a conclusion is reached of no LSE on the functionally linked land associated with the Thames Estuary SPA and Ramsar site, due to collisions of qualifying species with utilities infrastructure, as a result of the Project alone or in-combination with other plans and projects.

Disturbance to key species

6.2.87 The area where disturbance has the potential to affect qualifying bird features is restricted to the functionally linked land north and south of the River Thames and includes the intertidal zone on both sides, as shown on Figures 17 and 18 for Project construction and Figure 21 for Project operation.

6.2.88 The Project could result in disturbance as a result of the following impact pathways:

a. Changes in noise and vibration – underwater and above ground – tunnel construction only
b. Changes in noise and vibration – construction works and vehicles
c. Changes in visual disturbance – construction – people/machines in eyeline
d. Changes in noise and vibration – operation
e. Changes in visual disturbance – operation
f. Changes in light levels – construction and operation

Changes in noise and vibration – underwater and above ground – tunnel construction only

Effect alone

6.2.89 The noise and vibration associated with the construction of the tunnel by the TBM has been modelled using the Rupert Taylor Finite Difference Time Domain model FINDWAVE® (ES Appendix 9.1: TBM Noise and Vibration Assessment, Application Document 6.3) and the detailed discussion of the effects on the River Thames is within ES Chapter 9 Marine Biodiversity (Application Document 6.1). The modelling has been completed using geotechnical data from ground investigations, with details of tunnel lengths and soil parameters used. The intended construction method is for there to be a lag between the construction of the two tunnels, therefore the modelling assumes one TBM for the purposes of calculating levels of underwater noise. The modelling has been undertaken to provide both the sound pressure level as well as particle velocity at the following locations:

a. At a point above the TBM representing a worst-case assessment scenario
b. At the edge of the mudflats on the north and south of the river above the tunnel alignment

6.2.90 The results of modelling show that the highest levels of underwater noise associated with TBM operations are 130dB re 1µPa (SPL[15]), at a frequency of

[15] The sound pressure level (SPL) is normally used to characterise noise and vibration of a continuous nature such as drilling, boring, or background sea levels.

100Hz. This result is from a point in the river directly above the TBM head and represents the worst-case noise level and would decrease with increasing distance. In terms of particle velocity, the worst-case levels from above the TBM head were $0.01mms^{-1}$ reducing to $0.001mms^{-1}$ at the edge of the intertidal mudflats.

6.2.91 The noise associated with the TBM would not be perceived beyond the water column, particularly given the background level of noise from shipping (153-158dB re 1µPa [16]), therefore birds are unlikely to react when the TBM is in use. The potential disturbance to invertebrate prey items is also discounted as the changes in particle velocity predicted would not result in any change in prey distribution during the TBM operation. Therefore, it has been concluded that LSE can be ruled out for this effect pathway.

Effect in-combination

6.2.92 The pathway to effect for the Project alone is inconsequential (as defined in paragraphs 2.5.13 and 2.5.14) and so would not conceivably combine with underwater noise effects from other plans or projects to create a significant in-combination effect.

6.2.93 Therefore, a conclusion is reached of no LSE on the functionally linked land associated with the Thames Estuary SPA and Ramsar site due to changes in noise and vibration from tunnel construction as a result of the Project alone or in-combination with other plans and projects.

Changes in noise and vibration and visual disturbance

Effect alone

Construction

6.2.94 Figures 17 and 18 illustrate the area where changes in noise as a result of Project construction may result in the disturbance of qualifying birds.

6.2.95 South of the River Thames, the area of disturbance (approximately 56.6ha) within the Thames Estuary and Marshes Ramsar site has been discussed in paragraphs 6.2.29 to 6.2.31. The changes in noise and vibration associated with the following construction activities could result in significant disturbance of the area illustrated on Figure 17 (Appendix A):

a. activity within the A226 Gravesend Road and Milton compounds

b. construction of the infrastructure associated with the surface water discharge from the southern tunnel entrance compound

[16] Existing baseline for underwater noise is described in the ES Chapter 9 Marine Biodiversity paragraph 9.4.41 to 9.4.45.

6.2.96 North of the River Thames the changes in noise and vibration associated with the following construction activities could result in significant disturbance in the area illustrated on Figure 18 (Appendix A):

a. Construction of the northern tunnel entrance compound temporary drainage pipeline and outfall in the intertidal area

b. Activity within the northern tunnel entrance compound and utilities diversions in the same area, including the construction of the operational tunnel drainage outfall in the flood defence west of Bowater's Sluice

c. Use of the access road between the Port of Tilbury and the northern tunnel entrance compound

d. Highways construction works – Tilbury Viaduct north to just south of Hoford Road and utilities diversions in the same area

Table 6.7 Project elements that would disturb the SPA/Ramsar site bird features within functionally linked land

Project element	Phase 1 Habitat type affected (all suitable habitat for use by SPA/Ramsar site birds)	Duration of effect	Hectares of suitable habitat affected
North of the River Thames			
Northern tunnel entrance compound and any main works utilities diversions in the same area The intertidal area disturbed includes the area affected during construction of the northern tunnel entrance compound temporary drainage pipeline and outfall.	Poor semi-improved grassland Cultivated/disturbed land – arable	Semi-permanent	203.1
	Intertidal mud/sand (above MLW)	Semi-permanent	40.4
	Intertidal mud/sand/ open water (below MLW)	Semi-permanent	75.6
Highways construction works – Tilbury Viaduct north to just south of Hoford Road and any main works utilities diversions in the same area	Poor semi-improved grassland Cultivated/disturbed land – arable	Semi-permanent	38.3
South of the River Thames			
A226 Gravesend Road compound and Milton compound Drainage discharge and treatment array for southern tunnel entrance compound	Neutral grassland – semi-improved Poor semi-improved grassland Cultivated/disturbed land – arable Cultivated/disturbed land – amenity grassland	Temporary	62.1
	Intertidal mud/sand (above MLW)	Temporary	9.4

6.2.97 The distribution of the bird records in relation to the potentially disturbed areas are shown on Figures 17 and 18 (Appendix A) and the species distribution by season is shown on Figure 11a-I (Appendix A). Generally, the functionally linked land was used by species from the SPA/Ramsar site overwintering assemblage other than the intertidal habitats which recorded the greatest numbers and diversity of species including SPA/Ramsar site qualifying features. It is uncertain whether any significant disturbance to these individual birds within functionally linked land would occur and LSE cannot be discounted for the Thames Estuary and Marshes SPA and Ramsar site.

Operation

6.2.98 The noise and vibration, and visual disturbance associated with vehicles using the road has the potential to disturb birds using the adjacent functionally linked land. The road is in tunnel through much of the functionally linked land and the potential for disturbance is only likely within functionally linked land north of the River Thames between the North Portal and the Tilbury Loop rail line. The exception is the intertidal zone which would be unaffected as the road is within tunnel; and vehicle movements at the North Portal would not be perceived in the intertidal areas, over 300m away, where no disturbance reaction from the birds would be expected. South of the River Thames, no pathway to effect exists in the functionally linked land as the road is in tunnel throughout.

6.2.99 The Applicant has committed to measures that reduce the effects of traffic noise on human receptors in the form of false cuttings and noise attenuation barriers, as described in paragraphs 3.3.30 to 3.3.33 and shown on Figure 21 (Appendix A). The noise model for the operational phase includes the presence of these measures, in accordance with industry standards regarding their effectiveness at reducing noise. There is no scientific reason to think that measures that have proved successful on numerous projects in the past, protecting multiple habitat types and many people, would not be equally successful at reducing disturbance effects on the European site qualifying features within the functionally linked land.

6.2.100 Figure 21 (Appendix A) illustrates the areas of functionally linked land where the change in noise exceeds the thresholds.

6.2.101 Although there is functionally linked habitat within 300m of the proposed new highway, the road, and therefore passing traffic on the live carriageway, is screened from the surrounding habitat by the false cuttings and noise attenuation barriers; therefore, there is no scope for visual disturbance of the birds within the functionally linked land.

6.2.102 The change in noise exceeds the thresholds (>55dB or >3dB change) and there is potential for the qualifying features using the functionally linked land to be disturbed. The recorded distribution of the birds in relation to the potentially disturbed areas are shown on Figures 17 and 18 (Appendix A)and the species distribution by season is shown on Figure 11a-i (Appendix A). Figure 21 (Appendix A) and Table 6.8 set out the areas of functionally linked land affected by the changes in noise. These areas were recorded as being used by the overwintering assemblage species lapwing and mallard.

Table 6.8 Area of suitable habitats within the functionally linked land where the noise thresholds are exceeded

Habitat	Hectares affected
Agricultural land (reprovisioned following construction) – arable and pasture	65.4ha affected by >3dB change Of the 65.4ha, approximately 21.0ha affected by noise >55dB

6.2.103 The Project operation would result in exceeded noise thresholds in functionally linked land and it is uncertain whether any significant disturbance to individual birds from the overwintering assemblage using this area would result in LSE for the Thames Estuary and Marshes Ramsar site and SPA.

Effect in-combination

6.2.104 As uncertainty remains as to whether the Project construction (noise and visual disturbance) and operation (noise disturbance, alone, would result in LSE, the risk of LSE in-combination with other plans and projects also exists.

6.2.105 Therefore, it is uncertain whether any significant disturbance within functionally linked land, from the Project alone or in-combination with other plans or projects, would result in LSE at the Thames Estuary and Marshes SPA and Ramsar site.

6.2.106 The visual disturbance of the Project alone during operation is avoided as set out in paragraph 6.2.101 therefore there cannot be a feasible risk of this effect acting in combination with other plans and projects, so the Project would not conceivably combine with visual disturbance effects from other plans or projects to create a significant in-combination effect on the Thames Estuary and Marshes SPA and Ramsar site.

Changes in light levels

Efficacy of committed measures

6.2.107 The efficacy of the committed measures to avoid light spill during construction and operation of the Project has been assessed by modelling the light levels for the construction compounds and operational road lighting columns. The lighting assessment is reported in ES Appendix 8.15 Construction and Operational Light Spill Calculations (Application Document 6.3).

6.2.108 The lux plots, extracted from ES Appendix 8.15, in Plate 6.4 and Plate 6.5 illustrate the effect of construction lighting and show that the 0.5 lux contour is primarily within the construction compound and does not result in any changes in light levels within functionally linked habitats.

6.2.109 The lux plots in Plate 6.5 illustrate the operational lighting at the North Portal and clearly show that the 0.5 lux contour is within the cutting and does not affect the adjacent land.

Plate 6.4 Predicted lux levels from construction lighting within the northern tunnel entrance compound, extracted from ES Appendix 8.15 Construction and Operational Light Spill Calculations

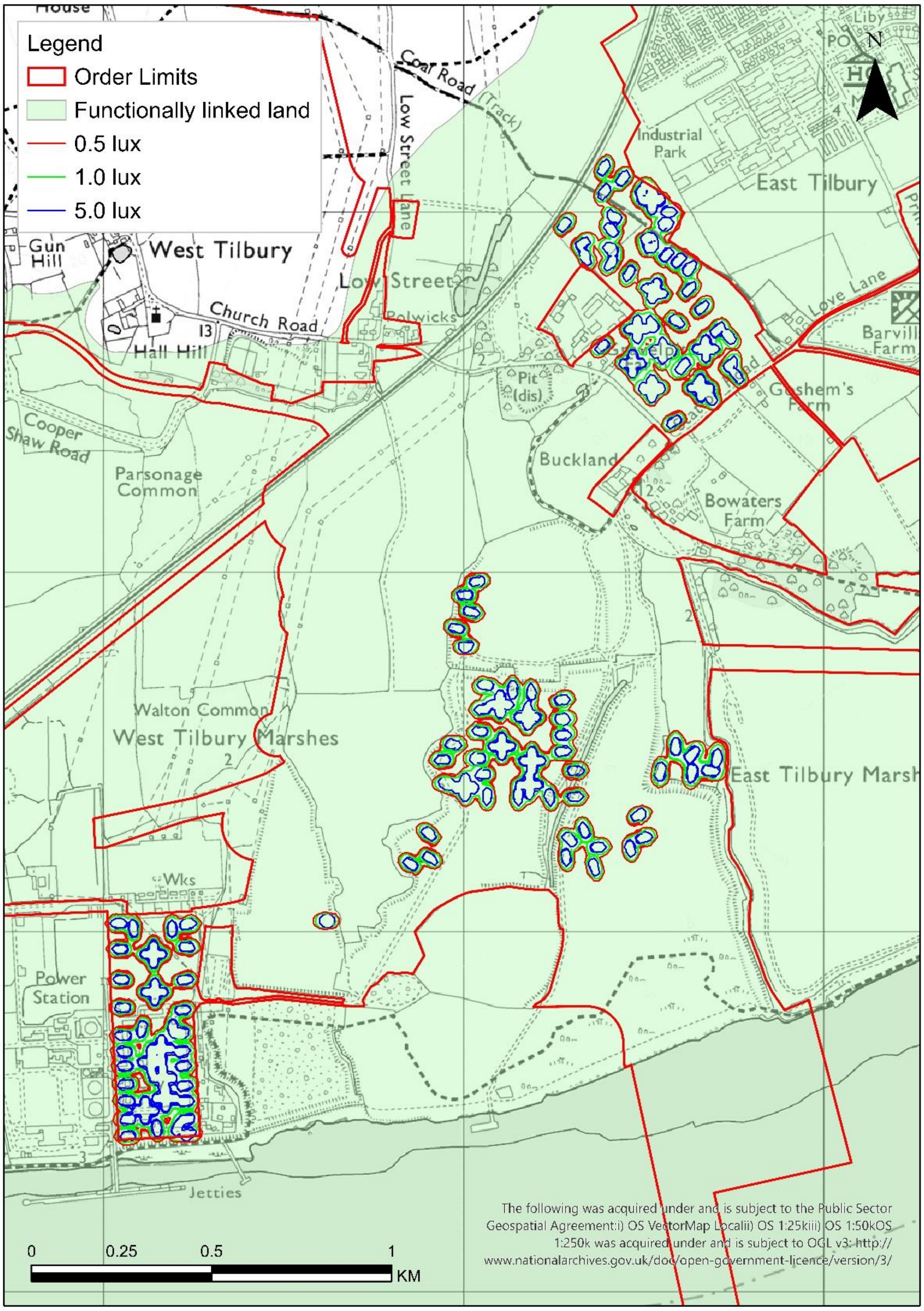
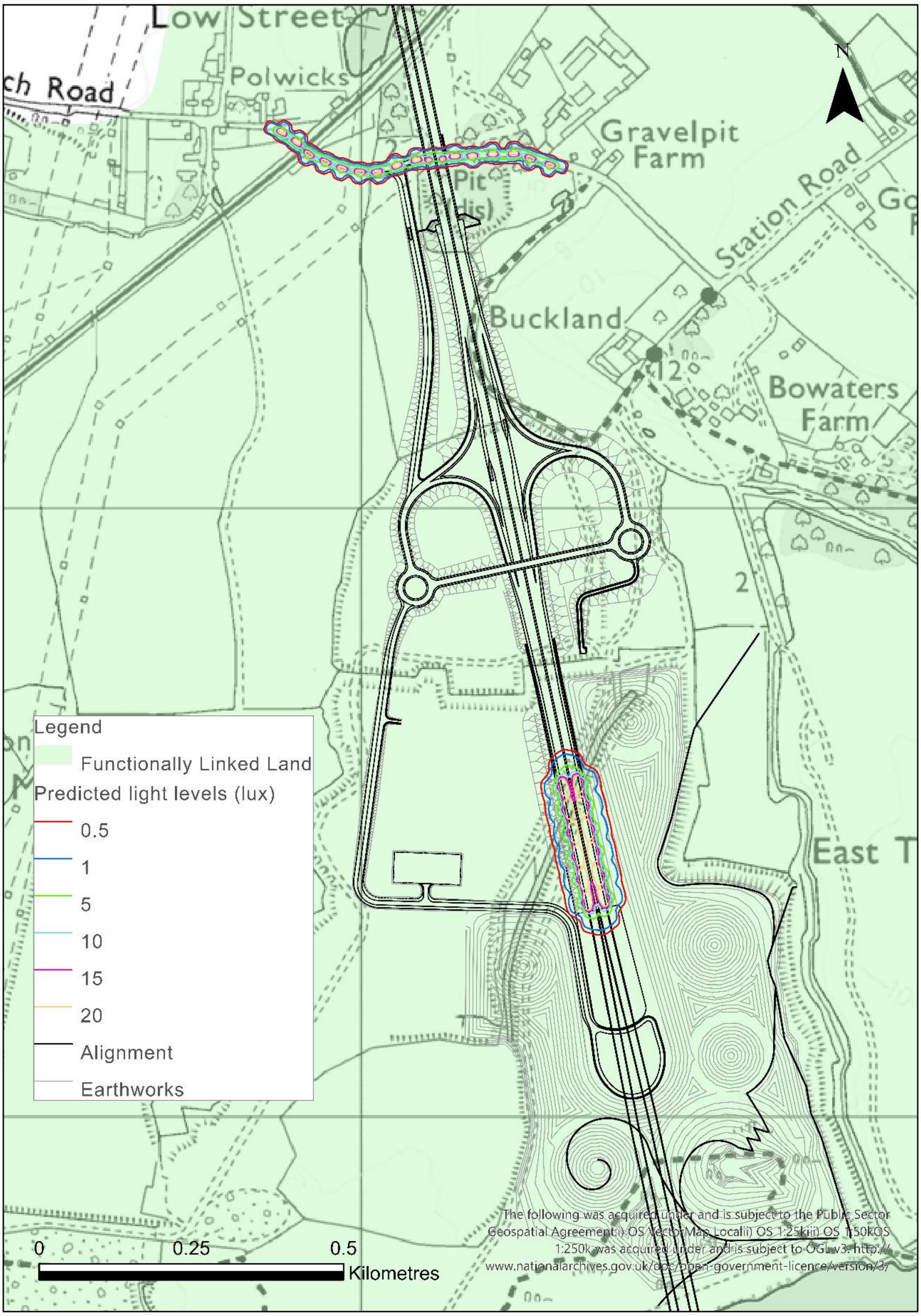


Plate 6.5 Predicted lux levels from operational lighting at the North Portal, extracted from ES Appendix 8.15 Construction and Operational Light Spill Calculations



Effect alone

Construction

6.2.110 The Applicant is committed to a number of measures with regard to lighting on the construction site (see paragraphs 3.3.34 to 3.3.38) such that (noting some land will be lost (see paragraphs 6.2.51 to 6.2.53 and Table 6.5), the remaining functionally linked land adjacent to the A226 Gravesend Road compound, Milton compound and northern tunnel entrance compound would not be affected to the extent that significant effects are likely because the measures reduce and avoid light emissions at source, disrupting any pathway to effect, as demonstrated in Plate 6.3 and Plate 6.4. Plate 6.3 illustrates the predicted lux levels at A226 Gravesend Road compound and Milton compound, and Plate 6.4 illustrates the predicted lux levels at the northern tunnel entrance compound. For all the compounds, the 0.5lux contour is within the Order Limits and therefore no light spill would be perceivable within the Ramsar site.

6.2.111 The existence of lighting associated with the various ports and other developments along this part of the River Thames also means any construction lighting for this Project would not materially change overall light levels, as shown in the Landscape and Visual Figure 7.18 (Application Document 6.2), viewpoints S38a and N04 which clearly illustrate the 'night-time glow' associated with the river. Therefore, the Project lighting would not be expected to result in any disturbance to birds feeding and roosting within the functionally linked land.

Operation

6.2.112 The road is in tunnel under the majority of the functionally linked land and is only lit within the tunnel and within the cutting at the North Portal where five pairs of lighting columns are proposed on approach to and exit from the tunnel (see Volume 2. General Arrangement Sheet 17 of 47 (Application Document 2.5)).

6.2.113 The Applicant is committed to a number of design principles relating to the lighting design (see measures listed in Section 3.3) which will reduce the light emissions at source and prevent light spill to the surrounding land. Plate 6.5 illustrates the predicted lux levels and the 0.5 lux contour is within the cutting earthworks. Therefore, the changes in light levels would not be expected to result in any disturbance to the birds feeding and roosting in these parts of the functionally linked land. The risk of effects within the functionally linked land is considered inconsequential with no LSE on the Thames Estuary and Marshes SPA and Ramsar site.

Effect in-combination

6.2.114 The pathway to effect alone would be disrupted at source during construction and operation, therefore there cannot be a feasible risk of this effect acting in combination with other plans and projects, so the Project would not conceivably combine with lighting effects from other plans or projects to create a significant in-combination effect.

6.2.115 Therefore, a conclusion is reached of no LSE on the Thames Estuary and Marshes Ramsar site, due to lighting as a result of the Project alone, or in-combination with other plans and projects.

Changes in air quality from vehicle emissions, effect on European sites

6.2.116 Changes in air quality as a result of vehicle emissions occur during construction and operation of the Project. The changes in air quality relevant to this assessment are in nitrogen oxides (NOx) and ammonia (NH_3) which both contribute to the deposition of nitrogen (N deposition). Increases in N deposition have the potential to change habitat composition, depending on the sensitivity of the habitat type. These changes could affect the habitats for which a European site is designated as well as the qualifying species if supporting habitat within the site is affected.

6.2.117 The European sites identified as potentially affected by vehicle emissions during construction and operation are:

a. Thames Estuary and Marshes Ramsar – construction

b. Epping Forest SAC – operation

c. North Downs Woodland SAC – operation

6.2.118 The contribution of changes in traffic from other plans or projects are considered with this ‘alone’ assessment as the data used within the traffic model includes the predicted changes in traffic from other plans and projects, as represented by the growth factor. The in-combination is assessed as the alone plus any contributions from other sources as described in paragraph 4.3.8.

Thames Estuary and Marshes Ramsar

Construction

Effect alone

6.2.119 Changes in air quality as a result of vehicle emissions could occur during construction of the Project. The changes in traffic that were predicted for the ARN within 200m of the Thames Estuary and Marshes Ramsar site are summarised in Table 6.9. Figure 22a illustrates where the construction ARN is within 200m of the Thames Estuary and Marshes Ramsar site and where the air quality model receptor point was located.

Table 6.9 Summary of the traffic changes predicted during construction, within 200m of the Thames Estuary and Marshes Ramsar site (N/A indicates criteria not met)

Road (Traffic model link ID)	Construction Year	AADT change	HDV change	Speed band change	Carriageway alignment change
Lower Higham Road (20161_86027)	2025	1708	N/A	Yes	N/A
	2026	1636	N/A	Yes	N/A
	2027	1721	N/A	Yes	N/A
	2028	2126	N/A	Yes	N/A
	2029	N/A	N/A	Yes	N/A

Road (Traffic model link ID)	Construction Year	AADT change	HDV change	Speed band change	Carriageway alignment change
	2030	N/A	N/A	N/A	N/A

Table 6.10 Summary of the predicted changes in air quality as a result of construction traffic for the 'Do Minimum' (DM) and 'Do Something' (DS) scenarios

Construction year	Total NOx (ug/m3) change (DS-DM)	>1% of Critical Level (30ug/m3)	Total N deposition (kg N ha-1yr-1)			
			Background	DM	DS	DS-DM change
2025	1.36	Yes	15.26	17.85	18.52	0.67
2026	1.36	Yes	15.26	17.79	18.20	0.41
2027	1.24	Yes	15.26	17.73	18.44	0.71
2028	1.35	Yes	15.26	17.66	18.49	0.83
2029	0.31	Yes	15.26	17.60	17.80	0.20
2030	Criteria not met for inclusion within the ARN.					

6.2.120 The changes in traffic result in variations in nitrogen deposition over a period of five years. The predicted total N deposition in the DS scenario (see Table 6.10), in all of the construction years where the ARN criteria were met, is less than the lower critical load, 20 kg N $ha^{-1}yr^{-1}$, for the Thames Estuary and Marshes Ramsar site. The change in nitrogen deposition is over a short duration, five years, as this site is not affected by the operational ARN therefore any changes are highly unlikely to result in any detectable changes in the habitat (Caporn, et al., 2016), particularly as the DS nitrogen deposition is less than the lower critical load.

6.2.121 Therefore, the changes in nitrogen deposition would result in no change in the habitats of the Thames Estuary and Marshes site and no LSEs are predicted to occur as a result of the Project alone.

Effect in-combination

6.2.122 The other plans and projects identified within the search areas were primarily on the National Infrastructure Planning register of applications and Local authority planning portals. The Environment Agency's list of permit applications were reviewed however they did not include any applications for permits that coincided with the construction years. Also, the majority of these permit applications did not appear on the local planning authority planning portals and are therefore sufficiently small and/or will not have any significant environmental effects such that they are extremely unlikely to contribute, in combination with the Project, to N deposition over the wider area.

6.2.123 The projects identified within the search areas were then reviewed to determine the predicted nitrogen deposition from them coincided with the construction years from the Project. The projects identified (see Figure 23a for locations) as potentially overlapping with the Project construction phase air quality changes are set out below.

a. Tilbury2. A new port terminal on the site of the demolished Tilbury Power Station. Construction was completed in 2020 and is now operational. The background emissions for the Project model are 2017-2019 therefore Tilbury 2 was not included and therefore is assessed as part of the in-combination as it will generate emissions from shipping which considered as part of the Tilbury 2 DCO application

b. Thurrock Flexible Generation Plant. These works comprise an NSIP and the DCO application was granted in February 2022 with the operation predicted to overlap the Project construction phase. The development comprises a gas-fired electricity generating station and a battery storage facility on land to the north of Tilbury substation, Thurrock.

c. Thurrock gas-fired electricity generation facility, Standford (19/01534/FUL). A planning application was submitted to Thurrock Council in October 2019 and is awaiting decision, for installation of 25 gas engine generators, a gas house, distribution network operator building for transformers and associated vehicular access roads for a gas-fired electricity generation facility at Wharf Road, Stanford-le-Hope, Essex. For the purposes of this assessment the Applicant has assumed there is potential for the operation of this facility to overlap with the Project construction phase.

d. STOR “Peaking” Power Plant, Purfleet (20/00360/FUL). Thurrock Council granted planning permission in May 2020 for a change of use of an existing building to house 8 No. 2.5MWe engines and associated plant. The facility will generate a combined total of up to 20MW of electricity to feed into the National Grid. For the purposes of this assessment the Applicant has assumed there is potential for the operation of this facility to overlap with the Project construction phase.

6.2.124 Other plans or projects and the respective contributions to N deposition within the search area around Thames Estuary and Marshes Ramsar site are shown in Table 6.11. The list of plans and projects is limited to where data on N deposition was available or where a reasonable proxy could be used.

Table 6.11 Contribution to N deposition on Thames Estuary and Marshes Ramsar site from other plans and projects

Background deposition kg N $ha^{-1}yr^{-1}$	15.26
LCL of habitat affected by the Project alone kg N $ha^{-1}yr^{-1}$	20
The Project alone kg N $ha^{-1}yr^{-1}$ – average change (DS-DM) over the construction period	0.9
Other plans and projects	**Contribution to N deposition (kg N $ha^{-1}yr^{-1}$)**
Tilbury 2	0.00005
Thurrock Flexible Generation Plant	0.4
Thurrock gas-fired electricity generation facility (19/01534/ FUL)	0.2
STOR “Peaking” Power Plant (20/00360/FUL)	No effect identified in the application
Deposition attributable to in-combination projects	**1.50**
Total predicted deposition (Background plus in-combination)	**16.76**

6.2.125 The background deposition to the Thames Estuary and Marshes Ramsar site does not exceed the LCL for the habitat type potentially affected by the Project alone. The combined deposition added to the background is also less than the LCL, and using the framework set out in Figure 2.98 of LA 105 (Highways England, 2019), no LSEs are predicted for the Thames Estuary and Marshes Ramsar site for the Project in-combination with other plans or projects.

Epping Forest SAC

Operation

Effect alone

6.2.126 The traffic scoping criteria that were used to determine the ARN are defined by DMRB LA 105 (Highways England, et al., 2019). Table 6.12 summarises the changes predicted by the traffic model for ARN within 200m of Epping Forest SAC.

Table 6.12 Summary of the traffic scoping criteria met at the ARN link identified within 200m of the Epping Forest SAC

Road (Traffic model link ID)	**AADT change**	**HDV change**	**Speed band change**	**Carriageway alignment change**
M25 (82844_8267 & 184854_82810)	4784	877	N/A	N/A

6.2.127 The air quality modelling results are presented in detail in ES Chapter 5 Appendix 5.4. The total N deposition was calculated as a matrix of modelled points for Epping Forest SAC to reflect the potential effect of the plume from the tunnel portals. Figure 22b shows the relationship between the modelled points and each of the European sites identified.

6.2.128 Table 6.13 summarises the results of the modelling and illustrates the minimum and maximum changes recorded at Epping Forest SAC. The values for the LCL are taken from the Air Pollution Information System (Centre for Ecology & Hydrology (CEH), 2019) for most sensitive habitat types present within 200m of the ARN.

Table 6.13 Minimum and maximum changes in total nitrogen (N) deposition at Epping Forest SAC for the 'Do Minimum' (DM) and 'Do Something' (DS) scenarios

Minimum/ maximum changes	Total NOx emissions (ug/m^3)				Total N deposition (kg N ha^{-1}yr^{-1})				
	DM	DS	DS-DM change	CL	Background	DM	DS	DS-DM change	LCL
Minimum (NOX emissions)	18.49	18.56	0.07	30	30.10	N/A	N/A	N/A	10
Minimum (N Dep)	23.63	26.93	0.3	30	30.10	36.86	37.08	0.22	10
Maximum (NOx emissions & NDep)	69.10	70.84	1.74	30	30.10	58.53	59.93	1.01	10

6.2.129 The methodology follows Figure 2.98 in LA 105 (Highways England, et al., 2019). Using the data summarised in Table 6.13, the following conclusions have been made:

a. The change in N deposition between the DS and DM scenario is greater than 1% of the relevant LCL at sample points within Epping Forest SAC.

6.2.130 As well as the changes in air quality predicted at Epping Forest SAC being greater than 1% of the LCL, the qualifying habitats are considered likely to be present in the area affected and are listed as vulnerable to changes in N deposition within Natural England's supplementary advice for Epping Forest (Natural England, 2019a). Therefore, LSE cannot be discounted at Epping Forest SAC as a result of the Project.

Effect in-combination

6.2.131 Where uncertainty of LSE remains for the Project alone, the possibility of LSE is also uncertain in-combination with other plans and projects for Epping Forest SAC. The in-combination assessment is completed as part of the assessment of effect on integrity of European sites in Section 7.2.

North Downs Woodland SAC

Operation

Effect alone

6.2.132 The traffic scoping criteria that were used to determine the ARN are defined by DMRB LA 105 (Highways England, et al., 2019). Table 6.14 summarises the changes predicted by the traffic model for ARN within 200m of North Downs Woodland SAC.

Table 6.14 Summary of the traffic scoping criteria met at the ARN link identified within 200m of the North Downs Woodland SAC

Road (Traffic model link ID)	**AADT change**	**HDV change**	**Speed band change**	**Carriageway alignment change**
A229 (83301_83306 & 83310_88842)	10180	1063	N/A	NA

6.2.133 The air quality modelling results are presented in detail in ES Chapter 5 Appendix 5.4. Figure 22c shows the relationship between the modelled points and each of the European sites identified.

6.2.134 Table 6.15 summarises the results of the modelling and illustrates the minimum and maximum changes recorded at North Downs Woodland SAC. The values for the LCL are taken from the Air Pollution Information System (Centre for Ecology & Hydrology (CEH), 2019) for most sensitive habitat types present within 200m of the ARN.

Table 6.15 Minimum and maximum changes in total nitrogen (N) deposition at North Downs Woodland SAC for the 'Do Minimum' (DM) and 'Do Something' (DS) scenarios

Minimum/ maximum changes	**Total NOx emissions (ug/m^3)**				**Total N deposition (kg N $ha^{-1}yr^{-1}$)**				
	DM	**DS**	**DS-DM change**	**CL**	**Background**	**DM**	**DS**	**DS-DM change**	**LCL**
Minimum	21.02	21.25	0.223	30	31.08	N/A[17]	N/A	N/A	5
Maximum	21.47	21.74	0.27	30	31.08	N/A	N/A	N/A	5

6.2.135 The methodology follows Figure 2.98 in LA 105 (Highways England, et al., 2019). Using the data summarised in Table 6.15, the following conclusions have been made:

a. The change in NOx emissions was less than $0.3\mu g/m^3$ (ie less than 1% of the CL) and therefore inconsequential at all of the sample points within the North Downs Woodlands SAC. Therefore, the change in N deposition would also be inconsequential at this site.

6.2.136 The inconsequential changes predicted in NOx emissions would not result in any material changes in the receiving habitats within the North Downs Woodland SAC. Therefore a conclusion is reached that no LSE on North Downs Woodlands SAC, due to changes in air quality from vehicle emissions in operation, would result from the Project alone.

[17] N/A not applicable – terminology used within the results of the air quality model see Appendix 5.4 Air Quality Operational Phase Results (Document Reference 6.3)

Effect in-combination

6.2.137 The changes in air quality were predicted to be inconsequential (as defined in paragraphs 2.5.13 and 2.5.14) at the North Downs Woodland SAC as a result of the Project alone, and so would not conceivably combine with nitrogen deposition effects from other plans or projects to create a significant in-combination effect.

6.2.138 Therefore, a conclusion is reached of no LSE on the North Downs Woodlands SAC due to changes in nitrogen deposition as a result of the Project alone or in-combination with other plans and projects.

Climate change

6.2.139 A number of European sites considered within this assessment are coastal in location and are therefore vulnerable to sea level rise, coastal flooding and coastal erosion (Government Office for Science, 2017). These direct consequences of climate change could result in loss or fragmentation of habitat and negative effects on the population sizes of the qualifying features, primarily waders and waterfowl. Therefore, the European sites potentially affected by climate change are:

a. Thames Estuary and Marshes SPA

b. Thames Estuary and Marshes Ramsar site

6.2.140 The following consequences of climate change could conceivably be exacerbated by development:

a. Coastal squeeze resulting from sea level rise

b. Changes to ecological climate space resulting from global warming

c. Changes to water resources and precipitation resulting from erratic weather patterns

Coastal squeeze resulting from sea level rise

6.2.141 Coastal squeeze has been identified as a specific pressure within the Site Improvement Plan (Natural England, 2014) for the Greater Thames Complex of European sites which includes the Thames Estuary and Marshes SAP/Ramsar site. Coastal squeeze could conceivably be exacerbated by land take from the Project affecting coastal habitats.

6.2.142 Shoreline Management Plans (SMP) are primarily the way in which the threats of sea level rise are managed and apply to sections of the coast around the UK. The Greater Thames Complex is part of the areas covered by Essex to South Suffolk SMP (East Anglia Coastal Group, 2010), Isle of Grain to South Foreland SMP (South East Coastal Group, 2010) and River Medway and Swale Estuary SMP (South East Coastal Group, 2010). The SMPs are each supported by an HRA which assesses the effects of shoreline realignment proposals on European sites and considers coastal squeeze as part of this process.

6.2.143 For the Project to significantly exacerbate the effects of coastal squeeze, it would need to result in the loss of coastal habitat that would compromise the implementation of the SMPs to an appreciable degree.

6.2.144 The Project would lead to very limited temporary land take within the intertidal area for construction of the northern tunnel entrance compound temporary drainage pipeline and outfall. The construction of the pipeline is over a matter of months and the Project would return all intertidal land to pre-construction state.

6.2.145 The HRAs supporting both the Isle of Grain to South Foreland and River Medway and Swale Estuary SMPs indicated that habitat creation measures were required to compensate for the losses of various coastal habitats from coastal squeeze.

6.2.146 The temporary intertidal habitat loss caused by the Project would be negligible in the context of the predicted changes in the SMPs, as substantial change is predicted e.g. from climate change. Climate change effects are necessarily long term, and the Project is not expected to exacerbate the effects of coastal squeeze in the long term. Therefore, there is no potential for LSEs at the European sites identified, as a result of the Project exacerbating the effects of climate change.

Changes to ecological climate space

6.2.147 The conservation objectives and supplementary advice do not identify changes in ecological climate space (the range of species in the context of climatic variables) as a key threat or key sensitivity for any European sites that are considered within the HRA. It is therefore not considered necessary to consider potential for exacerbation of this as a result of climate change in the HRA.

Changes to water resources and precipitation patterns

6.2.148 The conservation objectives and supplementary advice do not identify changes to water resources and precipitation patterns through climate change as a key threat or key sensitivity for any European sites that are considered within the HRA. It is therefore not considered necessary to consider the potential for the exacerbation of this as a result of climate change in the HRA.

Habitat or species fragmentation

6.2.149 Habitat and species fragmentation may arise as a result of any reduction in habitat area (see paragraphs 6.2.50 to 6.2.79) and is considered in the assessment of effects of reduction in habitat area.

Changes in key indicators of conservation value

6.2.150 The key indicators of conservation value for the European sites identified are primarily associated with the environmental conditions that could affect each site in terms of water quality, air quality, noise and light levels.

6.2.151 The Project has the potential to affect air quality, water quality, noise and light levels and these have been discussed in terms of the resulting effect on habitat area or disturbance in the preceding sections.

6.3 Summary of screening consultation

6.3.1 An early sight draft HRA report was provided to Natural England for comment on 06 August 2021. Its purpose was to enable the Applicant to have due regard to any representations made by Natural England prior to the submission of a Pre-Application draft in July 2022 for comment before the DCO application.

Ongoing engagement with Natural England has occurred with the development of the Pre-Application draft in the form of fortnightly meetings and sharing of technical notes as documented within the Evidence Plan in Appendix C.

6.3.2 Natural England has been consulted and is in agreement with the conclusions of no LSE for European sites and effect pathways, listed in Table 6.13. Natural England has also agreed that the European sites and effect pathways where the LSE conclusion was uncertain, as listed in in Table 6.13, would be considered at Stage 2 appropriate assessment (Section 7). Records of the discussion and agreements are recorded within Appendix C Evidence Plan and the Natural England Statement of Common Ground (SoCG) (Application Document 5.4.1.6).

Table 6.16 Agreement of Natural England with Screening conclusions

Site	Effect pathway	Likely significant effect conclusion	Agreement of Natural England with conclusion (Confirmation of agreement and ongoing discussions with Natural England are provided in the SoCG)
All European sites	All effect pathways	Scoping of relevant European sites and effect pathways excludes necessity to assess any pathways other than those below.	Natural England confirms agreement.
All European sites identified within 200m of the ARNs	Reduction in habitat area	Change in air quality – vehicle emissions – construction and operation	Natural England confirms agreement of the sites identified within 200m of the ARN.
Thames Estuary and Marshes Ramsar site	Reduction in habitat area (within the Ramsar site)	No LSE as a result of: Changes in groundwater quality and quantity – tunnel construction and operation	Natural England confirms agreement
		No LSE as a result of: Change in air quality – vehicle emissions – construction	Natural England confirms agreement
		LSE cannot be discounted as a result of: Changes in surface water quality and quantity – construction	Natural England agrees that LSE cannot be excluded.
	Disturbance to species (within the Ramsar site)	No LSE as a result of: Change in recreational pressure – construction and operation (wider visitor pressures) Changes in visual disturbance – operation (vehicles in eyeline)	Natural England confirms agreement

Site	Effect pathway	Likely significant effect conclusion	Agreement of Natural England with conclusion (Confirmation of agreement and ongoing discussions with Natural England are provided in the SoCG)
		No LSE as a result of: Changes in noise and vibration – underwater and above ground – tunnel construction only.	Conclusion is under discussion with Natural England see SoCG Table 2.1 Item 2.1.89 Application Document 5.4.1.6.
		No LSE as a result of: Changes in light levels – construction and operation	Natural England confirms agreement subject to the securing mechanism being suitably rigorous.
		LSE cannot be discounted as a result of: Changes in noise and vibration – construction works and vehicles Changes in visual disturbance – construction (people/machines in eyeline) Changes in noise and vibration – operation	Natural England agrees that LSE cannot be excluded.
Thames Estuary and Marshes SPA and Thames Estuary and Marshes Ramsar site	Reduction in habitat area (within functionally linked land)	No LSE as a result of: Change in air quality – dust emissions – construction Changes in surface water quality and quantity – construction and operation Introduction/spread of Invasive Non-Native Species	Natural England confirms agreement.
		LSE cannot be discounted as a result of: Land take in the terrestrial and aquatic environment – construction	Natural England agrees that LSE cannot be excluded.
	Disturbance to species (within functionally linked land	No LSE as a result of: Change in recreational pressure – construction and operation (wider visitor pressures) Changes in visual disturbance – operation (vehicles in eyeline)	Natural England confirms agreement

Site	Effect pathway	Likely significant effect conclusion	Agreement of Natural England with conclusion (Confirmation of agreement and ongoing discussions with Natural England are provided in the SoCG)
	and the Ramsar site)	No LSE as a result of: Changes in noise and vibration – underwater and above ground – tunnel construction only.	Conclusion is under discussion with Natural England. England see SoCG Table 2.1 Item 2.1.89 Application Document 5.4.1.6.
		No LSE as a result of: Changes in light levels – construction and operation	Natural England confirms agreement subject to the securing mechanism being suitably rigorous.
		LSE cannot be discounted as a result of: Changes in noise and vibration – construction works and vehicles Changes in visual disturbance – construction (people/machines in eyeline) Changes in noise and vibration – operation Changes in recreational pressure - operation (Tilbury Fields visitor pressures)	Natural England agrees that LSE cannot be excluded.
	Reduction in species density (within functionally linked land)	No LSE as a result of: Vehicle collision with species – operation Species collision with overhead utilities infrastructure – operation	Natural England confirms agreement.
	Climate change	No LSE	Natural England confirms agreement.
North Downs Woodlands SAC	Reduction in habitat area	No LSE as a result of: Change in air quality – vehicle emissions – operation	Conclusion is under discussion with Natural England see SoCG Table 2.1 Item 2.1.91 and 2.1.95 Application Document 5.4.1.6.
Epping Forest SAC	Reduction in habitat area	LSE cannot be discounted as a result of: Change in air quality – vehicle emissions – operation	Natural England agrees that LSE cannot be excluded.

6.4 Conclusion of Stage 1 screening

6.4.1 The European sites identified were:

a. Thames Estuary and Marshes SPA

b. Thames Estuary and Marshes Ramsar site

c. Epping Forest SAC

d. North Downs Woodlands SAC

6.4.2 The potential effects of the Project were assessed alone and in-combination with other plans and projects, and this identified three categories that reflect whether LSEs would occur at the European sites identified (or if uncertainty remains):

a. Project effects where no pathway to effect was found

b. Project effects that would be ecologically inconsequential and therefore where no LSE would occur

c. Project effects where LSE could not be discounted

6.4.3 All LSEs considered were wholly within England and no effects were considered to be likely in respect of European sites in devolved administrations.

6.4.4 Table 6.17 to Table 6.20 summarise the results of the assessment and Appendix E and F provide the LA115 and Planning Inspectorate Advice Note 10 screening matrices respectively.

Table 6.17 Summary of the conclusion of the assessment of LSE on Thames Estuary and Marshes SPA

Potential LSE	No LSE		LSE not discounted
	Project effects with no pathway to effect	**Inconsequential Project effects resulting in no LSE**	**Project effects where LSE cannot be discounted**
Reduction in habitat area	Changes in groundwater quality and quantity – tunnel construction and operation	Change in air quality – dust emissions – construction (associated functionally linked land)	Land take in the terrestrial and aquatic environment (associated functionally linked land)
	Change in air quality – vehicle emissions – construction and operation	Changes in surface water quality and quantity – construction (associated functionally linked land)	
		Changes in surface water quality and quantity – operation (associated functionally linked land)	
		Introduction/spread of Invasive Non-Native Species	

Potential LSE	No LSE		LSE not discounted
	Project effects with no pathway to effect	Inconsequential Project effects resulting in no LSE	Project effects where LSE cannot be discounted
		(associated functionally linked land)	
Reduction in species density	None	Vehicle collision with species during operation (associated functionally linked land)	None
		Utilities infrastructure collision (associated functionally linked land)	
Disturbance to species	None	Changes in noise and vibration – underwater and above ground – tunnel construction only (associated functionally linked land)	Changes in noise and vibration – construction works and vehicles (associated functionally linked land)
		Changes in light levels – construction (associated functionally linked land)	Changes in noise and vibration – operation (associated functionally linked land)
		Changes in light levels – operation (associated functionally linked land)	Changes in visual disturbance – construction (people/machines in eyeline) (associated functionally linked land)
		Changes in visual disturbance – operation (vehicles in eyeline) (associated functionally linked land)	
		Change in recreational disturbance – construction and operation (wider visitor pressures)	Change in recreational disturbance – operation (Tilbury Fields visitor pressures)
Changes to key indicators	None	None	None
Climate change	None	None	None

Table 6.18 Summary of the conclusion of the assessment of LSE on Thames Estuary and Marshes Ramsar site

Potential LSE	No LSE		LSE not discounted
	Project effects with no pathway to effect	**Inconsequential Project effects resulting in no LSE**	**Project effects where LSE cannot be discounted**
Reduction in habitat area	Change in air quality – vehicle emissions –operation	Change in air quality – dust emissions – construction (within the site itself and associated functionally linked land)	Land take in the terrestrial and aquatic environment (within the site itself and associated functionally linked land)
		Change in air quality – vehicle emissions – construction (within the site itself)	Changes in surface water quality and quantity – construction (within the site itself (southern tunnel entrance compound discharge))
		Changes in surface water quality and quantity – construction (within associated functionally linked land)	
		Changes in surface water quality and quantity – operation (associated functionally linked land)	
		Changes in groundwater quality and quantity – tunnel construction and operation (within the site itself)	
		Introduction/spread of Invasive Non-Native Species (associated functionally linked land)	
Reduction in species density	None	Vehicle collision with species during operation (associated functionally linked land)	None
		Utilities infrastructure collision (associated functionally linked land)	
Disturbance to species	None	Changes in noise and vibration – tunnel construction only. Underwater and above ground (within the site itself and associated functionally linked land)	Changes in noise and vibration – construction works and vehicles (within the site itself and associated functionally linked land)
		Changes in light levels – construction (within the site itself and associated functionally linked land)	Changes in noise and vibration – operation (within associated functionally linked land)

Potential LSE	No LSE		LSE not discounted
	Project effects with no pathway to effect	Inconsequential Project effects resulting in no LSE	Project effects where LSE cannot be discounted
		Changes in light levels – operation (within associated functionally linked land)	Changes in visual disturbance – construction (people/machines in eyeline) (within the site itself and associated functionally linked land)
		Changes in visual disturbance – operation (vehicles in eyeline) (within associated functionally linked land)	
		Change in recreational pressure – construction and operation (wider visitor pressures)	Change in recreational pressure – operation (Tilbury Fields visitor pressures)
Changes to key indicators	None	None	None
Climate change	None	None	None

Table 6.19 Summary of the conclusion of the assessment of LSE on Epping Forest SAC

Potential LSE	No LSE		LSE not
	Project effects with no pathway to effect	Inconsequential Project effects resulting in no LSE	Project effects where LSE cannot be discounted
Reduction in habitat area	None	None	Change in air quality – vehicle emissions – operation (within the site itself)
Disturbance to species	None	None	None
Reduction in species density	None	None	None
Changes to key indicators	None	None	None
Climate change	None	None	None

Table 6.20 Summary of the conclusion of the assessment of LSE on North Downs Woodlands SAC

Potential LSE	No LSE		LSE not discounted
	Project effects with no pathway to effect	Inconsequential Project effects resulting in no LSE	Project effects where LSE cannot be discounted
Reduction in habitat area	None	Change in air quality – vehicle emissions – operation (within the site itself)	None
Disturbance to species	None	None	None
Reduction in species density	None	None	None
Changes to key indicators	None	None	None
Climate change	None	None	None

7 Stage 2 Appropriate Assessment

7.1 Mitigation

7.1.1 The mitigation measures that have been put in place to avoid or reduce the effect pathways identified at Stage 1 Screening are set out in the following paragraphs and have been included within the Stage 2 appropriate assessment reported in Section 7.2. These measures are additional to the integral measures considered within the screening assessment (Section 3.3)

7.1.2 The following measures are secured via the REAC (Application Document 6.3) or the Design Principles (Application Document 7.5) and the relevant REAC commitment reference codes are also included e.g. RDWE033, HRA001 etc.

Measures to avoid changes in surface water quality and quantity

7.1.3 In response to Natural England's advice (see paragraph 6.2.11) the Environment Agency have agreed to issue a permit for the discharge of construction run off in to the Ramsar site. The Environment Agency do not normally issue a permit for construction run off discharge but have committed to doing so in this case due to the size and scale of the Project, the importance of the receiving water body and Natural England's advice. Paragraph 2.6.1-2.6.2 provides further detail of secondary consents and the detailed engagement with other consenting bodies that has occurred with respect to the assessment presented in this report. The position between the Applicant and Natural England is an agreed matter as set out in the NE SoCG Table 2.1 Item 2.1.4 and Item 2.1.59 (Application Document 5.4.1.6). The position between the Applicant and Environment Agency is an agreed matter as set out in the EA SoCG Table 2.1 Item 2.1.2, 2.1.4 and 2.1.15 (Application Document 5.4.1.2).

7.1.4 Further to the Environment Agency commitment and following NE advice the Project has committed to the discharge rate and water quality standards set out in RDWE033.

7.1.5 **RDWE033:** Water discharged into the Thames Estuary and Marshes Ramsar site western ditch from the southern tunnel entrance compound would be treated to the standard specified within the discharge licence consent granted by the Environment Agency and released at greenfield runoff rates. The runoff collection and management system would be operated until full reinstatement of the compound area is complete.
The water quality standards for the discharge into the western ditch will include (but not be limited to) the following parameters and would not exceed these values unless otherwise agreed by the Environment Agency as part of any relevant Environmental Permit (such agreement not to be unreasonably withheld or delayed) which would be set following consultation with Natural England and other consultees: Discharge rate of no more than 2ls^{-1}; chemical composition of: pH, biochemical oxygen demand, dissolved oxygen, total ammonia, unionised ammonia, suspended solids, total phosphorus, turbidity, salinity, cover of filamentous green algae (Enteromorpha), water levels (depth), with standards not environmentally worse than those recorded during the pre-construction survey.

Confidence of success

7.1.6 The parameters within the commitment RDWE033 were proposed following a review of the water quality of the receiving ditch network, sensitivities of relevant Ramsar site qualifying features, and calculations to quantify the effects of additional discharge volumes on water levels in the receiving western ditch and connecting ditches (Appendix C Evidence Plan). The commitment is directly linked to pre-construction water quality sampling to provide the most current information on the chemical composition of the receiving ditch and ensure that the EA discharge consent will result in any risk of pollution of the receiving water body, being removed.

7.1.7 The Applicant is confident that the measures in place to control the discharge of site drainage are such that any effect on the receiving watercourse is avoided.

Measures to avoid and reduce changes in noise and vibration

Construction phase measures

7.1.8 Figure 24 (Appendix A) illustrates the locations of the noise attenuation measures that reduce the changes in noise as a result of the Project construction. These include the following:

a. Noise attenuation barriers around specific elements of the northern tunnel entrance compound

b. Noise attenuation barriers around the A226 Gravesend Road and Milton compounds

c. Three-metre-high bund at southern edge of northern tunnel entrance compound earthworks area

d. Retention of the safety bund south of the Metropolitan Police firing range which forms the north side of the Milton compound.

7.1.9 **HR004:** Noise attenuation measures shall be incorporated within the northern tunnel entrance, A226 Gravesend Road and Milton compounds as shown on HRA Figure 24 (Application Document Ref 6.5) and having regard for HR005 & HR006 to ensure that the construction activities do not result in noise levels within the Thames Estuary and Marshes SPA/Ramsar site or any land functionally linked to it as shown on HRA Figure 2 (Application Document 6.5) that would cause disturbance to the wintering bird qualifying interests. The measures shall be in place prior to the operation of those compounds (or areas of compounds) and shall remain until the end of the compound operation.

7.1.10 **HR005:** The earthworks area (Tilbury Fields landform) in the southern part of the northern tunnel entrance compound will include a 3m high bund (including any temporary barrier or equivalent required) constructed 75m north of the existing field boundary (Indicative location shown on HRA Figure 24) to delimit the extent of works from the functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar and avoid disturbance of birds in the passage and winter period. Construction of the 3m high bund will be carried out during April, May, June and July and the 3m bund (including any temporary barrier or equivalent required) will be functional to mitigate noise and visual disturbance by the end of July, so that completion of the bund does not disturb (as monitored through HR009) the wintering bird qualifying interests. Any earthwork movements required to complete the Tilbury Fields landform south of the bund will only be carried out during April, May, June and July.

Confidence of success

7.1.11 The measures have been incorporated into the noise model so that the resulting area affected by noise greater than 55dB, or change greater than 3dB, was significantly reduced. The areas of suitable habitat (worst case) where the noise levels are greater than 55dB or where there is a >3dB change have been reduced from approximately 328.7ha to 78.6ha.

Measures to avoid visual disturbance

Construction phase measures

7.1.12 A number of the measures associated with noise mitigation and compound design will also avoid visual disturbance by screening any works from the land adjacent to them. These include the following:

a. HR004 and HR005

b. The retention of the safety bund south of the Metropolitan Police firing range which forms the north side of the Milton compound.

7.1.13 **HR001**: Works to construct the infrastructure for the new South Portal construction drainage discharge would not take place within the Thames Estuary and Marshes Ramsar site and any work within functionally linked land, as shown on HRA Figure 2 (Application Document 6.5) would be undertaken during April, May, June and July only to avoid disturbance to passage and overwintering birds associated with European designated sites unless otherwise agreed with SoS in consultation with Natural England.

7.1.14 **HR002**: Works within the intertidal area to construct or decommission the northern tunnel entrance compound temporary drainage pipeline and outfall would be undertaken during April, May, June, July and August only to avoid disturbance to passage and overwintering birds associated with European designated sites unless otherwise agreed with SoS in consultation with Natural England.

7.1.15 **HR005**: The earthworks area (Tilbury Fields landform) in the southern part of the northern tunnel entrance compound will include a 3m high bund (including any temporary barrier or equivalent required) constructed 75m north of the existing field boundary (Indicative location shown on HRA Figure 24) to delimit the extent of works from the functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar and avoid disturbance of birds in the passage and winter period. Construction of the 3m high bund will be carried out during April, May, June and July and the 3m bund (including any temporary barrier or equivalent required) will be functional to mitigate noise and visual disturbance by the end of July, so that completion of the bund does not disturb (as monitored through HR009) the wintering bird qualifying interests. Any earthwork movements required to complete the Tilbury Fields landform south of the bund will only be carried out during April, May, June and July.

7.1.16 **HR006:** Erection of noise attenuation measures at the boundaries of compounds identified in HR004 will be carried out in April, May, June and July only, to avoid disturbance of birds in the passage and winter period.

7.1.17 **HR012:** The construction of the permanent outfall for the operational tunnel drainage will be carried out in April, May, June and July only, to avoid disturbance of birds in the passage and winter period.

Confidence of success

7.1.18 The timing of works that are outside construction compound fences avoid the peak overwintering months and therefore avoid effects on qualifying species within the period the Thames Estuary and Marshes SPA/Ramsar site and functionally linked land is most sensitive. There is limited risk that some species may arrive early in the passage season, August, when there are some limited works occurring outside construction compounds.

Measures to reduce effects of land take and disturbance

Construction

Severe weather constraints

7.1.19 The following commitment has been included to reduce construction disturbance effects during severe winter weather.

7.1.20 **HR003:** To avoid impacts to wintering birds during prolonged periods of sub-zero temperatures, activities potentially causing disturbance to wintering bird qualifying interests of the Thames Estuary and Marshes SPA/Ramsar site, the JNCC's "Scheme to reduce disturbance to waterfowl during severe winter weather" (https://jncc.gov.uk/our-work/severe-weather-scheme/) will be adopted.

Enhanced functionality of habitat

7.1.21 Two habitat parcels within the functionally linked land area will be enhanced to improve functionality during the construction phase. The land parcel at Coalhouse Point (Design Principle S9.13) will also continue to provide an enhanced functionality during operation.

7.1.22 The integrity of the site is reliant on there being sufficient functionally linked habitat outside the SPA and Ramsar site. This mitigation ensures that the functionality of that habitat, in maintaining the qualifying bird feature populations, is not reduced throughout construction or operation. In this way the integrity of the SPA and Ramsar site is not adversely affected because the function of habitats outside the designated site will be maintained.

7.1.23 **Design Principle S9.13**: The land parcel (34.4ha) at Coalhouse Point shall be used for habitat enhancement to maintain baseline functionality of functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar site. The land will be used to create a series of shallow scrape habitats, high tide roost features and coastal grazing marsh habitat suitable for use by the qualifying features of the SPA/Ramsar site (LE6.2 Banks and ditches, LE6.1 Water bodies and associated plants, LE6.4 Marsh and wet grassland).

7.1.24 **HR007**: To provide enhanced functionality of functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar site during the construction period, the management of the three fields in the plot south of the Metropolitan Police firing range and adjacent to the SPA/Ramsar site (Land Registry ref. K794941) will consist of either a standing ripe crop ready to be harvested, winter stubbles or grass ley from 1 October to 1 March each year throughout the construction and operation of the A226 Gravesend Road and Milton compounds.

7.1.25 The land parcel at Coalhouse Point includes two specific commitments relating to implementation of the habitat creation and securing the water supply as set out in the following paragraphs.

7.1.26 **HR010:** The habitat creation at the land adjacent to Coalhouse Point, indicated on the Environmental Masterplan (Figure 2.4, Application Document 6.2) and described in Clause S9.13 of the Design Principles (Application Document 7.5) will be carried out prior to the commencement of works at the Northern tunnel entrance compound. The water required to maintain a range of depths within the habitat consistent with the guidance in “Manage lowland wet grassland for birds” (DEFRA 2021) will be secured prior to completion of the habitat creation works and will, unless otherwise agreed with the Secretary of State, be sourced from the River Thames by means of a water inlet with self-regulating valve or equivalent structure, passable by eels, constructed (in accordance with HR011) in the sea wall, at approximately TQ686761, to allow regulated tidal exchange, unless a formal agreement with Thurrock Council to release water on request from the Coalhouse Fort moat system has been secured.

7.1.27 **HR011:** Works to construct a water inlet with self-regulating valve or equivalent structure (HR010) would be undertaken with the following constraints:

a. All works requiring access to the inter-tidal zone would be completed to suit tidal cycle and at periods of low water.

b. All piling works would be completed during periods of low water to avoid transmission of underwater noise.

c. All piling works would utilise soft start piling and other best practice techniques, as per the JNCC 2010 guidance (Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise), to help avoid noise and vibration impacts.

d. Excavated arisings would be retained within the coffer dam or stored on a support barge.

7.1.28 Commitment HR011 is feasible to implement and would not result in any additional significant effects including disturbance of birds from the construction. If it is possible to construct the tidal gate between April and August (to avoid disturbance to passage and overwintering birds associated with European designated sites) in line with best practice, disturbance will be avoided, but if construction has to occur when the qualifying features are present it will take place over a short period of time and only within a localised area, and it is considered that any disturbance would be inconsequential to the conservation objectives of the Thames Estuary and Marshes SPA and Ramsar site.

7.1.29 The tidal gate is proposed to be constructed within the existing sea wall from a temporary working area within the River Thames. The construction work would result in temporary loss of intertidal habitat (approximately 0.4ha) and temporary disturbance of qualifying bird features as a result of noise and visual changes within functionally linked land (approximately 24.5ha) and the Thames Estuary and Marshes SPA (approximately 0.5ha). The effect would be limited to the total construction time which is predicted to be up to 12 weeks.

7.1.30 The field survey data recorded qualifying features within the intertidal habitats over the winter and passage months. Table 7.1 sets out the peak counts recorded within the affected habitats between September and March.

Table 7.1 Peak counts of qualifying features recorded (Sept-Mar) within the area affected by construction of the tide gate.

Qualifying feature	Peak count	Month peak count recorded	Potential % of Thames Estuary and Marshes SPA/ Ramsar site
Avocet (non breeding)	10	Nov	1%
Black-tailed godwit	271	Mar	9%
Dunlin	1132	Dec	3%
Grey plover	35	Dec	2%
Knot	1	Oct	0%
Lapwing	1	Mar	0%
Redshank	137	Nov	5%
Ringed plover	102	Sept	20%

7.1.31 Although some of the qualifying species, such as dunlin, black-tailed godwit, redshank and ringed plover were recorded in large numbers in the affected area, they are considered by Cutts et al (2013) to be tolerant of visual disturbance and habituate rapidly to noise stimuli. Therefore, considering the works will take place over a short period of time, only within a localised area, and there are many other adjacent areas of intertidal habitat, it is considered unlikely that any significant disturbance would result. This activity would be carried before works within the northern tunnel entrance compound commence so the disturbance would not be in combination with the main works.

Operation

7.1.32 Habitat enhancement as per Design Principle S9.13 and described in paragraph 7.1.23.

Confidence of success

Severe weather constraints

7.1.33 The severe weather restrictions are in accordance with a recognised scheme to avoid disturbance of overwintering waterfowl, therefore there is high confidence in the efficacy of this measure avoiding disturbance of the Thames Estuary and Marshes SPA/Ramsar site bird qualifying features during severe winter weather.

Enhanced functionality of habitat

7.1.34 The efficacy of the measures has been quantified by using species abundance as a measure of habitat functionality. The approach was developed in consultation with Natural England and was documented as described in the Evidence Plan (Appendix C). As evidence for the predicted increase in function of enhanced habitat on the mitigation areas, the Applicant has assessed the abundance of birds on a number of exemplar[18] habitat plots. Based on the survey data of bird use of existing exemplar habitats, it is expected that the new habitats created in the mitigation areas would attract similar numbers of birds, in particular the overwinter and passage features. The increase in functionality of the mitigation areas can therefore be identified by comparing existing use (from survey data) and expected future use (from survey data of existing exemplar habitat) in the habitat to be created.

7.1.35 The proposed change, within the land parcel at Coalhouse Point (Design Principle S9.13), from arable farmland to a mosaic of coastal grazing marsh, shallow scrapes and high tide roost features is designed to create a similar mosaic of habitats as currently found in the area around Tilbury Fort. The existing ditch system is primarily a rainfall-fed system with occasional inputs from adjacent landholdings. The ditch system has a single drainage point out to the Tilbury Main and this could be controlled with a simple sluice to ensure that the ditch system and proposed scrapes hold water throughout the winter and passage season. Should the seawall fail at this location allowing an intrusion of saltwater, the value of the enhanced habitat for the qualifying features would not be affected.

7.1.36 In addition, the geographical location of the proposed habitat creation is adjacent to intertidal mud and saltmarsh habitat that has also been shown by surveys to support relatively high concentrations of a range of qualifying species. The geographical location will provide connectivity to important areas in the upper estuary such as Tilbury Fort and the intertidal resource further upstream. These birds would therefore be certain to be able to find the new habitat easily and there would be no barriers between their current and new habitats. The functionality of this plot is expected to increase from 2.6 per hectare to 165 per hectare with the conversion of habitat from arable to a mosaic of coastal grazing marsh, shallow scrapes and high tide roost features.

7.1.37 The proposed change in management of the three fields south of the Metropolitan Police firing range from winter cereal crops to grassland or winter stubbles is designed to create a habitat more akin to that already present within the Thames Estuary and Marshes Ramsar site. The habitat west and east of this plot has been shown by surveys to support relatively high concentrations of a range of qualifying species. These birds would therefore be certain to be able to find the new habitat easily and there would be no barriers between their current and new habitats. The functionality of this plot is expected to increase from 6.2 per hectare to 19 per hectare.

[18] Exemplar – Habitat types include features that would be created in the new mitigation areas, for example, scrapes, grassland etc.

Measures to reduce recreational disturbance

Operation

7.1.38 The provision of public access at Tilbury Fields includes a number of design principles (Application Document 7.5) that include commitments to manage visitors which aim to avoid and reduce recreational disturbance of qualifying features using the functionally linked intertidal habitat.

7.1.39 **Design Principle S9.02:** A new public recreational site shall be provided at Goshems Farm. The recreational space of over 35 hectares shall primarily incorporate open mosaic habitats. It shall be designed for maximum biodiversity benefit to link existing habitat areas along the Thames Estuary, to proposed habitat creation further north of the Tilbury Loop line, extending to the new Open Mosaic habitat creation at Linford. The design of the new recreational site shall incorporate sculptural earthworks up to a maximum +24.0m AOD and shall be designed with elevated areas to create vistas (above the surrounding landfill) across the Thames Estuary and guide views to features such as Tilbury Fort, Cliffe Fort and Coalhouse Fort that reflect the military history of the Thames. The new recreational site shall be publicly accessible, via the Two Forts Way in the south and from FP200 in the north. It shall incorporate accessible permissive routes through the landforms and allow users to reach the elevated areas. Placemaking features shall be located at the top of the earthworks, to create a focal point and landmark. The landscape shall be designed (in consultation with Natural England) so that public access to the informal footpaths and viewing points would be appropriately screened to prevent significant visual intrusion to waterbirds using the Thames estuary.

7.1.40 **Design Principle S9.18:** Along footpaths and publicly accessible areas, interpretation boards shall be provided to explain the heritage of the area and the importance of the Thames Estuary for bird and nature conservation. Incorporated into the design of the new park will be viewing points and interpretation boards to draw the users attention to;

a. the various forts, batteries and block houses on this stretch of the Thames Estuary which, from the Tudor period onwards, have served as Britain’s defensive front line against attack and invasion and their relationship to remarkable and noteworthy periods and events in history and;

b. the importance and sensitivities of the Thames estuary for nature, including wetland habitats which support internationally important assemblages of birds during winter months, bare earth and wild flowers that support nationally important groups of insects, and a ditch network that is home to water voles.

Confidence of success

7.1.41 The measures proposed at Tilbury Fields are within land owned by the Applicant and do not require any third-party agreements to implement them. The use of interpretation boards, signage and design features to discourage public access into the intertidal habitat are standard management techniques (Natural England, 2015; Liley, et al., 2015) to reduce the effects of visitor pressures at important bird sites by organisations such as the Natural England, Royal Society for the Protection of Birds and Wildfowl and Wetland Trust.

Measures to reduce the effects of nitrogen deposition

Operation

7.1.42 The conclusion of the assessment (see paragraph 7.2.63 to 7.2.68) is that adverse effects on the integrity of Epping Forest SAC can be excluded beyond reasonable scientific doubt on the basis that the predicted scale of the impact of N deposition would cause no consequential risk of a measurable change in the habitats. Consequently, no mitigation measures are required or proposed by the Applicant.

7.1.43 However, during consultation, Natural England advised that they did not agree that adverse effects could be discounted without mitigation. The Statement of Common Ground (Application Document 5.4.1.6) between the Applicant and Natural England reports the positions of the two parties in relation to this matter, see Table 2.1 Item 2.1.94 of that document.

7.1.44 In order to show due regard to the representations of Natural England, on a without prejudice basis potential mitigation measures were investigated as to the feasibility of avoiding or reducing the predictions of the impact (N deposition) to below screening thresholds, as opposed to avoiding or reducing the adverse effect potentially caused by that impact (which is considered to be inconsequential, and which cannot be mitigated). The results of National Highways' without prejudice assessment of a potential speed limit reduction are presented in the Natural England SoCG Annex A.7 'Without prejudice consideration of mitigation for air quality effects on Epping Forest SAC' (Application Document 5.4.1.6). As noted at 7.1.42 above the Applicant's position is that no mitigation measures are required or proposed.

7.2 Assessment of effect on integrity of European sites

Thames Estuary and Marshes SPA and the Thames Estuary and Marshes Ramsar site

7.2.1 These two sites are assessed together in the main report as they have the same impact pathways (both sites have the same bird qualifying features and the Ramsar Criterion 2 features are similarly affected) for the purposes of the Stage 2 Appropriate Assessment. Site-specific summaries of the assessments are provided for each site in The Planning Inspectorate Advice Note 10 summary tables in Appendix F.

Magnitude/significance of the effects

7.2.2 There is a risk that LSE cannot be discounted on the Thames Estuary and Marshes SPA and the Thames Estuary and Marshes Ramsar site as a result of the Project for the following effect pathways:

a. Changes in surface water quality and quantity within the Thames Estuary and Marshes Ramsar site (affecting Criterion 2 features) as a result of the southern tunnel entrance compound construction discharge to the western ditch 10-20m upstream of the Ramsar site.

b. Reduction in habitat area (affecting bird qualifying features) as a result of land take in functionally linked land of the SPA and Ramsar site.

c. Disturbance to key species (affecting bird qualifying features) as a result of changes in recreational pressures during operation (Tilbury Fields visitor pressures within functionally linked land of the SPA and Ramsar site

d. Disturbance to key species (affecting bird qualifying features) as a result of changes in noise and vibration and changes in visual disturbance (people/machines in eyeline) during construction within the Ramsar site and functionally linked land of the SPA and Ramsar site.

e. Disturbance to key species (affecting bird qualifying features) as a result of changes in noise and vibration and changes in visual disturbance (vehicles in eyeline) during operation within functionally linked land of the SPA and Ramsar site.

Changes in surface water quality and quantity

Effect alone

7.2.3 The discharge of construction runoff from the southern tunnel entrance compound would be strictly controlled via an EA discharge permit. The Applicant has committed to a treatment system that will mean any water discharged will not affect the depth, flow or chemical composition of the receiving ditch network (permit will be set to discharges not exceeding pre-construction baseline, paragraph 7.1.3 - 7.1.5), which is part of the Thames Estuary and Marshes Ramsar site.

7.2.4 The Applicant’s commitment (RDWE033) to the control measures proposed, have a high confidence of success and mean that any effect on the Thames Estuary and Marshes Ramsar site as a result of changes in surface water quality is avoided.

Effect in-combination

7.2.5 The pathway to effect has been disrupted at source, so there cannot be a feasible risk of this effect (changes in surface water quality and quantity) acting in-combination with other plans and projects on the Thames Estuary and Marshes Ramsar site.

Land take within functionally linked land

Effect alone

7.2.6 The Applicant has committed to providing two land parcels (Design Principle S9.13 and HR007) where the functionality of the habitat would be enhanced to mitigate the loss of functionally linked land during construction and operation.

7.2.7 The peak counts of HRA species (defined in paragraph 5.3.7) recorded within the land take areas is shown in Table 7.2 along with the potential contribution to the European sites of which it is a qualifying feature, expressed as a percentage of that site’s total population. It is important to note that the percentages of the European site population presented in Table 7.2 do not indicate a scale of effect. They represent the theoretical worst-case proportion of a European site population that could be affected if there was a significant effect. Even if a significant proportion of a population of a European site was present, it is still possible that the scale of effect could be sufficiently low that the overall effect would be insignificant. A number of the individual qualifying features were not recorded within any land take areas and the peak count is denoted as "NR" to indicate this.

7.2.8 The land take within the intertidal area has not been included in these figures as it only relates to the installation of the pipeline for the northern discharge. The area required for the north temporary discharge pipe (approximately 0.4ha) and outfall (approximately 0.001ha) is small and the loss of intertidal habitat would be temporary, with recovery occurring relatively quickly over subsequent tidal cycles. Also, the mitigation in place to avoid disturbance on the intertidal area (see HR002, paragraph 7.1.14) will mean that the temporary loss of intertidal habitat occurs outside the important overwintering period. The key effect on the birds using the intertidal zone is as a result of disturbance and this is discussed in paragraph 7.2.23.

Table 7.2 Peak count of qualifying features recorded within the worst-case land take area (construction phase 2025-2030) and the potential percentage contribution to Thames Estuary and Marshes SPA/ Ramsar site

Qualifying feature	Peak count	Month peak count recorded	Potential % of Thames Estuary and Marshes SPA/ Ramsar site
Avocet (non-breeding)	16	Nov	1.63%
Black-tailed godwit	9	Jul	0.09%
Dunlin	6	Sep	0.02%
Lapwing	675	Jan	36.98%
Ringed plover	1	Aug	0.12%
Waterfowl assemblage	734	Overwinter (Oct-Mar)	0.97%

7.2.9 The percentages presented in Table 7.2 represent the worst-case scenario i.e. all functionally linked land is of equal value for the birds and all areas of suitable habitat would be unavailable for all of the construction phase. The construction phase is expected to be completed in early 2030 and in the following years (up to three) the habitats that are not permanently lost would also be reinstated as the construction site is decommissioned and available for use by the HRA species.

7.2.10 Where the percentages are greater than 1% in Table 7.2 this has been taken (in line with common convention) as an indication that these individuals are potentially an important part of the European site population. Potentially important numbers of HRA species have been recorded within the land take areas.

7.2.11 The graphs in Plate 7.1 and Plate 7.2 show the use of the land take areas by month for the waterfowl overwintering assemblage and for each of the qualifying species. It is clear from these graphs that the peak counts are considerably larger than average counts, particularly in January, which is limited to the high peak count of lapwing recorded.

7.2.12 When considering the overwinter assemblage qualifying feature, the numbers of individuals recorded are generally higher over winter as expected, however there are records all year round. The individual qualifying features generally recorded limited use of the land take areas, as the species are generally associated with the intertidal habitat. The exception was lapwing and ringed plover which are more ubiquitous species with very broad habitat usage. Given the land take is primarily agricultural (which is abundant in the area), the differences shown between peak and average counts indicate that the birds are not using the affected areas exclusively but in conjunction with other agricultural areas within the functionally linked land.

Plate 7.1 Seasonality of use of the land take areas by the waterfowl assemblage

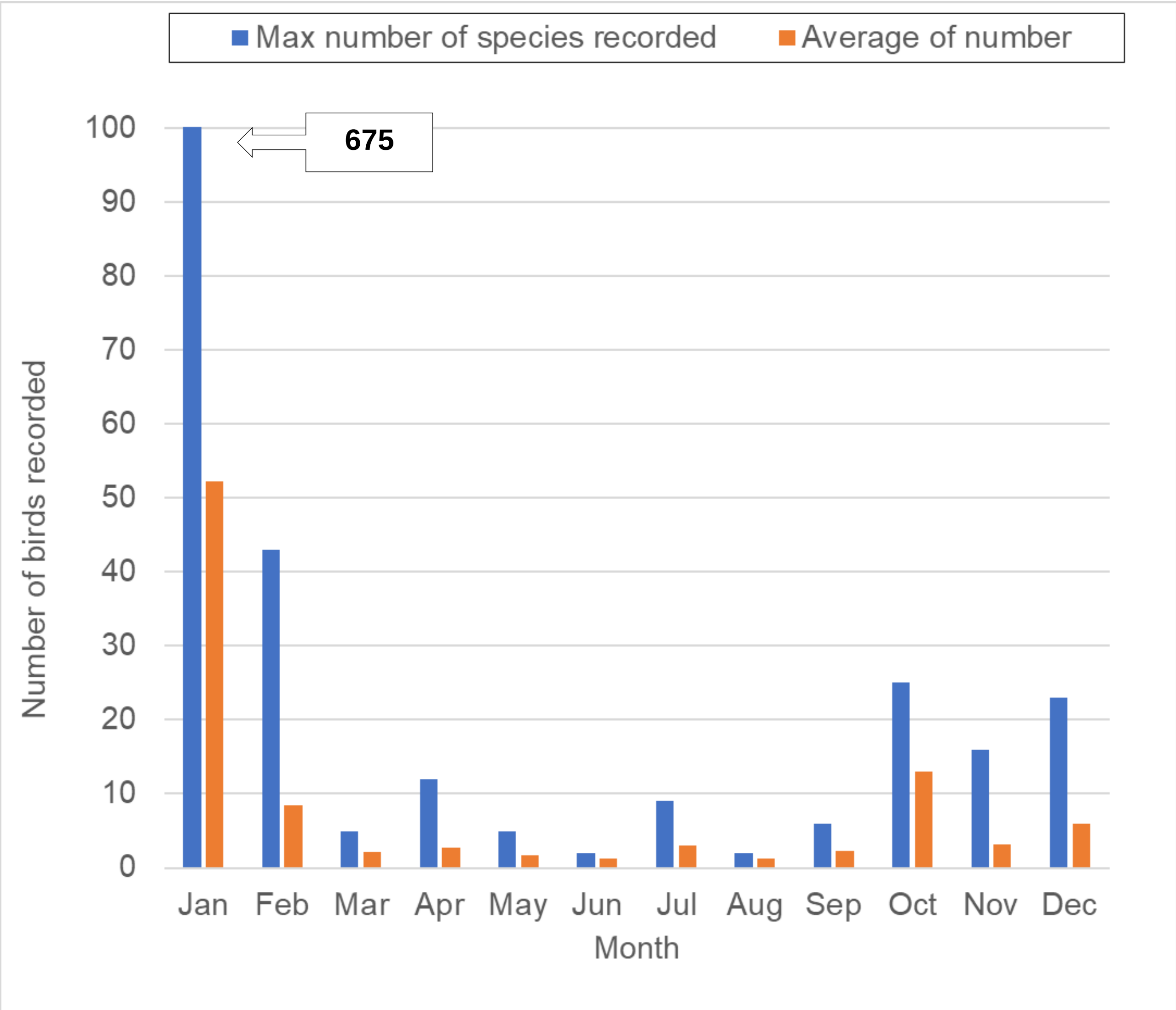
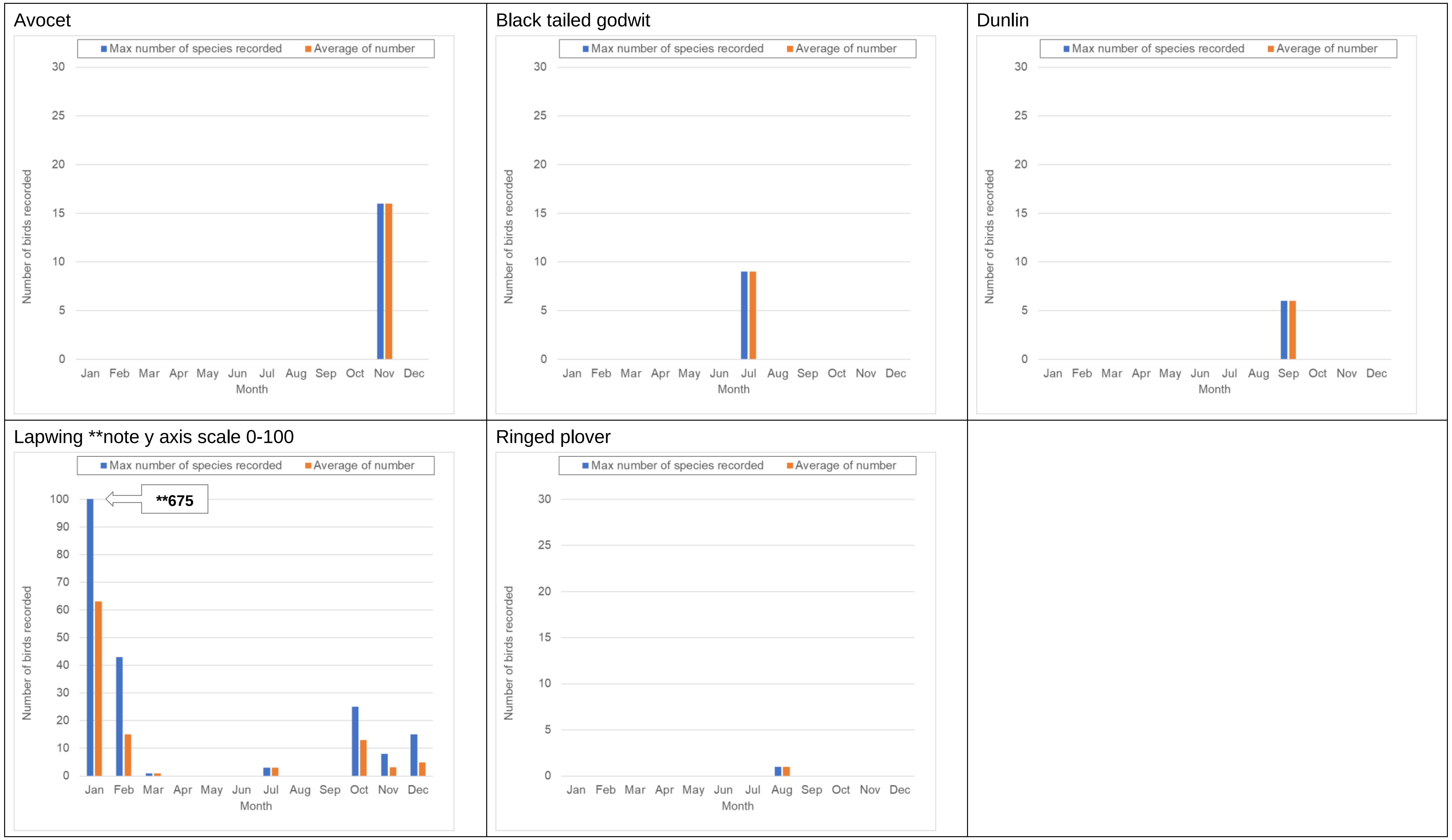


Plate 7.2 Comparison of the seasonality of use of the land take areas by qualifying features recorded
y axis – number of birds 0-30; x axis months January - December



Effect on habitat functionality

7.2.13 The functionality (as described in paragraphs 4.2.12) of the habitats lost to the Project has been quantified in conjunction with the functionality of the mitigation land provided. The predicted functionality of the land that had been used during construction and either reinstated to the pre-construction land use or planted as per the Project environmental design (as shown on ES Figure 2.4: Environmental Masterplan (Application Document 6.2) was assumed to be the same as the area before construction occurs. Table 7.3 clearly shows that the enhanced functionality provided in the mitigation land will ensure that the functionality of the functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar site will be maintained throughout the construction and operation of the Project.

Table 7.3 Predicted change in baseline functionality of the functionally linked land as a result of the Project land take alone

Land affected by the Project	Functionality (as described in paragraph 4.2.12)		
	Existing	Construction	Operation
Functionally linked land within Order Limits (Project land take)	1,323	0	1,204[19]
Mitigation area adjacent to Coalhouse Point	88	5,676	5,676
Mitigation area three arable fields	88	272	88
Total	1,499	5,948	6,968

7.2.14 Although there are potentially significant proportions of the SPA/Ramsar site population using the functionally linked land affected by the land take, the provision of the mitigation areas ensures that overall functionality remains throughout the construction and operation of the Project. Therefore, it is not considered that the use of the functionally linked land would be significantly altered as a result of the land take.

Effect in-combination

7.2.15 Table 7.4 to Table 7.6 provide the list of projects reviewed in the assessment of in-combination effects of land take within the functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar site. The locations of these are shown on Figure 27 (Appendix A).

7.2.16 The Thames Estuary 2100 programme is another large project within the functionally linked land, that will be delivered by the Environment Agency and its

[19] This is the predicted functionality of the land that had been used during construction and either reinstated to the pre-construction land use or planted as per the Project environmental design (as shown on ES Figure 2.4: Environmental Masterplan (Application Document 6.2) The measure of functionality for these areas was assumed to be the same as the area before construction occurs.

partners. The project aims to manage tidal flood risk in the Thames Estuary. The first phase, Phase 1: 2012 until 2035 includes maintenance and improvement of current flood risk management assets including walls, gates, embankments and pumps; protection of land needed for future improvements to flood defences; and monitoring how the estuary is changing. However, there is no detail available as to the exact locations of the projects and how they may influence the suitable habitat availability within the functionally linked land, and it does not form part of the in-combination assessment.

Table 7.4 NSIPs within functionally linked land

Development name	Status	Timing	Approximate distance from the Project	Approximate loss (temporary and permanent) of suitable habitat (ha)
Thurrock Flexible Generation Plant	Consent granted 16th February 2022	Depending on phasing strategy Single phase construction Q3/4 2022 – Q3 2023 Three phase construction Q3/4 2022 lasting between 4.5 to 6 years	Immediately adjacent	0.5ha of intertidal habitat 20ha of coastal agricultural land
The London Resort (Tilbury site only within the functionally linked land)	Application withdrawn 29th March 2022	Aiming to resubmit before the end of 2022	Tilbury site – adjacent Kent site – 6km west	Tilbury site – no suitable habitat lost. Kent site – outside functionally linked land
Oikos Marine & South Side Development	Pre-application EIA Scoping report 2020 Submission expected in 2022	Not specified two-year construction period	11km east	No suitable habitat lost
Perrys Farm Hazardous Waste Management Facility	Pre-application Scoping opinion 2013 No published application timetable	Not specified	19km east	Not specified but potential loss of approximately 10ha agricultural land
East Anglia Green Energy Enablement	Initial options appraisal complete. Non-statutory consultation	Proposed construction start date of 2026/7 with completion in 2030	Within and adjacent to Order Limits	Not specified but the preferred option would affect coastal agricultural land

Development name	Status	Timing	Approximate distance from the Project	Approximate loss (temporary and permanent) of suitable habitat (ha)
	completed 16th June 2022			within a similar area to already affected by the Project Order Limits and timed to coincide so would not be additional to the effects of the Project alone

Table 7.5 Major developments proposed adjacent and within the Project Order Limits

Development name	Status	Timing	Approximate distance from the Project	Approximate loss (temporary and permanent) of suitable habitat (ha)
Port of Tilbury Thames Freeport Tax Site	Thames Freeport site was designated on 19th November 2021	Not specified – will depend on the nature of developments in the masterplan	Within and adjacent to the Order Limits	Not specified potential loss of approximately 35 ha coastal agricultural land in addition to that within the Project Order Limits
Tilbury Link Road	Currently at National Highways Project Control Framework Stage 0	Strategic Outline Business Case approval being sought early 2022 to move into PCF Stages 1 & 2	Within and adjacent to the Order Limits	Not specified but the preferred option would affect coastal agricultural land within a similar area to already affected by the Project Order Limits. If completed at the same time it would not be additional to the effects of the Project alone
DP World London Gateway	Three berths constructed, fourth under construction, with the ability to expand to six	Construction began in February 2010 and the first phase of the port opened in November 2013	4km east	No suitable habitat lost

Table 7.6 Local planning projects within functionally linked land

Development Application description/ number	Development location	Status	Timing	Approximate distance from the Project	Approximate land take of suitable habitat (ha)
Thurrock gas-fired electricity generation facility 19/01534/FUL	East of Stanhope Industrial Park, Wharf Road, Stanford Le Hope, Essex	Application submitted	Not defined but construction has potential to overlap	3.5km east	No suitable habitat lost
Residential development 16/01232/OUT	West of East Tilbury, Essex	Application submitted	Not defined but assume construction overlaps	Within and adjacent to Order Limits Therefore, 40-50ha habitat loss is already considered with the assessment alone	Not specified but approximately 20ha agricultural land adjacent to Order Limits
Residential development 21/00781/SCR	Land east of the George and Dragon PH, Princess Margaret Road, East Tilbury	Screening opinion requested	Undefined	2km north and east	Not specified but approximately 9.5ha of agricultural land
PFA extraction Goshems Farm 19/00051/CV	Land adjacent to Tilbury Power Station, Thurrock, Essex	Related to other applications at Goshem's Farm/ Ingrebourne Valley Limited jetty/ Tilbury Riverside 18/01307/FUL 17/00412/FUL 17/00224/FUL 13/00497/FUL	Undefined	Within the Order Limits Therefore, habitat loss is already considered with the assessment alone	Suitable habitat within area already being reprofiled as part of existing permissions
Residential/ commercial redevelopment 20201229	Albion Quayside, Canal Basin, Gravesend, Kent	Outline application 20110713 decided Scoping opinion observations sent	Not defined. Scoping opinion sent January 2021	0.5km west	No suitable habitat lost
Residential/ commercial redevelopment	Albion Waterside Canal Basin,	Hybrid application (full	Not defined	0.6km west	No suitable habitat lost

Development Application description/ number	Development location	Status	Timing	Approximate distance from the Project	Approximate land take of suitable habitat (ha)
20210270	Gravesend, Kent	and outline) submitted			
Fobbing Marshes Restoration 20/00971/FUL	Fobbing Marshes, Wharf Road, Fobbing, Essex	Application approved Mar 2022	Work must start within 3 years of approval	2.3km east	Restoration of suitable habitat 76ha coastal grazing marsh
Enterprise Park 18/01404/OUT	Thames Enterprise Park, Thurrock, Essex.	Outline application submitted. Related to other applications at Thames Enterprise Park 20/00226/FUL 20/003/59/FUL	Not defined	7km east	No suitable habitat lost
Residential development 20/01053/FUL	Stanford Le Hope, Thurrock, Essex	Application submitted	Not defined	1.7km east	No suitable habitat lost
Residential development and Sports Club redevelopment 20/00592/OUT	Springhouse Road, Corringham, Thurrock, Essex	Outline application submitted	Not defined	3.5km east	No suitable habitat lost
Residential development and community hub MC/22/0254	Church Street, Cliffe, Rochester, Medway, Kent	Outline application submitted	Not defined	4.5km east	Not specified but approx. 20 ha amenity and agricultural land

7.2.17 The total area of suitable habitat predicted to be lost temporarily or permanently as a result of the other plans or projects listed in Table 7.4 to Table 7.6 is approximately 115ha and these are within functionally linked land. This assumes that these other projects progress within the first two years of the Project construction, however other than the Tilbury2 project which has been completed, there are no proposed timings for the other projects where suitable habitat is lost. Application 20/00971/FUL relates to the Essex Wildlife Trust Fobbing Marshes Restoration and is a proposal to manage the water within the Fobbing Marshes to maintain optimal water levels all year round with anticipated benefits for the waders and wildfowl recorded there.

7.2.18 The use, by qualifying features, of the habitats potentially lost within the other plans and projects is not reported consistently and therefore to assess the functionality of the habitat types lost, the habitat types have been assigned an abundance per hectare based on the abundances recorded within the Project[20]. The agricultural land recorded 2.7ha^{-1} and higher value areas such as the intertidal habitat 97ha^{-1} and coastal grazing marsh 18.6ha^{-1} (unmanaged areas) and 190ha^{-1} (managed areas). The measures of functionality have been used to illustrate the anticipated improvement in functionality if the Fobbing Marshes application is granted and proceeds within the same time frame as the Project.

7.2.19 Table 7.7 summarises the effect of habitat loss within the functionally linked land associated with the Thames Estuary and Marshes SPA and Ramsar site as a result of the Project in-combination with the other plans and projects identified in Table 7.4 to Table 7.6. As a worst case, the assessment assumes all other plans and projects would result in habitat being lost concurrently with the Project. The Project alone and in-combination with other plans and projects will maintain the overall functionality throughout the construction and operation of the Project. Therefore, it is not considered that the use of the functionally linked land would be significantly altered as a result of the land take.

Table 7.7 Predicted change in baseline functionality of the functionally linked land as a result of the Project land take in-combination with other plans and projects

	Functionality (as described in paragraph 4.2.12)		
	Existing	**Construction**	**Operation**
Functionally linked land within Order Limits (Project land take)	1,323	0	1,204[21]
Functionally linked land habitat lost (other plans and projects)	408	0	0[22]
20/00971/FUL – Essex Wildlife Trust Fobbing Marshes Restoration	1,414	14,417	14,417
Mitigation area adjacent to Coalhouse Fort	88	5,676	5,676
Mitigation area three arable fields	88	272	88
Total	**3,321**	**20,365**	**21,385**

[20] As part of the evidence plan the use of species abundance as a measure of functionality presented to Natural England in the LTC HRA Technical Note: Habitat enhancement to maintain baseline functionality of functionally linked land (Rev2). Natural England agreed this was an appropriate measure to illustrate efficacy of habitat enhancement measures.
[21] This is the predicted functionality of the land that had been used during construction but returned to land owner, i.e. not part of the Project environmental design (as shown on ES Figure 2.4: Environmental Masterplan (Application Document 6.2) The measure of functionality for these areas was assumed to be the same as the area before construction occurs
[22] No information available on the permanent and/or temporary land take for the other plans and projects

Changes in recreational disturbance – Tilbury Fields

Effect alone

7.2.20 The Project design for Tilbury Fields includes commitments (Design Principle S9.02 and S9.18 to manage visitors through the use of interpretation boards, signage and design features to discourage public access into the intertidal habitat. This will avoid any significant disturbance to the qualifying features using the functionally linked intertidal habitat.

Effect in-combination

7.2.21 The pathway to effect has been avoided through visitor management measures, so there cannot be a feasible risk of this effect acting in-combination with other plans and projects.

Changes in noise, vibration and visual disturbance

Effect alone

Construction phase

7.2.22 The Applicant has committed to avoiding and reducing to a minimum the disturbance within the Thames Estuary and Marshes Ramsar site and associated functionally linked land. The provision of noise attenuation measures, HR004 and HR005 as shown on Figure 24, will result in significantly less habitat affected as shown on Figure 25 and 26 and set out in Table 7.8.

7.2.23 The disturbance (visual and noise) of the functionally linked land (intertidal habitat) when the northern tunnel entrance compound temporary drainage pipeline and outfall is constructed, will be avoided by HR002 as it occurs outside the important overwintering period.

7.2.24 The disturbance (visual and noise) of the Thames Estuary and Marshes Ramsar site and associated functionally linked land (agricultural habitat), during construction of the southern tunnel entrance compound construction drainage outfall, will be avoided by HR001 as it occurs outside the important overwintering period.

7.2.25 The disturbance (visual and noise) of the functionally linked land (intertidal habitat) when the operational tunnel drainage outfall is constructed within the flood defence west of Bowater’s Sluice will be avoided by HR012 as it occurs outside the important overwintering period.

Table 7.8 Project elements where, following mitigation, the noise and visual thresholds are exceeded in the Thames Estuary and Marshes Ramsar site and associated functionally linked land

Project element	Phase 1 Habitat type affected (all suitable habitat for use by SPA/Ramsar site birds)	Duration of effect	Hectares of suitable habitat affected
North of the River Thames – functionally linked land			
Northern tunnel entrance compound and access – North Portal and any main works utilities diversions in the same area.	Poor semi-improved grassland Cultivated/disturbed land – arable	Semi-permanent	63.0
	Saltmarsh		0.5
Highways construction works – Tilbury Viaduct north to just south of Hoford Road and any main works utilities diversions in the same area	Poor semi-improved grassland Cultivated/disturbed land – arable	Semi-permanent	7.7
South of the River Thames – functionally linked land			
A226 Gravesend Road and Milton compounds	Poor semi-improved grassland Cultivated/disturbed land – arable	Temporary	4.8
South of the River Thames – Thames Estuary and Marshes Ramsar site			
A226 Gravesend Road and Milton compounds	Poor semi-improved grassland	Temporary	2.6

7.2.26 The peak counts of HRA species recorded within the residual areas disturbed, with the mitigation, is shown in Table 7.9 along with the potential contribution to each of the European sites of which it is a qualifying feature, expressed as a percentage of that site's total population. The percentages of European site populations presented in this table do not indicate a scale of effect. The percentages represent the theoretical worst-case proportion of a European site that could be affected if there was a significant effect. Even if a significant proportion of a population of a European site was present, it is still possible that the scale of effect could be sufficiently low that the overall effect would be insignificant.

Table 7.9 Peak count of species recorded within the worst-case area disturbed (construction phase 2024-2026) and the potential percentage contribution to each European site population

Species	Peak count	Month peak count recorded	Potential % of Thames Estuary and Marshes SPA/ Ramsar site
Lapwing	91	Jan	5.0%
Overwintering assemblage	110	Oct-Mar	0.1%

7.2.27 The percentages presented in Table 7.9 represent the worst-case scenario, i.e. the first two years of the construction phase 2025 – 2027 when the maximum area of habitat would be disturbed. After 2027, all the work associated with the A226 Gravesend Road and Milton compounds is expected to be completed and the surrounding suitable habitat no longer disturbed, and therefore available for use by the HRA species. The construction phase for Project as a whole is due to be completed in late 2029 and in the following years (up to three has been assumed) the northern tunnel entrance compound would be decommissioned, therefore the surrounding suitable habitat would no longer be disturbed and available for use by the HRA species.

7.2.28 Where the percentages are greater than 1% in Table 7.9 this has been taken (in line with common convention) as an indication that these individuals are potentially important contributors to the Thames Estuary and Marshes SPA/Ramsar site. The lapwing peak count was recorded within agricultural land north of Tilbury Fort.

7.2.29 Although the noise and visual thresholds are exceeded outside the Order Limits during construction, the magnitude of the disturbance response by the individuals using the area during construction is difficult to predict with certainty. The sensitivity of different waterfowl species to visual and auditory disturbance as well as habituation to disturbance is documented in Cutts *et al* (2013). Of the species with contributions over 1% in Table 7.9, lapwing are considered extremely tolerant of disturbance, and able to habituate quickly.

7.2.30 Also, birds are commonly understood to habituate to disturbance (especially noise stimuli), as shown by forming tolerance to bird scarers used to protect crops or disperse birds from airports. This is also likely in the environs of the Project, due to the fact that birds are still using the area of the Project despite many years of disturbance from existing developments and land uses.

7.2.31 To mitigate the uncertainty of the disturbance effect, the Project includes REAC commitments relating to work during periods of severe weather (HR003), temporary habitat management at the three arable fields south of the Metropolitan Police Firing Range (HR007) and habitat enhancement in the land adjacent to Coalhouse Fort (Design Principle S9.13). These measures ensure that the effects of disturbance on individuals is reduced by avoiding stressors during extreme winter weather when the birds are likely to be more vulnerable, and by maintaining the functionality of the functionally linked land as shown in Table 7.10.

Operation

7.2.32 The area affected by the operational noise is shown in Figure 21. The majority (approximately 90%) of the area is within the Order Limits and would have been part of the northern tunnel entrance compound and unavailable to birds during the construction period.

7.2.33 Therefore, any birds using this area post construction would have chosen to use it following the construction phase and therefore whilst any disturbing stimuli from operation of the road were present. Consequently, the birds would perceive the vehicle noise and vibration as the ‘normal environment’ for that area and any other areas within their range that are similarly subject to disturbing stimuli but that are used because the birds are accustomed to the stimuli. However, there is some uncertainty over this conclusion as no available evidence was found to support or contradict it.

7.2.34 To mitigate the uncertainty of the effect of operational disturbance on the HRA species, the Applicant has committed to habitat enhancement (as agreed with Natural England see item 2.1.93 of the SoCG (Document Reference 5.4.1.6)) in the land adjacent to Coalhouse Fort (Design Principle S9.13). These measures ensure that the effects of disturbance on individuals is reduced by maintaining the functionality of the functionally linked land as shown in Table 7.10.

Overall effect on habitat functionality

7.2.35 The functionality of the habitats disturbed by the Project has been quantified in conjunction with the functionality of the mitigation land provided, as shown in Table 7.10.

7.2.36 The changes shown in Table 7.10 indicate that with the provision of the habitat enhancement areas, the functionality is increased during construction and operation when compared to the baseline and therefore provides additional assurance that provision of the alternative habitats would provide an appropriate level of functionality for the HRA species. Also, given the proximity of the enhanced habitat areas to the Project, no change in energetic requirements to access the alternative areas is anticipated and would never be likely to be sufficiently high to result in any change in Thames Estuary and Marshes SPA/Ramsar site population sizes of the species affected.

Table 7.10 Predicted change in baseline functionality of the functionally linked land as a result of the Project disturbance alone

Land affected by the Project	**Functionality (as described in paragraph 4.2.12)**		
	Existing	**Construction**	**Operation**
Functionally linked land disturbed as a result of the Project	168	0	136
Mitigation area adjacent to Coalhouse Point	88	5,676	5,676
Mitigation area three arable fields	88	272	88
TOTALS	**344**	**5,948**	**5900**

Effect in-combination

7.2.37 Table 7.11 shows the other plans and projects within 1km (as described in paragraph 4.3.12) that have construction works within functionally linked land, in particular the intertidal habitat. Figure 27 (Appendix A) shows the location of these projects. A number of the projects are already in progress as shown in the table and they all overlap temporally with, or immediately precede the Project.

7.2.38 Table 7.12 provides a simple comparison of the peak counts of the SPA/Ramsar site qualifying species using the intertidal habitat published within the application documentation of the projects already in progress, with those collected as part of the Project. The data indicates that the projects that have already completed works in the intertidal area, or that are ongoing, do not appear to have altered the use of the intertidal habitat. This is reflected in the peak counts recorded in more recent surveys which are within the range of the peak counts recorded in surveys before these intertidal projects' works occurred. While some species show an overall trend of slight declines in populations over the period, such declines are consistent with regional and national declines and the large variance between years of the peak count indicates that it is not a single local effect that is causing differences in annual peaks in numbers. If local disturbance were to be responsible for changes in annual populations, it would be expected to see a steady decline over the period rather than a highly fluctuating population. Table 7.12 also shows the range of peak counts recorded, which in turn shows that use of this particular stretch of intertidal habitat must be combined with use of with other areas as a more consistent range of peak counts would indicate obligatory use.

7.2.39 The Project provides enhanced habitat areas both north and south of the River Thames as part of the construction phase mitigation measures the efficacy of which has been demonstrated to maintain the baseline functionality of the functionally linked land associated with the Thames Estuary and Marshes Ramsar site and SPA. Therefore, in conjunction with the evidence, of the qualifying species tolerance of disturbance, presented in Table 7.12, an in-combination disturbance effect (with the other plans and projects listed in Table 7.11) within functionally linked land is unlikely to be any more significant than the Project alone.

Table 7.11 Projects with overlapping construction programmes to Lower Thames Crossing

	2025				**2026**				**2027**				**2028**				**2029**				**2030**			
Project	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Lower Thames Crossing																								
Thurrock Flexible Generation Plant	Coincides if three-phase construction programme taken forward																							
Thames Estuary 2100 Plan	2012 Start – exact projects in area not defined and may result in disturbance within functionally linked land																							
Thames Freeport – Port of Tilbury Tax Site	Undefined but developments within the area may overlap with LTC construction and may result in disturbance within functionally linked land																							
Goshem's Farm/ Ingrebourne Valley Limited 19/0051CV	Applications in area have been in operation since 2017. Currently predicted to continue jetty use, completing works within functionally linked land by 2032.																							

Table 7.12 Comparison of the overwinter peak counts of the SPA/Ramsar site qualifying species recorded for other projects within the intertidal area broadly between Tilbury Fort and Coalhouse Fort

			East Tilbury jetty at Goshem's Farm and the Ingrebourne Valley Limited jetty use/ works approximate start and ongoing. Arrow indicates when project has begun work within the intertidal zone.			**Tilbury2 approximate date of works completed. Arrow indicates when project began work within the intertidal zone.**		
Project name	**Mr Paul Larkin (Essex birder)**	**Ingrebourne Valley Limited jetty application**	**Tilbury2 DCO applicatio n**		**Thurrock Flexible Generation Plant (Tilbury Energy centre application)**	**Lower Thames Crossing Project**		**Thurrock Flexible Generation Plant DCO application**
Survey years	**2014-2017**	**2016-2017 (Nov-Jan)**	**2016-2017**		**2017-2018**	**2017-2019**		**2019-2020**
Avocet	119	900	11		200	830		44
Black-tailed godwit	178	13	4		721	408		333
Dunlin	928	590	36		2,000	1,575		255
Grey plover	16	23	8		60	56		4
Lapwing	199	7	154		4	130		12
Redshank	80	22	12		100	122		26
Ringed plover		40	44		60	75		48

Note – empty cells indicate no count provided in source data – presumed not present

Assessment of effect on integrity

7.2.40 The Project alone and in-combination could potentially affect the achievement of the following conservation objectives for the Thames Estuary and Marshes SPA and by proxy the Thames Estuary and Marshes Ramsar site:

a. The extent and distribution of the habitats of the qualifying features

b. The population of each of the qualifying features

c. The distribution of the qualifying features within the site

7.2.41 The Natural England supplementary advice (Natural England, 2018) to the conservation objectives for the Thames Estuary and Marshes SPA/Ramsar site includes supporting attributes and targets, as set out in Table 5.3, that could be affected by the Project.

7.2.42 The attributes have been reviewed against the effects of the Project (as set out in Section 7.1) and based on the targets presented in the supplementary advice have been refined to those considered when determining the effect of the Project on the integrity of each of the European sites. Table 7.13 provides a summary of that review.

Table 7.13 Summary of the review of attributes against the Project effects

Attribute	Consideration in assessment of adverse effects
Assemblage of species: abundance Assemblage of species: diversity Non-breeding population: abundance	The targets for these attributes relate to the population numbers and diversity of species for the European site. The mitigation measures are such that the effects of the Project would not indirectly affect the numbers or diversity of species as a result of loss of function of suitable habitat, including changes in the energy requirements for species to use alternative suitable habitats. Therefore, the Project would not interfere with the achievement of the conservation objective '*The population of each of the qualifying features*'.
Connectivity with supporting habitats	The target to maintain safe passage between feeding and roosting areas has been maintained through provision of mitigation habitats in adjacent areas accessible to the qualifying features.
Disturbance caused by human activity	The provision of mitigation measures reduces the potential for disturbance of qualifying features and then maintains the functionality of retained habitats which together avoid any significant disturbance effect whilst the birds are roosting, foraging, feeding, moulting and/or loafing within functionally linked land.
Supporting habitat: conservation measures	The effects of the Project would not compromise the targets or undermine any necessary conservation measures set out in the Site Improvement Plan (Natural England, 2014).
Supporting habitat: extent and distribution of supporting habitat for the non-breeding season	The mitigation measures provided by the Project to maintain the functionality of habitats within the functionally linked land mean that the Project would not interfere with the achievement of the conservation objective '*The extent and distribution of the habitats of the qualifying features*'.

Attribute	Consideration in assessment of adverse effects
Supporting habitat: food availability (bird)	All of these attributes relating to supporting habitat have targets that could only be affected by the Project if the overarching extent and distribution target is affected. The mitigation measures provided by the Project to maintain the functionality of habitats within the functionally linked land mean that the Project would not interfere with the achievement of the conservation objective '*The extent and distribution of the habitats of the qualifying features*'.
Supporting habitat: landform	
Supporting habitat: landscape	
Supporting habitat: quality of supporting non-breeding habitat	
Supporting habitat: vegetation characteristics	
Supporting habitat: vegetation characteristics for nesting	
Supporting habitat: vegetation characteristics for roosting	

The extent and distribution of the habitats of the qualifying features

7.2.43 The Natural England supplementary advice for the Thames Estuary and Marshes SPA provides the following targets associated with this conservation objective.

a. Thames Estuary and Marshes SPA. Supporting habitat: extent and distribution of supporting habitat for the non-breeding season.
Maintain the extent, distribution and availability of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding) at the following:

i.	Intertidal sand and muddy sand	1.16 ha
ii.	Intertidal mixed sediment	0.61 ha
iii.	Coastal reedbeds	30.83 ha
iv.	Coastal lagoons	136.64 ha
v.	Freshwater and coastal grazing marsh	1,126.11 ha
vi.	Saltmarsh	108.14 ha

7.2.44 The Project would not result in any direct habitat loss from within the Thames Estuary and Marshes SPA/Ramsar site. The habitat loss is entirely within functionally linked land and comprises agricultural land (grassland and arable). These habitats are not listed with a target in the supplementary advice although the survey data for this Project show their use by the overwintering assemblage, primarily lapwing. Table 7.14 shows that baseline functionality of the functionally linked land is not adversely affected by the Project alone, or in-combination with other plans and projects. Therefore, the functionally linked land would continue to support the overwintering assemblage for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding), therefore the Project would not interfere with this conservation objective.

Table 7.14 Predicted change in baseline functionality of the functionally linked land as a result of the Project alone and in-combination with other plans and projects

	Functionality (as described in paragraph 4.2.12)		
	Existing	**Construction**	**Operation**
Project alone			
Functionally linked land within Order Limits (Project land take)	1,323	0	1204[23]
Functionally linked land disturbed by Project	168	0	136
Mitigation area adjacent to Coalhouse Fort	88	5,676	5,676
Mitigation area three arable fields	88	272	88
Other plans and projects			
Functionally linked land within the red line boundaries of other plans and projects (potential land take)	408	0	0[24]
20/00971/FUL – Essex Wildlife Trust Fobbing Marshes Restoration	1,414	14,417	14,417
Total	**3489**	**20,365**	**21,521**

The population of the qualifying features

7.2.45 The Natural England supplementary advice (Natural England, 2018) includes attributes relating to the abundance and diversity of the assemblage and the abundance of the non-breeding population. The population targets for the Thames Estuary and Marshes SPA assemblage and qualifying features are presented in Table 5.12 and Table 7.15 to provide a comparison between the estimated current population of the European site and the targets set out within the supplementary advice.

[23] This is the predicted functionality of the land that had been used during construction but returned to land owner, i.e. not part of the Project environmental design (as shown on ES Figure 2.4: Environmental Masterplan (Application Document 6.2) The measure of functionality for these areas was assumed to be the same as the area before construction occurs.
[24] No information available for the other plans and projects therefore assume no habitat restored or enhanced as a worst case.

7.2.46 Table 7.15 shows that most of the qualifying features are currently estimated to be meeting or exceeding the targets set for the Thames Estuary and Marsh SPA. This suggests therefore that conditions within and around the site are optimal to support the overwintering populations of these species.

Table 7.15 Comparison of the estimated current populations with the targets for the Thames Estuary and Marshes SPA

Qualifying feature (all overwintering/ passage unless otherwise specified)	Estimated current population	Target population	Target as defined in the supplementary advice
Avocet	982	283	Maintain the size of the non-breeding population at a level which is above 283, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
Black-tailed godwit	10,262	1,699	Maintain the size of the non-breeding population at a level which is above 1,699, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
Dunlin	33,500	29,646	Restore the size of the non-breeding population to a level which is above 29,646, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
Grey plover	2,074	2,593	Restore the size of the non-breeding population to a level which is above 2,593, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
Knot	4,266	4,848	Restore the size of the non-breeding population to a level which is above 4,848, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
Lapwing	1,825	-	Not available
Redshank	2,688	3,251	Restore the size of the non-breeding population to a level which is above 3,251, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
Ringed plover	834	1,324	Restore the size of the non-breeding population to a level which is above 1,324, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
Waterbird assemblage	75,769	75,019	Maintain the overall abundance of the assemblage at a level which is above 75,019 birds, whilst avoiding deterioration from its current level as indicated by the latest peak mean count or equivalent.

7.2.47 The effects of the Project could theoretically change the numbers or diversity of species indirectly through loss of functionality of suitable habitat and increased energy requirements to use alternative habitat. However, the provision of mitigation to reduce disturbance and maintain functionality of the functionally linked land means that any change in the energy requirements to use alternative habitat is considered to be inconsequential. It is therefore predicted that there would be no appreciable change from the effects of the Project, in the populations of the qualifying features to which the affected individuals contribute. Consequently, the Project would not interfere with this conservation objective.

The distribution of the qualifying features within the site

7.2.48 The objective of maintaining distribution of the qualifying features within the site is taken to relate to the effects of disturbance on qualifying features' ability to make use of suitable habitats available to them, as the extent and distribution of the habitats of the qualifying features has a separate objective. The Natural England supplementary advice provides the following target relating to disturbance for the Thames Estuary and Marshes SPA:

a. Reduce the frequency, duration and/or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed during the non-breeding (winter and/or passage) season and where relevant, breeding season.

   Significant disturbance is further defined in the supporting notes as follows: Disturbance should be judged as significant if an action (alone or in combination with other effects) impacts on (water) birds in such a way as to be likely to cause impacts on populations of a species through either:

   i. changed local distribution on a continuing basis

   ii. changed local abundance on a sustained basis

   iii. the reduction of ability of any significant group of birds to survive, breed, or rear their young.

7.2.49 The mitigation measures to avoid and reduce the changes in noise and visual stimuli mean that the works are highly unlikely to result in disturbance response from the birds that would change local distribution. This is supported by the review of the historical data presented in Table 7.12 in relation to how the peak counts of each qualifying species within the intertidal areas do not appear to have changed despite the construction and operation of the jetties at Tilbury2 as well as the East Tilbury jetty at Goshem's Farm and the smaller Ingrebourne Valley Limited jetty.

7.2.50 The mitigation measures also include constraints on work within the intertidal zone to avoid the overwintering season and periods of prolonged severe cold weather. Both of these measures specifically avoid disturbance to the birds at times that could reduce the ability of any significant group of birds to survive and are secured through inclusion in the REAC (Application Document 6.3).

7.2.51 The provision of enhanced habitat (as described in paragraphs 7.1.23 and 7.1.24), north and south of the River Thames throughout the construction phase and north of the river permanently, ensures that alternative habitat is available and maintains the functionality of the functionally linked land. Therefore, even if individuals are displaced through a disturbance response, the availability of enhanced habitat in adjacent areas means that the energetic requirements would not be out of the daily norm and therefore the ability of any significant group of birds to survive, breed or rear young would not be reduced. The Project therefore cannot be considered to undermine achieving the conservation objective relating to the distribution of qualifying species of the Thames Estuary and Marshes SPA or the Thames Estuary and Marshes Ramsar site.

Conclusion

7.2.52 The conservation objectives of the Thames Estuary and Marshes SPA, and by proxy the Thames Estuary and Marshes Ramsar site, would not be undermined by the construction and operation of the Project alone or in-combination with other plans and projects. Consequently, it is concluded that the Project alone or in-combination with other plans and projects would not have an adverse effect on the integrity of the Thames Estuary and Marshes SPA or the Thames Estuary and Marshes Ramsar site.

Epping Forest SAC

7.2.53 There is a risk of LSE on the Epping Forest SAC as a result of the Project due to the changes in air quality as a result of vehicle emissions in operation.

Magnitude/significance of effect

Changes in air quality as a result of vehicle emissions in operation

Effect alone

7.2.54 This section describes the effects of the Project alone, to distinguish it from the in-combination assessment presented in paragraphs 7.2.58 to 7.2.62. It is recognised that the assessment here (as described in paragraph 4.3.8) is of the changes in vehicle emissions as a result of the Project in-combination (rather than strictly ‘alone’) with other plans and projects that would contribute traffic into the modelled road network. This is due to the way traffic figures are generated using government traffic growth forecasts and is the most appropriate data available for estimating Project effects alone.

7.2.55 The change in N deposition is greater than 0.4kg N $ha^{-1}yr^{-1}$ at sample points within the Epping Forest SAC and this could theoretically lead to the loss of one species (as described in paragraph 4.2.2), although this is not treated as a single criterion to assess effects on integrity. The species recorded during the survey in the area, where that N deposition change is predicted to be greater than 0.4kg N $ha^{-1}yr^{-1}$, did not include any that were sensitive to N deposition (as described in paragraphs 5.3.25 to 5.3.27 and Appendix D). Therefore, this habitat is considered to be resilient to this impact and no loss of species is anticipated as a result of this change in N deposition. The other factors that influence this assessment have been considered as set out in Table 7.16.

Table 7.16 Consideration of other factors for Epping Forest SAC

Other factors considered	Epping Forest
What conditions is the habitat affected currently exposed to (e.g. existing exceedance of critical load)?	Air Pollution Information System nitrogen critical loads for this part of the SAC[25] (10-20kg N $ha^{-1}yr^{-1}$) are exceeded with the three year (2018-2020) average deposition 38.78kg N $ha^{-1}yr^{-1}$ and the exceedance of critical load ranging from 28.78 to 18.78kg N $ha^{-1}yr^{-1}$.
What is the area and quality of the habitat affected as a proportion of the qualifying habitat within the European site?	Site is 1,630.74ha. Extent of qualifying habitat (H9120) within the site is 652.3ha Approximately 1.1ha affected by changes >1%. Approximately 0.3ha where change is >0.4kg N $ha^{-1}yr^{-1}$. The survey work indicated that the habitat within this part of the SAC was representative of the qualifying habitat (H9120 Beech forests), however the quality was low, and no nitrogen-sensitive species were recorded.
Will there be any direct loss of habitat or change to the distribution of such habitats?	No direct loss or change in distribution is predicted to occur.
What is the predicted duration of the impact	Timescale of the impact was predicted to be 4 years.
Are N deposition / NOx operational changes predicted below the current baseline deposition levels (e.g. due to technological improvements in vehicle emissions between now and the time the Project is operational)?	The DS scenario (i.e. with the Project in place) for N deposition was predicted to equal or be slightly less than the baseline (current) situation. The AQ modelling used a conservative estimate when predicting the future changes in background N deposition and assumes no change between the base year (2016) and opening year (2030), i.e. does not consider improvements from technology. With the anticipated improvements in technology regarding vehicle emissions, the predicted N deposition with the Project (DS scenario) is in reality likely to be lower than calculated and below the current baseline levels.
Using professional judgement, taking into account the above factors, will there be a reduction in habitat area that significantly contributes to the favourable conservation status of the European site?	The habitat composition of the area affected by the predicted change in N deposition is not considered likely to change given the lack of nitrogen-sensitive species recorded and the small increase in deposition predicted. Therefore, it is considered that the conservation status of that part of the site would not change as a result.

7.2.56 The extent of qualifying habitat potentially affected by changes in N deposition within Epping Forest SAC has been calculated and the proportions in relation to each of these sites shown in Table 7.17.

[25] Data from APIS Search by Location tool. Grid reference used for area affected in Epping Forest - TL445009

Table 7.17 Proportions of habitat affected in Epping Forest SAC

Extent of the SAC	Total area of SAC (ha)	1,630.74
	Proportion of habitat affected by changes in N deposition of >1% LCL (%)	0.07
	Proportion of habitat affected by changes in N deposition of >0.4kg N ha^{-1} yr^{-1} (%)	0.02
Extent of the qualifying habitat	Total area of qualifying habitat within SAC (ha)	652.3
	Proportion of habitat affected by changes in N deposition of >1% LCL (%)	0.17
	Proportion of habitat affected by changes in N deposition of >0.4kg N ha^{-1} yr^{-1} (%)	0.05

7.2.57 The nitrogen critical loads for Epping Forest are currently already exceeded, and have been increasing with time (note the increase in three year average between 2017-2019 and 2018-2020). Table 7.18 provides a summary of the extent of these in comparison to the change predicted as a result of the Project.

Table 7.18 Comparison of the exceedances of critical loads for Epping Forest SAC with the predicted change as a result of the Project

Baseline conditions	Relevant LCL kg N $ha^{-1}yr^{-1}$	10
	Three- year (2017-2019) average deposition kg N $ha^{-1}yr^{-1}$ (Baseline used within Project AQ model)	30.10
	Three-year (2018-2020) average deposition[26] kg N $ha^{-1}yr^{-1}$ (Current APIS Baseline)	38.78
	Maximum range of exceedance of critical loads[23] kg N $ha^{-1}yr^{-1}$ (APIS current deposition data)	28.78
	Maximum range of exceedance of critical loads as a percentage of the LCL	288%
Do minimum scenario at opening year	Maximum total nitrogen deposition at opening year (Do Minimum scenario) kg N $ha^{-1}yr^{-1}$	58.53
	Maximum range of exceedance of critical loads as a percentage of the LCL (Do Minimum scenario)	585%
Do something scenario at opening year	Maximum total nitrogen deposition at opening year (Do Something scenario) kg N $ha^{-1}yr^{-1}$	59.53
	Maximum change in N deposition as a result of the Project (Do Something scenario) kg N $ha^{-1}yr^{-1}$	1.01
	Change in N deposition as a result of the Project (Do Something scenario) as a percentage of the LCL	10.1%

[26] N deposition data from APIS Search by Location tool (https://www.apis.ac.uk/search-location). Grid reference, TL445009, for area affected in Epping Forest was used.

Effect in-combination

7.2.58 The contribution of changes in traffic from other plans or projects has already been considered with the 'Effects of the Project alone' assessment, as the data used within the traffic model takes into account predicted changes in traffic from other plans and projects. The other plans and projects identified within the search areas were primarily on the National Infrastructure Commission's programme of projects and the Environment Agency's list of permit applications.

7.2.59 The Environment Agency's list of permit applications did not include any future permit applications that would have coincided with the Project opening year, 2030. However, any EA permits, once granted, would have a variety of thresholds for emissions to air which aim to protect the surrounding environment.

7.2.60 Therefore, the projects identified within this assessment are considered to be a reasonable representation of the other plans or projects likely to have an effect on N deposition in-combination with the Project. The locations are shown on Figure 23, and are as follows:

a. North London Heat and Power Project. An NSIP that was granted development consent in February 2017. It is an energy recovery facility located at the Edmonton EcoPark and will replace the existing Energy from Waste facility. The site is currently under construction and predicted to be operational from 2025. It is approximately 12km south-west of the area of the Epping Forest SAC affected by the Applicants Project.

7.2.61 Other plans or projects and the respective contributions to N deposition within the search area around Epping Forest SAC are shown in Table 7.19. The list of plans and projects is limited to where data on N deposition was available or where a reasonable proxy could be used.

Table 7.19 Contribution to N deposition on Epping Forest SAC from the Project in-combination with other plans and projects

Background deposition kg N $ha^{-1}yr^{-1}$	LCL of habitat affected by the Project alone kg N $ha^{-1}yr^{-1}$	Project alone kg N $ha^{-1}yr^{-1}$	Other plans or projects	Total combined potential deposition kg N $ha^{-1}yr^{-1}$
			North London Heat and Power Project kg N $ha^{-1}yr^{-1}$	
30.01	10	1.01	0.076	31.09

7.2.62 Table 7.19 shows that the background N deposition (30.01kg Nha^{-1}yr^{-1}) at Epping Forest far exceeds the LCL for the habitat type potentially affected by the Project alone. The combined change in N deposition of all the projects identified (see Table 7.19) is 1.086kg Nha^{-1}yr^{-1}, 10.86% of the LCL. The duration of effect from the Project alone is considered short term as the NOx emissions are equal to the DM scenario after 4 years. The length of time the Project could act in-combination with other plans and projects is limited to 4 years and therefore the changes in nitrogen deposition would be inconsequential to the receiving habitats. Also, the detailed site investigations completed as part of the assessment of the Project alone indicate that the habitat within the SAC potentially affected by the Project did not support any nitrogen-sensitive species, suggesting that further changes in N deposition would not result in the loss of one species.

Assessment of effect on integrity

7.2.63 The conservation objectives for the Epping Forest include attributes and targets relating to air quality and the assessment of effect on the integrity of the sites is judged on the basis of whether the Project would undermine these targets being achieved. The Project has the potential to result in a reduction in habitat area which could affect the following conservation objectives:

a. The supporting processes on which the qualifying natural habitats rely

b. The extent and distribution of the qualifying natural habitats

c. The structure and function (including typical species) of the qualifying natural habitats

7.2.64 The supplementary advice for Epping Forest SAC (Natural England, 2019a) included an air quality attribute and related target and has a restore target for the concentrations and deposition of air pollutants, to below or equal to the site-relevant critical load. The predicted N deposition with the Project in place is slightly higher than the Do Minimum scenario, but both scenarios predict N deposition equal to or less than the baseline, due to predicted improvements in vehicle emissions.

7.2.65 The site-relevant critical loads are currently exceeded by over 280% and the contribution of the Project to the N deposition on the site, alone and in combination, would be small (<5%). Although the Project would result in a slightly higher N deposition than would occur in the Do Minimum scenario, this would occur only within a very small proportion of the site (0.07%) and there would be no slowing of progress towards the target by any material degree. Progress to achieving this target is affected by a variety of factors and vehicle emissions are only part of the source of the site-relevant pollutants. The Project would contribute a very small proportion of the very substantial decreases in N deposition that would be required to meet this target and would affect only a very small proportion of the site. Achievement of the restore target would require many years of sustained significant reductions in pollution that would likely require new national policy and wholesale behavioural changes.

7.2.66 The improvement in vehicle emissions and the potential for habitats to improve in quality, are discussed in paragraphs 5.4.7 to 5.4.12. It is considered that the effect the Project would have on air quality at this location is not material compared to the very substantial reductions (see Table 7.18) that would have to be achieved through changes such as improvements in vehicle emissions to bring the N deposition below site-relevant critical loads.

7.2.67 There are no pathways to an effect identified in terms of the extent or distribution of the qualifying habitats, the vegetation structure within them, or their function as woodland. Any air quality effect would not degrade the habitat to the extent that it would no longer be classified as that qualifying habitat. The qualifying habitat within the area affected by the changes in N deposition would not change in extent and distribution, or structure and function as a result of the Project.

7.2.68 The assessment has considered the effects of the Project alone and in combination as a result of a reduction/degradation in habitat and concluded that there would be no adverse effect on the integrity of the Epping Forest SAC in view of its conservation objectives.

7.3 Proposals for monitoring and reporting

7.3.1 The Applicant has committed to the following proposals for monitoring and reporting during the construction period. These would be secured through their inclusion in the Register of Environmental Actions and Commitments (REAC). The REAC is provided within the CoCP[27], ES Appendix 2.2 (Application Document 6.3).

7.3.2 **HR008**: Surveillance of groundwater levels will be carried out within the Thames Estuary and Marshes Ramsar site in the vicinity of the tunnelling works for the duration of the construction period at borehole locations to be agreed with SoS in consultation with Natural England and Environment Agency.
The contractors would complete an annual review, for the period of construction and first five years of operation, of the groundwater levels and consult on any implications for qualifying features of the Ramsar site, and any necessary remedial measures with Natural England and the Environment Agency.

7.3.3 **HR009**: Between 01 July and 30 April inclusive during each year of construction, the Contractors will undertake monthly bird survey surveillance visits from fixed vantage points to observe functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar (as identified in Figure 2) that lies within 300m of the Order Limits of the Project. The surveys will record numbers of waterfowl present and any behaviours in response to disturbance stimuli (including no response) to a specification developed in consultation with Natural England.
If the bird surveillance visits show a change in bird behaviour, the Contractors will investigate if this is attributable to construction activities, and if this is agreed with the Secretary of State, after consultation with Natural England, the Contractors will review mitigation measures in consultation with Natural England.

7.4 Consultation on Stage 2 Appropriate Assessment conclusions

Pre-application consultation

7.4.1 Extensive statutory and non-statutory pre-application consultation has been carried out for the Project through options selection, design development and production of deliverables for the DCO application. A summary of key Project consultation milestones is provided in Table 7.20. The Consultation Report

[27] Requirement 4 in Schedule 2 (Part 1) of the DCO states that no part of the authorised development (the Project) is to commence until an Environmental Management Plan Iteration 2 (EMP2) (also referred to as the Construction EMP) in accordance with this CoCP has been submitted to and approved in writing by the Secretary of State following consultation with the relevant planning authority to the extent that it relates to the matters relevant to its function.

(Application Document 5.1) provides a full description of the consultation activities undertaken and the Project response to feedback received. The Natural England Statement of Common Ground (Application Document 5.4.1.6) will provide a summary of key issues identified by the stakeholder, and what has and has not been agreed.

Table 7.20 Key Project pre-application consultation milestones

Date	Project consultation description
21 May to 16 July 2013	Non-statutory public consultation considering the need for a new Lower Thames Crossing and inviting views on three locations and one variant.
July 2014	Response from Department for Transport – Government commissioned National Highways (then known as Highways England) to carry out more detailed assessment of Options A and C (with or without C variant).
September 2014 to December 2015	Programme of engagement to determine constraints/priorities, which would affect the identification and development of feasible options for a new Lower Thames Crossing.
26 January to 24 March 2016	Non-statutory public consultation to present shortlisted routes that performed satisfactorily against the Project objectives and were considered viable.
12 April 2017	Preferred Route (PR) announced. Further design development and refinement resulting in further changes to proposals presented in PR.
10 October to 20 December 2018	Statutory Consultation to invite comment on updated set of proposals for PR. A PEIR and non-technical summary were published to support consultation.
29 January to 2 April 2020	Supplementary Consultation on proposed changes to Project design since consultation in 2018. Included Environmental Impacts Update which presented expected effects on environment and outlined mitigation measures.
14 July to 12 August 2020	Design Refinement Consultation on proposed changes to the Project design following earlier consultation feedback, discussions with local stakeholders, ongoing design development and new technical data.
14 July to 8 September 2021	Community Impacts Consultation on the impacts of the Project and how they would be reduced, as well as the changes to the Project since the Design Refinement Consultation.
12 May to 20 June 2022	Local Refinement Consultation on the Project developments that will improve the improve the Project for local people, compensate for potential air quality impacts on sensitive habitats and reduce carbon during construction.

7.4.2 Consultation with Natural England has been carried out throughout the Project milestones presented in Table 7.20 through Project optioneering, environmental scoping and the HRA development. The feedback received through engagement with Natural England has informed the scope and content of the HRA. A complete record of consultation and correspondence with Natural England in relation to the HRA development is provided in Appendix C Evidence Plan.

Options selection stage consultation

7.4.3 Natural England was consulted on early design options, development and assessment of shortlisted routes for the Project between 2013 and 2016. A number of workshops were held with Statutory Environmental Bodies (SEBs) including Natural England to discuss route options in 2015 and 2016. This included early proposals for the approach to HRA. Natural England bilateral meetings were conducted to provide frequent Project updates, initial findings of environmental appraisals and to gain feedback on the HRA approach. Additionally, ecological survey methodologies including ornithology were consulted on to gain baseline data for the HRA. The record of relevant correspondence with Natural England during options selection is provided in Appendix C.

Environmental scoping

7.4.4 A draft EIA Scoping Report for comment was issued to Natural England in November 2017 following the announcement of a Preferred Route. A PEIR, detailing the intention to prepare a report to inform the HRA, was issued to Natural England during Statutory Consultation conducted between October and December 2018. Consultation with Natural England continued on key ecological survey methodologies, including ornithology surveys. SEB workshops and specific Natural England meetings were continued through 2018 and 2019 with the ongoing discussion on HRA and designated sites included as a key focus area on the heat map (colour-coded tracker of discussion items).

HRA development

7.4.5 Regular HRA-specific meetings with Natural England began in November 2019 and are ongoing to focus on key aspects of the HRA assessment as it was developed. Between February and August 2020, twelve HRA document packages were issued to Natural England for comment, providing detailed briefing notes on proposed HRA methodology assessments as well as further background / baseline information. The progression of assessments and early results were discussed during the calls with Natural England as they became available.

7.4.6 In addition, reiterations of the Evidence Base (developed into the Evidence Plan provided in Appendix C); a Natural England comment response tracker; and the draft SoCG HRA tracker have been issued to Natural England for information and comment.

7.4.7 Natural England has also been consulted on a number of EIA topics and underpinning assessments closely linked to the HRA, including terrestrial and marine biodiversity; air quality; noise and vibration; road drainage and the water environment; cumulative impacts; and traffic modelling. This included attendance at meetings and workshops as well as being provided with documents for comment such as design options papers. The record of relevant correspondence with Natural England for these wider topics related to HRA is provided in Appendix C.

Provision of draft reports

7.4.8 The Evidence Plan has been the primary vehicle for consultation with Natural England and for recording feedback and agreement with the assessment conclusions. Natural England confirmed that it is satisfied with the list of European sites identified.

7.4.9 Draft HRA reports have been shared with Natural England throughout the Project development and these are described within the Evidence Plan in Appendix C.

7.4.10 A draft HRA report was provided to Natural England for comment on 06 August 2021 (named for the purposes of the engagement with Natural England at that time the “Early sight draft”). Its purpose was to enable the Applicant to have due regard to any representations made by Natural England prior to the submission of the final Pre-Application draft on 25 July 2022. Ongoing engagement with Natural England has occurred with the development of the Pre-Application draft in the form of fortnightly meetings and sharing of technical notes as documented within the Evidence Plan in Appendix C

7.4.11 To facilitate this, and to focus on the key conclusions of the assessment, Table 7.21 provides a summary of the conclusions within the HRA, and Natural England’s comment on their agreement with each conclusion. The list of conclusions is also used within the Statement of Common Ground (Application Document 5.4.1.6) which reports the positions of the Applicant and Natural England in relation to this matter.

Table 7.21 Agreement of Natural England with effect on integrity conclusions

Site	Effect pathway	Effect on integrity conclusion	Agreement of Natural England with conclusion (Natural England has provided confirmation of this text as part of the ongoing SoCG process)
Thames Estuary and Marshes SPA/Ramsar site	Reduction in habitat area (within the Ramsar site)	No adverse effect on integrity as a result of: • Changes in surface water quality and quantity – construction (southern tunnel entrance compound)	Natural England confirms agreement
	Reduction in habitat area (within functionally linked land)	No adverse effect on integrity as a result of: • Land take in the terrestrial and aquatic environment (within functionally linked land)	The conclusion is under discussion with Natural England see SoCG table 2.1 Item 2.1.93 Application Document 5.4.1.6.
	Disturbance to species (within the Ramsar site and functionally linked land)	No adverse effect on integrity as a result of: • Changes in noise and vibration – construction works and vehicles • Changes in visual disturbance – construction (people/machines in eyeline) • Changes in noise and vibration – operation • Changes in visual disturbance – operation (vehicles in eyeline)	The conclusion is under discussion with Natural England see SoCG table 2.1 Item 2.1.93 Application Document 5.4.1.6.
		No adverse effect on integrity as a result of: • Changes in recreational disturbance at Tilbury Fields	Natural England confirms agreement

Site	Effect pathway	Effect on integrity conclusion	Agreement of Natural England with conclusion (Natural England has provided confirmation of this text as part of the ongoing SoCG process)
Epping Forest SAC	Reduction in habitat area	No adverse effect on integrity as a result of: Change in air quality – vehicle emissions – operation	This conclusion is not agreed with Natural England. Natural England have confirmed they would agree this conclusion if the “without prejudice” mitigation measures are implemented in an enforceable manner (see SOCG Table 2.1 Item 2.1.94, Application Document 5.4.1.6).

7.5 Conclusion of Stage 2 Appropriate Assessment

7.5.1 This HRA has been completed using the standard described within DMRB LA 115 Habitats Regulations Assessment (Highways England, et al., 2020a), which sets out the requirements for assessment and reporting of the implications from construction, operation and maintenance of highways and/or road projects on European sites. These assessments are compatible with and incorporate relevant guidance from Natural England and the Planning Inspectorate's Advice Notes.

7.5.2 The HRA Stage 2 Appropriate Assessment assesses the likely significant effects of the Project, in combination with other plans or projects, on the integrity of the Thames Estuary and Marshes SPA; the Thames Estuary and Marshes Ramsar site and the Epping Forest SAC.

7.5.3 The Applicant's Appropriate Assessment concludes, beyond reasonable scientific doubt, that the Project will not adversely affect the integrity of the Thames Estuary and Marshes SPA and the Thames Estuary and Marshes Ramsar site during its construction or operational phases, either alone or in combination with other plans or projects. Natural England have been consulted and are in agreement within this conclusion.

7.5.4 The Applicant's Appropriate Assessment concludes, beyond reasonable scientific doubt, that the Project will not adversely affect the integrity of the Epping Forest SAC during its construction or operational phases, either alone or in combination with other plans or projects. Natural England have been consulted and have advised that mitigation measures should be implemented. A mitigation measure has been assessed on a 'without prejudice' basis, shown to be feasible and would reduce the impact to below screening thresholds (see Annex A.7 of the Natural England Statement of Common Ground, Application Document 5.4.1.6). Further, Natural England has agreed that the mitigation measure would be appropriate and, if required to be implemented by the competent authority, would avoid any adverse effects on the integrity of Epping Forest SAC, thereby enabling the competent authority to conclude that there would be no adverse effects on the integrity of Epping Forest SAC.

8 Stage 3 Derogation

8.1.1 The Applicant has concluded there would be no adverse effects on the integrity of any European site, and accordingly there is no requirement for consideration of derogation at Stage 3. At the time of completion of this report, Natural England does not agree with the conclusion of the Stage 2 Appropriate Assessment in respect of Epping Forest SAC only.

8.1.2 In the event that the competent authority does not agree with the conclusions of the report, there would in any event be no need to employ Stage 3 Derogation of the HRA process as a mitigation measure has been assessed on a ‘without prejudice’ basis, shown to be feasible and would reduce the impact to below screening thresholds (see Annex A.7 of the Natural England Statement of Common Ground, Application Document 5.4.1.6). Further, Natural England has agreed that the mitigation measure would be appropriate and, if required to be implemented by the competent authority, would avoid any adverse effects on the integrity of Epping Forest SAC, thereby enabling the competent authority to complete the HRA process at Stage 2.

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Glossary

Term	Abbreviation	Explanation
2030 Opening year	**-**	A modelled year in the Project's LTAM traffic model in which traffic flows and costs are estimated when the Project is opened
2045 Design year	**-**	A modelled year in the Project's LTAM traffic model in which traffic flows and costs are estimated on which the Project design is based
Annual Average Daily Traffic	**AADT**	An estimate of the average daily traffic along a defined segment of roadway. This value is calculated from short-term counts taken along the same section, which are then factored to produce the estimate of AADT. Because of this process, the most recent AADT for any given roadway will always be for the previous year.
Affected Road Network	**ARN**	In air quality assessment, the network of roads to be considered within the air quality model (selection of the roads within the model depends on a number of criteria such as changes in Heavy Duty Vehicle flows).
Alignment	**-**	The horizontal (lateral) or vertical (height) position of a road. It can be defined by a series of horizontal tangents and curves or vertical crest and sag curves, and the gradients connecting them.
Above ordnance datum	**AOD**	Vertical datum used by an ordnance survey as the basis for delivering altitudes on maps
Air pollution information system	**APIS**	A website managed by the Centre for Ecology and Hydrology, providing a searchable database and information on pollutants and their impacts on habitats and species.
British Trust for Ornithology	**BTO**	An organisation founded in 1932 for the study of birds in the British Isles.
Closed-circuit television	**CCTV**	Closed-circuit television. National Highways CCTV cameras are used to monitor traffic flows on the English motorway and trunk road network primarily for the purposes of traffic management.
Cumulative Effects Assessment	**CEA**	Incremental effects that result from the accumulation of a number of individual effects, either caused by different types of effect from the same project (intra-project effects), or by the interactions between the likely effects of other reasonably foreseeable developments with the likely effects of the proposed project (inter-project effects).
Centre for Ecology and Hydrology	**CEH**	The UK Centre for Ecology & Hydrology is an independent, not-for-profit research institute, carrying out excellent environmental science across water, land and air.
Construction Industry Research and Information Association	**CIRIA**	Construction Industry Research and Information Association: CIRIA is a neutral, independent, not-for-profit organisation that facilitates a range of collaborative activities to help improve the construction industry.
Code of Construction Practice	**CoCP**	Contains control measures and standards to be implemented by the Project, including those to avoid or reduce environmental effects.
Candidate Special Area of Conservation	**cSAC**	A site that has been submitted to the European Commission to be considered for designation under the Habitats Directive but not yet formally adopted.
Development Consent Order	**DCO**	Means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects (NSIP) under the Planning Act 2008.

Term	Abbreviation	Explanation
Department for Environment, Food and Rural Affairs	**Defra**	the government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the United Kingdom of Great Britain and Northern Ireland.
Department for Transport:	**DfT**	The government department responsible for the English transport network and a limited number of transport matters in Scotland, Wales and Northern Ireland that have not been devolved.
Do Minimum	**DM**	A scenario in which the Lower Thames Crossing is not constructed.
Design Manual for Roads and Bridges	**DMRB**	A comprehensive manual (comprising 15 volumes) which contains requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (National Highways, Transport Scotland, The Welsh Government or the Department for Regional Development (Northern Ireland)) is highway authority. The DMRB has been developed as a series of documents published by the Overseeing Organisations of England, Scotland, Wales and Northern Ireland. For the Lower Thames Crossing the Overseeing Organisation is National Highways.
Do Something	**DS**	A scenario in which the Lower Thames Crossing is constructed.
Environment Agency	**EA**	The Environment Agency was established under the Environment Act 1995, and is a Non-Departmental Public Body of Defra. The Environment Agency is the leading public body for protecting and improving the environment in England and Wales. The organisation is responsible for wide-ranging matters, including the management of all forms of flood risk, water resources, water quality, waste regulation, pollution control, inland fisheries, recreation, conservation and navigation of inland waterways.
Eastbound	**EB**	Direction of travel.
Environmental Impact Assessment:	**EIA**	A process by which information about environmental effects of a proposed development is collected, assessed and used to inform decision making. For certain projects, EIA is a statutory requirement, reported an Environmental Statement.
Environmental Statement	**ES**	A document produced to support an application for development consent that is subject to Environmental Impact Assessment (EIA), which sets out the likely impacts on the environment arising from the proposed development.
Environmental Systems Research Institute	**ESRI**	A geographic information system software
European Union	**EU**	A politico-economic union of 27 member states that are located primarily in Europe.
Flood Risk Assessment	**FRA**	An assessment of the risk of flooding from all flooding mechanisms, the identification of flood mitigation measures, and identification of actions to be taken before and during a flood.
Flood Storage Area	**FSA**	A natural or man-made area basin that temporarily fills with water during periods of high river levels.
Geographic information system	**GIS**	An integrated collection of computer software and data used to view and manage information about geographic places, analyse spatial relationships, and model spatial processes.
Groundwater Dependent Terrestrial Ecosystem	**GWDTE**	A wetland that critically depends on groundwater flows and chemistries to support sensitive ecosystems.

Term	Abbreviation	Explanation
Hectare	**Ha**	The hectare is an SI unit of area primarily used in the measurement of land as a metric replacement for the imperial acre. An acre is about 0.405ha and 1ha is about 2.47 acres.
Heavy Duty Vehicle	**HDV**	Freight vehicles of more than 3.5 tonnes (e.g. lorries) or passenger transport vehicles of more than eight seats (e.g. buses).
Heavy Goods Vehicle	**HGV**	A large, heavy motor vehicle used for transporting cargo.
Habitats Regulations Assessment	**HRA**	A tool developed by the European Commission to help competent authorities (as defined in the Habitats Regulations) to carry out assessment to ensure that a project, plan or policy will not have an adverse effect on the integrity of any Natura 2000 or European sites (Special Areas of Conservation, Special Protection Areas and Ramsar sites), (either in isolation or in combination with other plans and projects), and to begin to identify appropriate mitigation strategies where such effects were identified.
Inter-peak	**-**	An average hour within the Lower Thames transport model (LTAM) to represent an hour within the period 09:00–15:00.
Impact Risk Zone	**IRZ**	A GIS tool developed by Natural England to make a rapid initial assessment of the potential risks to SSSIs posed by development proposals
Ingrebourne Valley Limited	**IVL**	A leading land reclamation and restoration company in the south-east of England
LA 105 – Air quality	**-**	This document sets out the requirements for assessing and reporting the effects of highway projects on air quality.
LA 115 – Habitats Regulations Assessment	**-**	This document sets out the requirements for assessment and reporting of the implications, from construction, operation and maintenance, of highways and/or roads projects on European sites.
Lower critical load (air quality)	**LCL**	Provided by APIS for use to assess the risk of impacts of 'plans and projects on protected sites and other semi-natural areas.
Light-emitting diode	**LED**	A semiconductor device that emits visible light when an electric current passes through it.
Light Goods Vehicle	**LGV**	Vehicles meeting the Department for Transport VEH04 criteria.
Lower Thames Area Model	**LTAM**	Transport model designed to forecast impacts of providing additional road-based capacity across the River Thames at locations at or east of the existing Dartford Crossing.
Lower Thames Crossing	**LTC**	A proposed new crossing of the Thames Estuary linking the county of Kent with the county of Essex, at or east of the existing Dartford Crossing.
M25	**-**	Orbital motorway that encircles most of Greater London.
Multi-Agency Geographic Information for the Countryside	**MAGIC**	A website based source of geographic information about the natural environment from across government. The information covers rural, urban, coastal and marine environments across Great Britain. It is presented in an interactive map which can be explored using various mapping tools that are included. Natural England manages the service under the direction of a Steering Group who represent the MAGIC partnership organisations.
Mean Low Water	**MLW**	The average low tide mark

Term	Abbreviation	Explanation
Marine Management Organisation	**MMO**	An executive non-departmental public body in the UK established under the Marine and Coastal Access Act 2009. The MMO exists to make a significant contribution to sustainable development in the marine area, and to promote the UK government's vision for clean, healthy, safe, productive and biologically diverse oceans and seas.
Nitrogen	**N**	A chemical element
National Cycle Route	**NCR**	A cycle route part of the National Cycle Network created by Sustrans to encourage cycling throughout Britain
National Grid Electricity Transmission	**NGET**	A UK company that builds and maintains the electricity transmission network in England and Wales.
Nitrogen dioxide:	**NO2/ NO_2**	A reactive gas introduced into the environment by natural causes, including entry from the stratosphere, bacterial respiration, volcanos, and lightning. It is also introduced by the emissions of internal combustion engines burning fossil fuels.
Nitrogen oxide	**NOx**	Nitrogen oxide: A group of seven gases and compounds composed of nitrogen and oxygen, sometimes collectively known as NOx gases.
Nationally significant infrastructure project	**NSIP**	Major infrastructure developments in England and Wales, such as proposals for power plants, large renewable energy projects, new airports and airport extensions, major road projects etc.
Preliminary Environmental Information Report	**PEIR**	An early output of the EIA process, and part of the DCO application process.
PM peak period	**-**	The hours between 15:00-18:00 within the Project traffic model (LTAM).
Proposed Ramsar site	**pRamsar**	A proposed wetland of international importance, designated under the Ramsar Convention.
Public Right of Way	**PRoW**	A right possessed by the public, to pass along routes over land at all times. Although the land may be owned by a private individual, the public may still gain access across that land along a specific route. The mode of transport allowed differs according to the type of public right of way which consist of footpaths, bridleways and open and restricted byways.
Possible Special Area of Conservation	**pSAC**	Sites which are approved by Government that are in the process of being classified as Special Area of Conservation
Potential Special Protection Area:	**pSPA**	Sites which are approved by Government that are in the process of being classified as Special Protection Areas.
Ramsar site	**-**	Wetlands of international importance, designated under the Ramsar site Convention. Named after the city in Iran where the convention was signed.
Register of Environmental Actions and Commitments	**REAC**	The REAC identifies the environmental commitments that would be implemented during the construction and operational phases of the Project if the Development Consent Order is granted, and forms part of the Code of Construction Practice (Application Document 6.3, ES Appendix 2.2).
Royal Society for the Protection of Birds	**RSPB**	A charitable organisation that works to promote conservation and protection of birds and the wider environment through public awareness campaigns, petitions and through the operation of nature reserves throughout the United Kingdom.

Term	Abbreviation	Explanation
Special Area of Conservation:	**SAC**	Defined in the European Union's Habitats Directive (92/43/EEC), also known as the *Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora*. SACs are to protect the 220 habitats and approximately 1000 species listed in annex I and II of the directive which are considered to be of European interest following criteria given in the directive.
Site of community importance	**SCI**	Supporting natural habitats and species of community interest that are listed in the Annexes of the Habitats Directive. A site becomes an SCI when it has been submitted and adopted by the European Commission as an SAC but not yet designated by the government of the member state.
Statutory Environmental Body(ies)	**SEB(s)**	Statutory Environmental Body(ies): Any principal council as defined in subsection (1) of section 270 of the Local Government Act 1982 for the area where the land is situated. Where the land is situated in England; Natural England, Historic England, the Environment Agency, Natural Resources Wales and the National Assembly for Wales where, in the opinion of the Secretary of State, the land is sufficiently near to Wales to be of interest to them and any other public authority which has environmental responsibilities and which the Secretary of State considers likely to have an interest in the scheme.
Statement of Common Ground	**SoCG**	A Statement of Common Ground is a written statement containing factual information about the proposal which is the subject of the appeal that the appellant reasonably considers will not be disputed by the local planning authority.
Special Protection Area	**SPA**	A designation under the European Union Directive on the Conservation of Wild Birds.
Strategic road network	**SRN**	Strategic road network, the core road network, managed in England by National Highways
Site of Special Scientific Interest	**SSSI**	A conservation designation denoting an area of particular ecological or geological importance.
Sustainable drainage system	**SuDS**	A sustainable drainage system designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges.
Tunnel boring machine	**TBM**	Tunnel boring machine, machine used to excavate tunnels with a circular cross section.
United Kingdom Power Network	**UKPN**	An energy network operator. Owns and maintains the electricity cables in South East England, the East of England and London.
Variable Message Sign	**VMS**	A road sign able to display different messages, typically mounted on a portal gantry.
Vantage Point	**VP**	Ornithological survey term
Walkers, cyclists and horse riders	**WCH**	Walkers, cyclists and horse riders
Westbound	**WB**	Direction of travel.
Wetland Bird Survey	**WeBS**	The Wetland Bird Survey monitors non-breeding water birds in the UK. The principal aims of WeBS are to identify population sizes, determine trends in numbers and distribution, and identify important sites for water birds.
Water Framework Directive	**WFD**	A European Community Directive (2000/60/EC) of the European Parliament and council designed to integrate the way water bodies are managed across Europe.
Zone of Influence	**ZoI**	The area within which terrestrial biodiversity features could potentially be affected by the construction and/or operational phases of the Project.

Appendices

Appendix A Figures

Figure 1: European sites located with 2km of the Project

Figure 2: Functionally linked land

Figure 3: Location of project elements in relation to European sites and functionally linked land

Figure 4: Area within 30km of European sites, where bats are one of the qualifying interests, in relation to the Project

Figure 5: Location of European sites up or downstream of watercourses crossed by the Project.

Figure 6: Location of GWDTE and European sites in relation to the Project

Figure 7: European sites located within 200m of the Affected Road Network (ARN) – Operation 2027

Figure 8: European sites located within 200m of the Affected Road Network (ARN) - Construction

Figure 9: The spatial relationship between the SSSI Impact Risk Zones and the Project

Figure 10: Locations of survey areas where SPA/Ramsar site qualifying features recorded

Figure 11: Numbers of qualifying features (QF) recorded in each season

Figure 11a QF: Avocet Numbers recorded in each season

Figure 11b QF: Black-tailed godwit Numbers recorded in each season

Figure 11c QF: Dunlin Numbers recorded in each season

Figure 11d QF: Grey plover Numbers recorded in each season

Figure 11e QF: Knot Numbers recorded in each season

Figure 11f QF: Lapwing Numbers recorded in each season

Figure 11g QF: Redshank Numbers recorded in each season

Figure 11h QF: Ringed plover Numbers recorded in each season

Figure 11i QF: Overwinter assemblage Numbers recorded in each season

Figure 12: Location of VP surveys and distribution of records of SPA/Ramsar site species by season

Figure 13: Diurnal survey areas and distribution of records of SPA/Ramsar site species by season

Figure 14: Nocturnal survey areas and distribution of records of SPA/Ramsar site species (winter survey only)

Figure 15: Area where potential dust emissions coincide with European sites and the functionally linked land

Figure 16: Location of the compound CA3 construction drainage discharge in relation to the Thames Estuary and Marshes Ramsar site

Figure 17: South of the River Thames - Bird records (from Project ornithology field surveys) in potential disturbance areas (noise >55dB/>3dB change or visual change)

Figure 18: North of the River Thames - Bird records (from Project ornithology field surveys) in potential disturbance areas (noise >55dB/>3dB change or visual change)

Figure 19: Distribution of bird records (from Project ornithology field surveys) in habitats lost north of the River Thames

Figure 20: Distribution of bird records (from Project ornithology field surveys) in habitats lost south of the River Thames

Figure 21: Distribution of bird records (from Project ornithology field surveys) in the functionally linked land potentially disturbed during operation.

Figure 22: Predicted change in nitrogen deposition at European sites

A – Thames Estuary and Marshes Ramsar site

B – Epping Forest SAC

C – North Downs Woodlands SAC

Figure 23: Location of other plans and projects identified for air quality in combination assessment

A - Thames Estuary and Marshes Ramsar site

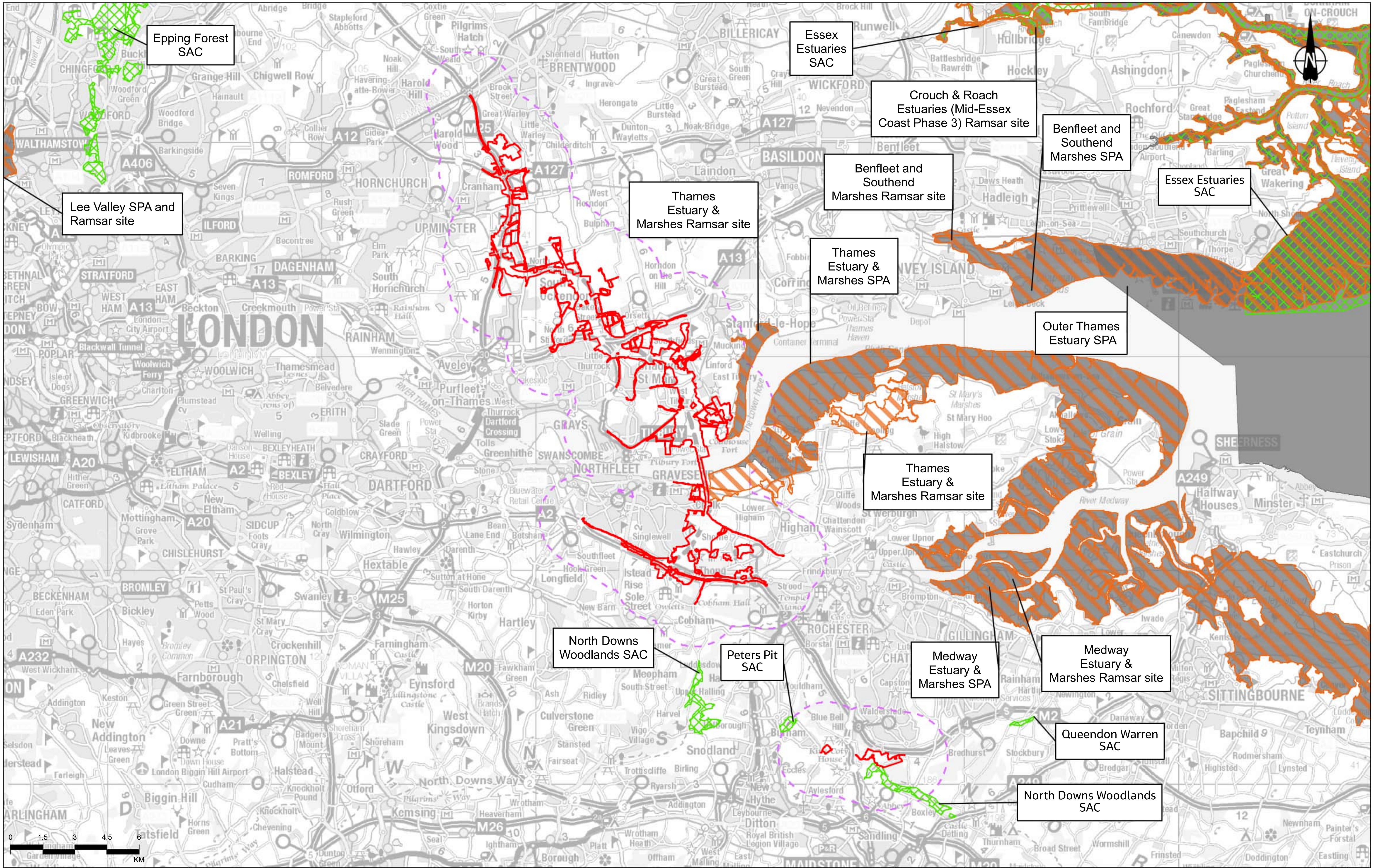
B – Epping Forest SAC

Figure 24: Location of the noise attenuation measures - construction

Figure 25: South of the River Thames - Bird records (from Project ornithology field surveys) in potential disturbance areas (noise >55dB/>3dB change or visual change) with noise attenuation measures

Figure 26: North of the River Thames - Bird records (from Project ornithology field surveys) in potential disturbance areas (noise >55dB/>3dB change or visual change) with noise attenuation measures

Figure 27: Location of other plans or projects considered within the in combination assessment (land take & disturbance)



Legend

- Order Limits
- Area within 2km of the Order Limits
- Ramsar site
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3 | Revision: P03

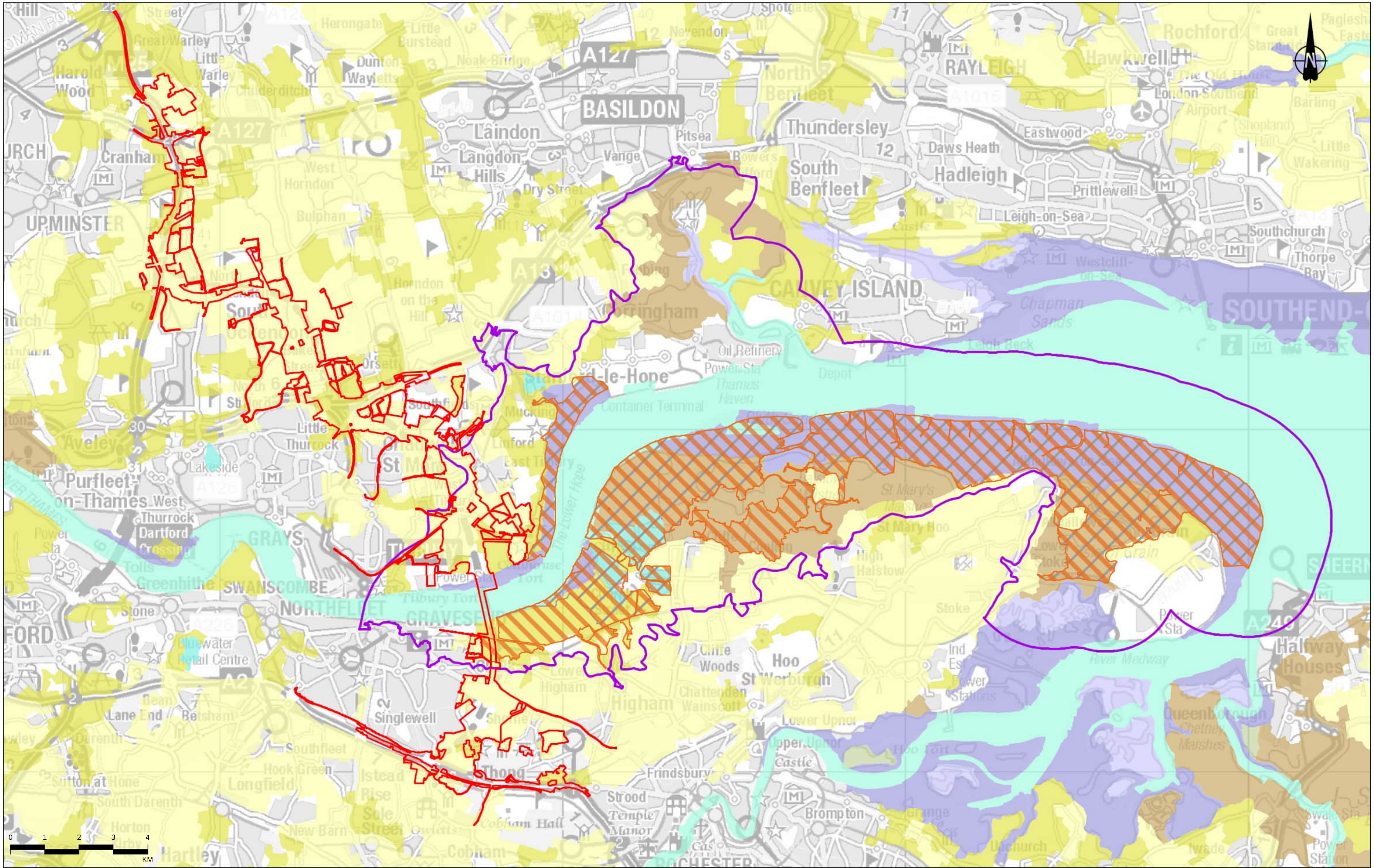
Application Document Number: TR010032/APP/6.5

Scale: 1:160,000

Drawing Title: Figure 1 - European Sites Located Within 2km of the Project

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60040

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 1 European sites located with 2km of the Project.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	25/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Thames Estuary & Marshes Special Protection Area
- Thames Estuary and Marshes Ramsar

Potential Suitable Habitats

- 211: Non-irrigated arable land
- 231: Pastures
- 321: Natural grasslands
- 411: Inland marshes
- 421: Salt marshes
- 423: Intertidal flats
- 512: Water bodies
- 522: Estuaries
- 523: Sea and ocean

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Application Document Number: TR010032/APP/6.5

Original Size: A3

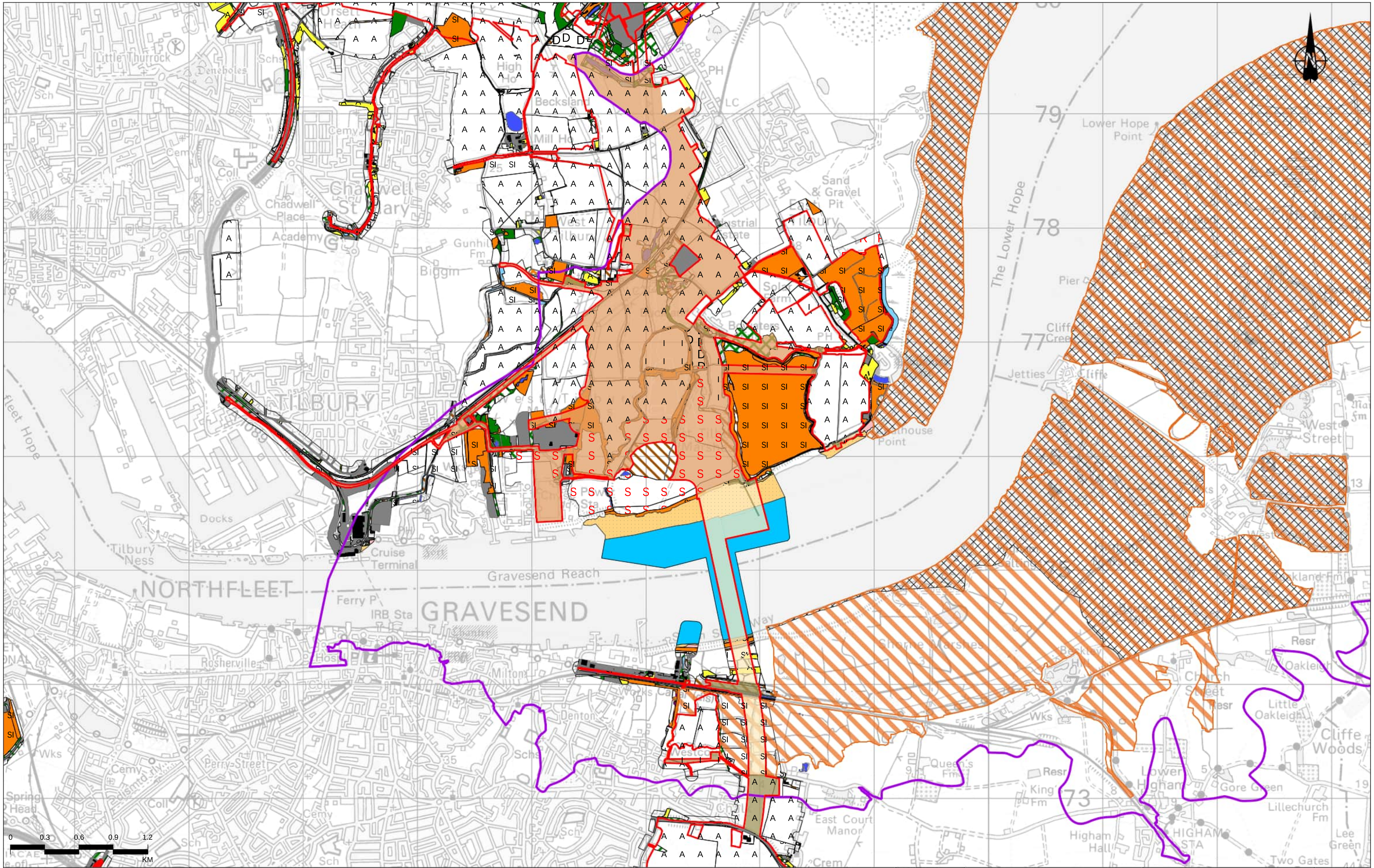
Revision: P03

Scale: 1:100,000

Drawing Title: Figure 2 - Functionally Linked Land

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60071

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 2 Functionally linked land.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	29/09/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Thames Estuary & Marshes Ramsar site
- Thames Estuary & Marshes Special Protection Area (SPA)

Areas of habitat loss within functionally linked land

- No surface works
- Land take - temporary
- Land take - semi-permanent and permanent

Note: For phase 1 data symbology, please refer to the separate phase 1 legend sheet.

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

Application Document Number: TR010032/APP/6.5

Scale: 1:30,000

Drawing Title: Figure 3 - Location of project elements in relation to European sites and functionally linked land

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60072

LEGEND

- Target Note
- Scattered scrub
- Broadleaved parkland/scattered trees
- Coniferous parkland/scattered trees
- Mixed parkland/scattered trees
- Scattered saltmarsh
- Artificial sea wall
- Broadleaved parkland/scattered trees
- Coniferous parkland/scattered trees SI
- Defunct hedge - native species-rich
- Defunct hedge - species-poor
- Dry ditch
- Earth bank
- Fence
- Hedge with trees - native species-rich
- Hedge with trees - species-poor
- Intact hedge - native species-rich
- Intact hedge - species-poor
- Standing water
- Running water
- Wall
- Other habitat
- Marginal vegetation

- SI Acid grassland - semi-improved
- Hardstanding; hardstanding
- Acid grassland - unimproved
- Bare ground
- Bracken - continuous
- Broadleaved woodland - plantation
- Broadleaved woodland - recently felled
- Broadleaved woodland - semi-natural
- Buildings
- Calcareous grassland - semi-improved
- Calcareous grassland - unimproved
- Caravan site
- Coniferous woodland - plantation
- A Cultivated/disturbed land - amenity grassland
- A Cultivated/disturbed land - arable
- Cultivated/disturbed land - ephemeral/short perennial
- I Improved grassland
- Intertidal - boulders/rocks
- Intertidal - mud/sand
- Intertidal - shingles/cobbles
- Introduced shrub
- Marsh/marshy grassland
- Mixed woodland - plantation
- Mixed woodland - semi-natural

- SI Neutral grassland - semi-improved
- Neutral grassland - unimproved
- Other Habitat
- Other tall herb and fern - non ruderal
- Other tall herb and fern - ruderal
- Other tall herb and fern - ruderal and basic scree
- Other tall herb and fern - non ruderal and basic scree
- SI Poor semi-improved grassland
- Q Quarry
- Q Quarry and bare ground
- R Refuse-tip
- R Refuse-tip and other tall herb and fern - ruderal
- R Refuse-tip and bare ground
- Running water
- Saltmarsh - dense/continuous
- Scrub - dense/continuous
- Shingle above high tide mark
- S Spoil
- S Spoil and coniferous woodland - semi-natural
- S Spoil and bare ground
- S Spoil and other tall herb and fern - ruderal
- Standing water
- Swamp

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P01	S8	39/09/2021	DCO Application	SW	HT	BF

Client: highways england

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P01

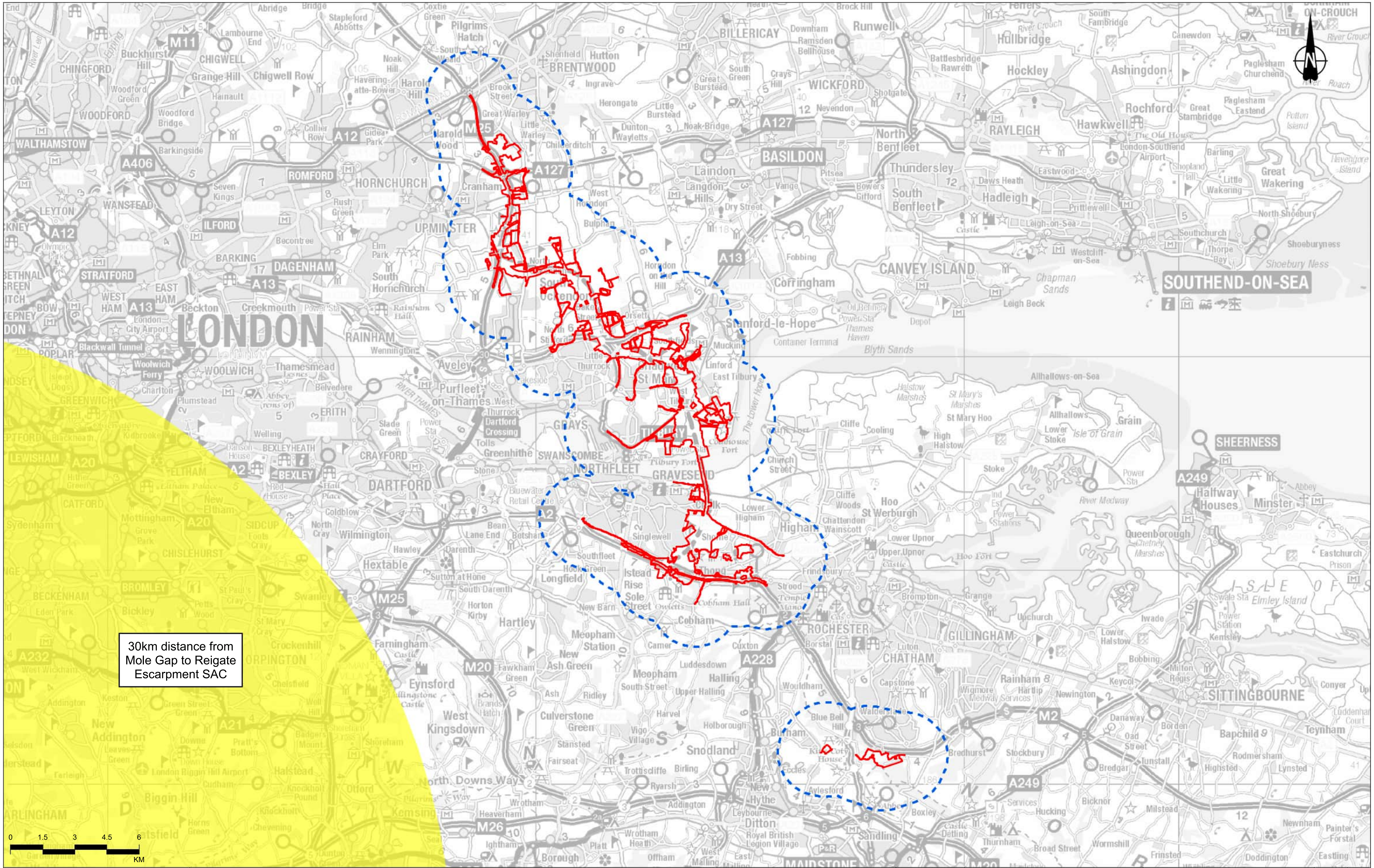
Application Document Number: TR010032/APP/6.2

Scale: 1:10,000

Drawing Title: Figure 3 a - Phase 1 Habitat Map Legend

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-50040

Z:\Environment\Environmental Statement\08. Terrestrial Biodiversity\HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-50040 - 8_2 Phase 1 Map.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Area within 2km of the Order Limits
- 30km buffer of Special Areas of Conservation (SAC) where bats are one of the qualifying interests

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

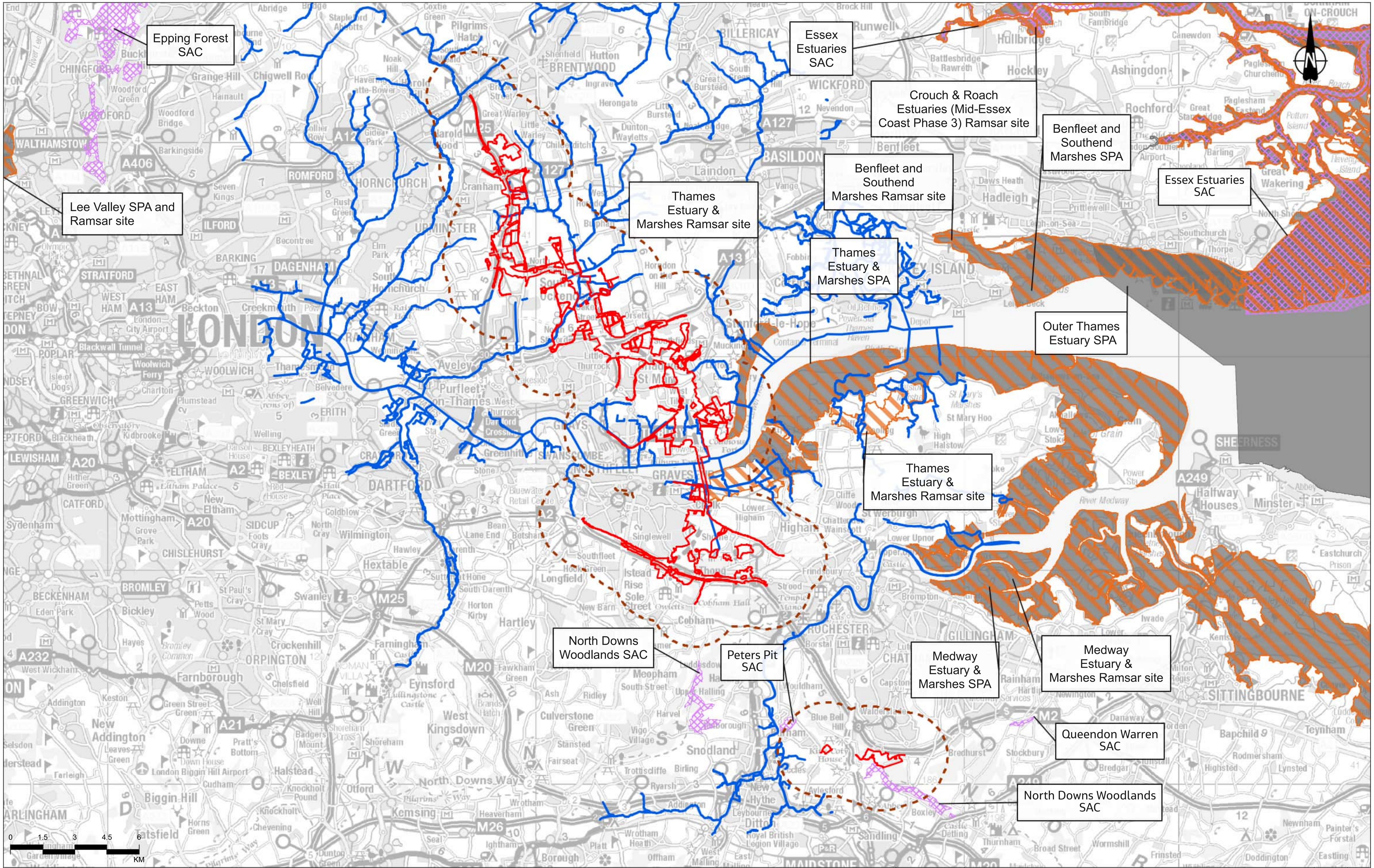
Application Document Number: TR010032/APP/6.5

Scale: 1:160,000

Drawing Title: Figure 4 - Area within 30km of European sites, where bats are one of the qualifying interests, in relation to the Project

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60041

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 4 Area within 30km of European sites, where bats are one of the qualifying interests, in relation to the Project.aprx



Legend

- Order Limits
- Area within 2km of the Order Limits
- Ramsar Site
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Main Rivers

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

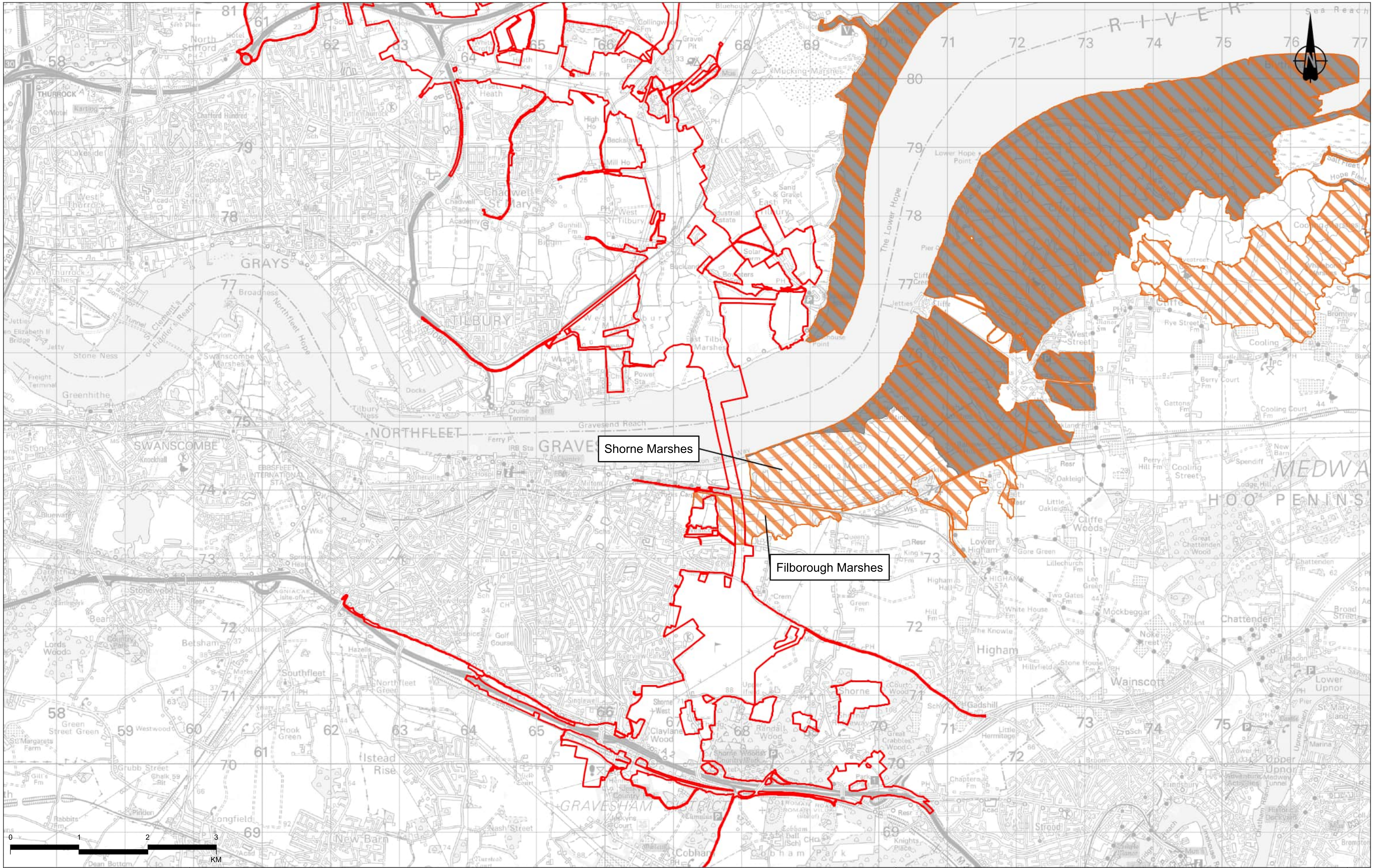
Application Document Number: TR010032/APP/6.5

Scale: 1:160,000

Drawing Title: Figure 5 - Location of European sites up or downstream of watercourses crossed by the Project

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60042

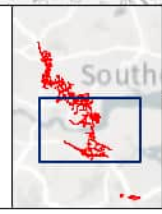
Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 5 Location of European sites up or downstream of watercourses crossed by the Project..aprx



Legend

- Order Limits
- Thames Estuary and Marshes Ramsar
- Thames Estuary & Marshes Special Protection Area

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC



Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

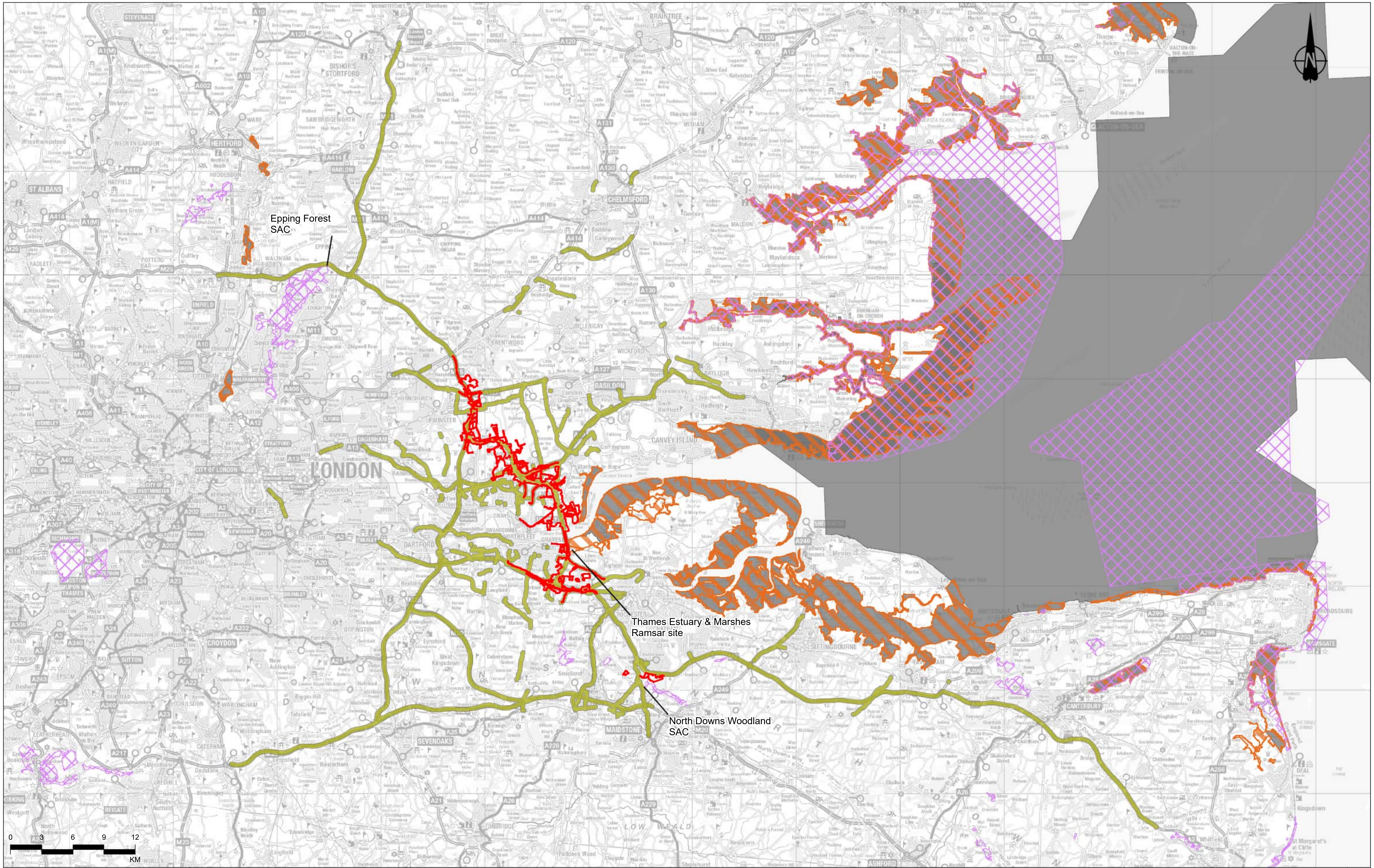
Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title: Figure 6 - Location of GWDTE and European sites in relation to the Project

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60043

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 6 Location of GWDTE and European sites in relation to the Project.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Ramsar site
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Areas within 200m of the operational Affected Road Network (ARN)

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Application Document Number: TR010032/APP/6.5

Original Size: A3

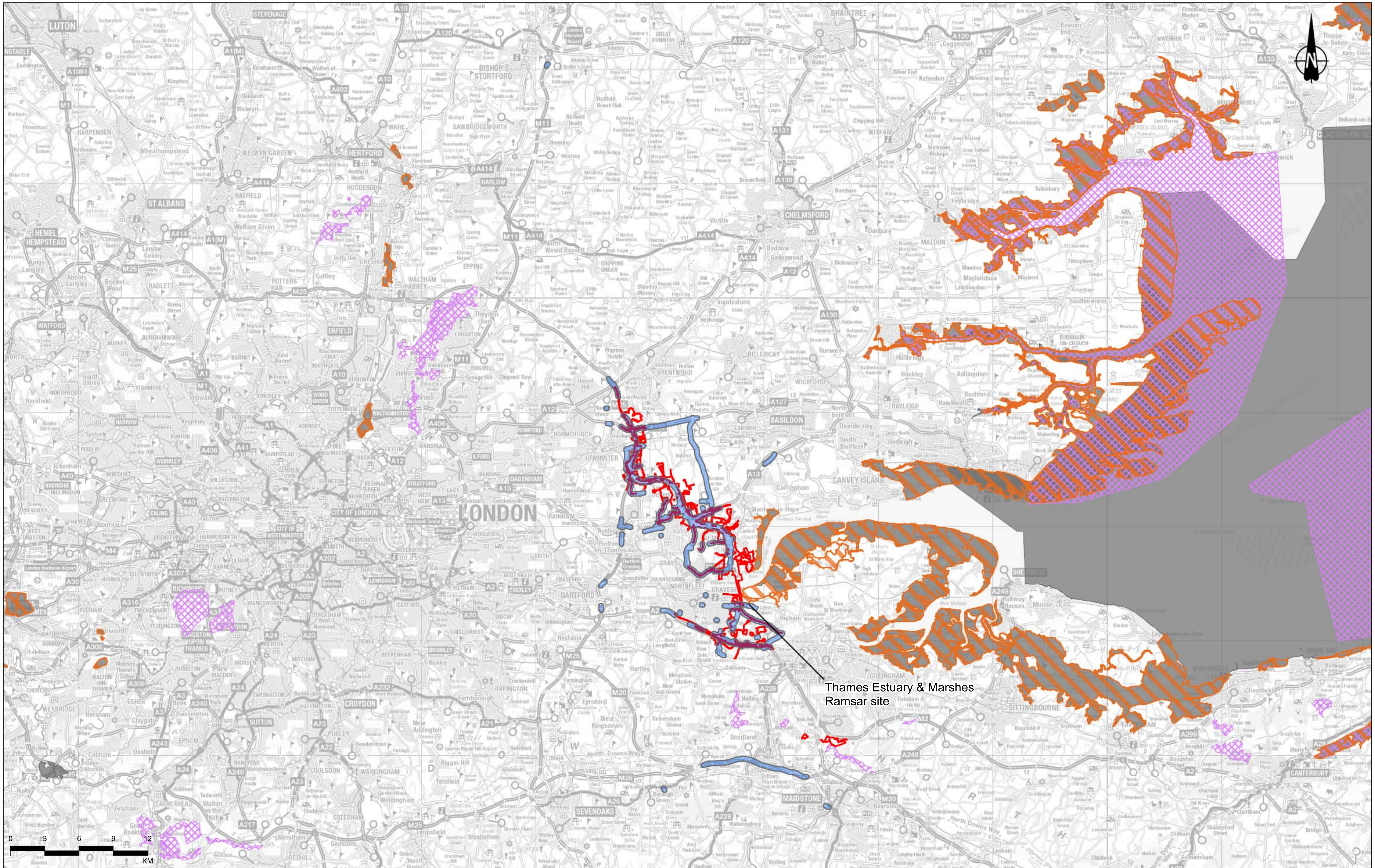
Revision: P03

Scale: 1:330,000

Drawing Title: Figure 7 - European sites located within 200m of the Affected Road Network (ARN) – Operational 2030

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60044

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 7 European sites located within 200m of the affected road network (ARN) – Operation 2029.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Ramsar site
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Area within 200m of the construction Affected Road Network (ARN)

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

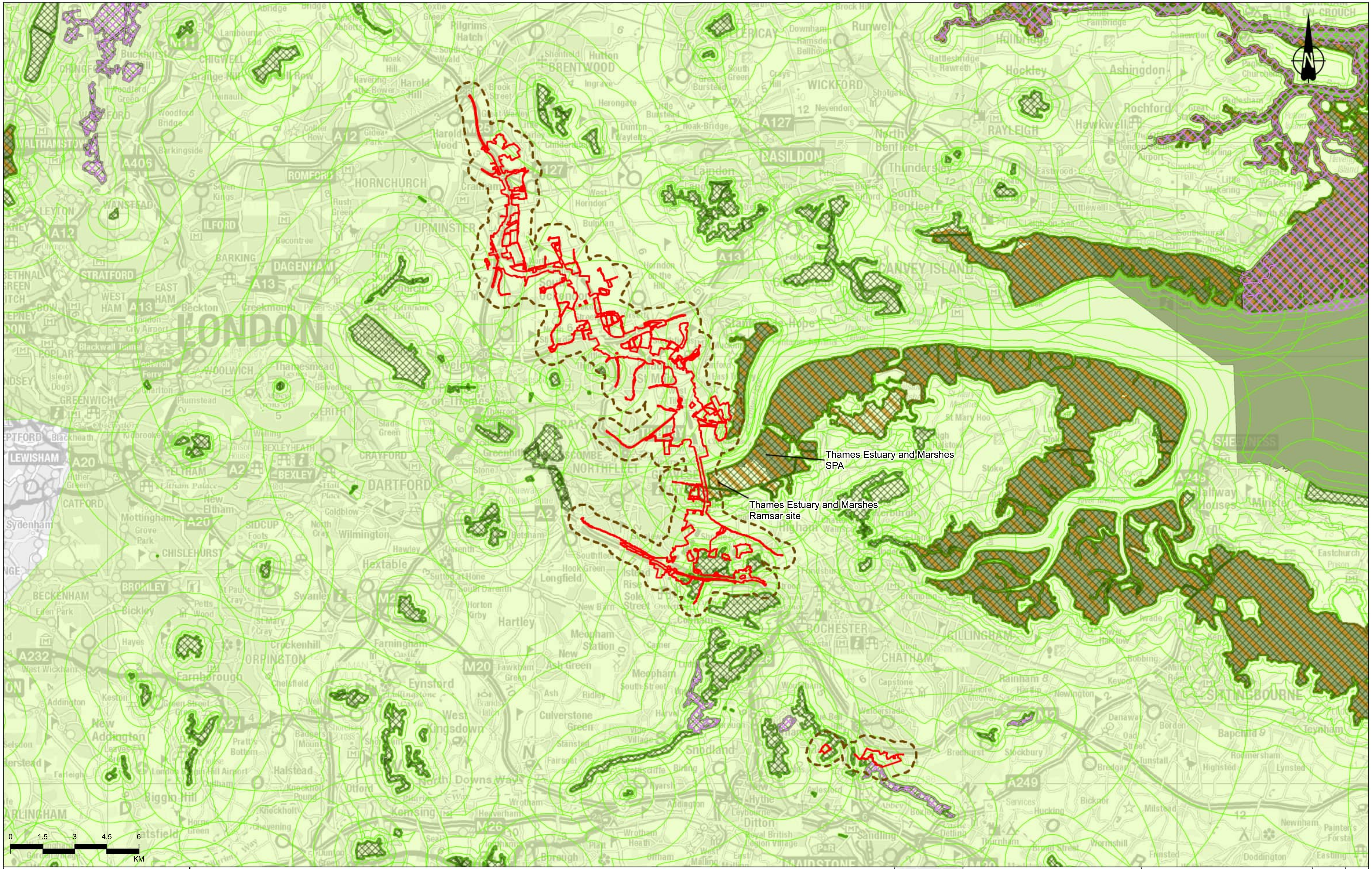
Application Document Number: TR010032/APP/6.5

Scale: 1:300,000

Drawing Title: Figure 8 - European sites located within 200m of the affected road network (ARN) – Construction phase

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60045

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 8 European sites located within 200m of the affected road network (ARN) - Construction .aprx



Legend

- Order Limits
- Project Zone of Influence (ZoI)
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Ramsar site
- Site of Special Scientific Interest (SSSI) Impact Risk Zone

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

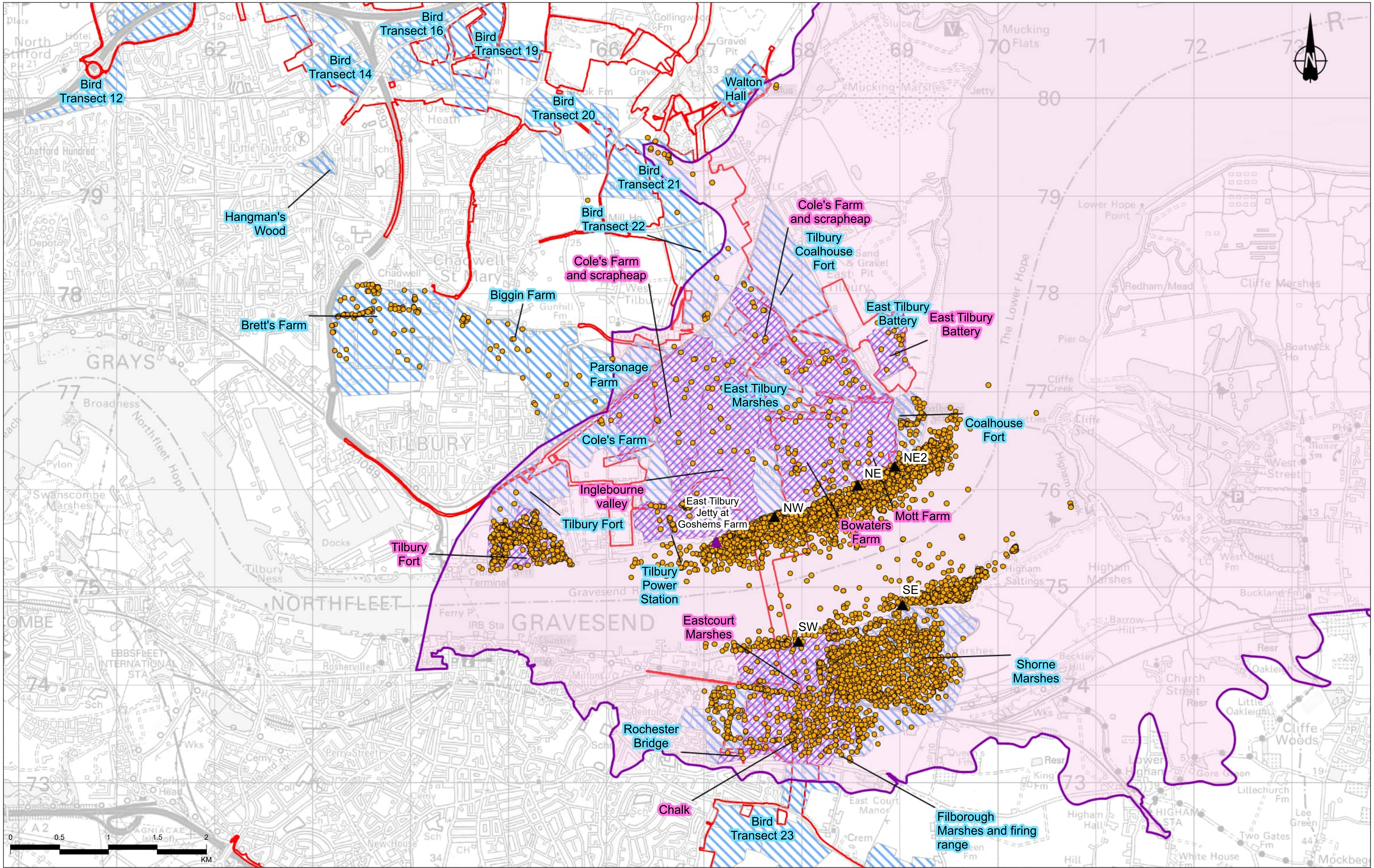
Application Document Number: TR010032/APP/6.5

Scale: 1:160,000

Drawing Title: Figure 9 - Spatial relationship between the SSSI Impact Risk Zones and the Project

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60054

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 9 Spatial relationship between the SSSI Impact Risk Zones and the Project.aprx



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Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Special Protection Area/Ramsar qualifying species record

Vantage Point Surveys - Twice per month April 2017 to March 2019 (inclusive)

- Nocturnal
- Intertidal

- Diurnal transect areas. Surveyed twice per month from April 2017 to March 2019 (inclusive)
- Nocturnal transect areas. Surveyed once per month from November 2017 to March 2018 and November 2018 to March 2019 (inclusive)

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

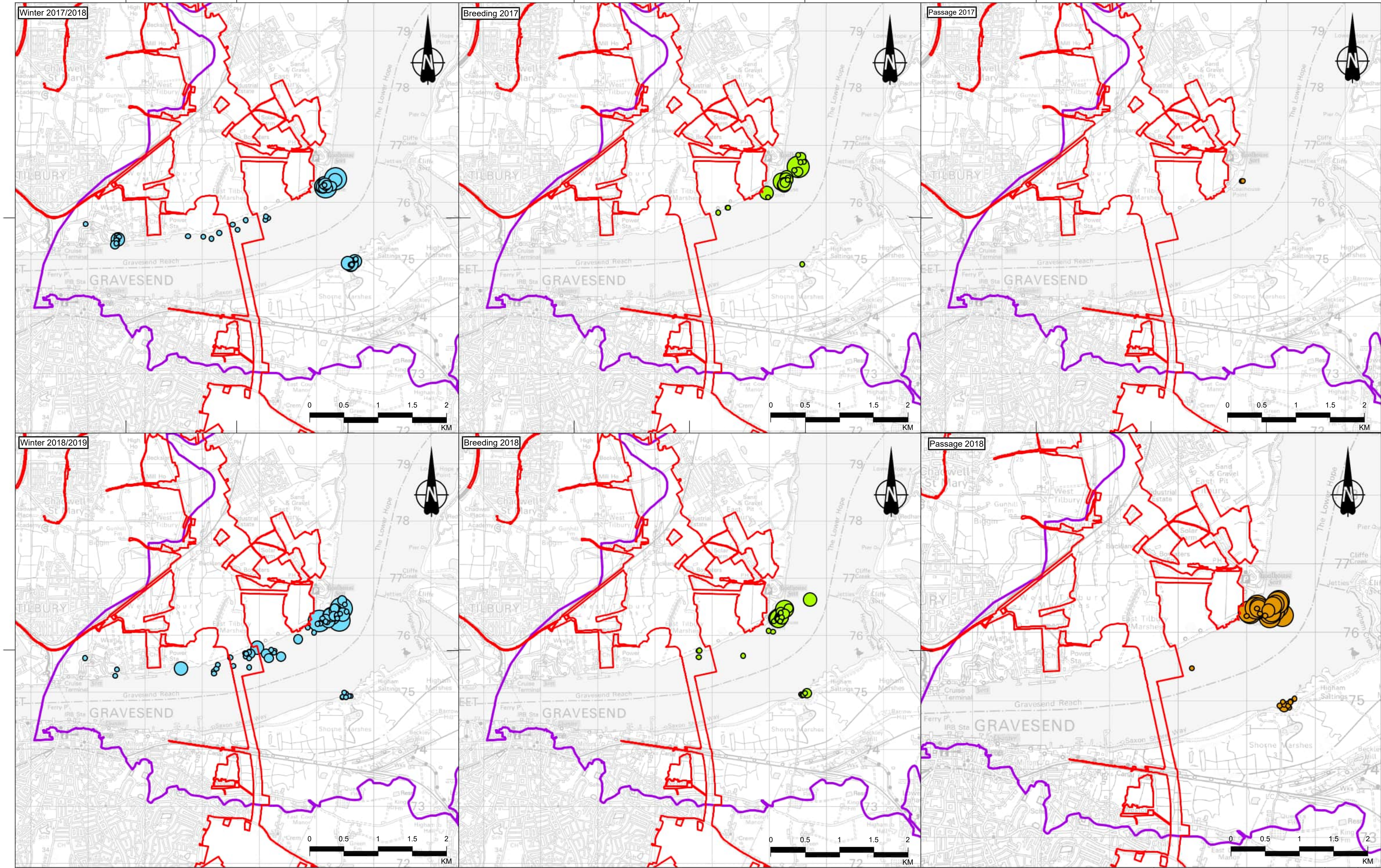
Application Document Number: TR010032/APP/6.5

Original Size: A3 | Revision: P03 | Scale: 1:35,000

Drawing Title: Figure 10 - Locations of survey areas where SPA/Ramsar qualifying features recorded

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60063

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 10 Locations of survey areas where SPARamsar qualifying features recorded.aprx



Legend

Order Limits

Functionally Linked Land

Winter Season (Nov-Mar) record

Number:

- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Breeding season (Apr-Jul) record

Number:

- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Passage Season (Aug-Oct) record

Number:

- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Application Document Number: TR010032/APP/6.5

Original Size: A3

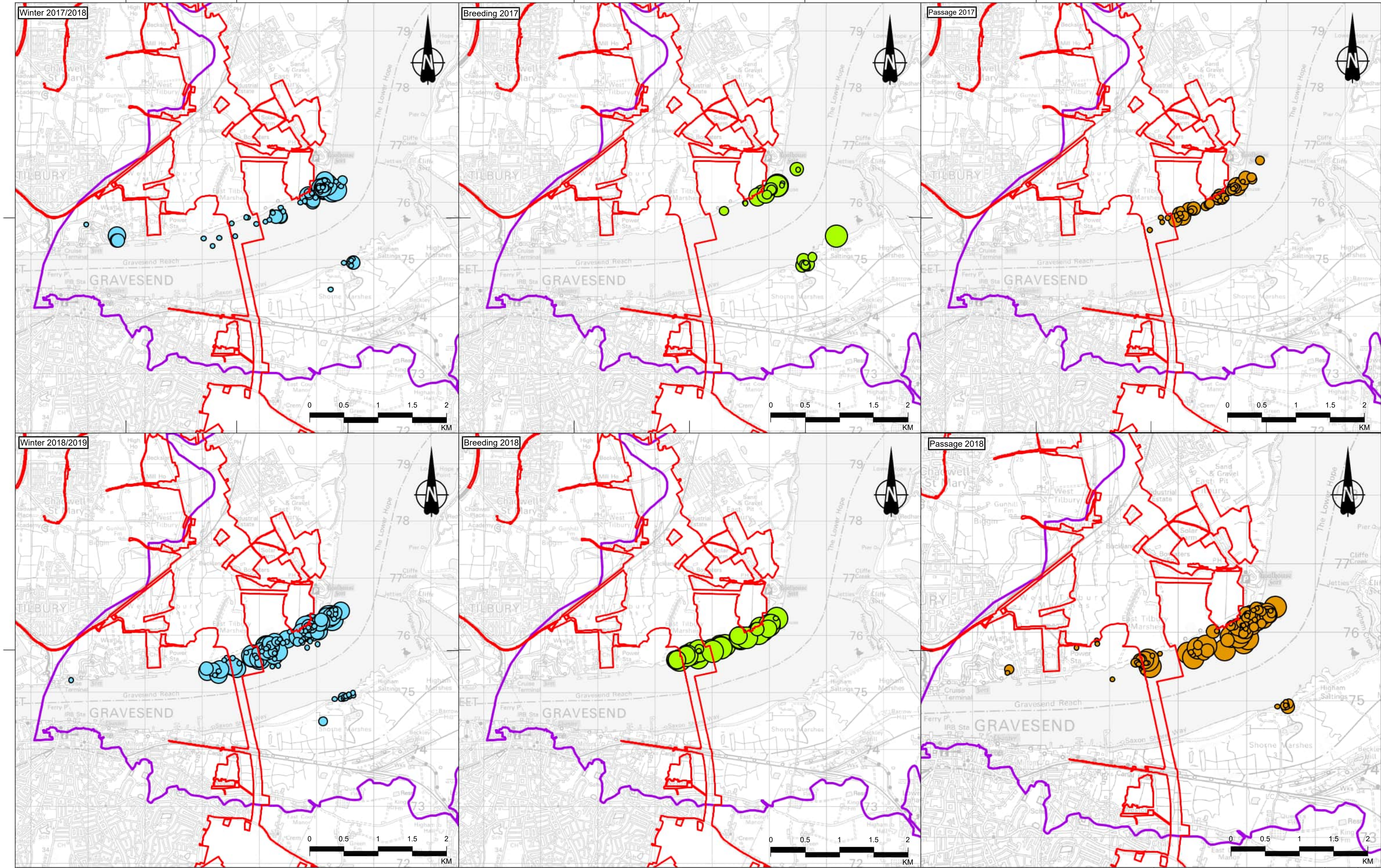
Revision: P03

Scale: 1:50,000

Drawing Title: Figure 11a - QF: Avocet Numbers recorded in each season Page 1 of 10

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Legend

- Order Limits
- Functionally Linked Land

Winter Season (Nov-Mar) record
Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Breeding season (Apr-Jul) record
Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Passage Season (Aug-Oct) record
Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

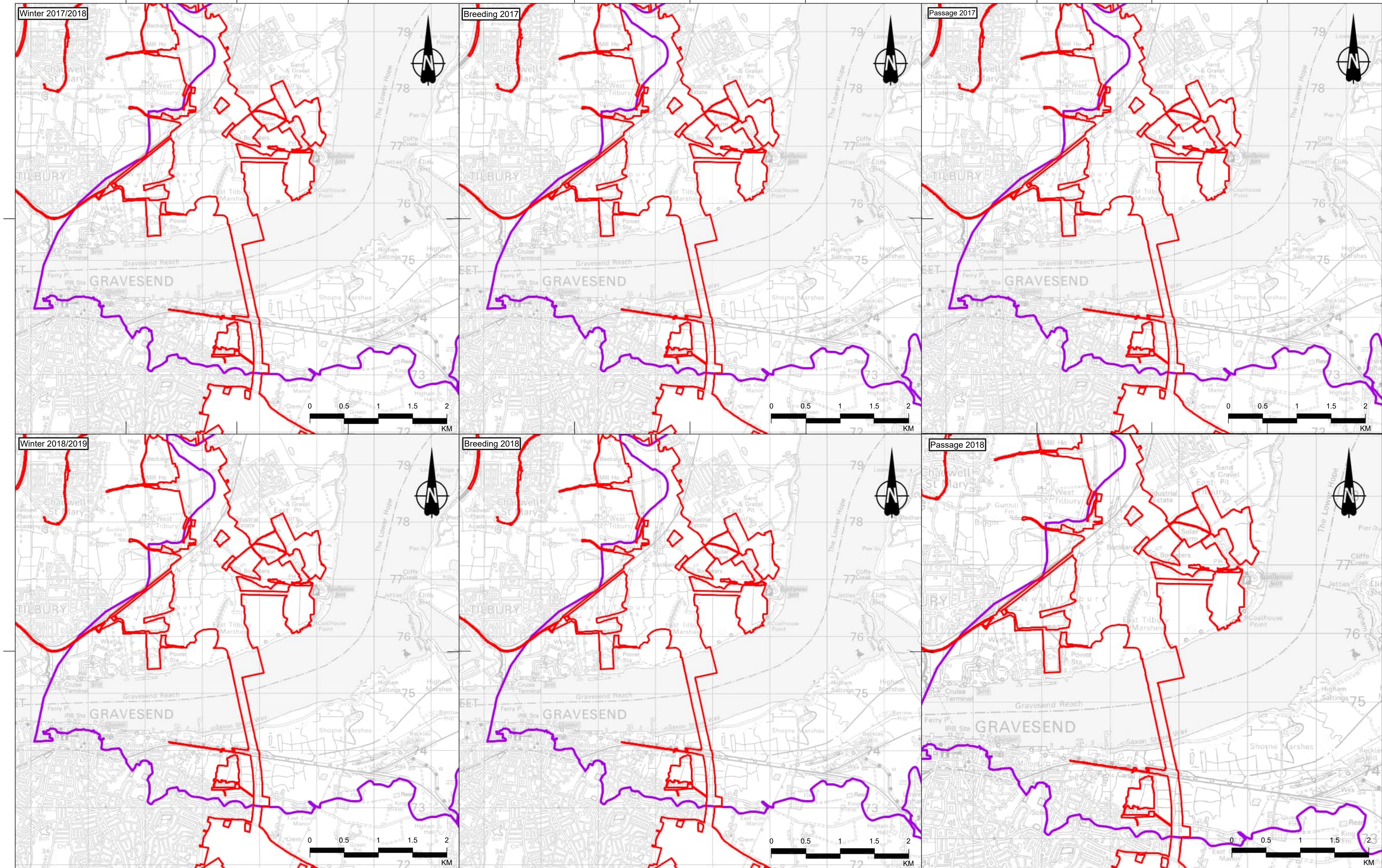
Application Document Number: TR010032/APP/6.5

Original Size: A3
Revision: P03
Scale: 1:50,000

Drawing Title: Figure 11b - QF: Black-tailed godwit Numbers recorded in each season
Page 2 of 10

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

Order Limits

Functionally Linked Land

Winter Season (Nov-Mar) record

Number:

1 - 5
6 - 10
11 - 20
21 - 50
> 50

Breeding season (Apr-Jul) record

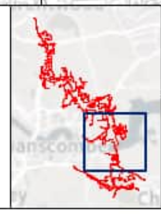
Number:

1 - 5
6 - 10
11 - 20
21 - 50
> 50

Passage Season (Aug-Oct) record

Number:

1 - 5
6 - 10
11 - 20
21 - 50
> 50



Client

national highways

Project

LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title

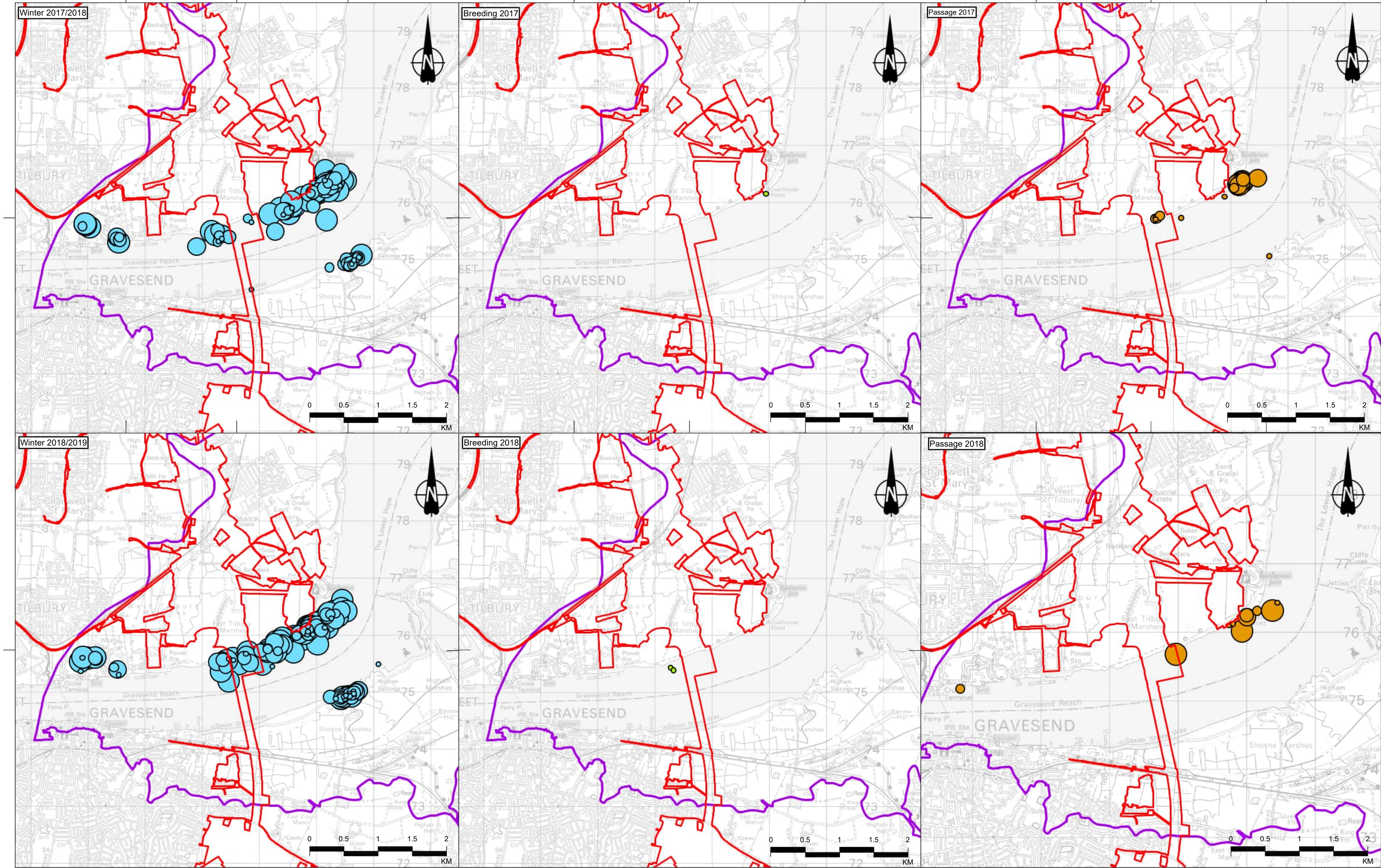
Figure 11c - QF: Dark-bellied brent goose Numbers recorded in each season

Page 3 of 10

Drawing Number

HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Legend

Order Limits

Functionally Linked Land

Winter Season (Nov-Mar) record
Number:
1 - 5
6 - 10
11 - 20
21 - 50
> 50

Breeding season (Apr-Jul) record
Number:
1 - 5
6 - 10
11 - 20
21 - 50
> 50

Passage Season (Aug-Oct) record
Number:
1 - 5
6 - 10
11 - 20
21 - 50
> 50

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

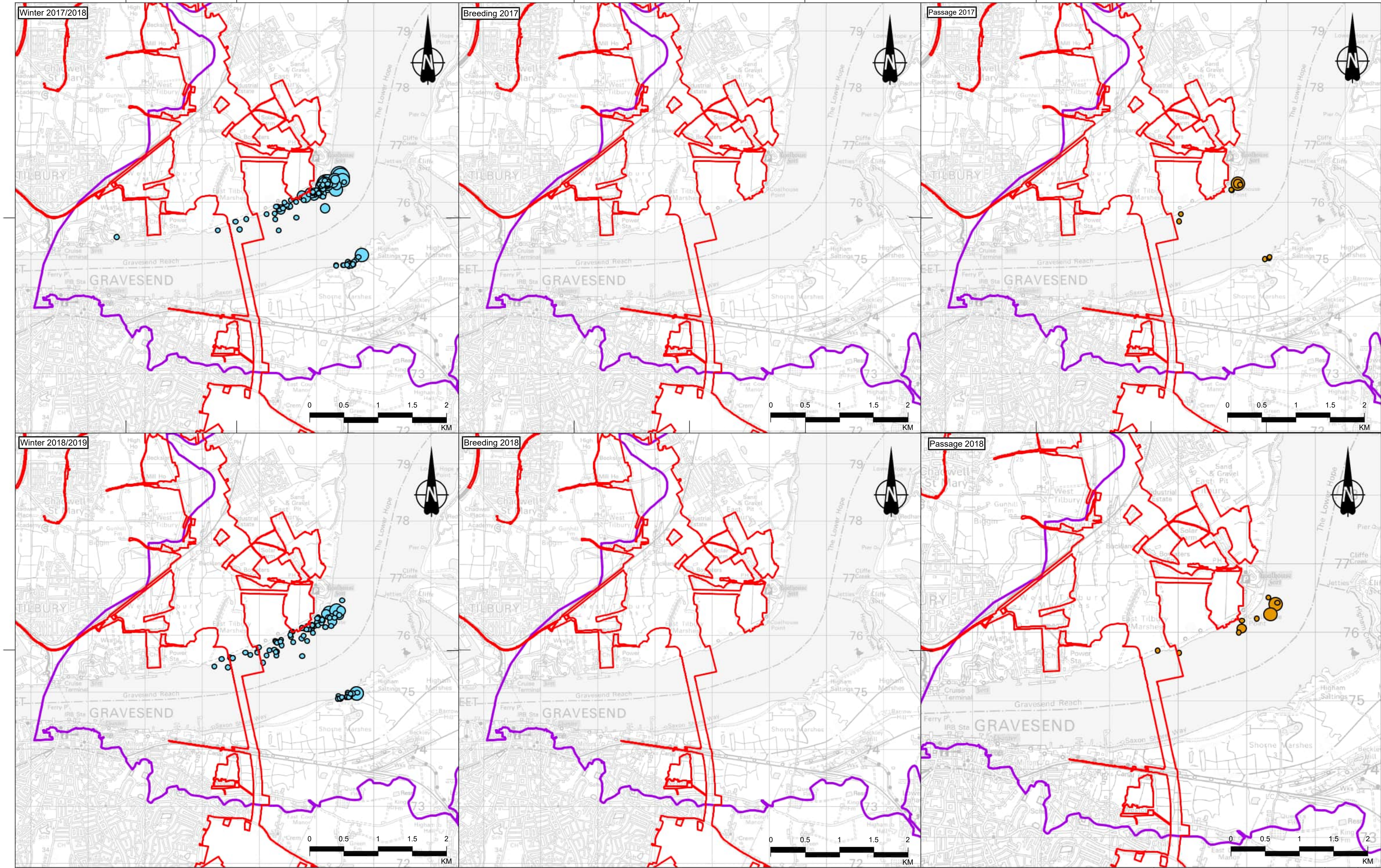
Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title: Figure 11d - QF: Dunlin Numbers recorded in each season Page 4 of 10

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Legend

Order Limits

Functionally Linked Land

Winter Season (Nov-Mar) record

Number:

1 - 5
6 - 10
11 - 20
21 - 50
> 50

Breeding season (Apr-Jul) record

Number:

1 - 5
6 - 10
11 - 20
21 - 50
> 50

Passage Season (Aug-Oct) record

Number:

1 - 5
6 - 10
11 - 20
21 - 50
> 50

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Application Document Number: TR010032/APP/6.5

Original Size: A3

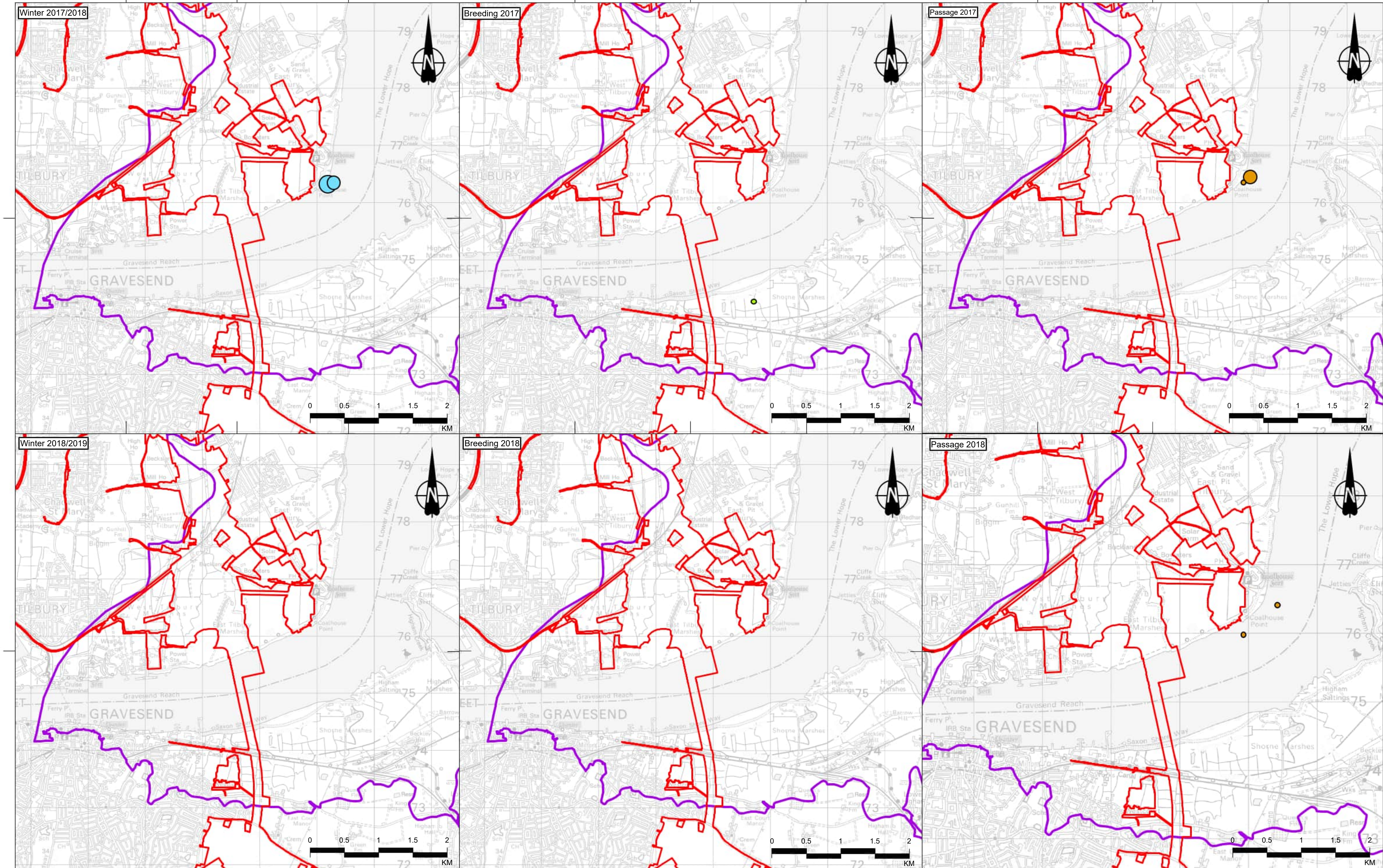
Revision: P03

Scale: 1:50,000

Drawing Title: Figure 11e - QF: Grey plover Numbers recorded in each season
Page 5 of 10

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Legend

- Order Limits
- Functionally Linked Land

Winter Season (Nov-Mar) record

Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Breeding season (Apr-Jul) record

Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Passage Season (Aug-Oct) record

Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

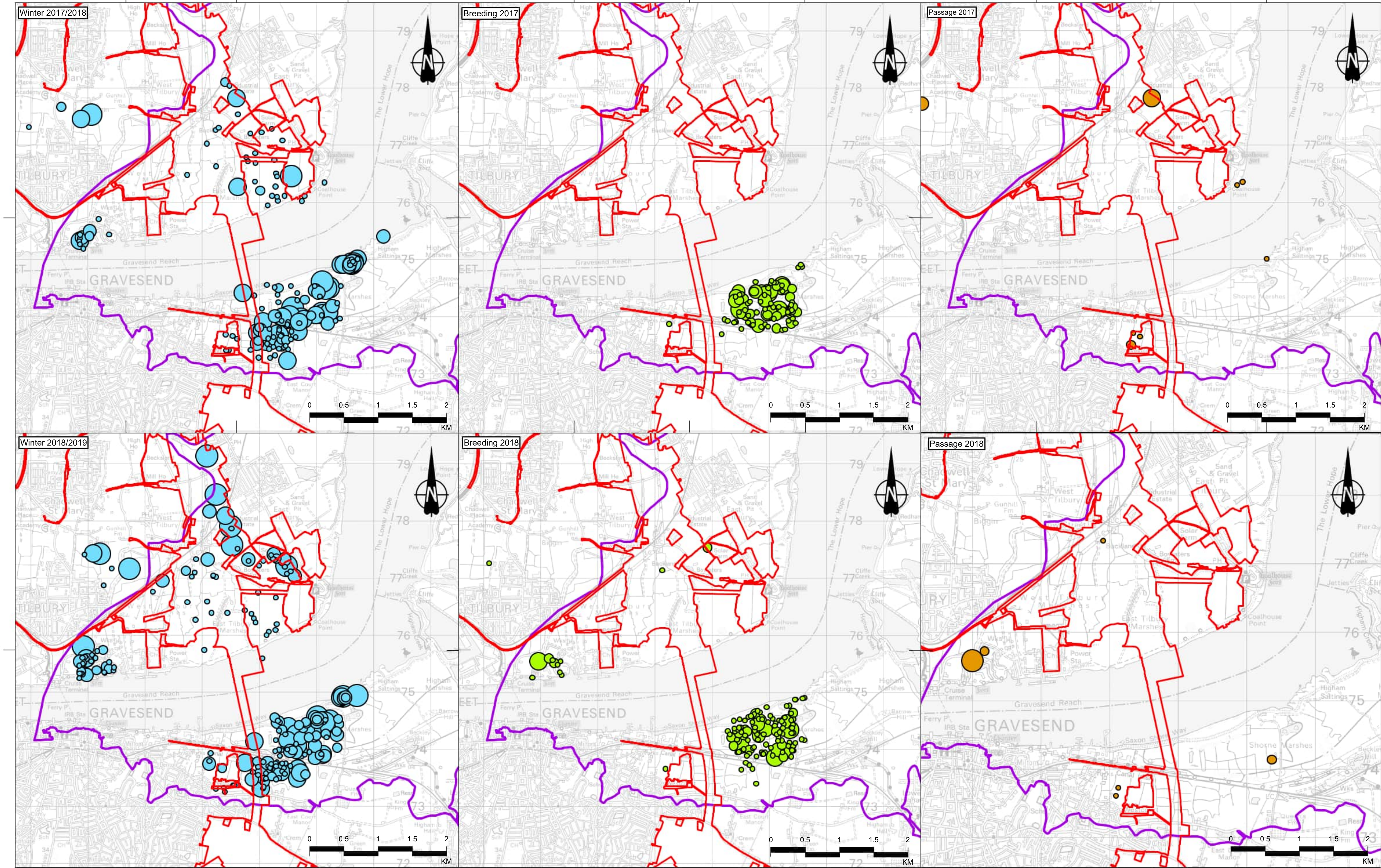
Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title: Figure 11f - QF: Knot Numbers recorded in each season Page 6 of 10

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

Order Limits

Functionally Linked Land

Winter Season (Nov-Mar) record

Number:

1 - 5

6 - 10

11 - 20

21 - 50

> 50

Breeding season (Apr-Jul) record

Number:

1 - 5

6 - 10

11 - 20

21 - 50

> 50

Passage Season (Aug-Oct) record

Number:

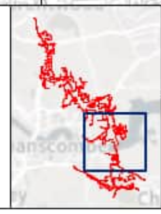
1 - 5

6 - 10

11 - 20

21 - 50

> 50



Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

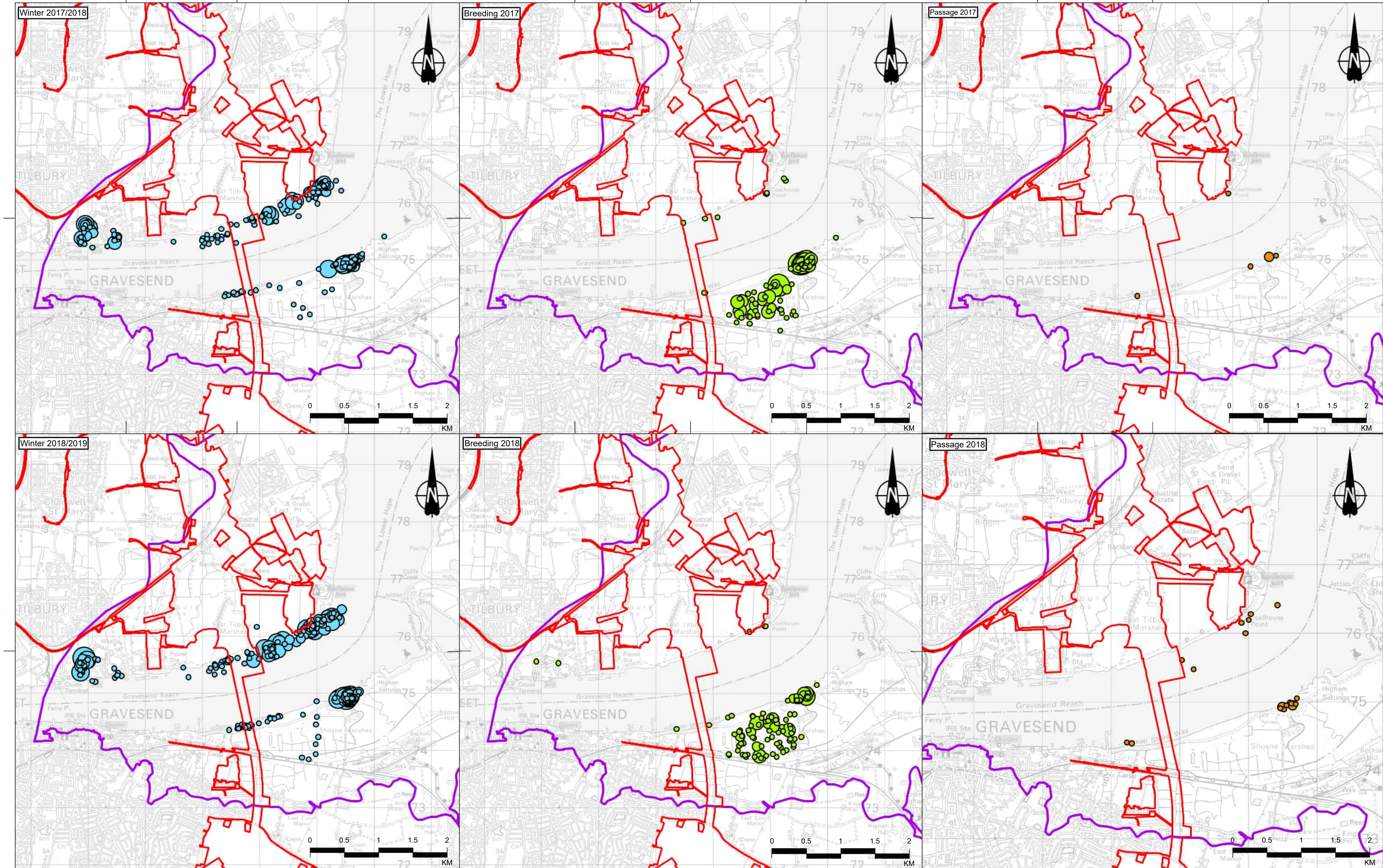
Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title: Figure 11g - QF: Lapwing Numbers recorded in each season
Page 7 of 10

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land

Winter Season (Nov-Mar) record

Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Breeding season (Apr-Jul) record

Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Passage Season (Aug-Oct) record

Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

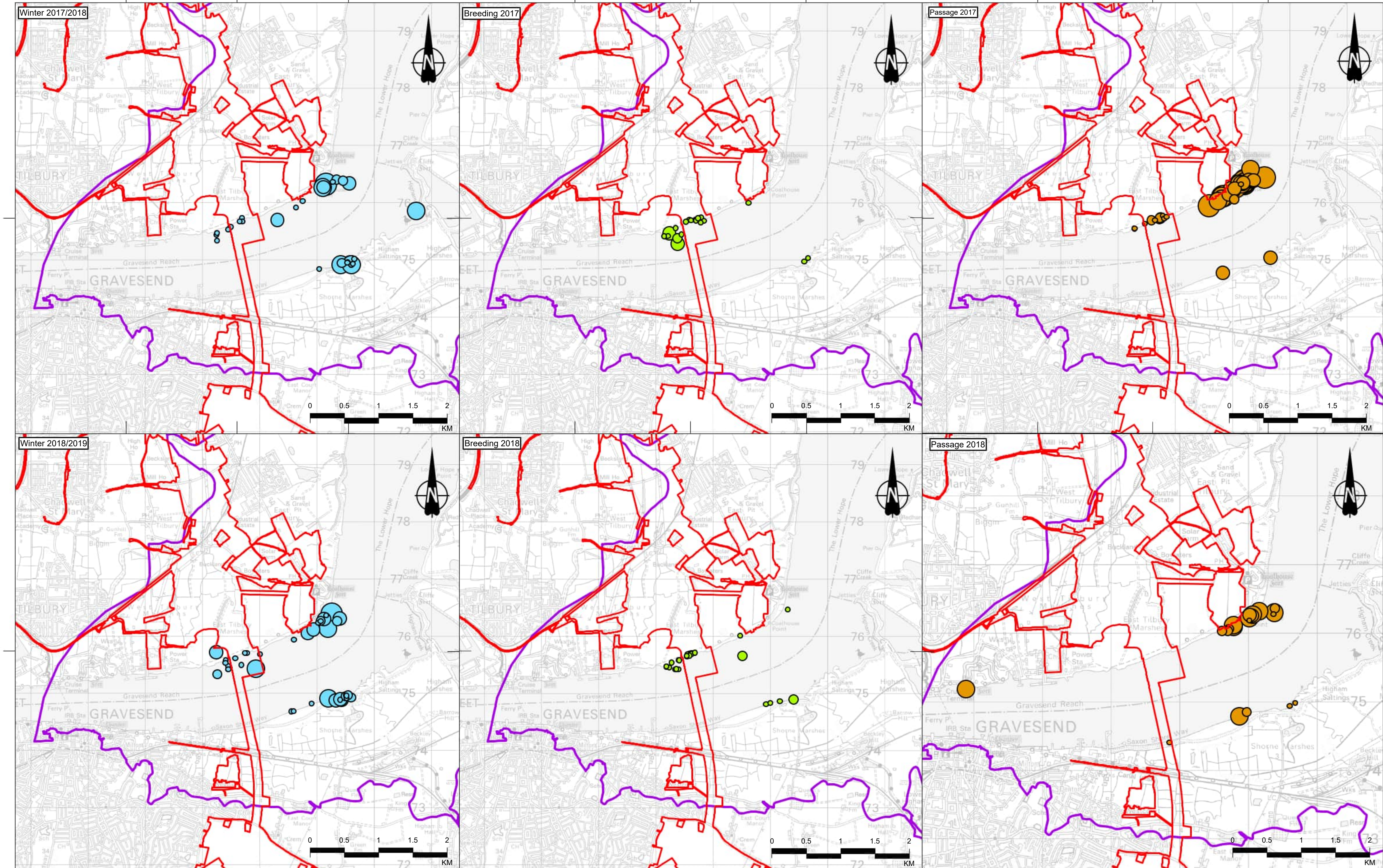
Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title: Figure 11h - QF: Redshank Numbers recorded in each season
Page 8 of 10

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Legend

- Order Limits
- Functionally Linked Land

Winter Season (Nov-Mar) record

Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Breeding season (Apr-Jul) record

Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Passage Season (Aug-Oct) record

Number:
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- > 50

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

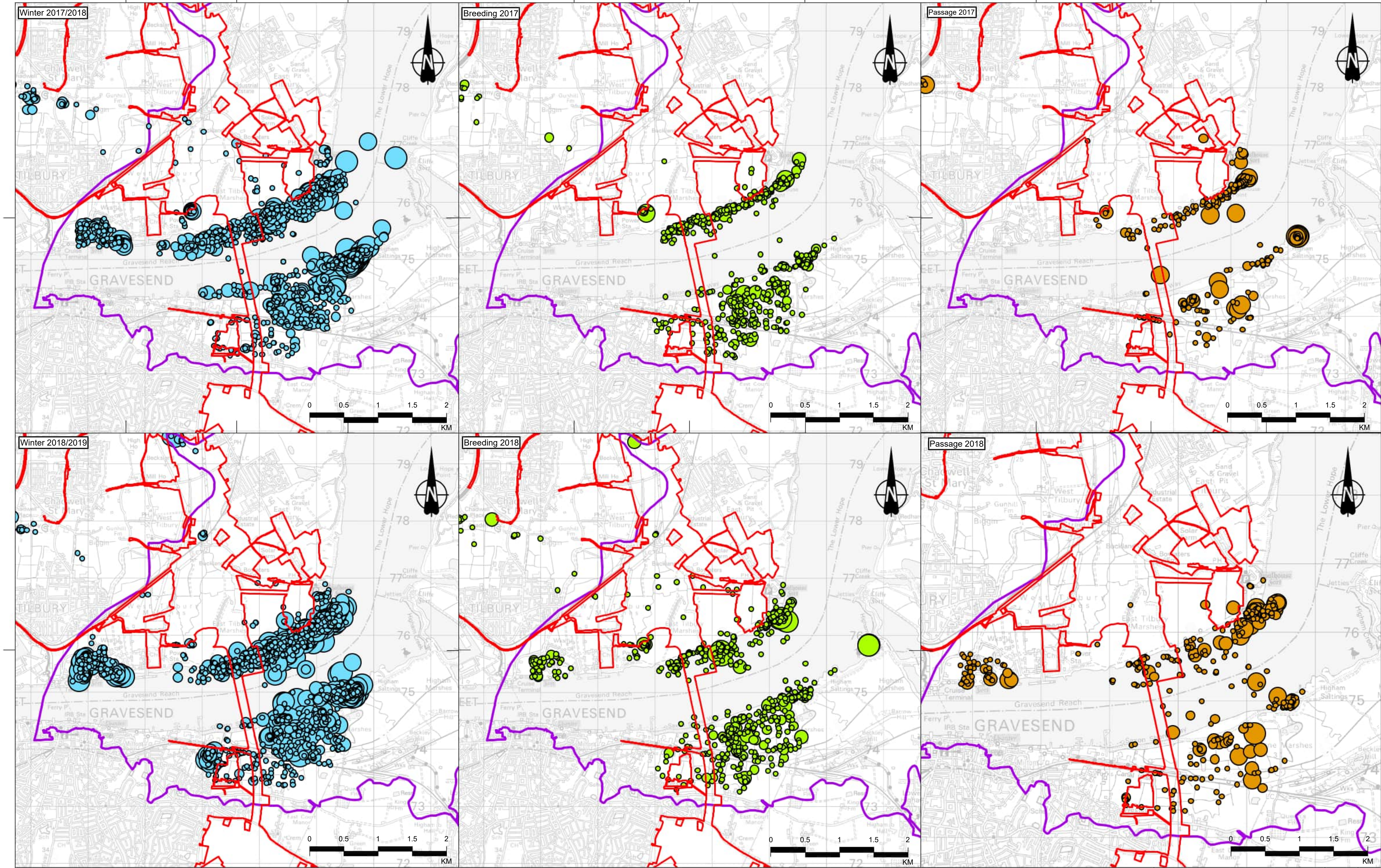
Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title: Figure 11i - QF: Ringed plover Numbers recorded in each season
Page 9 of 10

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Legend

Order Limits

Functionally Linked Land

Winter Season (Nov-Mar) record	Breeding season (Apr-Jul) record	Passage Season (Aug-Oct) record
Number:	Number:	Number:
1 - 5	1 - 5	1 - 5
6 - 10	6 - 10	6 - 10
11 - 20	11 - 20	11 - 20
21 - 50	21 - 50	21 - 50
> 50	> 50	> 50

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

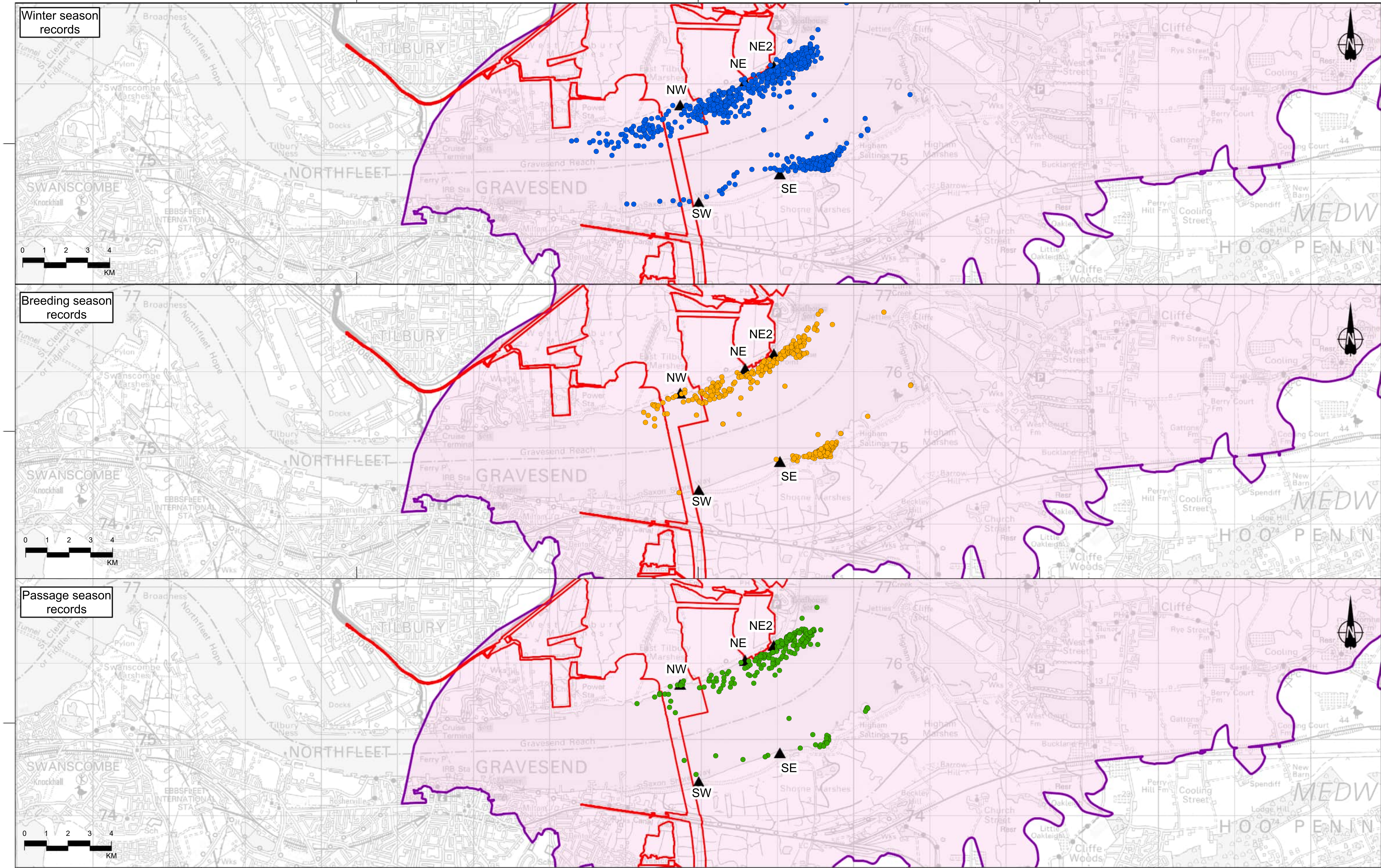
Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title: Figure 11j - QF: Over Winter Bird Assemblage Numbers recorded in each season
Page 10 of 10

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60080

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 11 Numbers of qualifying features (QF) recorded in each season.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Intertidal Vantage Point Surveys - Twice per month April 2017 to March 2019 (inclusive)

SPA/Ramsar qualifying feature recorded

- Breeding season (Apr-Jul)
- Passage season (Aug-Oct)
- Winter season (Nov-Mar)

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

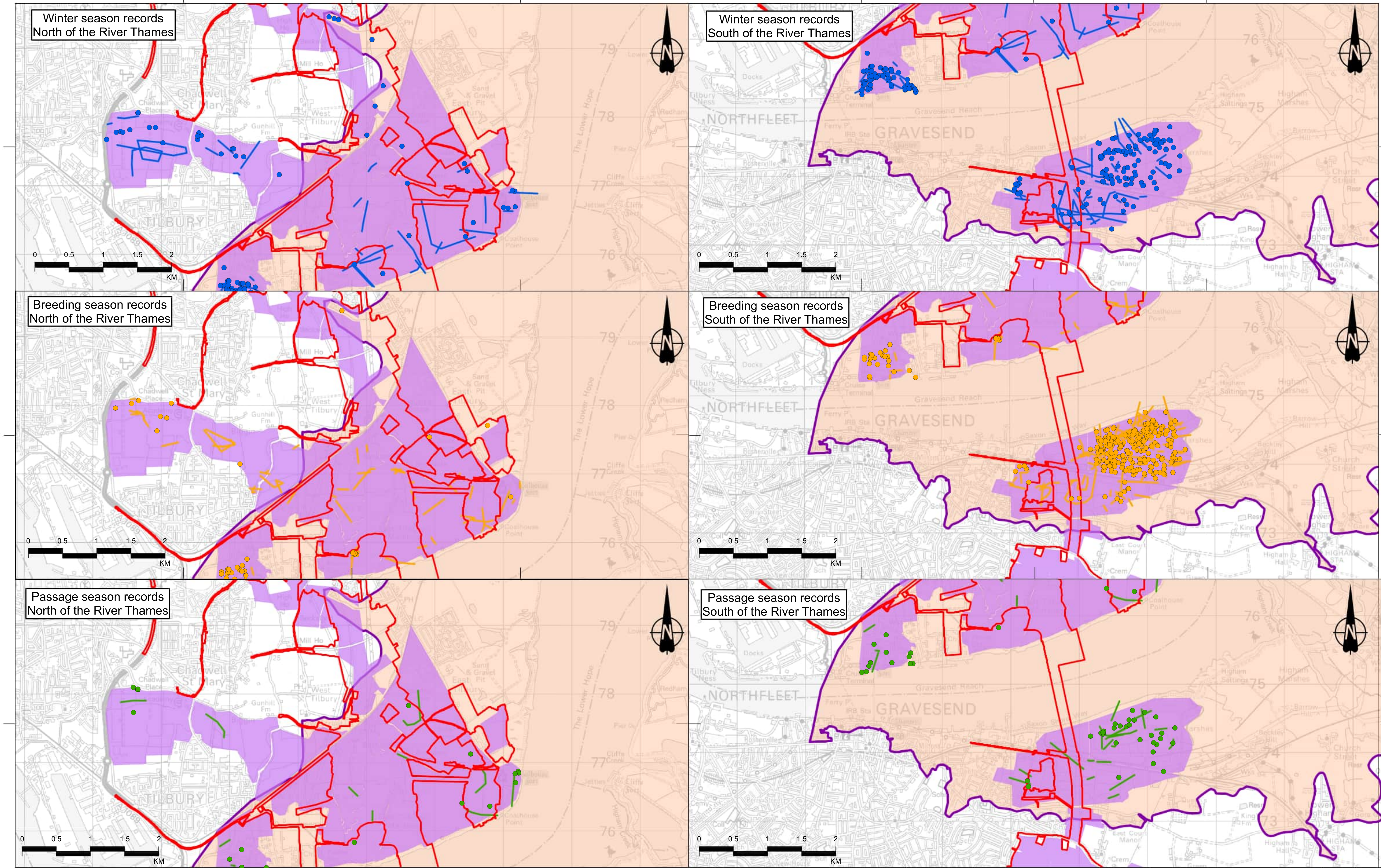
Application Document Number: TR010032/APP/6.5

Scale: 1:45,000

Drawing Title: Figure 12 - Location of VP surveys and distribution of records of SPA/Ramsar species by season

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60064

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 12 Location of VP surveys and distribution of records of SPARamsar species by season.aprx



Legend

- Order Limits
- Functionally Linked Land
- All diurnal transect areas

SPA/Ramsar qualifying feature recorded

- Breeding (Apr-Jul)
- Passage (Aug-Oct)
- Winter (Nov-Mar)

SPA/Ramsar qualifying feature recorded (Bird recorded in flight)

- Breeding (Apr-Jul)
- Passage (Aug-Oct)
- Winter (Nov-Mar)

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

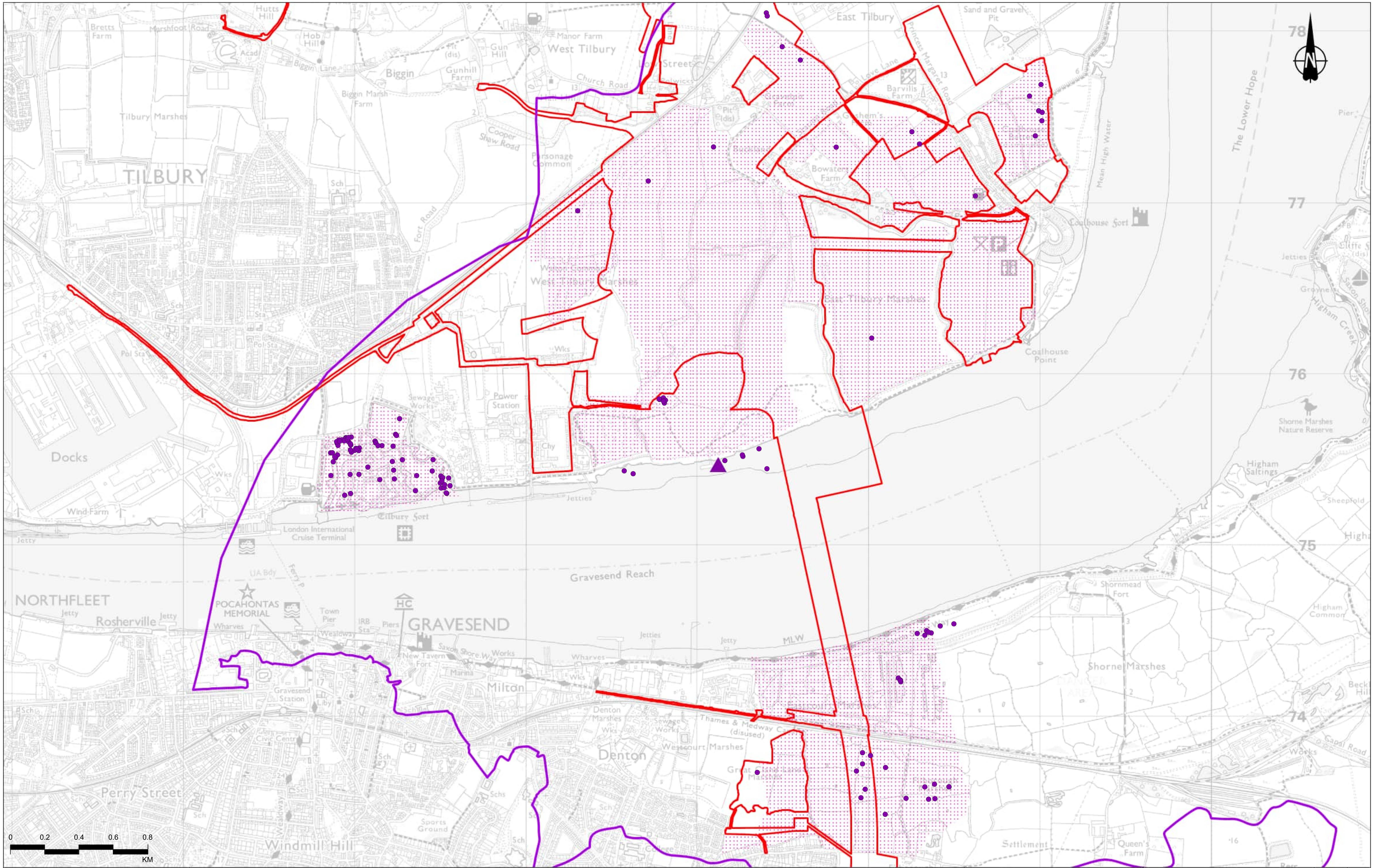
Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title: Figure 13 - Diurnal survey areas and distribution of records of SPA/Ramsar species by season

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60065

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 13 Diurnal survey areas and distribution of records of SPARamsar species by season.aprx



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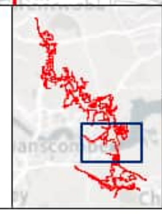
Legend

- Order Limits
- Functionally Linked Land
- Nocturnal transect areas
- Nocturnal Vantage Point Survey
- SPA/Ramsar qualifying feature recorded

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC



Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

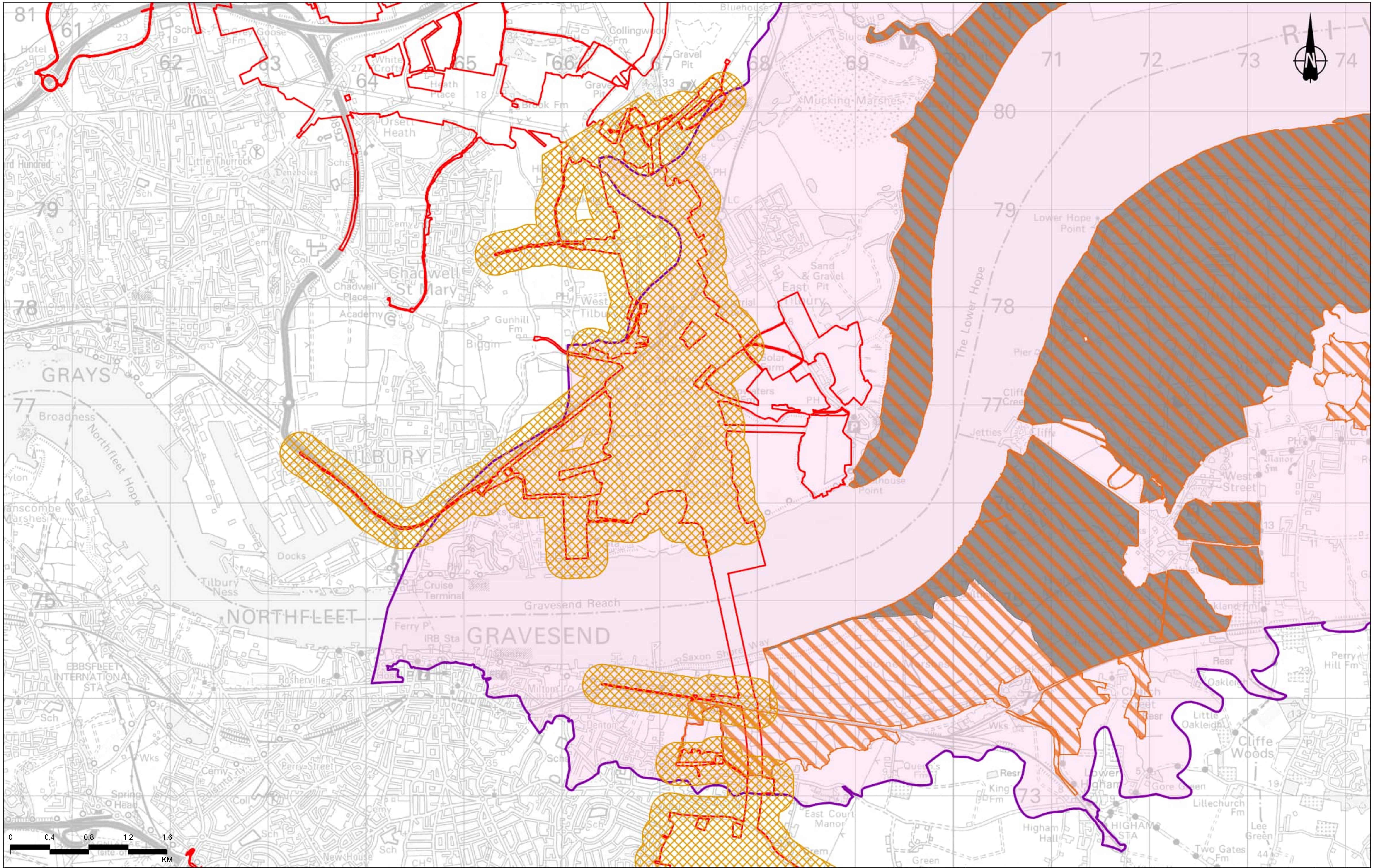
Application Document Number: TR010032/APP/6.5

Scale: 1:20,000

Drawing Title: Figure 14 - Nocturnal survey areas and distribution of records of SPA/Ramsar species (winter survey only)

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60066

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 14 Nocturnal survey areas and distribution of records of SPARamsar species (winter survey only).aprx



Legend

- Order Limits
- Functionally Linked Land
- Area potentially affected by dust emissions
- Thames Estuary and Marshes Ramsar site
- Thames Estuary and Marshes Special Protection Area

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

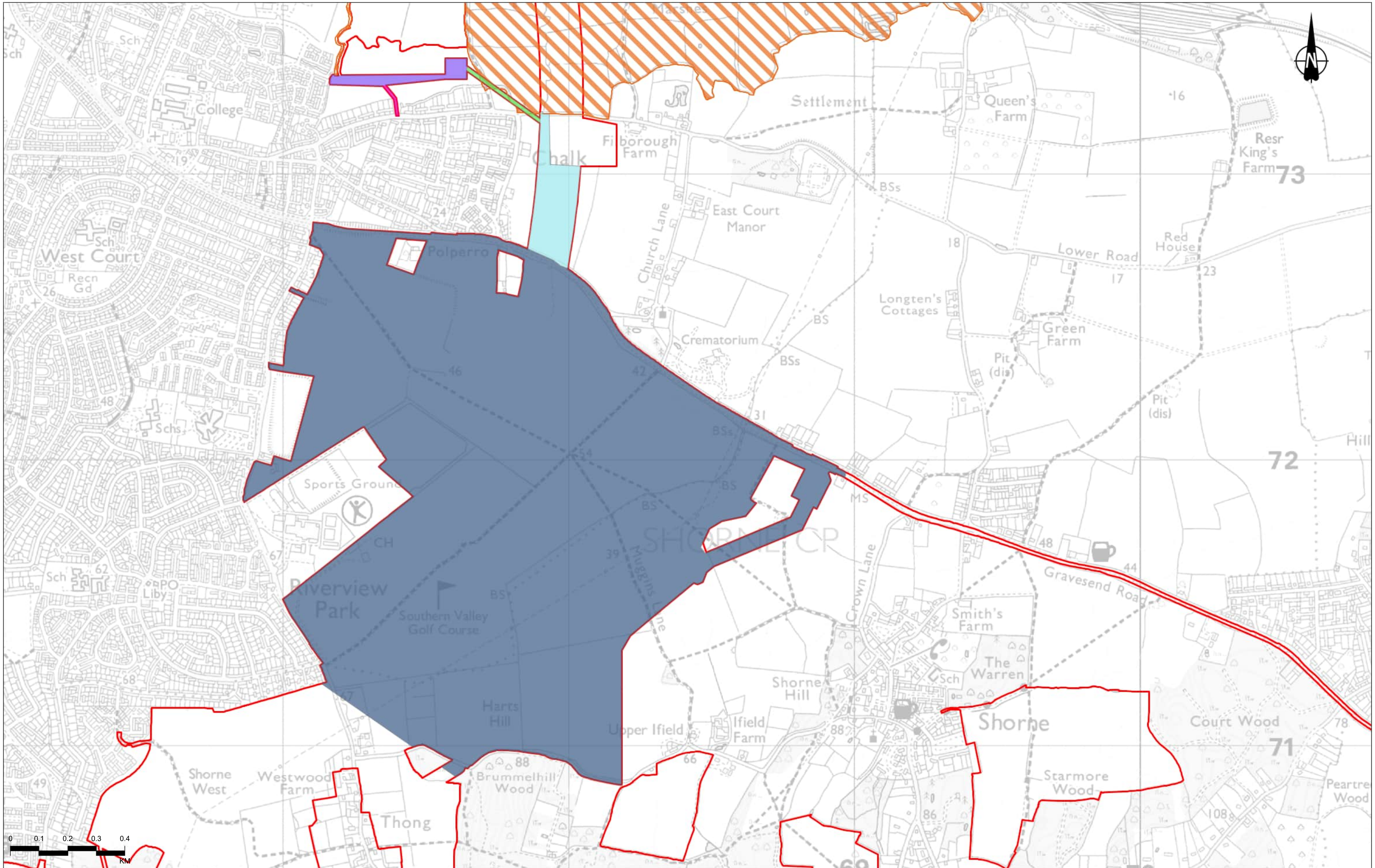
Application Document Number: TR010032/APP/6.5

Scale: 1:35,000

Drawing Title: Figure 15 - Area where potential dust emissions coincide with European sites and the functionally linked land

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60058

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 15 Potential dust emissions in relation to the European sites and the functionally linked land.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Thames Estuary and Marshes Ramsar site

Indicative location of the Southern Tunnel Entrance compound's construction drainage discharge

- Southern Tunnel Entrance compound
- Sub-surface pipe construction
- Drainage treatment area
- Construction working area for the discharge pipe and outfall
- Access to the working area

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

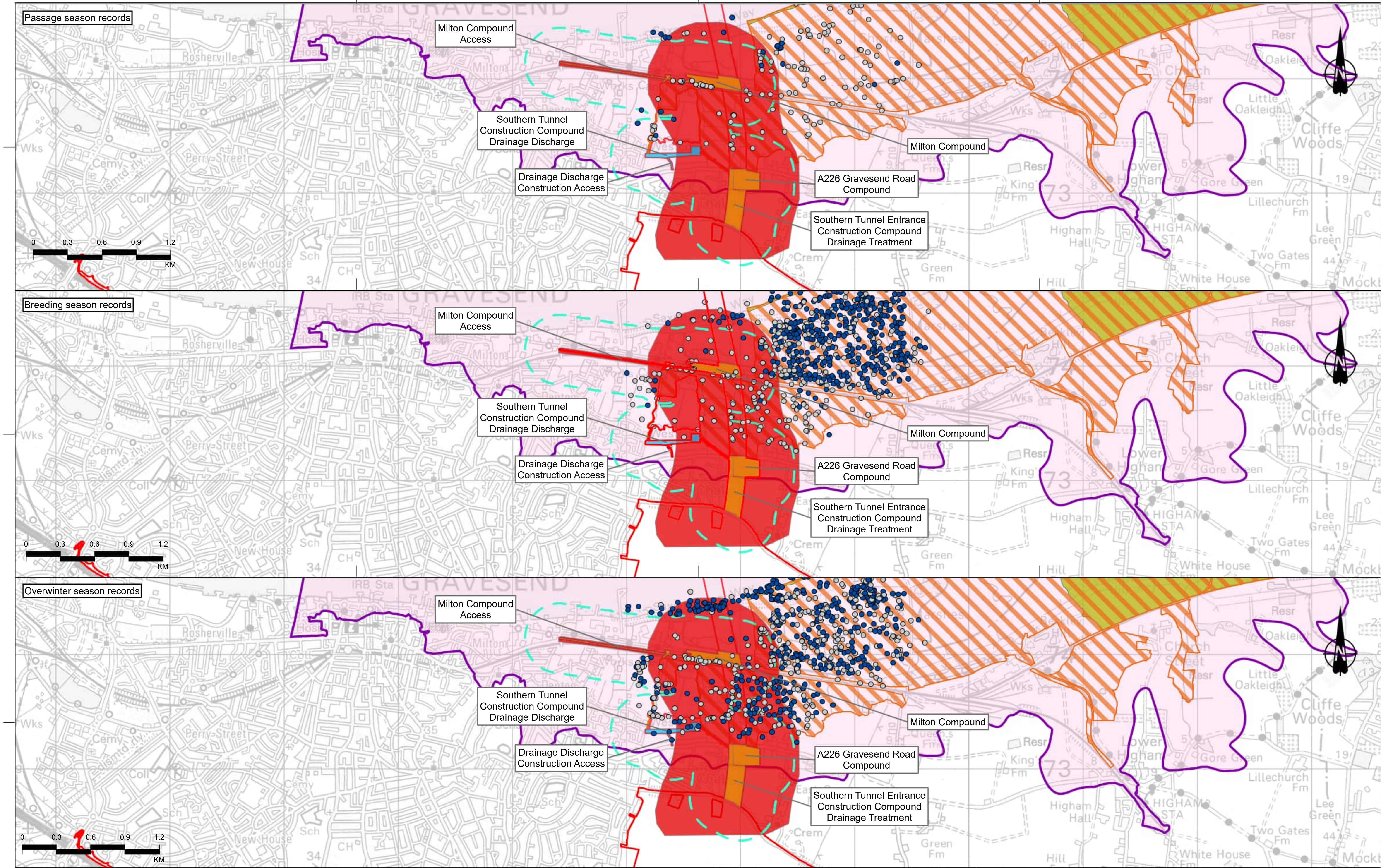
Application Document Number: TR010032/APP/6.5

Scale: 1:12,000

Drawing Title: Figure 16 - Indicative location of the Southern Tunnel Entrance compound construction drainage discharge in relation to the Thames Estuary and Marshes Ramsar site

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60084

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 16 Location of the compound CA3 construction drainage discharge in relation to the Thames Estuary and Marshes Ramsar.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Thames Estuary and Marshes Ramsar site
- Thames Estuary and Marshes Special Protection Area (SPA)

Field Survey Record

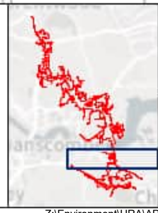
- Individual qualifying species
- Waterbird assemblage qualifying species

Duration of construction activity

- Works < 1yr
- Works 1 - 5yr
- Works > 5yrs

Extent of area potentially disturbed

- Noise >55dB or 3dB change - unmitigated
- Visual 300m - unmitigated

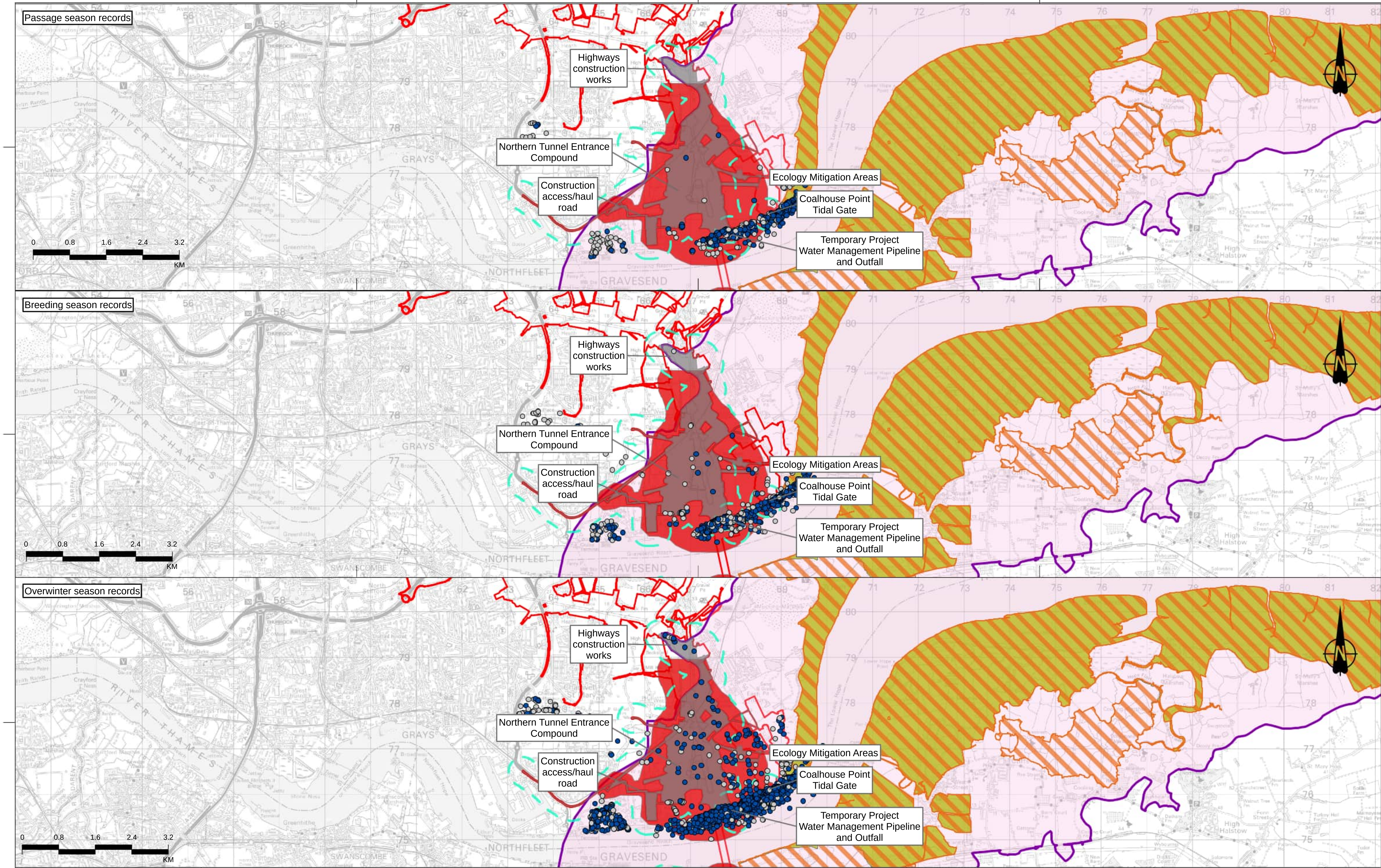


Client
national highways

Project
LOWER THAMES CROSSING

Status	DCO APPLICATION
Original Size	A3
Revision	P03
Application Document Number	TR010032/APP/6.5
Scale	1:30,000
Drawing Title	Figure 17 - South of the River Thames Bird records (from Project ornithology field surveys) in potential disturbance areas (noise >55dB/>3dB change or visual change)
Drawing Number	HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60078

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 17 South of the River Thames - Bird records (from Project ornithology field surveys) in potential disturbance areas (noise 55dB3dB change or visual change).aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	25/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Thames Estuary and Marshes Ramsar site
- Thames Estuary and Marshes Special Protection Area (SPA)

SPA/Ramsar qualifying feature recorded

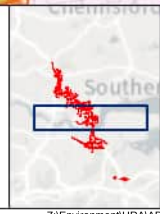
- Individual qualifying species
- Overwintering waterfowl assemblage species

Extent of area potentially disturbed

- Noise >55dB or 3dB change - unmitigated
- Visual 300m - unmitigated

Duration of construction activity

- Works < 1yr
- Works 1 - 5yr
- Works > 5yrs



Client

national highways

Project

LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

Application Document Number: TR010032/APP/6.5

Scale: 1:75,000

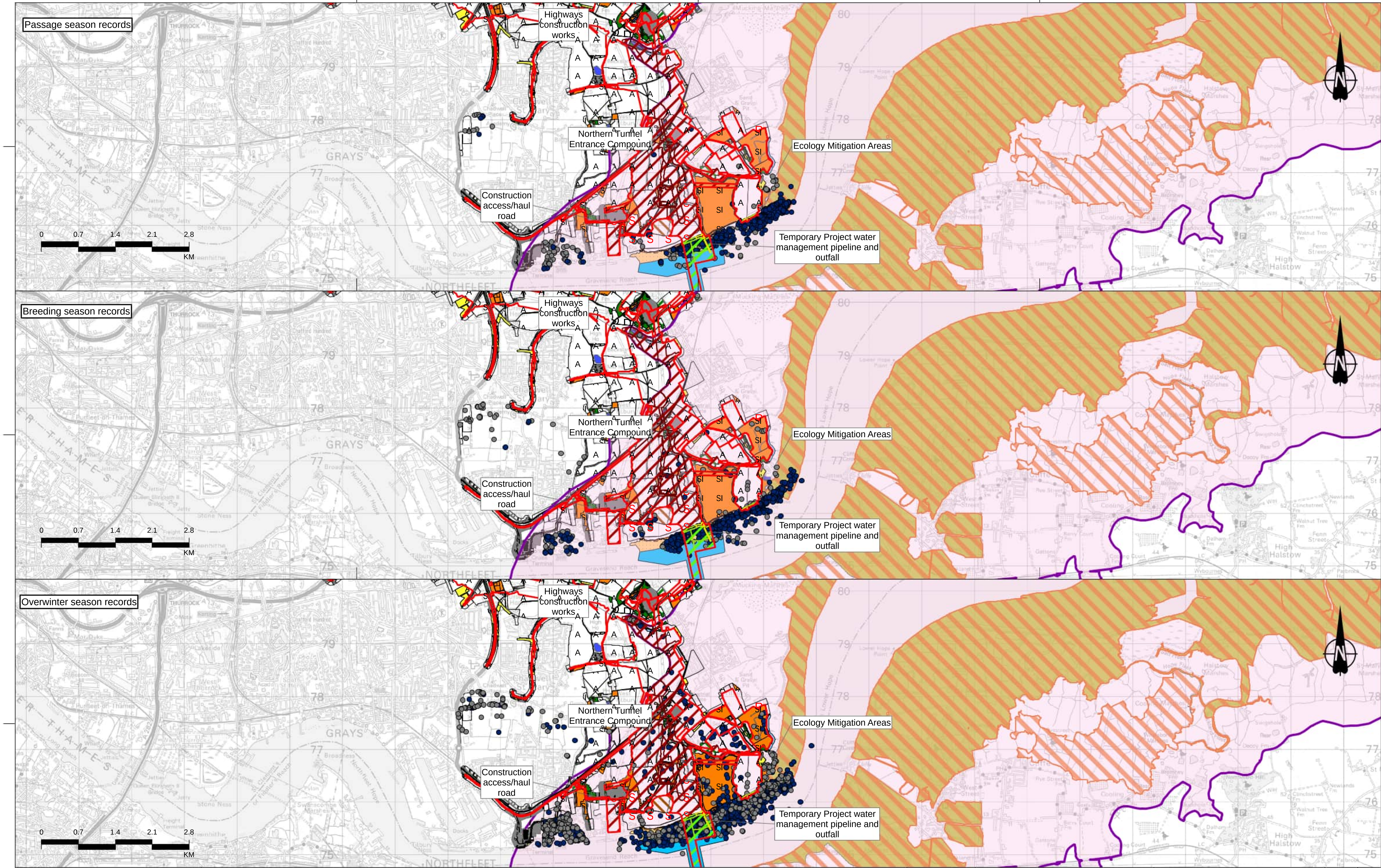
Drawing Title

Figure 18 - North of the River Thames Bird records
(from Project ornithology field surveys)
in potential disturbance areas
(noise >55dB/>3dB change or visual change)

Drawing Number

HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60077

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 18 North of the River Thames - Bird records (from Project ornithology field surveys) in potential disturbance areas (noise 55dB3dB change or visual change).aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	29/09/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Thames Estuary and Marshes Ramsar site
- Thames Estuary and Marshes Special Protection Area (SPA)

Areas of habitat loss within functionally linked land

- No surface works
- Land take - temporary
- Land take - semi-permanent and permanent

SPA/Ramsar qualifying feature recorded

- Individual qualifying species
- Overwintering waterfowl assemblage species

Note: For phase 1 data symbology, please refer to the separate phase 1 legend sheet.

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Application Document Number: TR010032/APP/6.5

Original Size: A3

Revision: P03

Scale: 1:65,000

Drawing Title: Figure 19 - Distribution of bird records (from Project ornithology field surveys) in habitats lost north of the River Thames

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60073

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 19 Distribution of bird records (from Project ornithology field surveys) in habitats lost north of the River Thames.aprx

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Thames Estuary and Marshes Ramsar site
- Thames Estuary and Marshes Special Protection Area (SPA)

SPA/Ramsar qualifying feature recorded

- Individual qualifying species
- Overwintering waterfowl assemblage species

Areas of habitat loss within functionally linked land

- No surface works
- Land take - temporary
- Land take - semi-permanent and permanent

Note: For phase 1 data symbology, please refer to the separate phase 1 legend sheet.

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

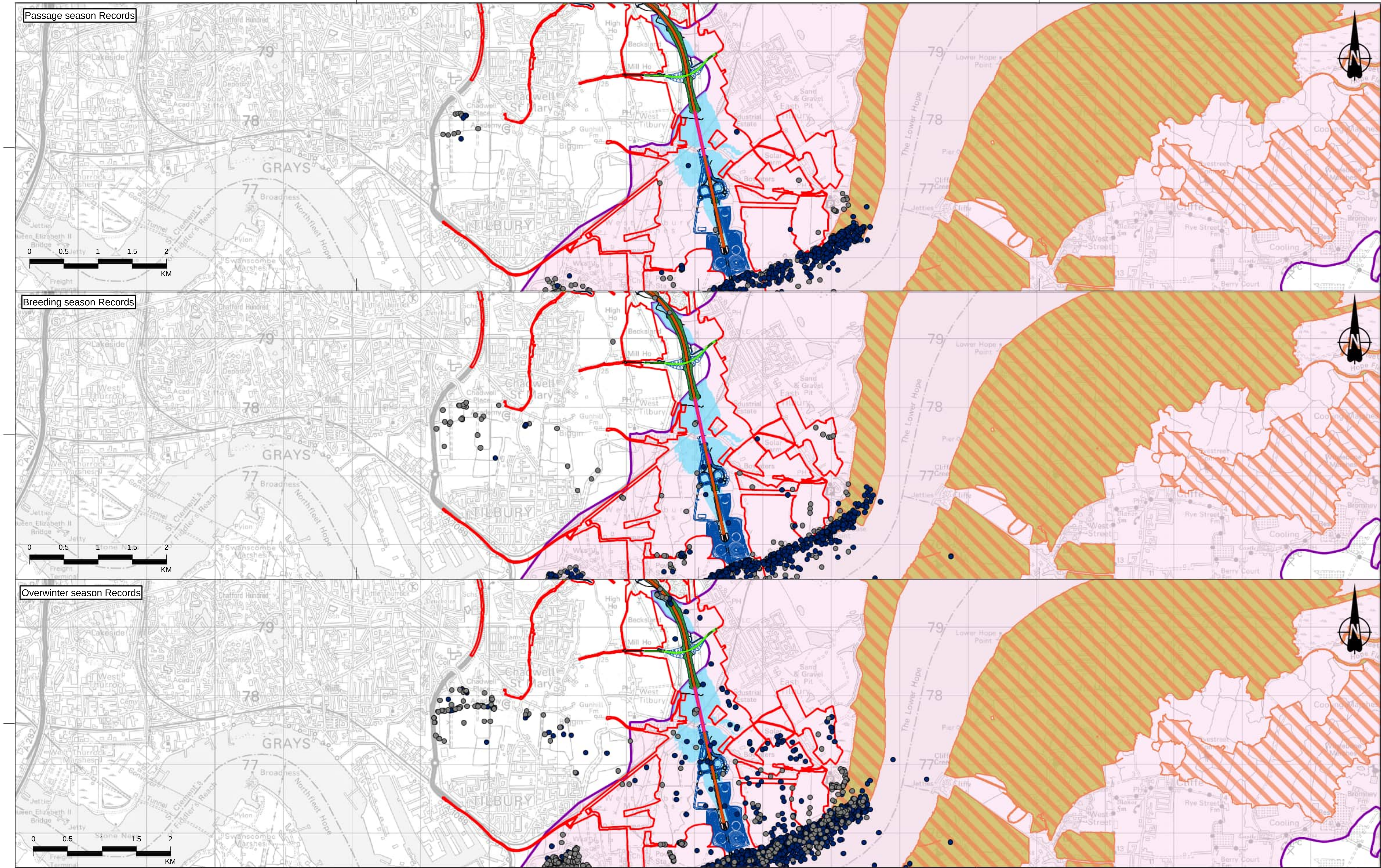
Application Document Number: TR010032/APP/6.5

Scale: 1:40,000

Drawing Title: Figure 20 - Distribution of bird records (from Project ornithology field surveys) in habitats lost south of the River Thames

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60046

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 20 Distribution of bird records (from Project ornithology field surveys) in habitats lost South of the River Thames.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	25/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Route alignment
- Earthworks
- Functionally Linked Land
- Thames Estuary and Marshes Ramsar site
- Thames Estuary and Marshes Special Protection Area

SPA/Ramsar qualifying feature recorded

- Individual qualifying species
- Overwintering waterfowl assemblage species

Extent of area potentially disturbed

- Noise > 55dB or 3dB change - mitigated

Noise attenuation measures

- Earthworks - Cutting
- Earthworks - Flood protection bund/false cutting
- Acoustic barriers

Low noise pavement surface

- Road Surface Influence (RSIH) of -2.5dB(A)
- Road Surface Influence (RSIH) of -7.5dB(A)

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

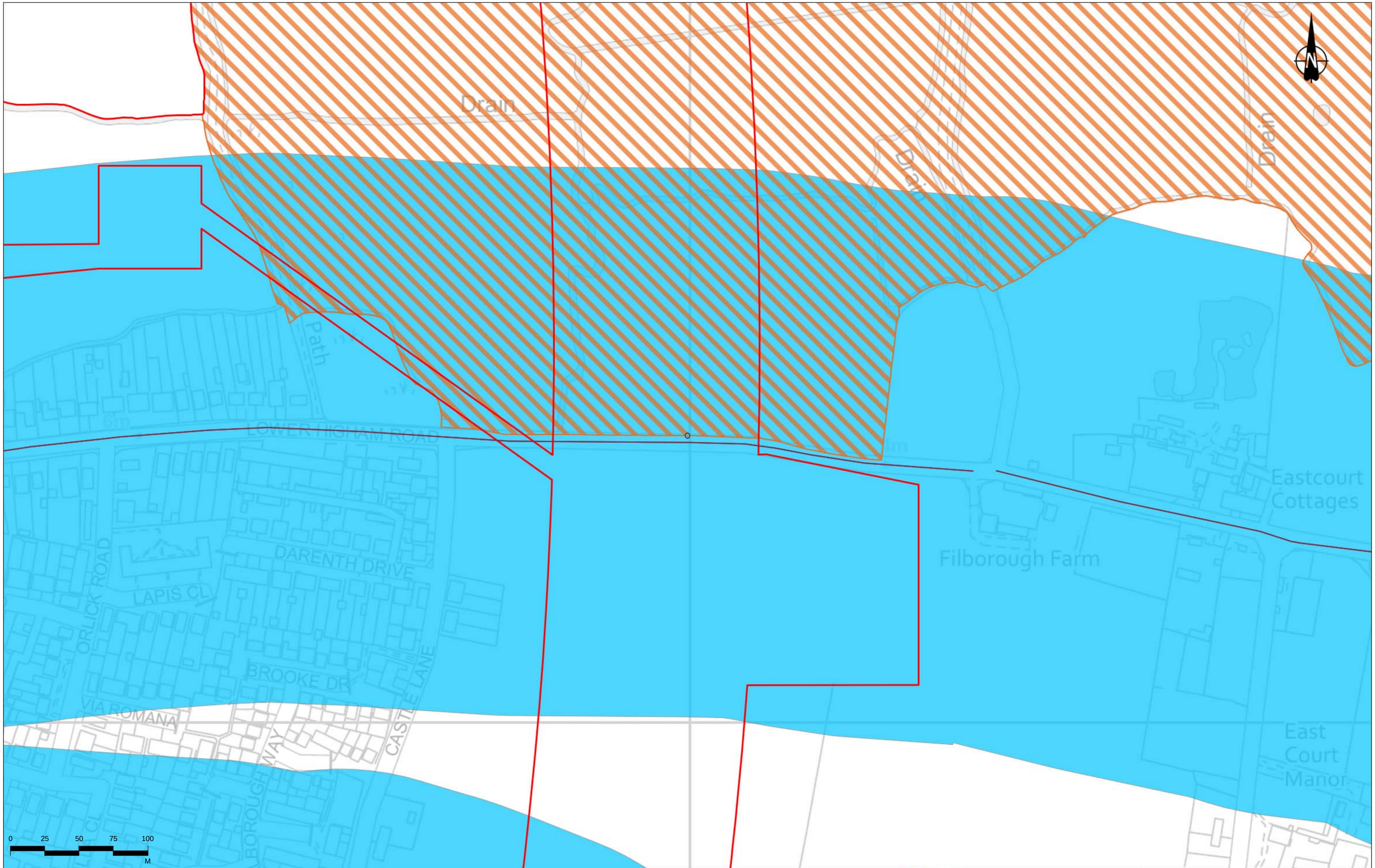
Application Document Number: TR010032/APP/6.5

Scale: 1:50,000

Drawing Title: Figure 21 - Distribution of bird records (from Project ornithology field surveys) in the functionally linked land potentially disturbed during operation

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60085

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 21 Distribution of bird records (from Project ornithology field surveys) in the functionally linked land potentially disturbed during operation.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	12/09/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Contruction Affected Road Network (ARN)
- Areas within 200m of the construction Affected Road Network (ARN)
- Ramsar site

Total N Deposition (kg N ha^{-1} yr^{-1})

- Less than lower critical load

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

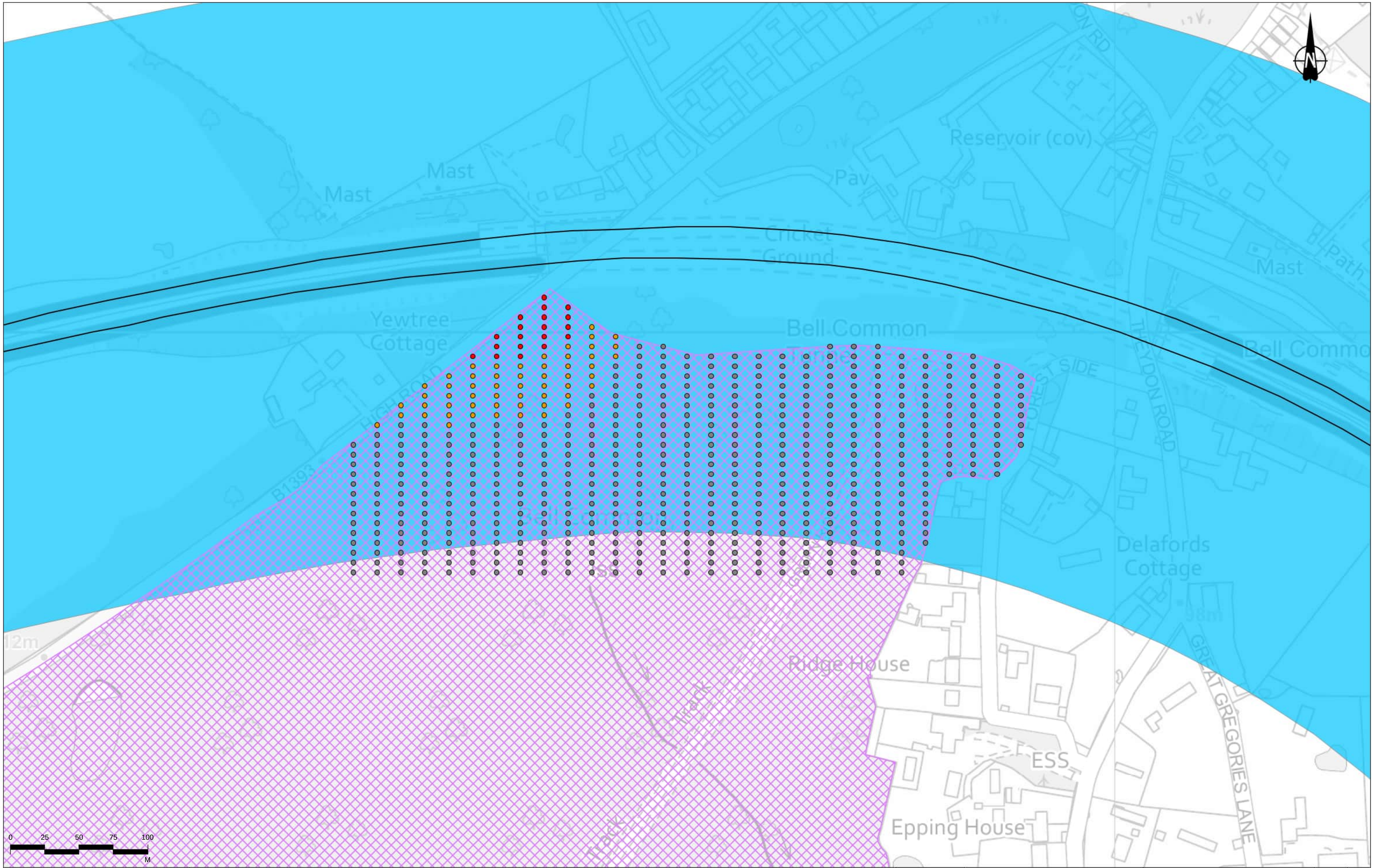
Application Document Number: TR010032/APP/6.5

Scale: 1:2,500

Drawing Title: Figure 22a - Thames Estuary & Marshes Ramsar site Predicted Change in Nitrogen Deposition at European Sites Page 1 of 3

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60061

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 22 Predicted change in nitrogen deposition at European sites.aprx



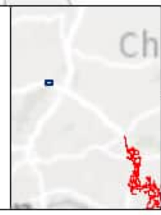
Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	12/09/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Operational Affected Road Network (ARN)
- Special Areas of Conservation (SAC)
- Areas within 200m of the operational Affected Road Network (ARN)

Total N Deposition Impact

- <= 0.4 kg N/ha/yr
- > 0.4 kg N/ha/yr
- < 0.3 NOx ug/m3



Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Application Document Number: TR010032/APP/6.5

Original Size: A3

Revision: P03

Scale: 1:2,500

Drawing Title: Figure 22b - Epping Forest SAC Predicted Change in Nitrogen Deposition at European Sites
Page 2 of 3

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60061

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 22 Predicted change in nitrogen deposition at European sites.aprx

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	12/09/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Operational Affected Road Network (ARN)
- Areas within 200m of the operational Affected Road Network (ARN)
- Special Areas of Conservation (SAC)

Total N Deposition Impact

- <= 0.4 kg N/ha/yr
- > 0.4 kg N/ha/yr
- < 0.3 NOx ug/m3

Client

national highways

Project

LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

Application Document Number: TR010032/APP/6.5

Scale: 1:2,500

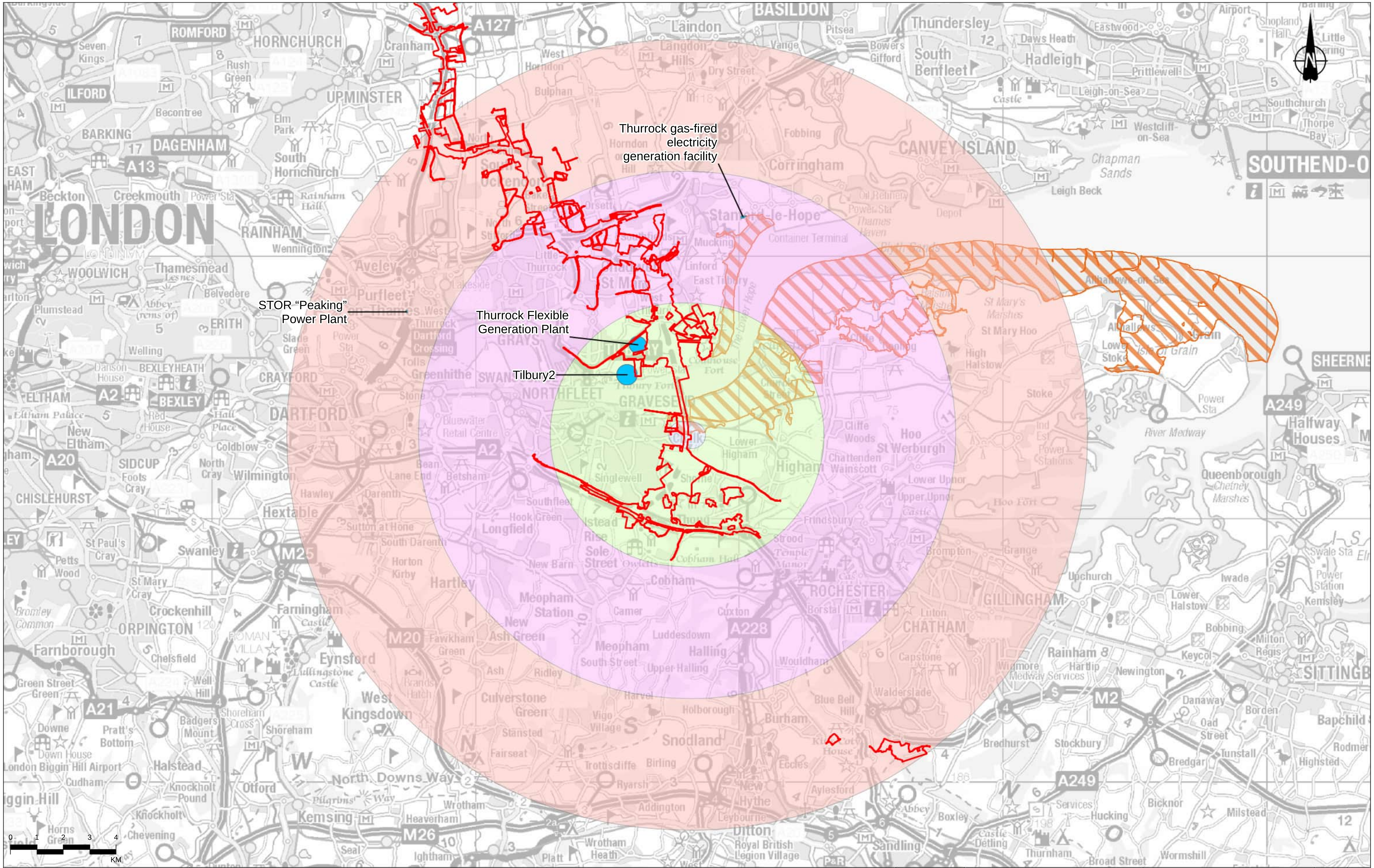
Drawing Title

Figure 22c - North Downs Woodland SAC
Predicted Change in Nitrogen
Deposition at European Sites
Page 3 of 3

Drawing Number

HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60061

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 22 Predicted change in nitrogen deposition at European sites.aprx



Legend

- Order Limits
- Ramsar site
- Indicative locations of other plans and projects

Air quality in combination search areas

- Agricultural biomass boilers within 500m
- Livestock units within 5km
- Industrial emissions e.g. energy generation plants within 10km
- Coal or oil fired power stations or >50 megawatt emitters within 15km

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	25/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

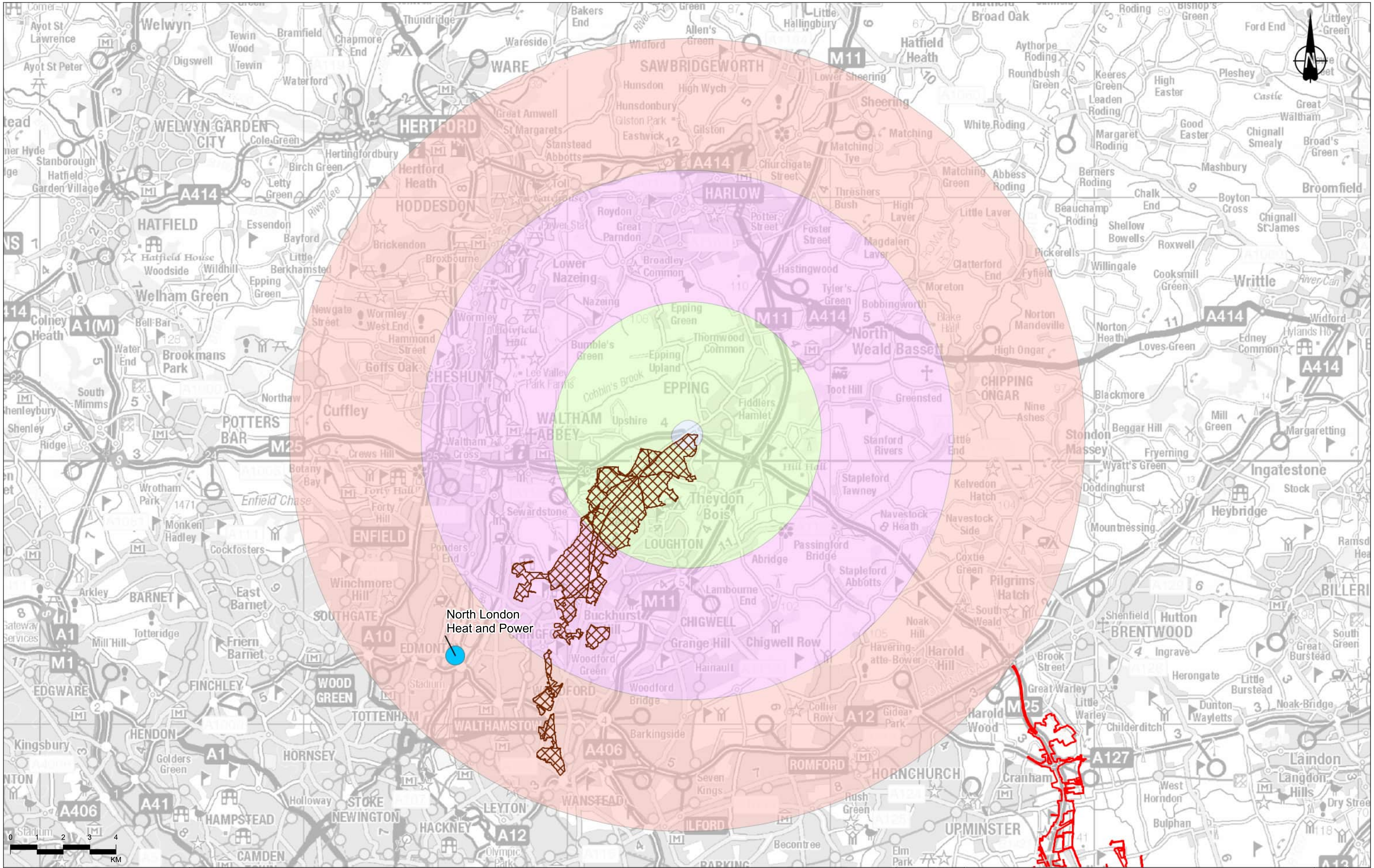
Application Document Number: TR010032/APP/6.5

Scale: 1:130,000

Drawing Title: Figure 23 - Location of Other Plans and Projects Identified for Stage 1 Screening Air-Quality In-combination Assessment

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60047

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 23 Location of other plans and projects identifed for Stage 1 Screening air quality in-combination assessment.aprx



Legend

- Order Limits
- Special Areas of Conservation (SAC)
- Indicative locations of other plans and projects

Air quality in combination search areas

- Agricultural biomass boilers within 500m
- Livestock units within 5km
- Industrial emissions e.g. energy generation plants within 10km
- Coal or oil fired power stations or >50 megawatt emitters within 15km

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

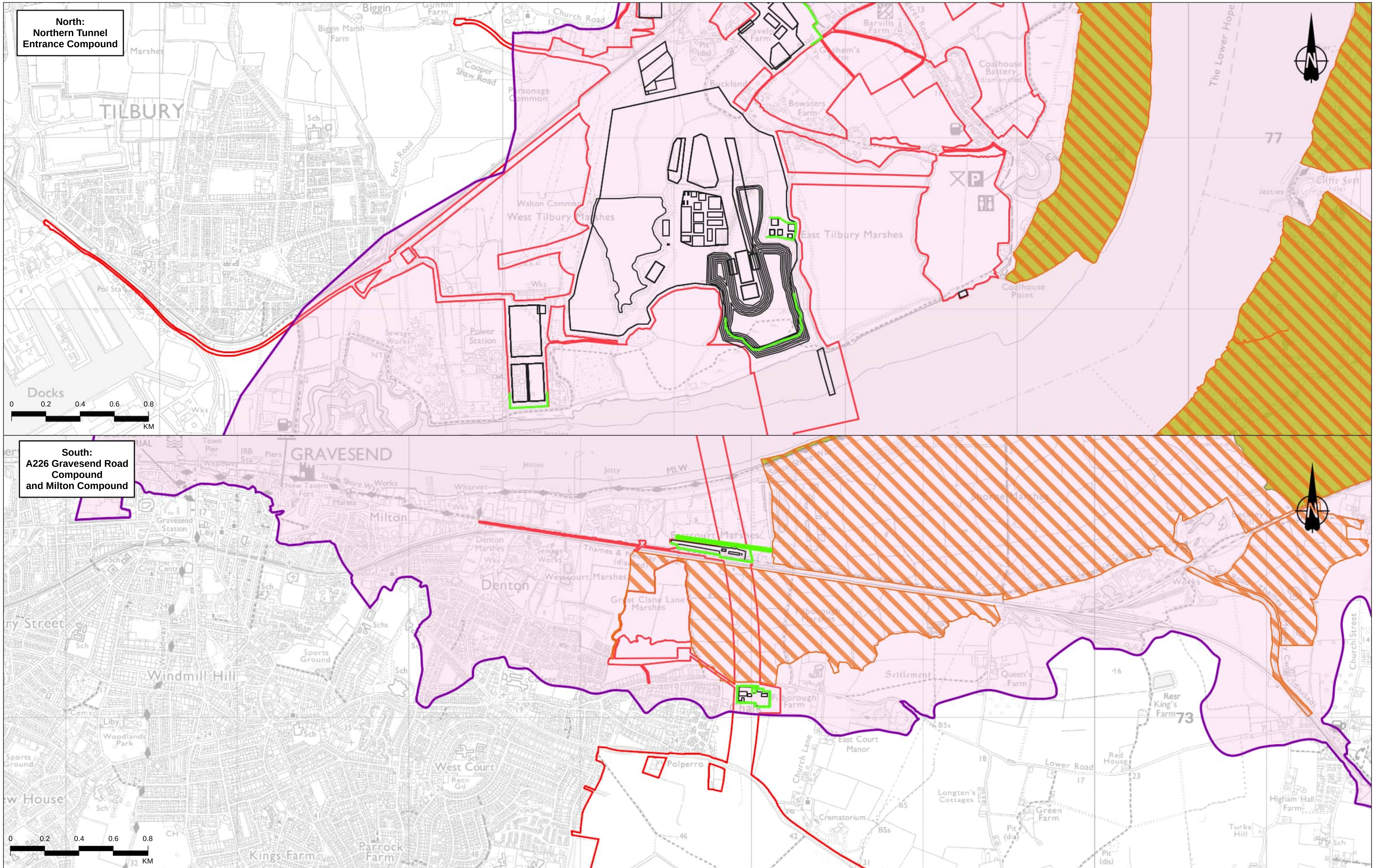
Application Document Number: TR010032/APP/6.5

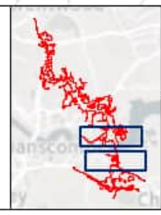
Scale: 1:130,000

Drawing Title: Figure 23 - Location of Other Plans and Projects Identified for Stage 1 Screening Air-Quality In-combination Assessment

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60047

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 23 Location of other plans and projects identifed for Stage 1 Screening air quality in-combination assessment.aprx





Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	25/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Thames Estuary and Marshes Ramsar Site
- Thames Estuary and Marshes Special Protection Area (SPA)
- Functionally Linked Land
- Compound elements
- Noise attenuation measures

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

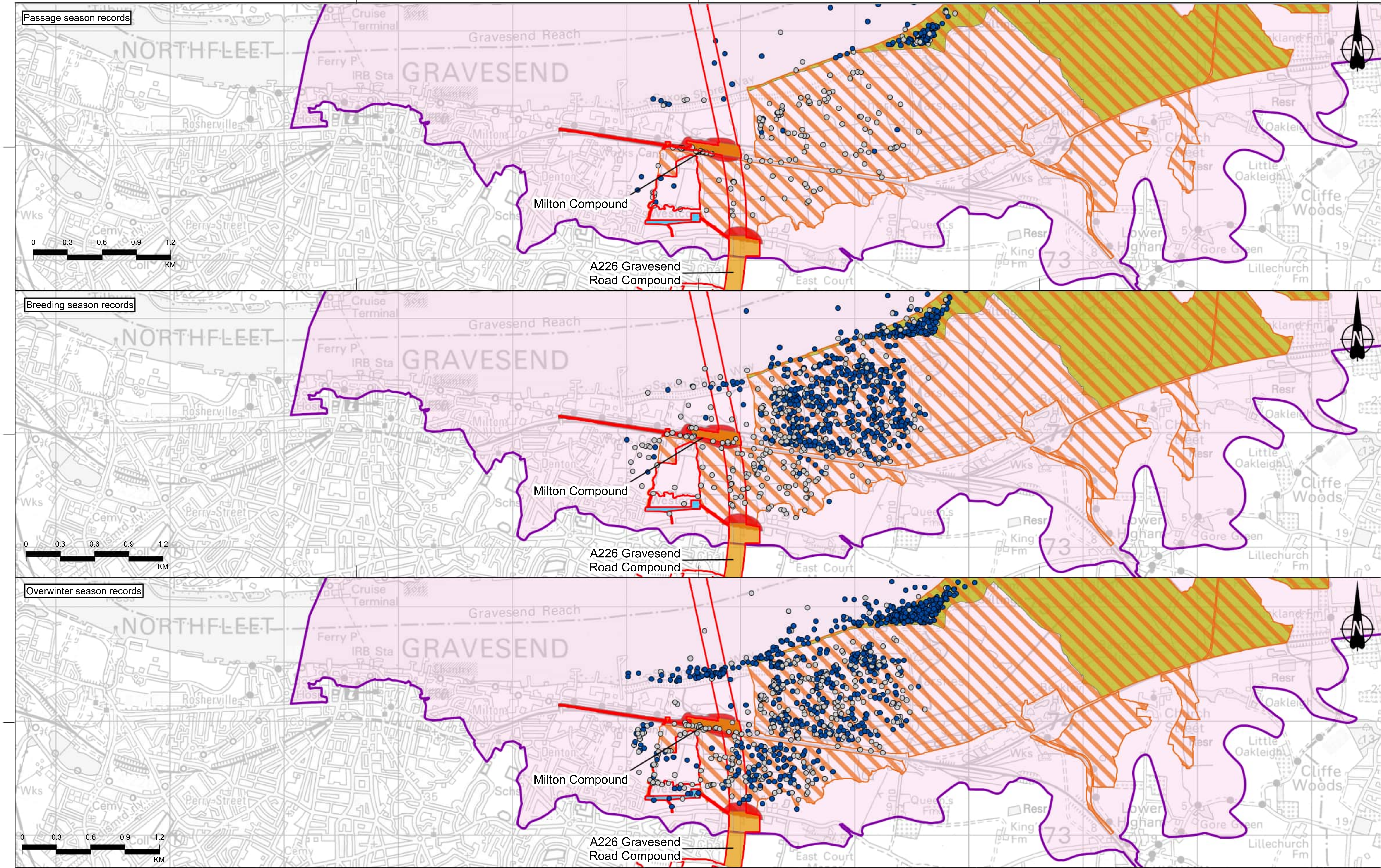
Application Document Number: TR010032/APP/6.5

Scale: 1:20,000

Drawing Title: Figure 24 - Location of the noise attenuation measures - construction

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60086

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 24 Location of Noise attenuation measures for Construction.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Thames Estuary and Marshes Ramsar Site
- Thames Estuary and Marshes Special Protection Area (SPA)

SPA/Ramsar qualifying feature recorded

- Individual qualifying species
- Overwintering waterfowl assemblage species

Duration of Impact

- Works < 1yr
- Works 1 - 5yr
- Works > 5yrs

Extent of area potentially disturbed

- Noise >55dB or 3dB change - mitigated

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

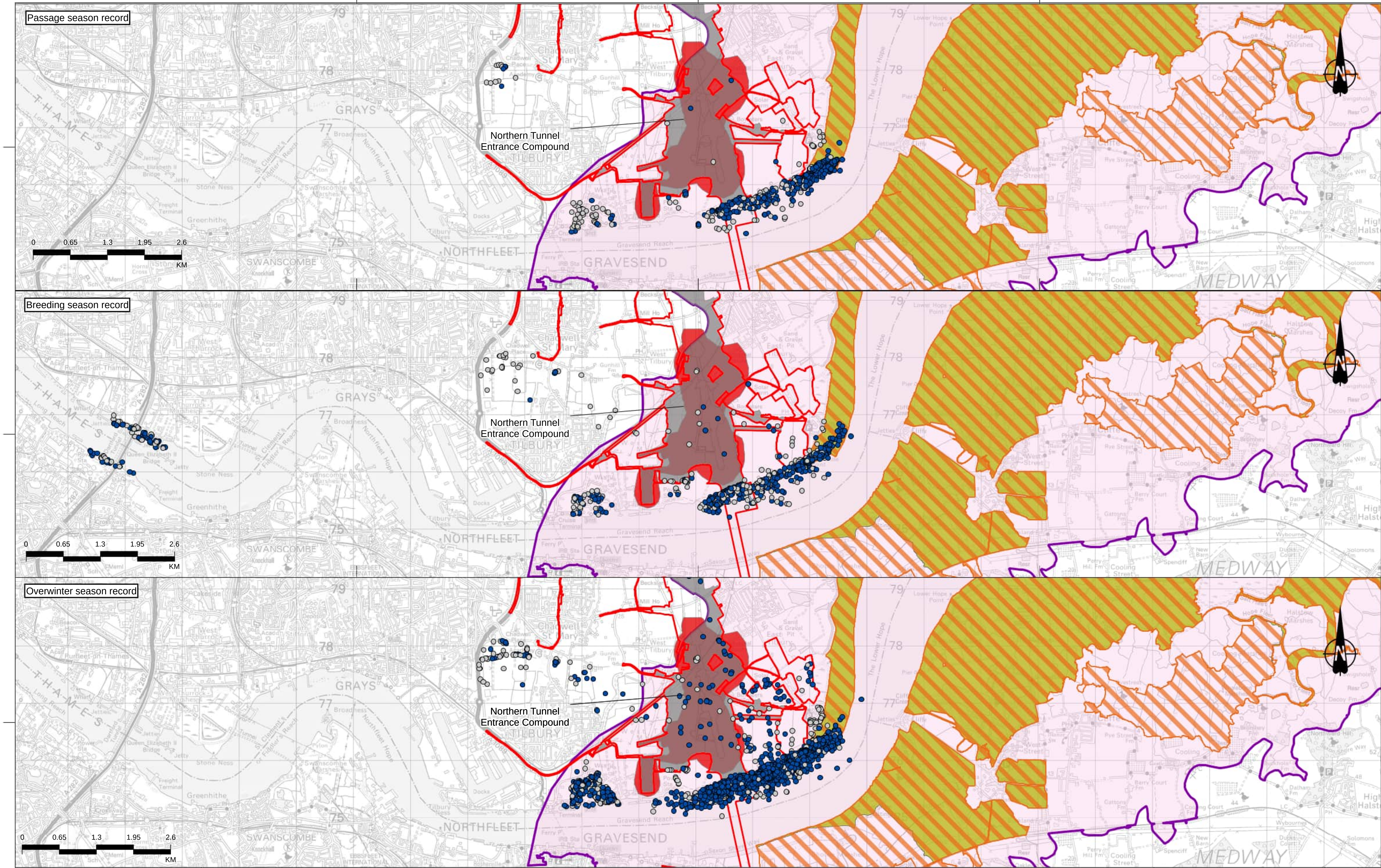
Revision: P03

Application Document Number: TR010032/APP/6.5

Scale: 1:30,000

Drawing Title: Figure 25 - South of the River Thames - Bird records (from Project ornithology field surveys) in potential disturbance areas (noise >55dB/>3dB change or visual change) with noise attenuation measures.

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60087



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	25/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Functionally Linked Land
- Thames Estuary and Marshes Ramsar site
- Thames Estuary and Marshes Special Protection Area (SPA)

SPA/Ramsar qualifying feature recorded

- Individual qualifying species
- Overwintering waterfowl assemblage species

Duration of construction activity

- Works < 1yr
- Works 1 - 5yr
- Works > 5yrs

Extent of area potentially disturbed

- Noise >55dB or 3dB change - mitigated

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Application Document Number: TR010032/APP/6.5

Original Size: A3

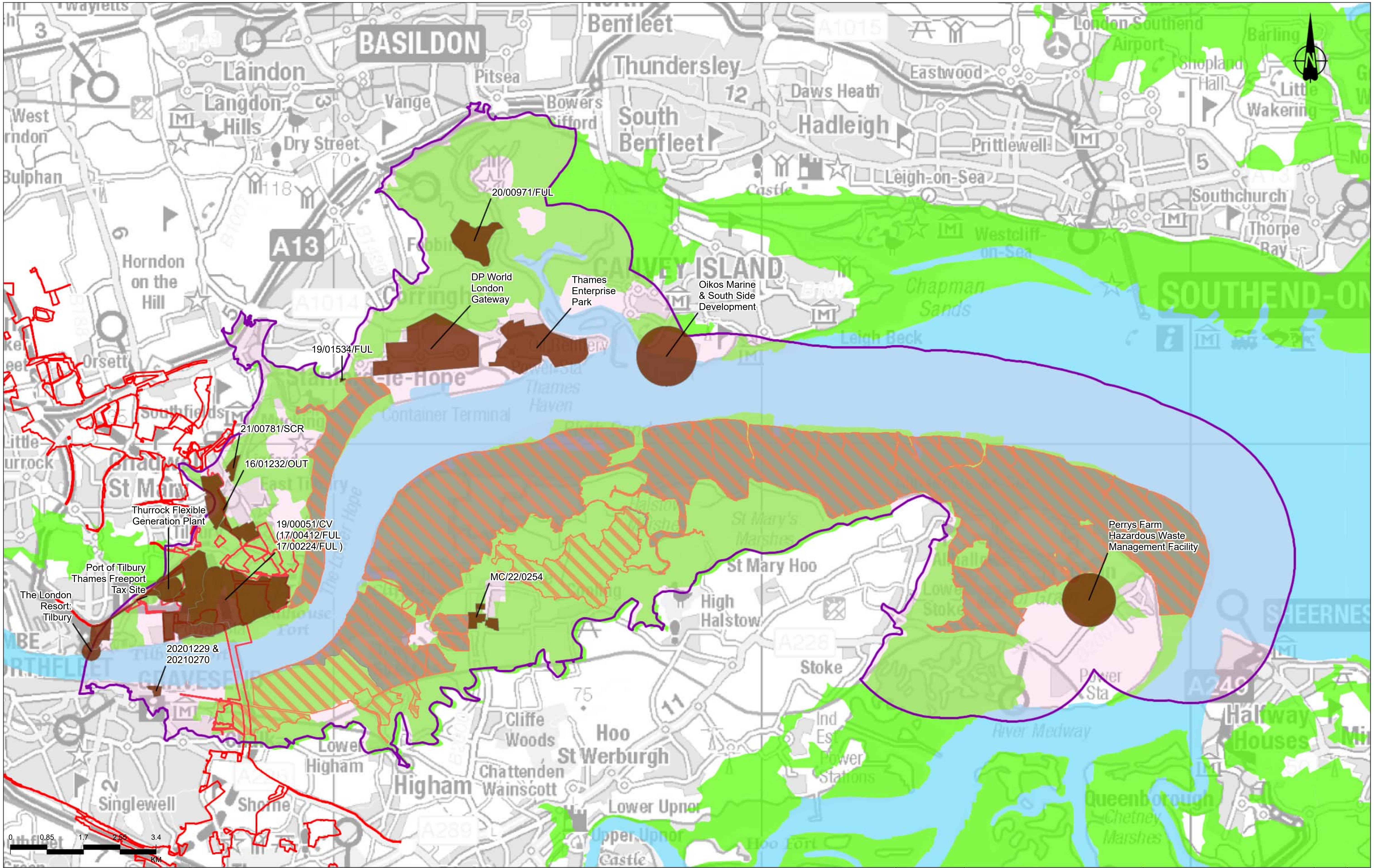
Revision: P03

Scale: 1:60,000

Drawing Title: Figure 26 - North of the River Thames - Bird records (from Project ornithology field surveys) in potential disturbance areas (noise >55dB/>3dB change or visual change) with noise attenuation measures.

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60088

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 26 North of the River Thames - Bird records (from Project ornithology field surveys) in potential disturbance areas - Mitigated.aprx



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S8	22/07/2022	DCO Application	AD	IP	RC

Legend

- Order Limits
- Indicitave location of other plans and projects
- Thames Estuary and Marshes Special Protection Area
- Thames Estuary and Marshes Ramsar site
- Functionally Linked Land
- Suitable habitat
- Thames Estuary

Client: national highways

Project: LOWER THAMES CROSSING

Status: DCO APPLICATION

Original Size: A3

Revision: P03

Application Document Number: TR010032/APP/6.5

Scale: 1:80,000

Drawing Title: Figure 27 - Location of other plans or projects considered within the in-combination assessment (land take & disturbance)

Drawing Number: HE540039-CJV-EBD-SZP_EGNE00000000-DR-LE-60079

Z:\Environment\HRA\APRX and MXDs\DCO2\Figure 27 Location of other plans or projects considered within the in-combination assessment (land take & disturbance).aprx

Appendix B European site Natura 2000 Forms

STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 (2011/484/EU).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the SPA homepage and SAC homepage on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

https://jncc.gov.uk/

EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the official European Union guidelines for the Standard Data Form (also referencing the relevant page number).

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	SPA (classified Special Protection Area)	53
B	cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation)	53
C	SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar)	53

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippopha• rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, screes and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Habitat representativity (abbreviated to ‘Representativity’ in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent representatively	57
B	Good representatively	57
C	Significant representatively	57
D	Non-significant presence representatively	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	58
B	> 2%-15%	58
C	≤ 2%	58

3.1 Degree of conservation (abbreviated to ‘Conservation’ in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global assessment (abbreviated to ‘Global’ in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to ‘Pop.’ in data form)

CODE	DESCRIPTION	PAGE NO
A	> 15%-100%	62
B	> 2%-15%	62
C	≤ 2%	62
D	Non-significant population	62

3.2 Degree of conservation (abbreviated to ‘Con.’ in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to ‘Iso.’ in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to ‘Glo.’ or ‘G.’ in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Other species – essentially covers bird assemblage types

CODE	DESCRIPTION	PAGE NO
WATR	Non-breeding waterbird assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code

BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code

4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic ressources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK04	Site of Special Scientific Interest (GB)	67
UK05	Marine Conservation Zone	67
UK06	Nature Conservation Marine Protected Area	67
UK86	Special Area (Channel Islands)	67
UK98	Area of Special Scientific Interest (NI)	67
IN00	Ramsar Convention site	67
IN08	Special Protection Area	67
IN09	Special Area of Conservation	67

NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE **UK9012021**

SITENAME **Thames Estuary and Marshes**

TABLE OF CONTENTS

1. SITE IDENTIFICATION

Back to top

1.1 Type	1.2 Site code
A	UK9012021

1.3 Site name

Thames Estuary and Marshes

1.4 First Compilation date	1.5 Update date
2000-03	2015-12

1.6 Respondent:

Name/Organisation:	Joint Nature Conservation Committee
Address:	Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:	

1.7 Site indication and designation / classification dates

Date site classified as SPA:	2000-03
National legal reference of SPA designation	Regulations 12A and 13-15 of the Conservation Habitats and Species Regulations 2010, (http://www.legislation.gov.uk/uksi/2010/490/contents/made) as amended by The Conservation of Habitats and Species (Amendment) Regulations 2011 (http://www.legislation.gov.uk/uksi/2011/625/contents/made).

2. SITE LOCATION

Back to top

2.1 Site-centre location [decimal degrees]:

Longitude	Latitude
0.596388889	51.48555556

2.2 Area [ha]:

4802.47

2.3 Marine area [%]

55.7

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code	Region Name
UKH3	Essex
UKJ4	Kent

2.6 Biogeographical Region(s)

Atlantic (100.0 %)

3. ECOLOGICAL INFORMATION

Back to top

3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Iso.	Glo
B	A672	Calidris alpina alpina			w	29646	29646	i		G	B		C	
B	A143	Calidris canutus			w	4848	4848	i		G	C		C	
B	A137	Charadrius hiaticula			c	1324	1324	i		G	B		C	
B	A082	Circus cyaneus			w	7	7	i		G	C		C	
B	A616	Limosa limosa islandica			w	1699	1699	i		G	B		C	
B	A141	Pluvialis squatarola			w	2593	2593	i		G	C		C	
B	A132	Recurvirostra avosetta			w	283	283	i		G	A		C	
		Tringa												

B	A162	totanus			w	3251	3251	i		G	B		C	

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

3.3 Other important species of flora and fauna (optional)

Species					Population in the site				Motivation					
Group	CODE	Scientific Name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C|R|V|P	IV	V	A	B	C	D
B	WATR	Waterbird assemblage			75019	75019	i						X	

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see reference portal)
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories: IV, V:** Annex Species (Habitats Directive), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

4. SITE DESCRIPTION

Back to top

4.1 General site character

Habitat class	% Cover
N09	1.9
N07	3.7
N05	0.9
N06	5.6
N10	29.1
N03	1.5
N02	57.3
Total Habitat Cover	100.00000000000001

Other Site Characteristics

1 Terrestrial: Soil & Geology: shingle,alluvium,mud 2 Terrestrial: Geomorphology and landscape: coastal,floodplain 4 Marine: Geomorphology: estuary,intertidal sediments (including sandflat/mudflat)

4.2 Quality and importance

ARTICLE 4.1 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: Circus cyaneus 1% of the population in Great Britain Five year peak mean for 1993/94 to 1997/98 Recurvirostra avosetta (Western Europe/Western Mediterranean - breeding) 28.3% of the population in Great Britain Five year peak mean for 1993/93 to 1997/98 ARTICLE 4.2 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: Calidris alpina alpina (Northern Siberia/Europe/Western Africa) 2.1% of the population Five year peak mean for 1993/94 to 1997/98 Calidris canutus (North-eastern Canada/Greenland/Iceland/North-western Europe) 1.4% of the population Five year peak mean for 1993/94 to 1997/98 Limosa limosa islandica (Iceland - breeding) 2.4% of the population Five year peak mean for 1993/94 to 1997/98 Pluvialis squatarola (Eastern Atlantic - wintering) 1.7% of the population Five year peak mean for 1993/94 to 1997/98 Tringa totanus (Eastern Atlantic - wintering) 2.2% of the population Five year peak mean for 1993/94 to 1997/98 On passage the area regularly supports: Charadrius hiaticula (Europe/Northern Africa - wintering) 2.6% of the population Five year peak mean for 1993/94 to 1997/98 ARTICLE 4.2 QUALIFICATION (79/409/EEC): AN INTERNATIONALLY IMPORTANT ASSEMBLAGE OF BIRDS Over winter the area regularly supports: 75019 waterfowl (5 year peak mean 1991/92-1995/96) Including: Recurvirostra avosetta , Pluvialis squatarola , Calidris canutus , Calidris alpina alpina , Limosa limosa islandica , Tringa totanus

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i|o|b]
H	I01		B
H	G01		I
H	M02		B
H	M01		B

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i|o|b]
H	A02		I
H	G03		I
H	D05		I
H	A04		I
H	A06		I

Rank: H = high, M = medium, L = low
Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,
T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions
i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): http://publications.naturalengland.org.uk/category/6490068894089216

http://publications.naturalengland.org.uk/category/3212324
http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

Back to top

5.1 Designation types at national and regional level:

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK04	100.0				

6. SITE MANAGEMENT

Back to top

6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

- [ ] Yes
- [ ] No, but in preparation
- [X] No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

Information Sheet on Ramsar Wetlands (RIS)

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

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.

2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.

3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

---

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

FOR OFFICE USE ONLY.

DD	MM	YY

Designation date

Site Reference Number

Joint Nature Conservation Committee
Monkstone House
City Road
Peterborough
Cambridgeshire PE1 1JY
UK
Telephone/Fax: +44 (0)1733 – 562 626 / +44 (0)1733 – 555 948
Email: RIS@JNCC.gov.uk

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2. Date this sheet was completed/updated:

Designated: 31 March 2000

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3. Country:

UK (England)

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4. Name of the Ramsar site:

Thames Estuary and Marshes

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

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

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

a) Site boundary and area:

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

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

7. Map of site included:

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

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

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

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

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

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

8. Geographical coordinates (latitude/longitude):

51 29 08 N 00 35 47 E

9. General location:

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

Nearest town/city: Gravesend

Contains part of the north coast of Kent and part of the southern coast of Essex, straddling the Thames estuary.

Administrative region: Essex; Kent; Medway; Thurrock

10. Elevation (average and/or max. & min.) (metres): 11. Area (hectares): 5588.59

Min.	-2
Max.	20
Mean	1

12. General overview of the site:

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

A complex of brackish, floodplain grazing marsh ditches, saline lagoons and intertidal saltmarsh and mudflat. These habitats together support internationally important numbers of wintering waterfowl. The saltmarsh and grazing marsh are of international importance for their diverse assemblages of wetland plants and invertebrates.

13. Ramsar Criteria:

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

2, 5, 6

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

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

Ramsar criterion 2

The site supports one endangered plant species and at least 14 nationally scarce plants of wetland habitats. The site also supports more than 20 British Red Data Book invertebrates.

Ramsar criterion 5

Assemblages of international importance:

Species with peak counts in winter:
45118 waterfowl (5 year peak mean 1998/99-2002/2003)

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

Qualifying Species/populations (as identified at designation):

Species with peak counts in spring/autumn:	
Ringed plover , *Charadrius hiaticula*, Europe/Northwest Africa	595 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9-2002/3)
Black-tailed godwit , *Limosa limosa islandica*, Iceland/W Europe	1640 individuals, representing an average of 4.6% of the population (5 year peak mean 1998/9-2002/3)
Species with peak counts in winter:	
Grey plover , *Pluvialis squatarola*, E Atlantic/W Africa -wintering	1643 individuals, representing an average of 3.1% of the GB population (5 year peak mean 1998/9-2002/3)
Red knot , *Calidris canutus islandica*, W & Southern Africa (wintering)	7279 individuals, representing an average of 1.6% of the population (5 year peak mean 1998/9-2002/3)
Dunlin , *Calidris alpina alpina*, W Siberia/W Europe	15171 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9-2002/3)
Common redshank , *Tringa totanus totanus*,	1178 individuals, representing an average of 1% of the GB population (5 year peak mean 1998/9-2002/3)

Contemporary data and information on waterbird trends at this site and their regional (sub-national) and national contexts can be found in the Wetland Bird Survey report, which is updated annually. See www.bto.org/survey/webs/webs-alerts-index.htm.
Details of bird species occuring at levels of National importance are given in Section 22

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

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

a) biogeographic region:
Atlantic

b) biogeographic regionalisation scheme (include reference citation):
Council Directive 92/43/EEC

16. Physical features of the site:

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

Soil & geology	alluvium, mud, shingle
Geomorphology and landscape	coastal, floodplain, intertidal sediments (including sandflat/mudflat), estuary
Nutrient status	eutrophic
pH	no information
Salinity	brackish / mixosaline, fresh, saline / euhaline
Soil	no information
Water permanence	usually permanent, usually seasonal / intermittent
Summary of main climatic features	Annual averages (Greenwich, 1971–2000) (www.metoffice.com/climate/uk/averages/19712000/sites/greenwich.html) Max. daily temperature: 14.8° C Min. daily temperature: 7.2° C Days of air frost: 29.1 Rainfall: 583.6 mm Hrs. of sunshine: 1461.0

General description of the Physical Features:

The marshes extend for about 15 km along the south side of the Thames estuary and also include intertidal areas on the north side of the estuary. To the south of the river, much of the area is brackish grazing marsh, although some of this has been converted to arable use. At Cliffe, there are flooded clay and chalk pits, some of which have been infilled with dredgings. Outside the sea-wall, there is a small extent of saltmarsh and broad intertidal mudflats.

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17. Physical features of the catchment area:

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

The marshes extend for about 15 km along the south side of the Thames estuary and also include intertidal areas on the north side of the estuary. To the south of the river, much of the area is brackish grazing marsh, although some of this has been converted to arable use. At Cliffe, there are flooded clay and chalk pits, some of which have been infilled with dredgings. Outside the sea-wall, there is a small extent of saltmarsh and broad intertidal mudflats.

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18. Hydrological values:

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

Shoreline stabilisation and dissipation of erosive forces, Sediment trapping, Flood water storage / desynchronisation of flood peaks, Maintenance of water quality (removal of nutrients)

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19. Wetland types:

Marine/coastal wetland

Code	Name	% Area
G	Tidal flats	49.6
4	Seasonally flooded agricultural land	38.6
Q	Saline / brackish lakes: permanent	4.2
Ss	Saline / brackish marshes: seasonal / intermittent	3.2
Other	Other	1.6
H	Salt marshes	1.3
E	Sand / shingle shores (including dune systems)	0.8
O	Freshwater lakes: permanent	0.7

20. General ecological features:

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

The intertidal flats are mostly fine, silty sediment, though in parts they are sandy. The saltmarsh shows a transition from pioneer communities containing *Zostera* to saltmarsh dominated by, for example, *Atriplex portulacoides*. The grazing marsh grassland is mesotrophic and generally species-poor. It does, however, contain scattered rarities, mostly annuals characteristic of bare ground. Where the grassland is seasonally inundated and the marshes are brackish the plant communities are intermediate between those of mesotrophic grassland and those of saltmarsh. The grazing marsh ditches contain a range of flora of brackish and fresh water. The aquatic flora is a mosaic of successional stages resulting from periodic clearance of drainage channels. The dominant emergent plants are *Phragmites communis* and *Bolboschoenus maritimus*. The saline lagoons have a diverse molluscan and crustacean fauna. Dominant plants in the lagoons include *Ulva* and *Chaetomorpha*.

Ecosystem services

21. Noteworthy flora:

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

Nationally important species occurring on the site:

Higher plants:

The site supports a population of the endangered least lettuce *Lactuca saligna*, and also supports several nationally scarce plants, including bulbous foxtail *Alopecurus bulbosus*, slender hare's-ear *Bupleurum tenuissimum*, divided sedge *Carex divisa*, saltmarsh goosefoot *Chenopodium chenopodioides*, sea barley *Hordeum marinum*, golden samphire *Inula crithmoides*, annual beard grass *Polypogon monspeliensis*, Borrer's saltmarsh-grass *Puccinellia fasciculata*, stiff saltmarsh-grass *P. rupestris*, one-flowered glasswort *Salicornia pusilla*, clustered clover *Trifolium glomeratum*, sea clover *T. squamosum*, narrow-leaved eelgrass *Zostera angustifolia* and dwarf eelgrass *Z. noltei*.

22. Noteworthy fauna:

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

Birds

Species currently occurring at levels of national importance:

Species with peak counts in spring/autumn:

Little grebe , *Tachybaptus ruficollis ruficollis*, Europe to E Urals, NW Africa	251 individuals, representing an average of 3.2% of the GB population (5 year peak mean 1998/9-2002/3)
Little egret , *Egretta garzetta*, West Mediterranean	54 individuals, representing an average of 3.2% of the GB population (5 year peak mean 1998/9-2002/3)
Ruff , *Philomachus pugnax*, Europe/W Africa	23 individuals, representing an average of 3.2% of the GB population (5 year peak mean 1998/9-2002/3)
Common greenshank , *Tringa nebularia*, Europe/W Africa	38 individuals, representing an average of 6.3% of the GB population (5 year peak mean 1998/9-2002/3)

Species with peak counts in winter:

Common shelduck , *Tadorna tadorna*, NW Europe	1238 individuals, representing an average of 1.5% of the GB population (5 year peak mean 1998/9-2002/3)
Gadwall , *Anas strepera strepera*, NW Europe	359 individuals, representing an average of 2% of the GB population (5 year peak mean 1998/9-2002/3)
Northern shoveler , *Anas clypeata*, NW & C Europe	288 individuals, representing an average of 1.9% of the GB population (5 year peak mean 1998/9-2002/3)
Water rail , *Rallus aquaticus*, Europe	6 individuals, representing an average of 1.3% of the GB population (5 year peak mean 1998/9-2002/3)
Pied avocet , *Recurvirostra avosetta*, Europe/Northwest Africa	607 individuals, representing an average of 17.8% of the GB population (5 year peak mean 1998/9-2002/3)
Spotted redshank , *Tringa erythropus*, Europe/W Africa	6 individuals, representing an average of 4.4% of the GB population (5 year peak mean 1998/9-2002/3)

Species Information

Nationally important species occurring on the site:

Invertebrates:

The endangered species *Bagous longitarsis* occurs on the site.

The following vulnerable species occur on the site: a groundbug *Henestaris halophilus*, a weevil *Bagous cylindrus*, a ground beetle *Polystichus connexus*, a cranefly *Erioptera bivittata*, a cranefly *Limnophila pictipennis*, a horse fly *Hybomitra expollicata*, a hoverfly *Lejops vittata*, a dancefly *Poecilobothrus ducalis*, a snail-killing fly *Pteromicra leucopeza*, a solitary wasp *Philanthus triangulum* and a damselfly *Lestes dryas*.

The following rare species occur on the site: a ground beetle *Anisodactylus poeciloides*, the water beetles *Aulacochthebius exaratus, Berosus fulvus, Cercyon bifenestratus, Hydrochus elongatus, H. ignicollis, Ochthebius exaratus* and *Hydrophilus piceus*, a beetle *Malachius vulneratus*, a rove beetle *Philonthus punctus*, a fungus beetle *Telmatophilus brevicollis*, a fly *Campsicnemus magius*, a horsefly *Haematopota bigoti*, a soldier fly *Stratiomys longicornis* and a spider *Baryphyma duffeyi*.

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23. Social and cultural values:

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

Aesthetic
Archaeological/historical site
Environmental education/ interpretation
Fisheries production
Livestock grazing
Non-consumptive recreation
Scientific research
Sport fishing
Sport hunting
Tourism
Transportation/navigation

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

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

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

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

25. Current land (including water) use:

Activity	On-site	Off-site
Nature conservation	+	+
Tourism	+	+
Recreation	+	+
Current scientific research	+	+
Fishing: commercial	+	
Fishing: recreational/sport	+	
Gathering of shellfish	+	
Bait collection	+	
Arable agriculture (unspecified)		+
Permanent arable agriculture		+
Livestock watering hole/pond	+	+
Grazing (unspecified)	+	+
Permanent pastoral agriculture	+	+
Hunting: recreational/sport	+	
Industrial water supply		+
Industry		+
Sewage treatment/disposal	+	+
Harbour/port	+	+
Flood control	+	
Transport route	+	+
Urban development		+
Military activities	+	

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

Explanation of reporting category:

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

NA = Not Applicable because no factors have been reported.

Adverse Factor Category	Reporting Category	Description of the problem (Newly reported Factors only)	On-Site	Off-Site	Major Impact?
Dredging	1		+	+	+
Erosion	2		+		+
Eutrophication	2	Studies by the Environment Agency indicate that the waters in the Thames estuary are hyper-nutrified for nitrogen and phosphorus.	+	+	+
General disturbance from human activities	1		+		+

For category 2 factors only. What measures have been taken / are planned / regulatory processes invoked, to mitigate the effect of these factors? Erosion - The North Kent Coastal Habitat Management Plan (CHaMP) has been produced. The Environment Agency is producing a Flood Defence Strategy for the Thames (Thames 2100) and decisions on future flood risk management will need to take into account the effects on features within the designated sites. Studies of sediment transport and hydrodynamics within Thames estuary. Investigation of beneficial use of dredgings for mudflat recharge and creation of compensatory habitat. Eutrophication - Water quality and sources of nutrient inputs are subject to further investigation by the Environment Agency as part of the Agency's review of consents under the Habitats Regulations. Stage 3 of the Review of Consents (appropriate assessment) is scheduled for completion by March 2006, at which point any consented discharges having an adverse effect on site integrity will be identified.
Is the site subject to adverse ecological change? YES

27. Conservation measures taken:

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

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

Land owned by a non-governmental organisation for nature conservation	+	+
Management agreement	+	
Site management statement/plan implemented	+	
Environmentally Sensitive Area (ESA)	+	+

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

28. Conservation measures proposed but not yet implemented:

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

No information available

29. Current scientific research and facilities:

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

Numbers of migratory and wintering wildfowl and waders are monitored annually as part of the national Wetland Birds Survey (WeBS) organised by the British Trust for Ornithology, Wildfowl and Wetlands Trust, the Royal Society for the Protection of Birds and the Joint Nature Conservation Committee.
Numbers of breeding waders have been monitored through the BTO/RSPB/English Nature/Defra survey Breeding Waders of Wet Meadows (2002).
Botanical surveys of vegetation of sea wall embankments and grazing marsh ditches have been carried out.
The distribution and extent of saltmarsh habitat has been mapped - North Kent Marshes Saltmarsh Survey (2002) (Blair-Myres 2003)
The RSPB monitors various species groups on its reserves within the site

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

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

The RSPB manages a network of reserves within and adjacent to the site, which are promoted locally through existing community initiatives, and more widely through publications and via the internet. The site forms part of proposals for a north Kent ‘Regional Park’, being promoted to balance development in Kent Thameside (part of the Thames Gateway growth area). The Management Guidance for the Thames Estuary aims to increase awareness of conservation and is promoted by the Thames Estuary Partnership. The Thames Estuary Partnership has also produced the Tidal Thames Habitat Action Plan to raise awareness of and address biodiversity issues.

31. Current recreation and tourism:

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

Yachting, angling, wildfowling, jet-skiing, water-skiing and birdwatching. Bird watching occurs throughout the year and wildfowling is restricted to the period September to February. The remaining activities occur year-round but are more prevalent in the summer months. Disturbance from these activities is a current issue but is being addressed through further research, negotiation and information dissemination.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept. of Agriculture/Dept. of Environment, etc.

Head, Natura 2000 and Ramsar Team, Department for Environment, Food and Rural Affairs, European Wildlife Division, Zone 1/07, Temple Quay House, 2 The Square, Temple Quay, Bristol, BS1 6EB

33. Management authority:

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

Site Designations Manager, English Nature, Sites and Surveillance Team, Northminster House, Northminster Road, Peterborough, PE1 1UA, UK

34. Bibliographical references:

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

Site-relevant references

Anon. (2002) *North Kent Coastal Habitat Management Plan: Executive summary*. English Nature, Peterborough (Living with the Sea LIFE Project) www.english-nature.org.uk/livingwiththesea/project_details/good_practice_guide/HabitatCRR/ENRestore/CHaMPs/NorthKent/NorthKentCHaMP.pdf

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Shirt, DB (ed.) (1987) *British Red Data Books: 2. Insects*. Nature Conservancy Council, Peterborough

Stewart, A, Pearman, DA & Preston, CD (eds.) (1994) *Scarce plants in Britain*. Joint Nature Conservation Committee, Peterborough

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Please return to: **Ramsar Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**
Telephone**: +41 22 999 0170** • Fax: **+41 22 999 0169** • email: **ramsar@ramsar.org**

NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE	**UK0012720**
SITENAME	**Epping Forest**

TABLE OF CONTENTS

1. SITE IDENTIFICATION

Back to top

1.1 Type	1.2 Site code
B	UK0012720

1.3 Site name

Epping Forest

1.4 First Compilation date	1.5 Update date
1996-01	2015-12

1.6 Respondent:

Name/Organisation:	Joint Nature Conservation Committee
Address:	Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:	

Date site proposed as SCI:	1996-01
Date site confirmed as SCI:	2004-12
Date site designated as SAC:	2005-04
National legal reference of SAC designation:	Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made).

2. SITE LOCATION

Back to top

2.1 Site-centre location [decimal degrees]:

Longitude	Latitude
0.0225	51.64416667

2.2 Area [ha]:	2.3 Marine area [%]
1630.74	0.0

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code	Region Name
UKI2	Outer London
UKH3	Essex

2.6 Biogeographical Region(s)

Atlantic (100.0 %)

3. ECOLOGICAL INFORMATION

Back to top

3.1 Habitat types present on the site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A|B|C|D	A|B|C		
						Representativity	Relative Surface	Conservation	Global
4010			3.26	0	G	C	C	B	C
4030			11.42	0	G	C	C	B	C
9120			652.3	0	M	A	B	A	A

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Iso.	Glo.
I	1083	Lucanus cervus			p				P	DD	C	A	C	B
A	1166	Triturus cristatus			p				P	DD	D			

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

4. SITE DESCRIPTION

Back to top

4.1 General site character

Habitat class	% Cover
N09	20.0
N16	70.0
N07	0.2
N06	6.0
N08	3.8
Total Habitat Cover	100

Other Site Characteristics

1 Terrestrial: Soil & Geology: acidic,neutral,sand,clay 2 Terrestrial: Geomorphology and landscape: lowland

4.2 Quality and importance

Northern Atlantic wet heaths with Erica tetralix for which the area is considered to support a significant presence. European dry heaths for which the area is considered to support a significant presence. Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion) for which this is considered to be one of the best areas in the United Kingdom. Lucanus cervus for which this is one of only four known outstanding localities in the United Kingdom.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
	Threats and	Pollution	inside/outside

Positive Impacts			
Rank	Activities, management	Pollution (optional)	inside/outside

Rank	pressures [code]	(optional) [code]	[i|o|b]
H	J02		B
H	A04		I
H	G01		I
H	H04		B
H	M02		B

	[code]	[code]	[i|o|b]
H	A04		I
H	B02		I
H	A02		I

Rank: H = high, M = medium, L = low
Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,
T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions
i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): http://publications.naturalengland.org.uk/category/6490068894089216

http://publications.naturalengland.org.uk/category/3212324
http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

Back to top

5.1 Designation types at national and regional level:

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK04	100.0				

6. SITE MANAGEMENT

Back to top

6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

- [ ] Yes
- [ ] No, but in preparation
- [X] No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE **UK0030225**

SITENAME **North Downs Woodlands**

TABLE OF CONTENTS

1. SITE IDENTIFICATION

Back to top

1.1 Type	1.2 Site code
B	UK0030225

1.3 Site name

North Downs Woodlands

1.4 First Compilation date	1.5 Update date
2001-01	2015-12

1.6 Respondent:

Name/Organisation:	Joint Nature Conservation Committee
Address:	Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:	

Date site proposed as SCI:	2001-01
Date site confirmed as SCI:	2004-12
Date site designated as SAC:	2005-04
National legal reference of SAC designation:	Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made).

2. SITE LOCATION

Back to top

2.1 Site-centre location [decimal degrees]:

Longitude	Latitude
0.403611111	51.34

2.2 Area [ha]:	2.3 Marine area [%]
288.58	0.0

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code	Region Name
UKJ4	Kent

2.6 Biogeographical Region(s)

Atlantic (100.0 %)

3. ECOLOGICAL INFORMATION

Back to top

3.1 Habitat types present on the site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A|B|C|D	A|B|C		
						Representativity	Relative Surface	Conservation	Global
6210			40.4	0	G	C	C	C	C
9130			53.1	0	G	B	C	B	B
91J0	X		66.08	0	G	A	B	B	B

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

4. SITE DESCRIPTION

Back to top

4.1 General site character

Habitat class	% Cover
N09	14.0
N16	63.0
N17	23.0
Total Habitat Cover	100

Other Site Characteristics

1 Terrestrial: Soil & Geology: sedimentary,basic,nutrient-poor,limestone 2 Terrestrial: Geomorphology and landscape: escarpment,lowland,slope

4.2 Quality and importance

Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) for which the area is considered to support a significant presence. Asperulo-Fagetum beech forests for which this is considered to be one of the best areas in the United Kingdom. Taxus baccata woods of the British Isles for which this is considered to be one of the best areas in the United Kingdom.

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts

Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i|o|b]
H	B02		I
H	H04		B
H	I01		B
H	G01		I

Positive Impacts

Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i|o|b]
H	B02		I
H	A02		I
H	A04		I

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): http://publications.naturalengland.org.uk/category/6490068894089216

http://publications.naturalengland.org.uk/category/3212324

http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

Back to top

5.1 Designation types at national and regional level:

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK04	100.0				

6. SITE MANAGEMENT

Back to top

6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

	Yes
	No, but in preparation
X	No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

Appendix C Evidence Plan

Appendix C Evidence Plan

C.1 Introduction

C.1.1 The purpose of this Evidence Plan is to provide a narrative of the wide range of evidence that has been collected, reviewed and iterated to provide a robust and agreed source of information for the Habitats Regulations Assessment (HRA). This has been completed with consistent ongoing engagement with Natural England throughout.

C.1.2 This Evidence Plan details the information and evidence used to carry out the HRA for the Project as specified in LA 115 (Highways Agency, 2009) and Planning Inspectorate guidance note 11 Annex H (Planning Inspectorate, 2021). It details the evidence inputs, survey methods and impact prediction methods used as well as the consultation correspondence with Natural England to agree the scope of evidence or assessment approach for individual impact pathways during development of the assessments.

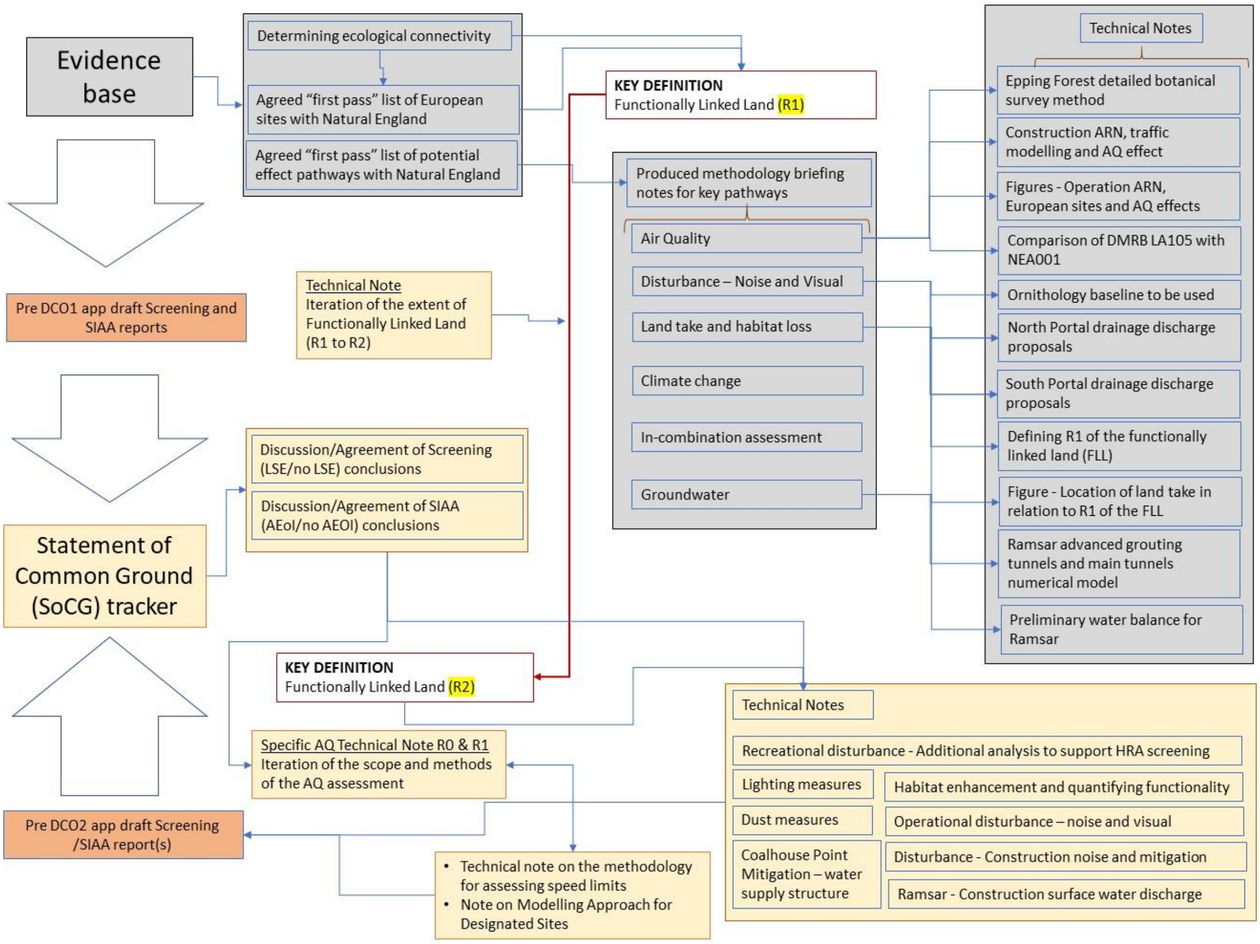
C.1.3 Where evidence is available that is definitive or quantitative, this has been used. Also, accepted industry-wide conventions have been used wherever available, such as 1% of a population of birds being considered to be a significant proportion of the population. However, many conclusions within any ecological assessment are necessarily a matter of professional judgement, having considered what evidence is available but that is not definitive or quantitative or having an industry-wide acceptance. Such evidence includes the scientific literature, case studies, guidance, etc, and forms the scientific knowledge available to inform professional judgements. Where professional judgements have been used, these have been subject to extensive consultation with Natural England to agree such judgements as consensus views.

C.1.4 The Project has been in development for a number of years. Table C.1 illustrates the key milestones to date which are used within this document to frame the explanation of the iteration of the evidence used to support the HRA. The diagram on Plate C.1 illustrates how the various documents and technical notes form the basis of the evidence plan.

Table C.1 Key Project milestones

Date	Milestone description
May to July 2013	Non-statutory public consultation considering the need for a new Lower Thames Crossing
September 2014 to December 2015	Programme of engagement to determine constraints/priorities, which would affect the identification and development of feasible options for a new Lower Thames Crossing
January to March 2016	Non-statutory public consultation to present shortlisted routes for the Project
April 2017	Preferred Route announced
October to December 2018	Statutory Consultation for the Preferred Route
January to April 2020	Supplementary Consultation on proposed changes to Project design since consultation in 2018
July to August 2020	Design Refinement Consultation
July to September 2020	Community Impacts Consultation
November 2020	DCO application withdrawn (DCO1.0)
May/June 2022	Local Refinement Consultation
October/November 2022	DCO application submission (DCO2.0)

Plate C.1 Contents of the Evidence Plan



Note: Abbreviations on Plate C.1 refer to:

R0, R1, R2 – revision 0,1,2; ARN – affected road network;

AEoI/AEOI – Adverse effect on integrity; SIAA – Statement to inform the appropriate assessment;

FLL – functionally linked land;

AQ – air quality;

NEA001 - Natural England publication 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001)'

C.2 Working arrangements

C.2.1 Throughout its development, the Project has engaged with Natural England. The consultation with Natural England as the relevant Statutory Nature Conservation Body has been carried out through a Discretionary Advice Service agreement in addition to statutory consultations.

C.2.2 Consultation on the evidence to be provided has been carried out via:

a. presentations and discussions on regular consultation calls

b. a spreadsheet-based 'Evidence base'

c. technical notes on specific impact pathways

d. draft reports:

   i. early sight drafts of HRA stage 1 screening report

   ii. HRA stage 1 screening report (from withdrawn DCO application (DCO1.0))

   iii. Statement to Inform an Appropriate Assessment (SIAA) (from withdrawn DCO application (DCO1.0)

   iv. early sight draft HRA Screening Report and SIAA (without air quality (AQ)) (for DCO2.0)

e. drafts of Statement of Common Ground (SoCG) (Application Document 5.4) and associated tracker spreadsheets documenting conclusions, issues and level of agreement

f. tables of responses to written advice

C.2.3 A complete record of consultation with Natural England is provided in Sections C.8 and C.9, which include discussions on evidence requirements.

C.2.4 The written advice provided by Natural England throughout the consultation process along with the Project's response to each comment has been recorded within a tracker spreadsheet and is available on request.

C.2.5 Agreement with Natural England on the conclusions of the HRA for each impact pathway has been documented within the HRA SIAA. A SoCG has also been developed between National Highways and Natural England which provides a narrative of the level of agreement between the two parties.

Consultation meeting timetables

C.2.6 The consultation meetings have been planned on regular intervals throughout the Project and since early 2020 have had clearly defined timetables and proposed discussion topics that were shared with Natural England as follows:

a. Within presentation – Natural England 06/11/2019 – set the proposed programme and format of consultation on HRA matters – monthly HRA consultation meetings from week ending 8 November 2019 to 5 June 2020

b. Shared document 26 February 2020 – Proposed Natural England consultation process agenda – updated the engagement meeting frequency to fortnightly from 19 February 2020 to 10 June 2020

c. Shared document 25 August 2020 – Natural England consultation approach SoCG – HRA items – updated the engagement frequency to weekly meetings from 26 August 2020 to 16 December 2020

d. Continued Natural England engagement through weekly meetings 20 January to 3 March 2021 whilst awaiting DCO resubmission programme to be confirmed

e. Shared document 9 Mar 2021 – draft programme of milestones and call agendas – Fortnightly engagement meetings proposed from 15 March 2021 – 19 July 2021

f. Shared document 16 April 2021 – revised draft programme of milestones and call agendas – updated to include non HRA issues; meeting schedule unchanged

g. Shared document 12 May 2021 – revised draft programme of milestones and call agendas – updated issues to be discussed; meeting schedule unchanged

h. Shared document 15 June 2021 – revised draft programme of milestones and call agendas – updated issues to be discussed; meeting schedule unchanged

i. Shared document 9 February 2022 SoCG and milestones tracker – updated document to combine the HRA SoCG tracker with the meeting schedules and list the remaining SoCG issues and draft call schedule from week commencing 17 January to 2 May 2022.

j. Continued Natural England engagement through fortnightly meetings 18 May to 24 August 2022 to discuss remaining SoCG issues and agree SoCG text.

SoCG tracker

C.2.7 Once the pre-application draft of the DCO1.0 (subsequently withdrawn) HRA Screening and SIAA reports had been shared with Natural England, a tracker (SoCG tracker) of the HRA conclusion was set up to record Natural England's agreement with the assessment conclusions and where agreement was still to be reached, allowed scope for further evidence required to be recorded and acted upon.

C.2.8 The SoCG tracker was an iterative live spreadsheet that listed all of the likely significant effects (LSE) and adverse effect on integrity (AEoI) conclusions for all of the European sites and impact pathways assessed. Table C.2 sets out the structure of the SoCG tracker.

Table C.2 Structure of the SoCG tracker

SoCG tracker heading/category	Description
ID	Unique ID code
Relating to	Indicates if the line relates to the methodologies, screening, or appropriate assessment conclusions
Site	European site assessed
Impact	Type of impact on the site, e.g. disturbance to species
Pathway	Project impact, e.g. changes in noise and vibration during construction
Conclusion DCO1.0	Short summary of the conclusion of the assessment of the impact pathway on the site identified – either 'No LSE' or 'LSE Uncertain'
Conclusion DCO2.0	As above
Natural England comment (relates to DCO1.0)	Comments/feedback received on whether or not Natural England agrees with the conclusion
Agreed at DCO1	Summary of Natural England agreement – either Agreed, Not Agreed or Under discussion
Has there been change in rationale to reach conclusion, or change in conclusion since DCO1?	Short summary of any changes in rationale between DCO1.0 version and early sight draft HRA (DCO2.0).
Agreed – DCO2 – early sight draft HRA SIAA	Summary of Natural England agreement – either Agreed, Not Agreed or Under discussion
Natural England comment – DCO2 – early sight draft HRA SIAA	Comments/feedback received on whether or not Natural England agrees with the conclusion

C.2.9 The SoCG tracker was an iterative live tracker used between June 2020 and December 2021, issued to Natural England for update on the following dates:

a. 26/08/2020

b. 03/09/2020

c. 10/09/2020

d. 18/09/2020

e. 24/09/2020

f. 01/10/2020

g. 13/10/2020

h. 29/10/2020

i. 17/11/2020

j. 01/12/2020

k. 28/01/2021

l. 10/02/2021

m. 17/02/2021

n. 09/03/2021

o. 13/04/2021

C.2.10 In the SoCG meeting on 7 February 2022 the proposed programme for the ongoing engagement meetings and topics for discussion was presented to Natural England. It was agreed with Natural England that the HRA SoCG tracker did not need to be continued in the same form as the number of remaining issues were few. Therefore, to reduce the complexity of the tracking process the remaining issues were merged in to the main SoCG tracker held by the Project stakeholder engagement team.

C.2.11 The meetings were agreed to be fortnightly until the beginning of May 2022 to fit with the timetable for finalising the SoCG for the DCO application. It was agreed that consultation and calls would continue after this date on an ongoing basis, but this timescale was the key period to inform the application for the DCO.

C.3 Scope of evidence required

Scope for the DCO1.0 application

C.3.1 The scope of evidence required was established for the Project using an evidence base which illustrated how the ecological connectivity between the Project and European sites was determined see Plate C.2. The evidence base comprised an Excel file with a number of tabs, see Plate C.3, that recorded the data for each of the components of the source pathway receptor approach. This was used to identify all the potential effect pathways and therefore European sites potentially affected by the Project.

C.3.2 As shown in Plate C.2, determining ecological connectivity reviewed both proximity of European sites to the Project (via the LA 115 screening criteria) and ecological connectivity between the European sites and Project by reviewing the Extents of Sensitivity (EoS) of qualifying features recorded within the Zone of Influence (ZoI) of the Project. The Project ZoI was also defined through reviewing the likely activities and compiling a list of generic impacts.

C.3.3 The evidence base facilitated discussion with Natural England on the list of European sites and Project pathways where the risk of LSE was sufficient to require screening (essentially a scoping exercise).

C.3.4 The European sites and impact pathways identified through the evidence base as requiring screening are shown in Table C.3.

Plate C.2 Flow chart illustrating the scope of evidence required to complete the HRA

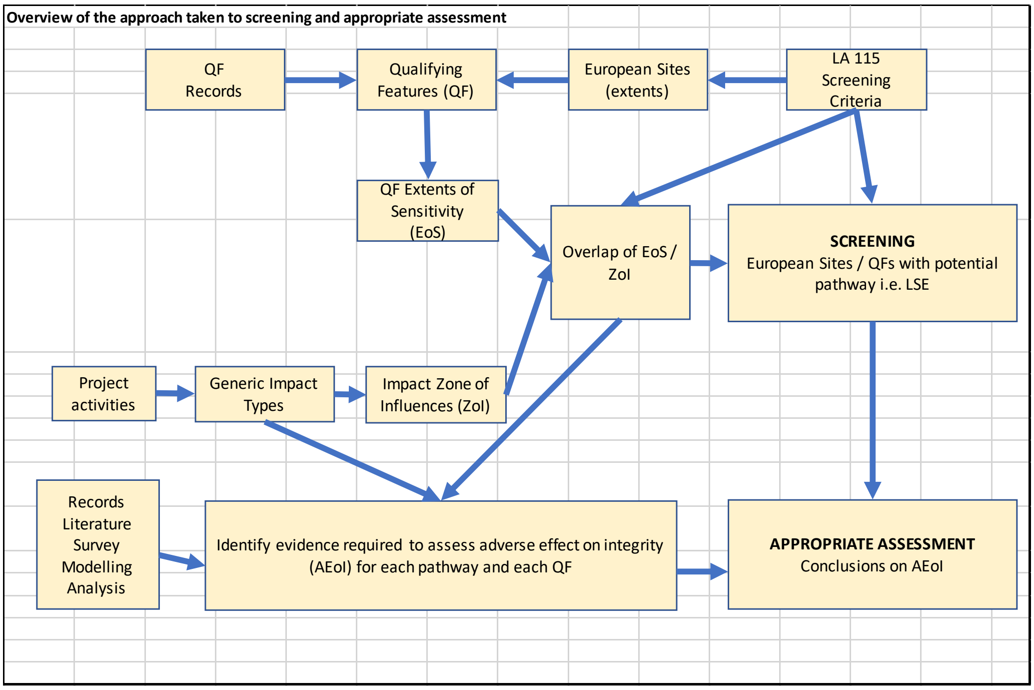


Plate C.3 The contents of the evidence base indicating the data collated to determine the scope of the HRA

Contents of the Evidence Base	
Elements of HRA for consultation	**Evidence Base Tab**
LA 115 Screening Criteria	DMRB Screening Criteria
List of recent case law	Recent Case Law
European Sites (extents)	None – GIS layer
Qualifying Features	None – JNCC Natura2000 site details spreadsheet (https://hub.jncc.gov.uk/assets/a3d9da1e-dedc-4539-a574-84287636c898) NE Designated Sites View (https://designatedsites.naturalengland.org.uk/SiteSearch.aspx)
Qualifying Interest records	Qualifying Species present
Qualifying Interest Extents of Sensitivity	Species Extents of Sensitivity
Project activities	Source Pathway
Generic Impact Types	Source Pathway
Impact Zones of Influence	Source Pathway
Matrix of QFs / Impacts for Screening / AA possibly	Impact Matrix
Evidence required to assess AEoI for each QF / Impact pathway	Evidence Required
Screening conclusions on LSE	None – Consultation on Screening report
Appropriate Assessment conclusions on AEoI	None – Consultation on Stage 2 AA report

Table C.3 The European sites and potential impact pathways for the Project (at DCO1.0)

European site name	Qualifying features – potential interactions	Land take in terrestrial and aquatic environment - construction	Vehicle collision with species during operation	Utilities infra-structure collision - operation	Vessel collision - construction	Change in air quality - dust emissions - construction	Change in air quality - vehicle emissions - construction	Change in air quality - vessel emissions – construction river transport	Change in air quality - vehicle emissions - operation	Changes in noise and vibration - operation	Changes in noise and vibration – construction works and vehicles	Changes in noise and vibration - tunnel construction only. Underwater and above ground	Changes in noise and vibration - intertidal works only (outfall construction, refurbishment/ use/ maintenance/ decommis-sioning of East Tilbury jetty at Goshem's Farm. Underwater and above ground	Changes in light levels - construction	Changes in light levels - operation	Changes in visual disturbance - construction (people/ machines in eyeline)	Changes in visual disturbance - operation (vehicles in eyeline)	Change in recreational pressure – construction and operation	Changes in surface water quality and quantity - construction	Changes in surface water quality and quantity - operation	Changes in groundwater quality and quantity - tunnel construction and operation	Invasive Non-Native Species – Estuarine/ marine and terrestrial
Benfleet and Southend Marshes SPA and Ramsar	Birds - supporting habitat	Reduction in habitat area	Reduction in species density	Reduction in species density		Reduction in habitat area				Disturbance to key species	Disturbance to key species	Disturbance to key species	Disturbance to key species	Disturbance to key species		Disturbance to key species	Disturbance to key species	Disturbance to key species				
Epping Forest SAC	Habitat features Species features also potentially affected due to reliance on habitat								Reduction in habitat area													
Medway Estuary and Marshes SPA and Ramsar	Birds - supporting habitat	Reduction in habitat area	Reduction in species density	Reduction in species density		Reduction in habitat area			Reduction in habitat area	Disturbance to key species	Disturbance to key species	Disturbance to key species	Disturbance to key species	Disturbance to key species		Disturbance to key species	Disturbance to key species	Disturbance to key species				
North Downs Woodlands SAC	Habitat features								Reduction in habitat area													
Thames Estuary and Marshes SPA and Ramsar	Birds - supporting habitat Plant and invertebrate features	Reduction in habitat area	Reduction in species density	Reduction in species density		Reduction in habitat area			Reduction in habitat area	Disturbance to key species	Disturbance to key species	Disturbance to key species	Disturbance to key species	Disturbance to key species		Disturbance to key species	Disturbance to key species	Disturbance to key species			Ramsar site only: Reduction in habitat area	
The Swale SPA and Ramsar	Birds - supporting habitat	Reduction in habitat area	Reduction in species density	Reduction in species density		Reduction in habitat area			Reduction in habitat area	Disturbance to key species	Disturbance to key species	Disturbance to key species	Disturbance to key species	Disturbance to key species		Disturbance to key species	Disturbance to key species	Disturbance to key species				

Iteration of the evidence scope for the DCO2.0 application

C.3.5 The scope of evidence has gone through a number of iterations as the discussions and consultation with Natural England progressed including after the withdrawal of the DCO1.0 submission.

C.3.6 Following discussion of the scope and consideration of the evidence base it was identified that the key additional evidence required for the HRA involved the following:

C.3.7 Impact pathways linked to qualifying features and assemblages at SPAs and Ramsar sites of the greater Thames estuary and the European sites they are connected to, as defined by the extent of functionally linked land (FLL).

C.3.8 Impact pathways linked to the changes in air quality as a result of vehicle emissions; and the European sites potentially affected as defined in the scope of the air quality (vehicle emissions) assessment.

Defining extent of functionally linked land

C.3.9 The impact pathways linked to the qualifying features and assemblages at SPAs and Ramsar sites of the Greater Thames Estuary were primarily defined by the extent of FLL which at DCO1.0 submission had been defined as any suitable habitat within 20km of the European site. This key definition was reviewed following advice from Natural England, and ‘HRA Technical Note: Iteration of the extent of functionally-linked land’ documented this review and its outcome. Natural England commented on the technical note and agreed the definition of FLL and the European sites identified (see Plate C.4 and Plate C.5).

C.3.10 The key steps followed when defining the functionally linked land were:

a. Mapped all suitable habitat (Corine Land Cover mapping Non-irrigated arable land, Pastures, Natural grasslands, Inland marshes, Salt marshes, Intertidal flats, Water bodies, Estuaries) within 20km (extent of sensitivity of overwintering birds) of the European sites within the Greater Thames Estuary complex.

b. Reviewed the field survey record for the Project and found the pattern of use indicated that the qualifying features appeared to use the low lying terrestrial habitats closer to the River Thames and below 10m AOD (above ordnance datum).

c. Reviewed the Natural England SSSI impact zones (IRZs) and found that the habitat within approximately 2km were considered by NE to be the areas at significant risk from road projects and essentially contain the habitats functionally linked to the European site.

d. Onbringing these steps together all of the suitable habitat with 2km of the European site and below 10m AOD the extent was reviewed with Natural England and it was agreed to include the areas of habitat at Tilbury Fort and Holehaven Creek as these were considered important the qualifying species from the Thames Estuary and Marshes SPA/Ramsar. The final extent of FLL agreed with Natural England for use in the assessment is shown in Plate C.4 below.

Plate C.4 Extent of FLL for Thames Estuary and Marshes SPA & Ramsar

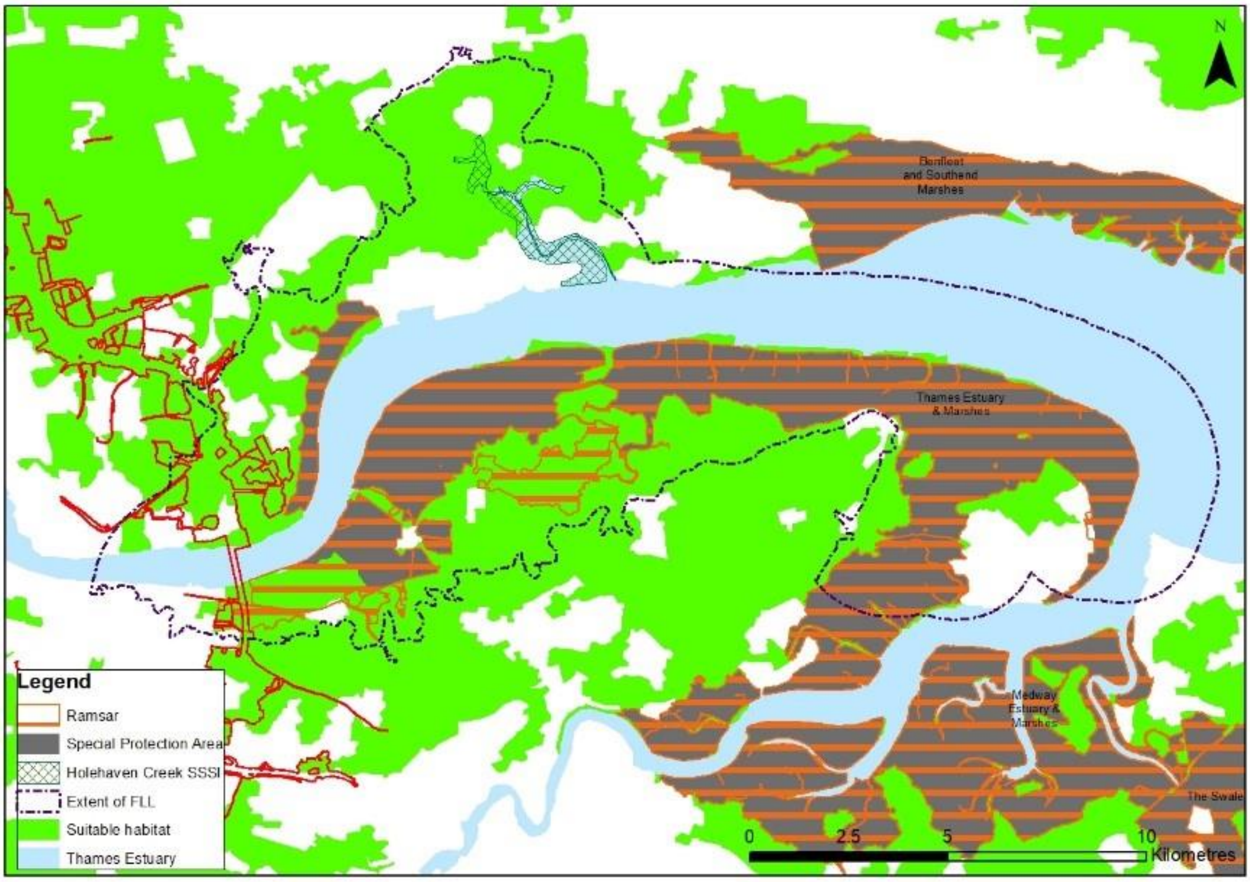
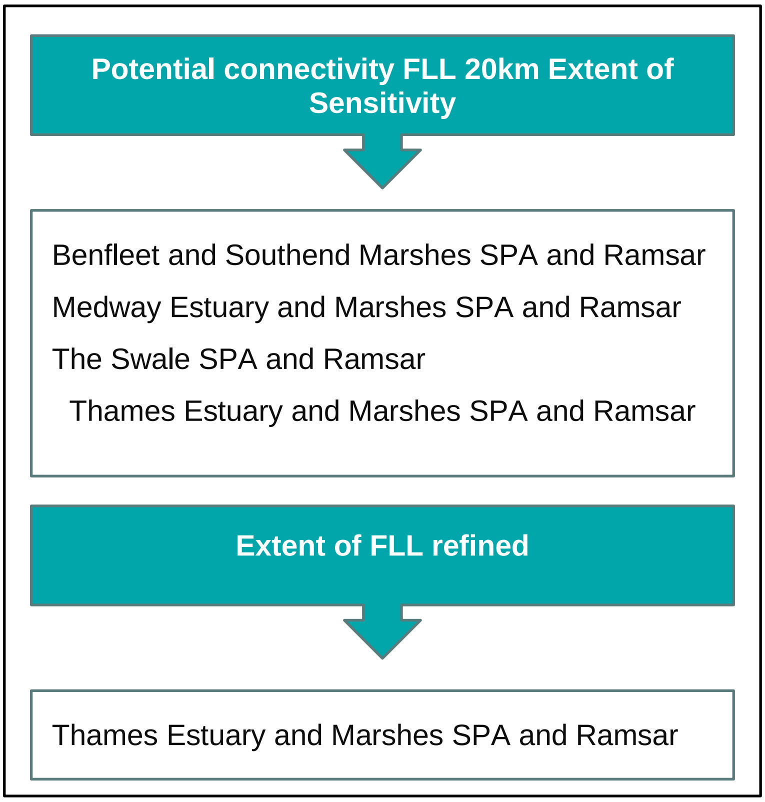


Plate C.5 Illustration of the change in European sites identified as a result of the refinement of the extent of FLL



C.3.11 Table C.4 sets out the European sites and impact pathways that were identified following the change in the definition of FLL through the iteration of the evidence between DCO1.0 and the preparation for the DCO2.0 application.

Table C.4 European sites and impact pathways identified for the DCO2.0 application

European site	Project impact	Pathway	Effect
Thames Estuary and Marshes Ramsar	Changes in groundwater quality and quantity – tunnel construction and operation Changes in surface water quality and quantity – construction	European site itself is within the ZoI	Reduction in habitat area
Thames Estuary and Marshes SPA	Change in air quality – dust emissions – construction	Qualifying features from this European site use FLL that is within the ZoI	Reduction in habitat area
Thames Estuary and Marshes Ramsar Thames Estuary and Marshes SPA	Land take – terrestrial and aquatic (marine) environment – construction Changes in surface water quality and quantity – operation Introduction/spread of Invasive Non-Native Species – terrestrial environment	Qualifying features from this European site use FLL that is within the ZoI	Reduction in habitat area

European site	Project impact	Pathway	Effect
Thames Estuary and Marshes Ramsar Thames Estuary and Marshes SPA	Vehicle collision with species during operation Species collision with overhead utilities infrastructure – operation	Qualifying features from this site use FLL that is within the ZoI	Reduction in species density
Thames Estuary and Marshes Ramsar	Changes in noise and vibration – construction works and vehicles Changes in noise and vibration – underwater and above ground – tunnel construction only Changes in light levels – construction Changes in visual disturbance – people/machines in eyeline – construction	European site itself is within the ZoI	Disturbance to key species
Thames Estuary and Marshes Ramsar Thames Estuary and Marshes SPA	Changes in noise and vibration – construction works and vehicles Changes in noise and vibration – underwater and above ground – tunnel construction only Changes in noise and vibration – vehicles – operation Changes in light levels – construction and operation Changes in visual disturbance – people/machines in eyeline – construction Changes in visual disturbance – vehicles in eyeline – operation Change in recreational pressure – construction Change in recreational pressure – operation - – wider visitor pressures and Tilbury Fields visitor pressures	Qualifying features from this European site use FLL that is within the ZoI	Disturbance to key species

Defining the scope of the AQ – vehicle emissions assessment

C.3.12 The scope of evidence required to complete this assessment has been iterated through the development of the Project. At DCO1.0 it was based on the assessment scope as defined by the Design Manual for Roads and Bridges LA 105 (Highways England, 2019). However, following withdrawal of the DCO1.0 application, the scope of evidence required has been iterated within a specific AQ technical note for both the HRA and environmental impact assessment (EIA) which has been used to facilitate more detailed discussions with Natural England. The scope of evidence is focussed on the methods used to assess the impact pathway from which the identification of affected sites emerged.

C.3.13 Table C.5 sets out the European sites that were identified as potentially being affected by changes in air quality as a result of vehicle emissions.

Table C.5 European sites and impact pathways identified for the DCO2.0 application

European site	Project impact	Pathway	Effect
Thames Estuary and Marshes Ramsar	Change in air quality – vehicle emissions – construction	European site itself is within the ZoI	Reduction in habitat area
Epping Forest SAC North Downs Woodlands SAC	Change in air quality – vehicle emissions – operation	European site itself is within the ZoI	Reduction in habitat area

C.4 Approach to uncertainties and likely significant effect

Criteria for effects

Likely significant effects

C.4.1 Following the gathering of information on the Project and the European sites, an assessment has been undertaken to predict the likely significant effects of the Project 'alone' on the European sites. To inform this process, all parts of the Project were assessed to see if they could result in likely significant effects on the European sites.

C.4.2 An effect is likely if:

a. It is likely to affect the ability of the European site to achieve its conservation objectives.

b. It is likely to affect the integrity of the European site.

c. On the basis of available objective information, either a) and b) above cannot be discounted.

C.4.3 Each of the European sites has been examined in detail to see if the proposals could have a significant effect on the conservation objectives of the qualifying features of the European sites.

C.4.4 LSEs have been assessed by reference to the conservation objectives of the qualifying feature (interest feature) of the European site, as per paragraph C.4.2a. Any plan or project that might cause the cited interest features of a site to fall into unfavourable condition can be considered to have LSEs on the site. Stage 1 of the HRA process does not assess effects on the integrity of European sites (this forms Stage 2 of the HRA process). However, the definition of integrity provided below has been taken into account during the assessment of LSEs: '…*the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified*.'

C.4.5 Plans or projects can lead to significant effects on a European site by, amongst other things:

a. causing delays in progress towards achieving the conservation objectives of the site

b. interrupting progress towards achieving the conservation objectives of the site

c. disrupting those factors that help to maintain the favourable conditions of the site

d. interfering with the balance, distribution and density of key species that are the indicators of the favourable condition of the site.

Inconsequential effects

C.4.6 In concluding that a theoretical pathway would not result in LSEs alone due to the limited scale of effect (but without absolute certainty of being entirely absent) but would not be sufficient in scale to significantly contribute to any in-combination effect with effects from other plans and projects, the conclusion of an inconsequential effect has been made.

C.4.7 An effect pathway that is considered to be inconsequential should be considered immaterial to the decision of the competent authority in authorising the Project in terms of compliance with the Habitats Regulations due to its inconsequential scale. An inconsequential or 'trivial' scale of effect alone cannot be reasonably considered to be an LSE; and equally cannot be reasonably considered likely to contribute to in-combination effects in any consequential or material way.

C.4.8 Following discussion with Natural England, an effect pathway that requires further investigation or thought, over and above a very preliminary assessment, cannot be considered to be inconsequential.

C.4.9 The terminology used in the assessment (i.e. 'inconsequential effect') was finalised after consultations with Natural England and the Planning Inspectorate following earlier technical reports and draft assessment documents using other terminologies such as 'nugatory effects' and 'de minimis effects'. All such terminologies used throughout the process of agreeing the evidence, methods and conclusions of the assessment have had the same meaning, but previous terminologies have resulted in uncertainty as to whether the concept was clear enough to support the assessment conclusions based on the concept. 'Inconsequential effect' has therefore been used as the clearest terminology available, and a definition of its meaning in terms of supporting the assessment conclusions has been included in the assessment.

Use of thresholds

C.4.10 A number of thresholds have been used when determining likely significant effects and these are set out in Section C.5.3. The thresholds used were all discussed and agreed with Natural England for use in identifying the levels of change in impact pathways that could result in likely significant effects.

Approach to uncertainties

C.4.11 No generic approach to uncertainties was taken over and above the use of the precautionary principle.

C.4.12 However, a number of uncertainties were identified throughout the assessment engagement process with Natural England and the following approaches were taken for each.

C.4.13 Where there was uncertainty about whether the effect is likely to be significant, it was agreed that Natural England advice would be followed, such that if the assessment of effect required more than a simple investigation to demonstrate that the magnitude of effect would be inconsequential, then it was appropriate to assume likely significant effects (to be consistent with the 'low bar' of stage 1 HRA) and then consider the likelihood and potential scale of effects and any mitigation measures necessary to avoid or reduce the LSE in light of the stage 2 appropriate assessment.

C.4.14 Natural England advised that there was uncertainty with regard to which the other plans and projects were being considered in the assessment of air quality changes as a result of vehicle emissions. The relevant sections of the Combined Modelling Appraisal Report (Application Document 7.7) and Traffic Forecasts Non Technical Summary (Application Document 7.8) that provide the explanation of the other plans and projects included within the future traffic forecasting have been shared and discussed with Natural England.

C.4.15 Natural England advised of its uncertainty about how the Project design would be implemented post consent, with the specific measures that are relied upon in the HRA to avoid or reduce effects. The Project team presented the proposals to illustrate how the Project design would be developed and ensured that Natural England was listed on Schedule 2 Requirement 5 of the DCO as well as part of the OEMP Advisory Group.

C.5 Methodology and standards for data analysis, outputs and consultations

Briefing / technical notes for consultation

C.5.1 The assessment methods and standards for data analysis used within the HRA were set out within a series of methodology briefing notes and technical notes applicable to specific impact pathways. These were shared with Natural

England as set out in Table C.10 and due regard to the advice from Natural England has been recorded within the Natural England response tracker.

Updates to methodologies following advice from Natural England

C.5.2 Through the evidence plan process, a number of the assessment methodologies were updated and a summary of these is shown below.

a. Inclusion of change in noise greater than 3dB threshold for determining LSE

b. Use of the 1% LCL threshold for determining LSE rather than the 0.4 kg N ha-1 yr-1 threshold

c. Inclusion of ammonia in the AQ modelling of nitrogen deposition

d. Inclusion of change in light levels of greater than 0.5 lux for determining LSE

Use of thresholds

C.5.3 A number of thresholds, as listed in Table C.6, were used to define LSE and agreed with Natural England. The evidence for their use was described in detail within the methodology briefing or technical notes.

Table C.6 Thresholds used within the assessment methods

Impact pathway	Threshold used to determine LSE	Relevant note
Noise – disturbance to qualifying species	Noise greater than 55dB Change in noise greater than 3dB	Disturbance – Noise and Visual Methodology Briefing Note
Visual – disturbance to qualifying species	Area within 300m of activity	Disturbance – Noise and Visual Methodology Briefing Note
Lighting – disturbance to qualifying species	Light levels greater than 0.5 lux	Technical Note: No LSE from Lighting Construction and Operation
Recreational pressure – disturbance to qualifying species	Distance from European site below which there is a risk of LSE: North of the River Thames 8.1km South of the River Thames 6km	Recreational disturbance scope and method
AQ – dust emissions during construction	Area within 200m of activity	Air Quality Methodology Briefing Note
AQ – sensitivity of European sites	Lower critical load (kg N $ha^{-1}yr^{-1}$ as defined by the Air Pollution Information System	Air Quality Technical Note R0 & R1

Impact pathway	Threshold used to determine LSE	Relevant note
AQ – Nitrogen deposition	DS DM change in nitrogen deposition is greater than 1% of the LCL	Air Quality Technical Note R0 & R1

Measuring functionality

C.5.4 In order to predict the likely success of mitigation measures designed to avoid and reduce effects of land take and disturbance on qualifying features, a measure of functionality of habitat was determined in consultation with Natural England.

C.5.5 The measure took the form of a factor on the hectares of habitat to provide a measure of how functional it was for the qualifying features, to allow the loss or disturbance and to enable mitigation to be quantified in a consistent way.

C.5.6 A HRA Technical note – Habitat Enhancement and Quantifying Functionality, was produced and shared with Natural England. The note set out the proposed mitigation measures and provided a rationale for the calculation of the functionality metrics.

C.5.7 The measure of functionality of impacted areas has been completed by summing the total number of individuals recorded during Project field surveys within the impacted area during the overwinter and passage months (August to April).

C.5.8 The predicted functionality of the mitigation areas and the other plans and projects identified has been predicted by multiplying the area, in hectares, by the expected abundance per hectare (the functionality factor), that quantifies site functionality for the qualifying features relative to the hectares of habitat, assuming both the loss or disturbance, and effect of mitigation. The expected abundance figures were calculated through a review of a variety of habitat types and numbers of individuals recorded during the Project field surveys. Table C.7 illustrates the various factors that were calculated based on the bird survey data recorded in the FLL during the Project field work.

Table C.7 Summary of the functionality factors found in each habitat type

Habitat type	Functionality factor
Agricultural land	2.6
Intertidal	97.01
Exemplar agricultural e.g. within the Ramsar at Filborough Marshes	18.62
Exemplar wetland/grassland e.g. Tilbury Fort	165

C.6 Timetable for implementing and reviewing the plan

C.6.1 The programme of engagement with Natural England was initially set to reflect the proposed DCO submission in 2020 and was the basis on which the Evidence Plan was implemented and reviewed. The process of engagement and agreement on evidence became iterative as the DCO submission date changed, resulting in this evidence plan that records the process and agreements reached. The following paragraphs provide an account of the consultation that has been carried out with Natural England.

C.6.2 Extensive statutory and non-statutory pre-application consultation has been carried out for the Project through options selection, design development and production of deliverables for the DCO application. A summary of key Project consultation milestones is provided in Table C.1.

C.6.3 The feedback received through engagement with Natural England has informed the scope and content of the HRA. A complete record of correspondence with Natural England in relation to the HRA is recorded as part of this Evidence Plan within Table C.9, a record of meetings (with minutes where relevant); and Table C.10, a record of correspondence.

C.6.4 A detailed table tracker of comments from Natural England with regard to the HRA and Project responses, is available on request.

C.6.5 The Consultation Report (Application Document 5.1) provides a full description of the consultation activities undertaken and the Project response to feedback received. The Natural England Statement of Common Ground (SoCG) (Application Document 5.4) provides a summary of key issues identified by the stakeholder and what has and has not been agreed.

C.6.6 Natural England was consulted on early design options, development, and assessment of shortlisted routes for the Project between 2013 and 2016. A number of workshops were held with Statutory Environmental Bodies (SEBs) including Natural England to discuss route options in 2015 and 2016. This included early proposals for the approach to HRA. Natural England bilateral meetings were conducted to provide frequent Project updates, initial findings of environmental appraisals and to gain feedback on the HRA approach. Additionally, ecological survey methodologies including ornithology were consulted on to gain baseline data for the HRA.

C.6.7 A draft EIA Scoping Report for comment was issued to Natural England in November 2017 following the announcement of a Preferred Route. A PEIR, detailing the intention to prepare a report to inform the HRA, was issued to Natural England during Statutory Consultation conducted between October and December 2018. Consultation with Natural England continued on key ecological survey methodologies, including ornithology surveys. SEB workshops and specific Natural England meetings were continued through 2018 and 2019 with the ongoing discussion on HRA and designated sites included as a key focus area on the heat map (colour-coded tracker of discussion items). The record of relevant correspondence with Natural England during options selection is provided in Table C.10.

C.6.8 Regular HRA-specific meetings with Natural England began in November 2019 and are ongoing to focus on key aspects of the HRA assessment as it was developed. Prior to DCO1.0 submission, an early sight draft of the HRA Stage 1 Screening Report was issued to Natural England for comment in December 2019 with comments received in February 2020. This early sight draft set out the impact pathways and the European sites likely to be affected.

C.6.9 Between February and August 2020, twelve HRA document packages, (see Table C.10), were issued to Natural England for comment, providing detailed briefing notes on proposed HRA methodology assessments as well as further background / baseline information. The progression of assessments and early results were discussed during the calls with Natural England as they became available. In addition, reiterations of the Evidence Base (precursor to the Evidence Plan); the Natural England comment response tracker; and the draft SoCG HRA tracker have been issued to Natural England for information and comment.

C.6.10 Pre-Application Drafts (DCO1.0) of the HRA Stage 1 Screening Report and HRA Statement to Inform the Appropriate Assessment were issued to Natural England in June and July 2020 for comment as well as to the Planning Inspectorate.

C.6.11 The DCO1.0 application was withdrawn in November 2020. At this point the Evidence Plan was reviewed via detailed discussion of the outstanding issues with Natural England. The ongoing fortnightly meetings continued to iterate the evidence required to assess the impact pathways in the HRA reports that would be submitted for DCO2.0.

C.6.12 The Pre-Application Draft (DCO2.0) of the HRA Report: Screening Report and Statement to Inform an Appropriate Assessment was issued to Natural England in July 2022 for comment.

C.7 Evidence to be collected

C.7.1 This section sets out the evidence that has been collected based on the scope developed within the evidence base and SoCG tracker. Table C.8 provides a complete record of the evidence required, collected and shared with Natural England as part of the assessment of each impact pathway.

C.7.2 The evidence required to complete an assessment of each impact pathway primarily included field survey data and predictive modelling calculations. Literature reviews were also used to support the efficacy of mitigation measures.

Field survey data

C.7.3 The results of the following field survey data were used as part of the evidence collected to support the HRA:

a. Ornithology survey

b. Phase 1 Habitat survey

c. Detailed botanical survey

d. Walkover surveys

C.7.4 Ornithology, Phase 1 Habitat and National Vegetation Classification (NVC) survey data was collected between 2017 and 2020. The survey methodologies including survey locations were presented to Natural England at stakeholder engagement workshops between June 2015 and January 2017 and updated as required following discussions within those meetings. The Bird Survey Methodology – Preferred Route (Draft) was shared with Natural England in February 2017 and May 2017.

C.7.5 The EIA scoping report, which detailed the proposed survey approaches, was issued to Natural England via the Planning Inspectorate on 2 November 2017.

C.7.6 Detailed botanical survey was carried out at Epping Forest SAC and the proposed survey methodology was discussed with Natural England and presented in the form of a technical note in April 2020. The survey was completed on 7th, 9th and 18th May 2020.

Predictive modelling

C.7.7 Standard modelling techniques, described in full within the Environmental Statement (Application Document 6.1) have been used to predict the following changes to the surrounding environment as a result of the Project:

C.7.8 Changes in air quality (as a result of vehicle emissions) are predicted using the Atmospheric Dispersion Modelling System ADMS-Urban (version 5.0). The model provides results that apply to the following scenarios:

a. Base year (2016) – predicted baseline air quality environment, used to characterise baseline and to carry out model verification

b. Do Minimum (2030) – predicted future air quality environment in the Project’s opening year without the Project

c. Do Something 2030) – predicted future air quality environment in the Project's opening year with the Project

C.7.9 Changes in noise (construction and operation) – Noise has been assessed within this HRA using the results from a number of different calculation and modelling techniques as follows:

a. Road traffic noise predicted using the commercially available, proprietary noise mapping software IMMI, which is validated to implement the Calculation of Road Traffic Noise (CRTN) methodology. The model provides results that apply to the Do Minimum and Do Something scenarios.

b. Onsite construction noise levels during the construction phase of the Project have been predicted using the formulae contained within BS 5228-1 Code of practice for noise and vibration control on construction and open sites. Noise (+A1:2014).

c. Off-site construction vehicle noise predicted using the CRTN methodology.

C.7.10 Changes in noise and vibration (underwater from tunnel boring machine (TBM)) – Ground-borne noise and vibration levels generated from the operation of the TBM have been calculated using proprietary software FINDWAVE®.

C.7.11 Changes in light levels (construction and operation) – The lux level contours have been calculated using industry standard software, Lighting Reality.

C.7.12 Changes in groundwater – The changes in ground water levels as a result of the construction of the advance ground protection and main tunnels has been predicted using the industry standard software MODFLOW-2005. Visualisation and MODPATH simulations are completed in Groundwater Vistas 7, produced by Environmental Simulations International (ESI).

Table C.8 Record of the evidence associated with each of the impact pathways

Impact pathway	Effect	Evidence required	Evidence collected	Technical notes used to engage with Natural England	Discussion meetings (see Table C.9)	Review points (see Table C.10)
Change in air quality as a result of vehicle emissions	Habitat degradation within identified sites where predicted nitrogen deposition exceeds 1% LCL	Predicted change in nitrogen deposition kg N ha^{-1} yr^{-1} Extent of site affected by change Habitat sensitivity of area affected by change Measures avoiding impact pathway	Air quality model – predicted change in nitrogen deposition Epping Forest SAC – Matrix for areas within 200m of road All other sites – Transect out to 200m from road Habitat survey – Epping Forest SAC – walkover survey and detailed transects All other sites – walkover survey Efficacy of speed limits to avoid impact pathway	Air Quality methodology briefing note Construction Affected Road Network (ARN), traffic modelling and AQ effect Figures detailing European site locations in relation to ARN and predicted change in nitrogen deposition at European sites Comparison of DMRB LA 105 with NEA001 Epping Forest detailed botanical survey briefing note HRA/EIA AQ evidence technical note R0 and R1 Technical note on the methodology for assessing speed limits AQ technical note - Note on Modelling Approach for Designated Sites	19/12/2019 16/01/2020 18/03/2020 29/04/2020 13/05/2020 27/05/2020 10/06/2020 09/09/2020 25/09/2020 04/11/2020 16/06/2021 14/07/2021 28/07/2021 11/08/2021 25/08/2021 04/11/2021 08/11/2021 17/11/2021 06/12/2021	26/02/2020 AQ Methodology briefing note issued (*02/04/2020 Feedback received from Natural England*) 08/04/2020 Epping Forest detailed botanical survey briefing note (*30/04/2020 (&12/05/2020) Feedback received from Natural England*) 18/05/2020 Epping Forest detailed botanical survey briefing note – Revision 1 18/05/2020 Figures detailing European site locations in relation to ARN 02/06/2020 Construction traffic modelling and AQ effects briefing (*30/06/2020 Feedback received from Natural England*) 02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 (*30/06/2020 Feedback received from Natural England*) 26/06/2020 Local Model Validation Report and Air Quality ES chapter with technical appendices 13/07/2020 Statement to Inform the Appropriate Assessment – Pre-Application Draft DCO1.0 (*10/08/2020 Feedback received from Natural England)* 22/07/2020 Stage 1 Screening Figure 31 – Predicted change in nitrogen deposition at European sites 10/09/2020 DCO1.0 Stage 1 Screening – Appendix H – LA 105 NEA001 Comparison 11/08/2021 HRA Evidence Technical Note Rev 0: Air Quality from vehicle emissions *(03/12/2021 Feedback received from Natural England)* 11/11/2021 HRA and EIA Evidence Technical Note Rev1 Air Quality from vehicle emissions 26/11/2021 Technical note on the methodology for assessing speed limits 10/02/2022 Note on Modelling Approach for Designated Sites 25/07/2022 Pre-application draft of the HRA report: Screening Report and Statement to Inform an Appropriate Assessment
Change in air quality – dust emissions – construction	Habitat degradation within identified sites and FLL within 200m of activity	Extent of area potentially affected Measures avoiding impact pathway	Efficacy of good practice measures – literature review	Dust measures	16/09/2020 04/11/2020 13/03/2021 21/04/2021 05/05/2021 19/05/2021 02/06/2021	26/02/2020 AQ Methodology briefing note issued (*02/04/2020 Feedback received from Natural England*) 02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 (*30/06/2020 Feedback received from Natural England*) 09/03/2021 Technical Note - Dust measures

Impact pathway	Effect	Evidence required	Evidence collected	Technical notes used to engage with Natural England	Discussion meetings (see Table C.9)	Review points (see Table C.10)
					30/06/2021	12/05/2021 Revised Technical Note - Dust measures (Revision 1) (*24/06/2021 Feedback received from Natural England)*
Changes in groundwater quality and quantity – tunnel construction and operation	Reduction/degradation of habitat	Predicted change in groundwater levels Extent of site affected by changes Site/Habitat sensitivity to groundwater changes	Groundwater model – to assess groundwater flows and levels Phase 1 habitat and NVC survey data reviewed to identify groundwater dependent terrestrial ecosystems	Groundwater methodology briefing note Baseline Water Balance for the Ramsar site (Filborough Marshes) Ramsar Advanced Grouting Tunnel and Main Tunnels Numerical Model	06/11/2019 19/12/2019 09/04/2020 09/06/2020 14/07/2020 11/02/2021 03/03/2021 31/03/2021 05/05/2021 19/05/2021 02/06/2021	21/10/2019 Technical Note Ramsar Advanced Grouting Tunnel and Main Tunnels Numerical Model 08/11/2019 Advanced Grout Tunnel Technical Note 11/03/2020 Groundwater Assessment Methodology briefing note issued (*02/04/2020 Feedback received from Natural England*) 05/06/2020 Technical Note Ramsar Advanced Grouting Tunnel and Main Tunnels Numerical Model (R1) & Technical Note Baseline Water Balance for the Ramsar site (Filborough Marshes) issued 02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 (*30/06/2020 Feedback received from Natural England*)
Changes in surface water quality and quantity – construction	Reduction/degradation of habitat	Predicted changes in receiving water quality and quantity Site/Habitat sensitivity to surface water changes Extent of site/habitat affected by any changes Use of habitat affected by qualifying features Measures avoiding/reducing impact pathway	Project construction surface water collection, treatment and discharge design Phase 1 habitat and NVC survey data reviewed to identify potential sensitivity Water chemistry data reviewed to identify potential sensitivity Ornithology survey data reviewed to determine use of discharge area Modelling to predict rate of discharge to avoid changes in receiving water depths	North Portal Discharge Construction South Portal drainage discharge options Technical Note - Ramsar Surface Water Ecology Baseline (Construction surface water discharge)	06/11/2019 01/04/2020 09/04/2020 07/05/2020 13/05/2020 27/05/2020 08/06/2020 02/07/2020 13/07/2020 16/09/2020 11/02/2021 17/02/2021 03/03/2021 02/06/2021 30/06/2021	07/05/2020 Technical Note South Portal drainage discharge options (*25/06/2020 Feedback received from Natural England*) 04/06/2020 Technical Note North Portal Discharge Construction (*25/06/2020 Feedback received from Natural England*) 13/04/2021 Technical Note - Ramsar Surface Water Ecology Baseline (Construction surface water discharge) 12/05/2021 Technical Note - Ramsar Surface Water Ecology Baseline (Construction surface water discharge) Revision 1 (*24/06/2021 Feedback received from Natural England*)
Changes in surface water quality and quantity – operation	Reduction/degradation of habitat	Predicted changes in receiving water quality and quantity Measures avoiding impact pathway	Project highway drainage design	Evidence base Pre-application draft HRA (DCO1.0 screening)	13/05/2020 27/05/2020	02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 *(30/06/2020 Feedback received from Natural England)*
Land take – terrestrial and aquatic (marine) environment – construction	Reduction in habitat area within FLL	Extent of site/habitat affected by land take Duration of land take Habitat types affected Use of habitat affected by qualifying features	Phase 1 habitat survey Ornithology survey data reviewed to determine use of habitats Extent of land take required for construction and operation calculated	Ornithology baseline Land take and habitat loss methodology briefing note Defining functionally linked land Figure showing land take in relation to European sites and functionally linked land	13/05/2020 27/05/2020 10/06/2020 24/06/2020 02/07/2020 23/09/2020	18/05/2020 HRA Briefing Note Ornithology baseline (*30/06/2020 Feedback received from Natural England*) 06/05/2020 HRA Briefing Note Defining functionally linked land (*18/05/2020 Feedback received from Natural England*) 22/05/2020 Figure showing land take in relation to European sites and functionally linked land

Impact pathway	Effect	Evidence required	Evidence collected	Technical notes used to engage with Natural England	Discussion meetings (see Table C.9)	Review points (see Table C.10)
		Measures reducing effect Feasibility of water supply	Functionality of affected habitats and mitigation habitats	See also specific notes relating to North and South Portal discharges and Jetty. Iteration of the extent of functionally linked land Habitat enhancement to maintain baseline functionality of functionally linked land Early sight HRA (DCO2.0) Coalhouse Point Mitigation Water Supply Structure	07/10/2020 28/10/2020 11/11/2020 31/03/2021 21/04/2021 05/05/2021 14/07/2021 11/08/2021 03/03/2022 29/06/2022 13/07/2022	10/06/2020 Land take methodology (*30/06/2020 Feedback received from Natural England* 12/02/2021 Technical Note - Habitat enhancement to maintain baseline functionality of functionally linked land 23/02/2021 Technical Note - Habitat enhancement to maintain baseline functionality of functionally linked land (Revision 1) 22/04/2021 Technical Note - Habitat enhancement to maintain baseline functionality of functionally linked land (Revision 2) (*28/07/2021 Feedback (partial) received from Natural England*) 22/04/2021 Technical note - Iteration of the extent of functionally linked land 06/08/2021 "Early sight" DCO2.0 draft of the HRA SIAA report and figures (without AQ part of the assessment) (*11/02.2022 Feedback received from Natural England)* /07/2022 Technical Note - Coalhouse Point Mitigation Water Supply Structure
Introduction/spread of Invasive Non-Native Species – terrestrial environment	Reduction/degradation of habitat within FLL	Identify areas where Invasive Non-Native Species occur in relation to sites/FLL Measures avoiding impact pathway	Phase 1 habitat survey Efficacy of good practice measures	Evidence base Pre-application draft HRA (DCO1.0 screening)	-	02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 (*30/06/2020 Feedback received from Natural England*)
Vehicle collision with species during operation Species collision with overhead utilities infrastructure – operation	Reduction in species density	Use of habitats in FLL by qualifying features Distribution of habitats in relation to new road and infrastructure	Phase 1 habitat survey Ornithology survey data reviewed to determine use of FLL	Evidence base Pre-application draft HRA (DCO1.0 screening)	-	02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 (*30/06/2020 Feedback received from Natural England*)
Changes in noise and vibration – construction works and vehicles Changes in noise and vibration – operation	Disturbance to key species	Predicted changes in noise – worst case during construction period and operation Extent of habitat affected by noise >55dB or change >3dB Duration of noise - construction Habitat types affected Use of habitat affected by qualifying features	Noise model – predicted changes illustrated by noise contours at 55dB and >3dB change Phase 1 habitat survey supplemented by use of Corine Land Cover Habitat Mapping 2018 data set Ornithology survey data reviewed to determine use of habitats Functionality of affected habitats and mitigation habitats	Disturbance – noise and visual methodology briefing note Ornithology baseline Technical notes relating to the Surface water impact pathway are also linked to disturbance Jetty Refurbishment, Use and Decommissioning Disturbance – Construction noise and mitigation Operational disturbance – noise and visual	29/04/2020 13/05/2020 27/05/2020 10/06/2020 07/10/2020 28/10/2020 11/11/2020 31/03/2021 21/04/2021 05/05/2021 19/05/2021 16/06/2021	26/02/2020 Disturbance – noise and visual methodology briefing note (*02/04/2020 Feedback received from Natural England)* 04/06/2020 Jetty Refurbishment Use and Decommissioning Paper (*26/06/2020 Feedback received from Natural England*) 09/03/2021 Technical Note - Operational Noise & Visual Disturbance (*24/06/2021 Feedback received from Natural England)* 13/04/2021 Technical Note - Construction Noise and Mitigation (*24/06/2021 Feedback received from Natural England)*

Impact pathway	Effect	Evidence required	Evidence collected	Technical notes used to engage with Natural England	Discussion meetings (see Table C.9)	Review points (see Table C.10)
		Sensitivity of qualifying features to changes in noise Measures reducing effect	Efficacy of proposed mitigation measures shown through results of updated noise model	FLL notes as per land take impact pathway Early sight HRA (DCO2.0)		06/08/2021 "Early sight" DCO2.0 draft of the HRA SIAA report and figures (without AQ part of the assessment) (*11/02.2022 Feedback received from Natural England)*
Changes in noise and vibration – underwater and above ground – tunnel construction only	Disturbance to key species	Predicted changes in noise & vibration– worst case use of TBM under the River Thames	Bespoke noise and vibration model to predict changes	Evidence base Pre-application draft HRA (DCO1.0 screening)	09/06/2020 29/06/2022	02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 (*30/06/2020 Feedback received from Natural England*)
Changes in light levels – construction & operation	Disturbance to key species	Predicted lux levels as a result of construction lighting and operational street lighting Extent of habitat affected by light levels >0.5 lux Measures reducing effect	Lighting model - predicted lux level contours Efficacy of good practice measures	No LSE from Lighting in Construction and Operation Early sight HRA (DCO2.0)	31/03/2021 21/04/2021 05/05/2021 19/05/2021 02/06/2021 16/06/2021 30/06/2021	09/03/2021 Technical Note - No LSE from Lighting Construction and Operation 12/05/2021 Technical Note - No LSE from Lighting Construction and Operation Revision 1 (*24/06/2021 Feedback received from Natural England*) 06/08/2021 "Early sight" DCO2.0 draft of the HRA SIAA report and figures (without AQ part of the assessment) (*11/02.2022 Feedback received from Natural England)*
Changes in visual disturbance – people/machines in eyeline – construction & operation	Disturbance to key species	Extent of habitat affected within 300m of construction activities and operational road Use of habitat affected by qualifying features Sensitivity of qualifying features to changes in visual disturbance Measures avoiding/reducing effect	Phase 1 habitat survey supplemented by use of Corine Land Cover Habitat Mapping 2018 data set Ornithology survey data reviewed to determine use of habitats Functionality of affected habitats and mitigation habitats Efficacy of good practice and proposed mitigation measures	Disturbance – noise and visual methodology briefing note Ornithology baseline Disturbance – Construction noise and mitigation Operational disturbance – noise and visual Early sight HRA (DCO2.0)	31/03/2021 21/04/2021 05/05/2021 19/05/2021 02/06/2021 30/06/2021	26/02/2020 Disturbance – noise and visual methodology briefing note (*02/04/2020 Feedback received from Natural England*) 09/03/2021 Technical Note - Operational Noise & Visual Disturbance (*24/06/2021 Feedback received from Natural England)* 13/04/2021 Technical Note - Construction Noise and Mitigation (*24/06/2021 Feedback received from Natural England*) 06/08/2021 "Early sight" DCO2.0 draft of the HRA SIAA report and figures (without AQ part of the assessment) (*11/02.2022 Feedback received from Natural England)*
Change in recreational pressure – construction	Disturbance to key species	Predicted changes to / use of Public Right of Way (PRoW) network Habitat types potentially affected Use of habitat affected by qualifying features	Project construction design PRoW use assessment Phase 1 habitat survey supplemented by use of Corine Land Cover Habitat Mapping 2018 data set Ornithology survey data reviewed to determine use of habitats	Evidence base Pre-application draft HRA (DCO1.0 screening)	07/10/2020	02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 *(30/06/2020 Feedback received from Natural England)*
Change in recreational pressure –operation	Disturbance to key species	ZoI for visitor travel distance to sites	ZoI identified using Essex Coast Recreational disturbance Avoidance & Mitigation Strategy (Essex County Council, 2019)	Evidence base Pre-application draft HRA (DCO1.0 screening)	07/10/2020	02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 *(30/06/2020 Feedback received from Natural England)*

Impact pathway	Effect	Evidence required	Evidence collected	Technical notes used to engage with Natural England	Discussion meetings (see Table C.9)	Review points (see Table C.10)
(wider visitor pressure)		Identify key visitor access points Predicted changes in visitor travel distance site access points Predicted change in visitor numbers	and North Kent Strategic Access Management and Monitoring Scheme (Birdwise North Kent SAMMS Project Board, 2018) Visitor access points identified using Essex Coast Recreational disturbance Avoidance & Mitigation Strategy (Essex County Council, 2019) and North Kent Visitor Survey Results (Birdwise North Kent SAMMS Project Board, 2018) Change in distances predicted using directions function in Google Maps	Technical Note: Recreational disturbance - Additional analysis to support HRA screening		28/01/2021 Technical Note: Recreational disturbance - Additional analysis to support HRA screening (*24/06/2021 Feedback received from Natural England)*
Change in recreational pressure – operation (Tilbury Fields)	Disturbance to key species	Proposed changes to / use of PRoW network Proposed visitor management Habitat types potentially affected Use of habitat affected by qualifying features	Project proposals as reported within: Design Principles and Outline Landscape and Environmental Management Plan (OLEMP) set out the proposals for Tilbury Fields Environmental Master Plan (EMP) – shows the proposed design of Tilbury Fields Phase 1 habitat survey supplemented by use of Corine Land Cover Habitat Mapping 2018 data set Ornithology survey data reviewed to determine use of habitats	Draft EMP Draft Design Principles Draft OLEMP Ornithology baseline Presentation slides - Tilbury Fields Joint Stakeholder Workshop 20/05/2021 Presentation slides - Tilbury Fields Update 25/01/2022 Pre-application draft HRA (DCO2.0)	31/03/2021 20/05/2021 02/06/2021 22/09/2021 06/10/2021 20/10/2021 25/01/2022	May 2021 - Presentation slides - Tilbury Fields Joint Stakeholder Workshop (*10/06/2020 Feedback received from Natural England* 12/06/2020 DCO1.0 Draft Environmental Master Plan – North 26/08/2020 DCO1.0 Draft Design Principles and Cross Sections of Key Structures 20/01/2021 DCO2.0 Draft Outline Landscape Environmental Management Plan 25/01/2022 Presentation slides - Tilbury Fields Update Joint Stakeholder Workshop 25/07/2022 Pre-application draft of the HRA report: Screening Report and Statement to Inform an Appropriate Assessment
Climate change	Coastal squeeze	Extent of intertidal habitat affected by land take Duration of land take	Extent of land take required within the intertidal zone	Approach to climate change assessment Figure showing land take in relation to European sites and functionally linked land See also specific notes relating to North and South Portal discharges and jetty.	29/04/2020 13/05/2020 27/05/2020 24/06/2020	22/05/2020 Approach to climate change assessment *(30/06/2020 Feedback received from Natural England)* 02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 *(30/06/2020 Feedback received from Natural England)*
In combination with other plans and projects	All of the above			Methodology for the assessment of in-combination effects Pre-application draft DCO1.0 Statement to Inform the Appropriate Assessment	19/02/2019 16/01/2020 18/03/2020 13/05/2020 27/05/2020 10/06/2020	22/05/2020 Methodology for the assessment of In-combination effects *(30/06/2020 Feedback received from Natural England)* 02/06/2020 HRA Stage 1 Screening Report – Pre-Application Draft DCO1.0 *(30/06/2020 Feedback received from Natural England)*

Impact pathway	Effect	Evidence required	Evidence collected	Technical notes used to engage with Natural England	Discussion meetings (see Table C.9)	Review points (see Table C.10)
				Pre-application draft DCO1.0 HRA Stage 1 screening	24/06/2020	13/07/2020 Statement to Inform the Appropriate Assessment – Pre-Application Draft DCO1.0 (*10/08/2020 Feedback received from Natural England)* 25/07/2022 Pre-application draft of the HRA report: Screening Report and Statement to Inform an Appropriate Assessment

C.8 Record of meetings/workshops

C.8.1 A summary of relevant meetings held with Natural England is provided in Table C.9. The minutes of all meetings are available on request.

Table C.9 Record of meetings held with Natural England

Date	Meeting description	Summary/topics of discussion
22/01/2015	SEB workshop (1)	Update on development of options for the Project; share draft approach to the options appraisal process and seek feedback on the approach; to understand roles and responsibilities of the environmental bodies and to agree the future programme of engagement.
13/03/2015	SEB Workshop (2)	Update on emerging long list of options and those that have been discounted; an overview of the types of river crossings being considered; an overview of the environmental data-gathering and appraisal work completed to date.
17/06/2015	SEB Workshop (3)	Obtaining feedback on the draft shortlist of routes and rejected design options; seeking feedback on the detailed assessment of the shortlist; outlining the proposed methodology and survey work to be undertaken; providing an update on the crossing types to enable this information to be reviewed by SEBs.
09/07/2015	Natural England Bilateral meeting	Discussion on context for ecological surveys, bird survey methodology including vantage points and transects area.
28/07/2015	Natural England Bilateral meeting	Feedback on the proposed approach to the HRA; discuss uncertainty and design parameters; update on modifications to the bird survey methodology; discuss timetable for sharing HRA information with Natural England.
01/10/2015	Natural England Bilateral meeting	A Project update; discussion on initial findings of detailed appraisal and to discuss feedback on the draft HRA Appropriate Assessment part 1 report.
05/10/2015	Natural England Bilateral meeting	Project update on shortlist of route options; discussion on HRA; key impacts; assessment approach; and ecological risks.
30/11/2015	SEB Workshop (4)	A Project update including the final shortlist of route options. Gaining feedback on initial environmental appraisal.
08/02/2016	SEB Workshop (5)	Discussion on Project public consultation materials.
21/07/2016	SEB Workshop (6)	Update on the Project post-consultation and discussion of the Project's next steps. Opportunity to discuss SEB consultation responses and clarify any issues.
19/01/2017	Natural England Bilateral meeting	Update on the Project; EIA programme; survey methodology including survey areas for passage and wintering birds to be considered in the HRA. Update on

Date	Meeting description	Summary/topics of discussion
		other surveys for EIA including ornithology; marine; air quality and noise.
21/03/2017	SEB meeting	Update on the Project; introduction on approach to EIA; outline the environmental scoping report prior to submission to the Planning Inspectorate and to outline engagement requirements going forward.
24/04/2017	Environment meeting	Review of the Project's proposed approach to bird survey and reduction of extent of surveys in view of the Preferred Route announcement (12 April 2017).
18/05/2017	SEB meeting	Update on Preferred route for Project outlining issues and obtaining feedback to begin more detailed technical discussions. Introduction of Environmental Consents team and introduction of Project Strategic Vision and Goals (SVG).
01/07/2017	Natural England Bilateral meeting	Seeking feedback on the proposed approach to the HRA for the shortlist.
15/09/2017	Surface Water Drainage and Biodiversity meeting	Update on PR and design; received feedback on options for the surface water disposal; discussion on pump tests and consents; and discussion on surface water drainage along the A2.
22/03/2018	SEB meeting	Provided updates to the SEBs on the Project; the EIA Scoping Opinion; the PEIR; the mitigation approach; and legacy and benefits.
09/04/2018	Natural England Post-SEB meeting	Update on survey work (bird survey work for HRA); discussion on district level protected species licensing; the PEIR; and the HRA scoping document.
05/06/2018	Bilateral meeting	Discussion on feedback from Defra family meeting, a Project update, environmental constraints and the Project's initial approach to mitigation.
25/09/2018	SEB Workshop	Overview of the information which was to be presented at Statutory Consultation including: highways alignment design; PEIR; key public-facing and technical materials.
25/04/2019	SEB Workshop	To update key stakeholders on the latest thinking on the Project's design development and to seek initial feedback and further suggestions for improving the design.
17/09/2019	Natural England Strategic meeting	Project update and run through of heat maps. No subsequent discussion.
09/10/2019	Natural England meeting – Marine Biodiversity	Marine Conservation Zone (MCZ) meeting to discuss Project interactions with the Thames Estuary; baseline data and the MCZ assessment.
09/10/2019	Natural England Strategic meeting	Discussion on ways of working and heat map including the following topics: HRA; designated sites; mitigation/enhancements.
06/11/2019	Natural England meeting - HRA Update	Programme for HRA and Evidence Base introduced by Project team.

Date	Meeting description	Summary/topics of discussion
06/11/2019	Hydrogeology meeting	Discussion on: overall hydrogeology modelling approach the Ramsar model the North Portal model
06/11/2019	Utilities Workshop (north and south)	Run through of potential utility diversion and the environmental impacts.
07/11/2019	Design Development Workshop (South)	Technical Design Workshop with local authorities (south of Thames) and Statutory Environmental Bodies to update on Supplementary Consultation delivery, pre-enabling works, design refinement and development boundary.
11/11/2019	Natural England Area manager meeting	Introductions between the Project and Natural England leadership and discussion on collaborative approach to information sharing to facilitate timely pragmatic regulation.
13/11/2019	Design Development Workshop (north)	Technical Design Workshop with local authorities (north of Thames) and SEBs to update on Supplementary Consultation delivery, pre-enabling works, design refinement and development boundary.
03/12/2019	Utilities Diversion Workshops (north and south)	With local authorities and SEBs to update on utilities diversions design and the potential impact on environmental designations and development boundary.
04/12/2019	Utilities update meeting	Update on utility requirements and environmental impacts.
04/12/2019	Natural England meeting - HRA Update	Run through Evidence Base with Natural England comments. No subsequent discussion.
11/12/2019	Construction Impacts Workshop (north)	Construction Impacts Workshop with local authorities (north of the River Thames) and SEBs to provide an overview of proposed construction proposals, including compounds, accommodation strategy, HGV access routes and logistics, excavated materials plans, Code of Construction Practice (CoCP) and REAC and Project’s timetable for procurement.
11/12/2019	Construction Impacts Workshop (south)	Construction Impacts Workshop with local authorities (south of the river) and SEBs to provide an overview of proposed construction proposals, including compounds, accommodation strategy, HGV access routes and logistics, excavated materials plans, CoCP and REAC and Project’s timetable for procurement.
19/12/2019	Natural England meeting - HRA Update	Discussions on: ARN/traffic modelling and in-combination data used air quality impacts and sites already exceeding critical loads along with relevant case law and potential compensation groundwater dependent Ramsar habitat

Date	Meeting description	Summary/topics of discussion
		supporting evidence for assessing qualifying species lists / functionally linked habitat agreement of zones of influence used in draft screening (10-20km)
16/01/2020	Natural England meeting - HRA Update	Discussions on: traffic modelling and in-combination data used air quality methodologies
28/01/2020	SEBs Supplementary Consultation Pre-Briefing	Introduction to Supplementary Consultation (29 January to 25 March 2020) which builds on 2018 consultation. Discussion on design changes; Order Limits; environmental impacts; and utilities.
06/02/2020	Construction Impacts Workshop (North)	Second Construction Impacts Workshop with local authorities (north of River Thames) and SEBs to provide an update of likely construction impacts (as a follow up to the workshop on 11 December 2019) and updates on construction traffic modelling and potential utility diversions.
06/02/2020	Construction Impacts Workshop (South)	Second Construction Impacts Workshop with local authorities (south of River Thames) and SEBs to provide an update of likely construction impacts (as a follow up to the workshop on 11 December 2019) and updates on construction traffic modelling and potential utility diversions.
07/02/2020	Natural England Area Manager meeting	Update on HRA development with briefing on traffic and air quality and presentation of Evidence Base. No subsequent discussion.
19/02/2020	Natural England meeting - HRA Update	Plan for HRA information sharing with Natural England including programme and contents of document packages.
12/03/2020	Hydrogeology meeting	Roadmap of hydrogeological assessments; approach and findings of the assessment of Project cuttings and embankments; operational drainage pollution simple risk assessment; infiltration basin detailed assessment; phase 1 pumping tests (south of River Thames).
18/03/2020	Natural England Area Manager meeting	Provided project update and discussed ways of working in relation to Covid-19.
18/03/2020	Natural England meeting - HRA Update	Discussions on: air quality assessment and use of ARN in-combination assessment
31/03/2020	Traffic modelling meeting	Overview of traffic model methodology and inclusion of future projects and developments.
01/04/2020	Natural England Area Manager meeting	Discussion on details of the Natural England heat map. With regards to HRA topics covered included South Portal, tunnel (hydrogeological effects), North Portal (hydrogeology) and air quality assessment.

Date	Meeting description	Summary/topics of discussion
09/04/2020	Natural England meeting – Terrestrial Biodiversity (joint meeting with EA)	Ecological interpretation of hydrogeology study with the Thames Estuary and Marshes Ramsar. Discussion on South Portal discharge.
09/04/2020	Natural England meeting – Terrestrial Biodiversity	Emerging ecological mitigation
21/04/2020	EIA - Preliminary environmental impacts and mitigation (north)	Preliminary workshop for discussing EIA impacts and mitigation for local authorities north of the River Thames and SEBS. In particular, the following key purposes: update to Project's approach to assessing potential effects (significance of, and mitigation); introduction of the control plan; provision of an update on the progress of the EMP and technical chapters of the ES; and to provide a forum for open discussion and ideas around mitigation.
22/04/2020	EIA - Preliminary environmental impacts and mitigation (south)	Preliminary workshop for discussing EIA impacts and mitigation for local authorities south of the river and SEBS. In particular, the following key purposes: update to Project's approach to assessing potential effects (significance of, and mitigation); introduction of the control plan; provision of an update on the progress of the EMP and technical chapters of the ES; and to provide a forum for open discussion and ideas around mitigation.
29/04/2020	Natural England meeting - HRA Update	Discussion on: Air Quality assessment methodology – Epping Forest Botanical Survey HRA programme and expected Natural England review times identification of key issues: air quality, disturbance to birds, changes to groundwater/surface water, climate change.
06/05/2020	Natural England Area Manager meeting	Discussion regarding consultation including ways of working and sharing of documentation.
13/05/2020	Natural England meeting - HRA Update	Discussion on: traffic model methodology Air Quality assessment (construction and operation) botanical survey of Epping Forest extent of FLL disturbance to birds water quality (operational and construction) in-combination assessment Climate change assessment.
27/05/2020	Natural England meeting - HRA Update	Discussion on: traffic model methodology

Date	Meeting description	Summary/topics of discussion
		air quality assessment (construction and operation) botanical survey of Epping Forest extent of FLL disturbance to birds water quality (operational and construction) in-combination assessment climate change assessment.
29/05/2020	DCO Workshop	Discussion on: Order Limits update further consultation (D-CON) Lower Thames Crossing 'Digital First' Consultation and Electronic Submission DCO process - Key Stages DCO application documentation Control Plan Draft Development Consent Order and Schedules Requirement, Secondary Consents and Permit schemes Book of Plans SoCGs – Purpose, Content, Principles and Preparation
08/06/2020	South Portal Outfall meeting	To discuss feedback on South Portal outfall options paper and introduce North Portal jetty options (East Tilbury jetty at Goshem's Farm).
09/06/2020	WFD Stage 4 Assessment Update	Update on findings of the updated Stage 4 WFD Assessment including discussion on Environment Agency comments; underwater noise and vibration during construction and operation; air quality modelling; and M25 cutting.
09/06/2020	Hydrogeology Update meeting	Overview of the approach to groundwater modelling including groundwater levels and infiltration basins.
10/06/2020	Natural England meeting - HRA Update	Discussion on: screening: general and air quality in-combination assessment Appropriate Assessment: extent of FLL; disturbance to birds; land take; and mitigation and monitoring securing mechanisms programme/documentation of HRA
24/06/2020	Natural England meeting – HRA Update	Discussion on: screening consultation Appropriate Assessment consultation key issues: air quality; extent of FLL; disturbance to birds; land take; water quality; in-combination; and climate change securing mechanisms programme / documentation of HRA

Date	Meeting description	Summary/topics of discussion
24/06/2020	Natural England Area Manager meeting	Discussion on: heat map DEFRA map (north of the River Thames) draft ES chapters air quality methodology South Portal discharge legacy and benefits
02/07/2020	Natural England and Environment Agency meeting – North Portal Discharge and Jetty Design / Construction Assumptions	Discussion on the North Portal discharge assumptions paper and East Tilbury jetty at Goshem's Farm design and construction paper issued to Natural England and Environment Agency.
08/07/2020	Natural England meeting – HRA Update	Discussion on: consultation on HRA Screening; briefing documents; and SIAA securing mechanisms including the process and any Natural England concerns programme and consultation process
14/07/2020	Hydrogeology Update meeting	Update on the North Portal model and the M25 / Lower Thames junction Groundwater Impact Assessment Numerical Model.
22/07/2020	Natural England meeting – HRA Update	Discussion on: consultation on HRA Screening; briefing documents; SIAA; and ES chapters securing mechanisms including Natural England comments on REAC, CoCP and dDCO requirements
03/08/2020	Natural England Area Manager meeting	Discussion on HRA key issues including air quality, level of detail and securing mechanisms as well as current consultation.
05/08/2020	Natural England meeting – HRA Update	Discussion on ongoing consultation process and programme.
26/08/2020	Natural England meeting – SoCG Workshop 1	Discussion on consultation process for HRA SoCG development and use of the SoCG tracker.
02/09/2020	Natural England meeting – SoCG Workshop 2	Discussion on HRA items on SoCG and Key Issues.
09/09/2020	Natural England meeting – SoCG Workshop 3	Discussion on air quality (operation) and ARN.
16/09/2020	Natural England meeting – SoCG Workshop 4	Discussion on: securing mechanisms water quality

Date	Meeting description	Summary/topics of discussion
		light levels construction air quality construction dust emissions air quality construction vehicles air quality vessel emissions
16/09/2020	Natural England Area Manager meeting	Discussion on DCO, HRA, water vole mitigation and Kent Downs AONB compensation
23/09/2020	Natural England meeting – SoCG Workshop 5	Discussion on: land take operational assessment
25/09/2020	Natural England meeting – SoCG Workshop 5a	Discussion with Natural England air quality specialists.
30/09/2020	Natural England meeting – SoCG Workshop 6	Discussion on: actions from previous SoCG workshops and air quality specialist meeting future meetings and agendas
07/10/2020	Natural England meeting – SoCG Workshop 7	Discussion on: recreational disturbance air quality meeting agendas land take and disturbance meeting agendas
21/10/2020	Natural England Area Management meeting	Discussion on Project progress, disapplication of Section 28e (Wildlife and Countryside Act 1981), DCO, SoCG and HRA.
28/10/2020	Natural England meeting – SoCG Workshop 8	Discussion on: land take and disturbance: feedback on early sight SIAA approach to assessing AEoI baseline used species-specific assessments vs broad approach permanence of effects reprovisioning of habitat operational baseline energetic requirements relative disturbance with seasonal constraints
04/11/2020	Natural England meeting – SoCG Workshop 9	Discussion on: air quality: feedback on early sight SIAA traffic model air quality assessment verification approach ammonia vessel contribution construction ARN dust

Date	Meeting description	Summary/topics of discussion
		use of LA 105 vs NE001 presence of veteran trees alignment with conservation objectives
11/11/2020	Natural England meeting – SoCG Workshop 10	Discussion on: land take and disturbance: feedback on early sight SIAA assessment of AEoI sterilisation of land; baseline used species-specific assessments vs broad approach permanence of effects reprovisioning of habitat operational baseline energetic requirements relative disturbance with seasonal constraints
25/11/2020	Natural England meeting – SoCG Workshop 11	Discussion on: SoCG Tracker and ongoing consultation and programme
02/12/2020	Natural England meeting – SoCG Workshop 12	Discussion on: SoCG Tracker and ongoing consultation and programme
09/12/2020	Natural England meeting – SoCG Workshop 13	Discussion on: SoCG Tracker and ongoing consultation and programme approach to screening and SIAA
16/12/2020	Natural England meeting – SoCG Workshop 14	Discussion on: SoCG Tracker and ongoing consultation and programme draft mitigation
20/01/2021	Natural England meeting – SoCG Workshop 15	Discussion on: SoCG Tracker and ongoing consultation and programme draft mitigation
03/02/2021	Natural England meeting – SoCG Workshop 16	Discussion on: SoCG Tracker and ongoing consultation and programme draft mitigation
10/02/2021	RSPB – Ground preparation tunnel meeting	Discussion on: bird survey results for Thames Estuary and impacts from ground preparation tunnel surface and groundwater changes land take and disturbance
11/02/2021	Natural England meeting – SoCG Workshop 17	Discussion on: SoCG Tracker and ongoing consultation and programme groundwater and surface water monitoring
17/02/2021	Natural England meeting – SoCG Workshop 18	Discussion on: SoCG Tracker and ongoing consultation and programme groundwater and surface water monitoring

Date	Meeting description	Summary/topics of discussion
17/02/2021	Natural England Area Manager meeting	Discussion on: key milestones resourcing HRA air quality high priority issues
03/03/2021	Natural England meeting – SoCG Workshop 19 (with Environment Agency)	Discussion on: Securing mechanisms and Hydrogeological risk assessment
11/03/2021	RSPB – Habitat Enhancement	Discussion on bird survey results and gather RSPB thoughts for habitat enhancement on their land.
17/03/2021	Natural England Area Manager meeting	Discussion on invertebrate study, SoCG dashboard and high priority issues and programme milestones.
31/03/2021	Natural England meeting – SoCG Workshop 20	Discussion on: programme air quality dust disturbance lighting (operation/ construction) disturbance noise and visual (operation) habitat enhancement groundwater approach to Shorne Woods as dormouse receptor site Tilbury Fields – landscape and invertebrate proposals
01/04/2021	RSPB – Habitat Enhancement	Discussion on terrestrial bird survey results and habitat enhancements on RSPB land.
21/04/2021	Natural England meeting – SoCG Workshop 21	Discussion on: programme air quality dust disturbance lighting (operation/ construction) disturbance noise and visual (operation) habitat enhancement groundwater
22/04/2021	Natural England Area Manager meeting	Discussion on invertebrate study, SoCG dashboard and high priority issues and programme milestones.
05/05/2021	Natural England meeting – SoCG Workshop 22	Discussion on: disapplication of Section 28E (Wildlife and Countryside Act 1981) programme air quality dust disturbance lighting (operation/ construction) disturbance noise and visual (operation) habitat enhancement groundwater

Date	Meeting description	Summary/topics of discussion
13/05/2021	RSPB – Habitat Enhancement	Discussion on outline prescriptions for RSPB land and method for securing.
19/05/2021	Natural England meeting – SoCG Workshop 23	Discussion on: invertebrate mitigation Shorne Woods car park programme air quality dust disturbance lighting (operation/ construction) disturbance noise and visual (operation) construction water quality groundwater
02/06/2021	Natural England meeting – SoCG Workshop 24	Discussion on: Tilbury Fields – recreational disturbance air quality – dust disturbance – lighting (construction & operation) disturbance – noise & visual: construction & operation construction water quality – surface and groundwater Project milestones
16/06/2021	Natural England meeting – SoCG Workshop 25	Discussion on: Shorne Woods Country Park – car park design Shorne Woods Country Park – dormouse receptor site air quality – operational AQ HRA bird disturbance – lighting contours
30/06/2021	Natural England meeting – SoCG Workshop 26	Discussion on: Shorne Woods Country Park – dormouse translocation/ receptor site Shorne Woods Country Park – car park Agricultural Land Classification assessment air quality – dust disturbance – lighting (construction & operation) disturbance – noise & visual: construction & operation construction water quality – surface
14/07/2021	Natural England meeting – SoCG Workshop 27	Discussion on: operational air quality sufficiency of habitat enhancement
28/07/2021	Natural England meeting – SoCG Workshop 28	Discussion on: operational air quality Project milestones
11/08/2021	Natural England meeting – SoCG Workshop 29	Discussion on: Coalhouse Fort mitigation area (FLL) operational air quality Project milestones

Date	Meeting description	Summary/topics of discussion
25/08/2021	Natural England meeting – SoCG Workshop 30	Discussion on: Coalhouse Fort mitigation area (FLL) S28e disapplication OLEMP green bridges Project milestones operational air quality
08/09/2021	Natural England meeting – SoCG Workshop 31	Discussion on: OLEMP advisory group
22/09/2021	Natural England meeting – SoCG Workshop 32	Discussion on: Tilbury freeport and potential change to Tilbury Fields proposals breeding bird disturbance – ES
06/10/2021	Natural England meeting – SoCG Workshop 33	Discussion on: Tilbury freeport and potential change to Tilbury Fields proposals
20/10/2021	Natural England meeting – SoCG Workshop 34	Discussion on: EIA operational AQ effects, mitigation and compensation approach Tilbury Fields proposals update
03/11/2021	Natural England meeting – SoCG Workshop 35	Discussion on: outstanding actions Natural England feedback protected species licensing
04/11/2021	Natural England meeting – AQ assessment workshop 1	Specific meeting to discuss the AQ assessment used in the EIA and HRA following provision of the AQ evidence plan R1
08/11/2021	Natural England meeting – North Downs Woodlands SAC	Specific meeting to discuss the AQ modelling methods used to screen out North Downs Woodlands SAC in the HRA
17/11/2021	Natural England meeting – SoCG Workshop 36	Discussion on: AQ evidence plan clarifications
01/12/2021	Natural England meeting – SoCG Workshop 37	Discussion on: AQ compensation area site selection and habitat creation
06/12/2021	Natural England meeting – AQ assessment workshop 2	Specific meeting to discuss the AQ assessment used in the EIA and HRA following provision of the AQ evidence plan R2
07/12/2021	Natural England meeting – AQ	Specific meeting to discuss the AQ assessments and compensation habitats with Natural England woodland specialist

Date	Meeting description	Summary/topics of discussion
	assessment – woodland specialist	
15/12/2021	Natural England meeting – SoCG Workshop 38	Discussion on: AQ compensation area site selection updates
12/01/2022	Natural England meeting – SoCG Workshop 39	Discussion on: AQ compensation area sites and draft order limits proposed SoCG engagement going forward
26/01/2022	Natural England meeting – SoCG Workshop 40	Meeting postponed to 07/02/2022
07/02/2022	Natural England SoCG meeting - SoCG Workshop 40	Specific SoCG meeting to discuss the remaining SoCG issues and the proposed timetable of meetings going forward
09/02/2022	Natural England meeting – SoCG Workshop 41	Discussion on: protected species licensing – LTC update on progress and LONIs Project proposals for the development of the design of the ES nitrogen deposition compensation land. Included: timescales, level of detail, management objectives and OLEMP implementation
03/03/2022	Natural England meeting – SoCG Workshop 42	Discussion on: HRA – NE feedback and remaining issues Clarification of functionality measure Feasibility of Coalhouse Point mitigation EIA – AQ Ndep assessment – summary of the evidence technical note EIA – AQ mitigation measures – options taken forward and discounted EIA – AQ compensation – strategic management areas
09/03/2022	Natural England meeting – SoCG Workshop 43	Discussion on: EIA – Invertebrate assessment EIA – AQ Mitigation & Compensation Review SoCG/Milestone tracker
23/03/2022	Natural England meeting – SoCG Workshop 44	Discussion on NE requests for clarification on Use of the Emission Factor Toolkit (EFT) Inconsequential NOx threshold Maidstone LDP and the LTC traffic model assumptions (see meeting 26/04/2022)
20/04/2022	Natural England meeting – SoCG Workshop 45	Discussion on EIA – invertebrates assessment and proposed SSSI scoping study

Date	Meeting description	Summary/topics of discussion
		mitigation potential of Coalhouse Point mitigation area size of provision at the new Tilbury Fields proposal EIA – AQ potential for habitat management fund
26/04/2022	Natural England meeting – SoCG Workshop 46	Extra Meeting: Discussion on Maidstone Local Plan and how it has been considered in LTC traffic model NE feedback on the use of inconsequential NOx at NDW SAC NE feedback of use of "without prejudice" mitigation at Epping Forest SAC
04/05/2022	Natural England meeting – SoCG Workshop 47	Discussion on EIA AQ mitigation solutions HRA - Deliverability of Coalhouse Point wetland creation EIA – Common land provision Review of SoCG/Milestone tracker
18/05/2022	Natural England meeting – SoCG Workshop 48	Discussion on NE feedback on Discuss 'without prejudice' mitigation - NE feedback (Epping Forest) Inconsequential NOx use at HRA Screening 'Early–Sight' Draft HRA – LTC comments to NE feedback issued Feb 23rd HRA screening – Groundwater – NE to source specialist advice and provide feedback HRA – Feasibility of Coalhouse Point Wetland Creation EIA – review of the assessment and provision for ecological features EIA -Strategic management areas design and management
26/05/2022	Natural England meeting – SoCG Workshop 49	Discussion on The issues still to be resolved with NE to allow text to be drafted for the SoCG
29/06/2022	Natural England meeting – SoCG Workshop 50	Discussion on HRA - Feasibility of Coalhouse Point wetland creation HRA - Underwater noise assessment EIA Ndep Compensation – order limit proposed changes following public consultation HRA / AQ Definition of inconsequential NOx (actual calculation) Epping Forest SAC: 4 year duration calculation and without prejudice mitigation. Traffic: Tempro model – Development and Growth Factors

Date	Meeting description	Summary/topics of discussion
13/07/2022	Natural England meeting – SoCG Workshop 51	Discussion on HRA – proposed REAC commitments for Coalhouse Point wetland creation EIA Ndep Compensation – order limit confirmed changes EIA – Invertebrate assessment Kent areas impacted and mitigation EIA – Ancient woodland impacts and mitigation
27/07/2022	Natural England meeting – SoCG Workshop 52	Call cancelled
17/08/2022	Natural England meeting – SoCG Workshop 53	Discussion on EIA – Bowater's bridleway EIA – SSSI designation EIA – East Tilbury Landfill Access Track
24/08/2022	Natural England meeting – SoCG Workshop 54	Discussion on HRA – review of the SoCG text for the matters agreed and under discussion EIA – Common land
07/09/2022	Natural England meeting – SoCG Workshop 55	Discussion on HRA/EIA - SoCG text drafting and assurance programme HRA - Updated PINS advice Note 10
21/09/2022	Natural England meeting – SoCG Workshop 56	Discussion on HRA/EIA - SoCG assurance programme EIA – Mitigation habitat and BNG metrics
05/10/2022	Natural England meeting – SoCG Workshop 57	Discussion on HRA – final review of the SoCG text for the matters agreed and under discussion

C.9 Record of correspondence

C.9.1 A summary list of documents and correspondence with Natural England pertinent to the development of the HRA is provided in Table C.10.

Table C.10 Correspondence with Natural England pertinent to HRA development

Date	Summary
06/2013	From Natural England – Written feedback on potential options for a new Lower Thames Crossing
12/07/2013	From Natural England – Response to Options for Project Consultation Document

Date	Summary
11/2014	Letter issued to request technical information to inform route options development work, response received.
2015	Note to inform on the HRA / Template
04/2015	From Natural England – Email feedback regarding the environmental appraisal approach requested by project team at Environment Workshop 2
07/2015	From Natural England – Email feedback on draft shortlist of options; survey and appraisal approach; design and opportunities requested at Workshop 3
03/2016	From Natural England – Written response to the 2016 Public Consultation
02/2017	Habitats Regulations Assessment Screening Matrix for the Preferred Option
02/2017 05/2017	Bird Survey Methodology – Preferred Route (Draft)
02/11/2017	EIA scoping report issued via Planning Inspectorate
04/ 2018	HRA Scoping document
09/2018	Habitats Regulations Assessment Screening Matrix for the Preferred Option (updated)
10/10/2018	Preliminary Environmental Information Report (PEIR)
19/10/2018	Proposed Marine Monitoring and Modelling Programme *Feedback received from Natural England 04/12/2018 (Discretionary Advice Service advice letter: Development proposal and location: Lower Thames Crossing – Goshem's Jetty)*
21/10/2019	North Portal Stage 1 Numerical Model Technical Note
21/10/2019	Ramsar Advanced Grouting Tunnel and Main Tunnels Numerical Model Technical Note
08/11/2019	Advanced Grout Tunnel Technical Note
28/11/2019	HRA Briefing note issued for comment: • HRA Evidence Base Rev1.0
17/12/2019	SoCG Draft Template
17/12/2019	CoCP Skeleton
19/12/2019	Draft HRA Stage 1 Screening Report *Feedback received from Natural England 12/02/2020*
13/01/2020	HRA Briefing note issued for comment: • HRA Evidence Base Rev2.1
29/01/2020	Letter to inform consultees of Supplementary Consultation
30/01/2020	Natural England Activity Map and Technical Note for SoCG
25/02/2020	Hydrogeology – Pumping test interpretation report – south of the River Thames
26/02/2020 (reissued 18/03/2020)	HRA Briefing note issued for comment: • Air quality assessment methodology *Feedback received from Natural England 02/04/2020*
	HRA Briefing note issued for comment:

Date	Summary
	• Disturbance assessment methodology *Feedback received from Natural England 02/04/2020*
	Updated HRA Evidence Base
	Updated Draft SoCG including HRA Tracker *Feedback received from Natural England 28/04/2020*
	Natural England Consultation Process Agenda *Discussed at HRA Update Meeting 19/02/2020*
11/03/2020 (reissued 18/03/2020)	HRA Briefing note issued for comment: • Groundwater assessment methodology *Feedback received from Natural England 02/04/2020*
19/03/2020	Consultation extension letter
02/04/2020	From Natural England – Comments in relation to Supplementary Consultation
06/04/2020	SoCG Technical Note
08/04/2020	HRA Briefing note issued for comment: • Botanical survey of Epping Forest methodology *Feedback received from Natural England 30/04/2020. Additional references provided 12/05/2020.*
24/04/2020	Stage 4 WFD Assessment
06/05/2020	HRA Briefing note issued for comment: • Defining functionally linked land *Feedback received from Natural England 18/05/2020.*
07/05/2020	Infiltration Basins Detailed Assessment South of the River Thames
07/05/2020	M25/Project Junction Groundwater Impact Assessment Numerical Model – Technical Note
07/05/2020	Design Briefing note issued for comment: • South Portal Discharge Options Paper *Feedback received from Natural England 25/06/2020*
13/05/2020	WFD Marine habitat compensation proposal
13/05/2020	Provision of weblink to traffic modelling updates from Supplementary Consultation
18/05/2020	HRA Briefing notes issued for comment: • Ornithology Baseline *Feedback received from Natural England 30/06/2020* • Epping Forest Botanical Survey Update • Figures detailing European site locations in relation to ARN
22/05/2020	HRA Briefing notes issued for comment: • In-combination assessment methodology • Approach to climate change methodology

Date	Summary
	• Figure showing land take in relation to European sites and functionally linked land. *Feedback received from Natural England 30/06/2020*
02/06/2020	HRA Briefing notes issued for comment: • HRA Stage 1 Screening Report – DCO1.0 Pre-Application Draft *Feedback received from Natural England 30/06/2020* • Construction traffic modelling and AQ effects briefing *Feedback received from Natural England 30/06/2020* • Natural England Response Tracker and Draft HRA SoCG
03/06/2020	Draft Code of Construction Practice *Feedback received from Natural England 21/06/2020*
04/06/2020	Design Briefing notes issued for comment: • North Portal Discharge Construction paper *Feedback from Natural England received 25/06/2020* • Jetty Refurbishment Use and Decommissioning Paper *Feedback received from Natural England 26/06/2020 (Refers to East Tilbury jetty at Goshem's Farm)*
05/06/2020	Ramsar Advanced Grouting Tunnel and Main Tunnels Numerical Model Technical Note
05/06/2020	Baseline Water Balance for the Ramsar site (Filborough Marshes) Technical Note
05/06/2020	WFD Stage 4 report
05/06/2020	Draft Environmental Masterplan – South
10/06/2020	Shortlist for Cumulative Effects Assessment
10/06/2020	HRA Briefing notes issued for comment • Mitigation and monitoring • Land take methodology *Feedback received from Natural England 30/06/2020*
11/06/2020	Draft Air Quality ES Chapter *Feedback received from Natural England 27/08/2020*
11/06/2020	Draft Marine Biodiversity ES Chapter
12/06/2020	Draft Environmental Masterplan – North
15/06/2020	Traffic Modelling query from Natural England and the Project's response – traffic forecasting in AADT terms (Project's responses 18/06/2020-25/06/2020)
24/06/2020	Draft Development Consent Order *Feedback received from Natural England 21/07/2020 (Project response to comments issued 24/08/2020)*
26/06/2020	Local Model Validation Report and Air Quality ES chapter with technical appendices
07/07/2020	Draft Noise and Vibration ES Chapter Draft Climate ES Chapter

Date	Summary
13/07/2020	Statement to Inform the Appropriate Assessment – DCO1.0 Pre-Application Draft *Feedback received from Natural England 10/08/2020*
13/07/2020	Draft Cumulative Effects ES Chapter
14/07/2020	Design Refinement Consultation
15/07/2020	Draft Terrestrial Ecology ES Chapter *Feedback received from Natural England 28/07/2020*
15/07/2020	Draft Road Drainage and Water Environment ES Chapter
22/07/2020	HRA Document package issued for information • Stage 1 Screening Figure 31 – Predicted change in nitrogen deposition at European sites
06/08/2020	HRA Document package issued for information: • SIAA Figure 10 – Bird baseline (Individual HRA species recorded in each season) • SIAA Figure 12 – Noise modelling contours • Stage 1 Screening Appendix F.1 – Evidence Plan • Stage 1 Screening Appendix F.2 – Natural England Comment Response Tracker
06/08/2020	Securing Mechanism Control Diagram (excerpt from presentation on the way in which landscape design and ecological mitigation measures are secured)
06/08/2020	*Natural England feedback provided on Draft Landscape and Visual ES Chapter*
19/08/2020	Updated Code of Construction Practice *Feedback received from Natural England 01/09/2020*
19/08/2020	Register of Environmental Actions and Commitments *Feedback received from Natural England 01/09/2020*
24/08/2020	Draft Natural England SoCG
25/08/2020	HRA Document package: • Briefing paper on proposed consultation approach – HRA SoCG • HRA SoCG Tracker – Natural England
26/08/2020	Draft Design Principles and Cross Sections of Key Structures
26/08/2020	HRA Document package: • HRA SoCG Tracker Revision 1 – Natural England • HRA SoCG Workshop 1 Minutes
03/09/2020	HRA Document package: • HRA SoCG Tracker Revision 2 – Natural England • HRA SoCG Workshop 2 Minutes
08/09/2020	HRA Document package: • LTC HRA SIAA Appendix B – Natural England Comment Response Tracker
10/09/2020	HRA Document package:

Date	Summary
	• HRA SoCG Tracker Revision 3 – Natural England • HRA SoCG Workshop 3 Minutes (09/09/2020) • AQ Specialist Call Draft Agenda • Stage 1 Screening – Appendix H – LA 105 NEA001 Comparison
18/09/2020	HRA Document package: • HRA SoCG Tracker Revision 4 – Natural England • HRA SoCG Workshop 4 Minutes (16/09/2020) • Natural England HRA AQ Consultation Meeting 25/09/2020 (HRA Workshop 5a) Presentation Slides (draft) • Natural England HRA Land Take Consultation Meeting 23/09/2020 Presentation Slides (draft)
24/09/2020	HRA Document package: • HRA SoCG Tracker Revision 5 – Natural England • HRA SoCG Workshop 5 Minutes (23/09/2020) and Presentation slides (final) • Natural England HRA AQ Consultation Meeting 25/09/2020 (HRA Workshop 5a) Presentation Slides (Final)
29/09/2020	HRA Document package: • Pre-DCO1.0 Submission – HRA Screening Report – issued for information
01/10/2020	HRA Document package: • HRA SoCG Tracker Revision 6 – Natural England
06/10/2020	HRA Document package: • HRA SoCG Workshop 6 Minutes (30/09/2021) • AQ Specialist Meeting Minutes (HRA Workshop 5a)
13/10/2020	HRA Document package: • HRA SoCG Tracker Revision 7 – Natural England • HRA SoCG Workshop 7 Minutes (07/10/2021) • Pre-DCO1.0 Submission – HRA SIAA Report – issued for information
20/10/2020	EA Pre-Application Advice – North Portal – Meeting Minutes
29/10/2020	HRA Document package: • HRA SoCG Tracker Revision 8 – Natural England • Natural England HRA Land Take Disturbance Consultation Meeting 28/10/2020 Presentation Slides (HRA Workshop 8)
03/11/2020	HRA Document package: • HRA SoCG Workshop 8 Minutes (28/10/2020) • Natural England HRA AQ Consultation Meeting 04/11/2020 (HRA Workshop 9) Presentation Slides • Briefing note on LTC Construction Barge Movements
10/11/2020	HRA Document package: • HRA SoCG Workshop 9 Minutes and Presentation Slides (04/11/2020)

Date	Summary
	• HRA SoCG Tracker Revision 9 – Natural England
17/11/2020	HRA Document package: • HRA SoCG Workshop 10 Minutes and Presentation slides (11/11/2020) • HRA SoCG Tracker Revision 10 – Natural England • Natural England Area Manager Meeting Minutes (21/10/2020)
24/11/2020	EA Pre-application Advice – North Portal / South Portal – Meeting Minutes (02/11/2020 and 03/11/2020)
01/12/2020	HRA Document package: • HRA SoCG Workshop 11 Minutes and Presentation slides (25/11/2020) • HRA SoCG Tracker Revision 11 – Natural England
08/12/2020	HRA Document package: • HRA SoCG Workshop 12 Minutes (02/12/2020) • Natural England HRA Consultation Meeting 09/12/2020 Presentation slides
15/12/2020	HRA Document package: • HRA SoCG Workshop 13 Minutes (09/12/2020) • Natural England HRA Consultation Meeting 16/12/2020 Presentation slides
19/01/2021	HRA Document package: • Natural England HRA Consultation Meeting 20/01/2021 (HRA Workshop 15) Presentation slides
28/01/2021	HRA Document package: • HRA Workshop 14 and 15 Minutes (16/12/2020 and 20/01/2021) • HRA SoCG Tracker Revision 12 – Natural England • Technical Note: Recreational disturbance – Additional analysis to support HRA screening *Feedback on Technical Note received from Natural England 24/06/2021*
02/02/2021	HRA Document package: • Natural England HRA Consultation Meeting 03/02/2021 (HRA Workshop 16) Presentation slides
10/02/2021	HRA Document package: • HRA Workshop 16 Minutes (03/02/2021) • HRA SoCG Tracker Revision 13 – Natural England • Natural England HRA Consultation Meeting 11/02/2021 (HRA Workshop 17) Presentation slides
12/02/2021	HRA Document package: • Technical Note – Habitat Enhancement Areas • Summary of LTC Air Quality consultation discussions
17/02/2021	HRA Document package: • HRA Workshop 17 Minutes (11/02/2021) • HRA SoCG Tracker Revision 14 – Natural England

Date	Summary
	• Natural England HRA Consultation Meeting 17/02/2021 (HRA Workshop 18) Presentation slides
20/02/2021	Draft Outline Landscape Environmental Management Plan
23/02/2021	HRA Document package: • HRA Workshop 18 Minutes and Presentation Slides (17/02/2021) • Technical Note – Habitat Enhancement Areas (Revision 1)
09/03/2021	HRA Document package: • Draft Programme of milestones and call agendas • HRA SoCG Tracker Revision 15 – Natural England • Environment Agency comments on Hydrogeological Risk Assessment • Technical Note – Dust measures • Technical Note – No LSE Lighting • Technical Note – Operational Noise & Visual Disturbance *Feedback on Technical Notes received from Natural England 24/06/2021*
07/04/2021	HRA Document package: • HRA Workshop 19 Minutes (with Environment Agency 03/03/2021)
13/04/2021	HRA Document package: • HRA Workshop 20 Minutes (31/03/2021) • Revised Draft Programme of milestones & call agendas • HRA SoCG Tracker Revision 15 – Natural England • Technical Note – Construction Noise and Mitigation • Technical Note – Ramsar Surface Water Ecology Baseline *Feedback on Technical Notes received from Natural England 24/06/2021*
16/04/2021	HRA Document package: • Revised Draft Programme of milestones & call agendas
22/04/2021	HRA Document package: • Technical Note – Habitat Enhancement Areas (Revision 2) • Technical note – Iteration of FLL and SoCG update
27/04/2021	HRA Document package: • HRA Workshop 21 Minutes and Presentation slides (21/04/2021)
12/05/2021	HRA Document package: • HRA Workshop 22 Minutes and Presentation slides (05/05/2021) • Revised Draft Programme of milestones & call agendas • Revised Technical Note – Dust measures (Revision 1) • Revised Technical Note – No LSE Lighting (Revision 1) • Revised Technical Note – Ramsar Surface Water Ecology Baseline (Revision 1) Feedback on Technical Notes received from Natural England 24/06/2021
25/05/2021	HRA Document package: • HRA Workshop 23 Minutes and Presentation slides (19/05/2021)

Date	Summary
10/06/2021	HRA Document package: • HRA Workshop 24 Minutes and Presentation slides (02/06/2021)
15/06/2021	HRA Document package: • Updated Programme of milestones & call agendas
24/06/2021	HRA Document package: • HRA Workshop 25 Minutes and Presentation slides (16/06/2021)
08/07/2021	HRA Document package: • HRA Workshop 26 Minutes (30/06/2021)
28/07/2021	HRA Document package: • HRA Workshop 28 Draft Minutes and Presentation slides (28/07/2021)
06/08/2021	HRA Document package: • Early sight draft of the HRA SIAA report and figures (without AQ part of the assessment) *Feedback on early sight draft of the HRA SIAA report and figures (excluding AQ) received from Natural England (11/02/22)*
11/08/2021	HRA Document package: • HRA Workshop 29 Draft Minutes and Presentation slides (11/08/2021) • Rev0 of the HRA Evidence Technical Note: Air Quality from vehicle emissions *Feedback on Rev0 of the HRA Evidence Technical Note: Air Quality from vehicle emissions received from Natural England (03/12/21)*
25/08/2021	HRA Document package: • HRA Workshop 30 Presentation slides (25/08/2021) and updated HRA milestones
14/10/2021	HRA Document package: • HRA Workshops 31, 31, 32 Draft Minutes and Presentation slides (25/08/2021, 08/19/2021, 22/09/2021)
20/10/2021	HRA Document package: • HRA Workshop 33 Draft Minutes and Presentation slides (06/10/2021)
11/11/2021	HRA Document package: • HRA and EIA Evidence Technical Note Rev1 • Evidence Plan response table
26/11/2021	HRA/EIA Document package: • Technical note on the effects of nitrogen deposition on designated sites (EIA) • Technical note on the methodology for assessing speed limits
10/02/2022	HRA/EIA Document package • Note on approach to modelling for designated sites • Natural England SoCG and milestones tracker 2022 Feedback on 'Note on approach to modelling for designated sites' received from Natural England by Email on 09/03/2022

Date	Summary
10/02/2022	HRA Document package: • HRA Workshop 34 Draft Minutes and Presentation slides (06/10/2021) • HRA Workshop 35 Draft Minutes and Presentation slides (03/11/2021) • HRA Workshop 36 Draft Minutes and Presentation slides (17/11/2021) • HRA Workshop 37 Draft Minutes and Presentation slides (01/12/2021) • HRA Workshop 38 Draft Minutes and Presentation slides (15/12/2021) • HRA Workshop 39 Draft Minutes and Presentation slides (12/01/2022)
11/02/2022	From Natural England: Feedback on early sight draft of the HRA SIAA report and figures (excluding AQ)
23/02/2022	HRA Document package: • HRA Workshop 10 Draft Minutes (11/11/2020) • HRA Workshop 15 Presentation slides (20/01/2021) • HRA Workshop 16 Presentation slides (03/02/2021) • HRA Workshop 26 Presentation slides (30/06/2021) LTC response (excel spreadsheet) to Natural England comments on the early sight draft HRA
23/03/2022	HRA Document package: SoCG Workshop 44 Presentation slides (23/03/2022)
28/04/2022	HRA Document package: Meeting recordings for meeting held 26/04/2022 and 23/03/2022
30/06/2022	HRA Document package: SoCG Workshop 50 Presentation slides (29/06/2022)
20/07/2022	HRA Document package: Coalhouse Point Water Supply Technical Note
25/07/2022	HRA Document package Pre Application draft of the Habitats Regulations Assessment Report : Screening Report and Statement to Inform an Appropriate Assessment
16/09/2022	Technical Note Consideration of in-combination development within the traffic modelling
03/10/2022	Technical Note (Annex A.7 of the SOCG) Without prejudice consideration of mitigation for air quality effects on Epping Forest SAC

References

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Essex County Council, 2019. *Essex Coast Recreational disturbance Avoidance & Mitigation Strategy (RAMS).* [Online]
Available at: https://essexcoast.birdaware.org/media/32380/Recreational-disturbance-Avoidance-and-Mitigation-Strategy/pdf/FINAL_RAMS_-_July_2019_reduced_size.pdf
[Accessed 13 Jan 2021].

Highways Agency, 2009. *HD44/09 Assessment of Implications (of highwaysand/or road projects) on European Sites (includeing Appropriate Assessment).* [Online]
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[Accessed Mar 2021].

Appendix D Epping Forest Detailed Botanical Survey Results

Appendix D Epping Forest Botanical Survey Report

D.1 Introduction

Purpose of this document

D.1.1 This document presents the results of a botanical record search and field survey within Epping Forest Special Area of Conservation (SAC). Its purpose was to inform part of the assessment to determine if the Project will result in habitat degradation as a result of changes in air quality as part of the Habitat Regulations Assessment (HRA) in accordance with the standard DMRB LA 105 (Highways England, 2019) and Natural England guidance (Natural England, 2018).

Background

D.1.2 Air quality modelling for the Project has been undertaken for European sites within 200m of the Affected Road Network (ARN). The model predicted that a change in nitrogen deposition (N deposition) within the northern part of Epping Forest SAC (within the north-western section of Epping Thicks (Site of Special Scientific Interest (SSSI) unit 105)) that would exceed 1% of the Lower Critical Load (LCL). Within this part of the SAC a single point in the model showed a predicted N deposition increase equivalent to 0.4kgN/ha/yr. This is equivalent to the threshold that could lead to the loss of one species in line with Figure 2.98 in DMRB LA 105 (Highways England, 2019).

D.1.3 In line with DMRB LA 105 (Highways England, 2019) and Natural England NEA001 internal guidance (Natural England, 2018), to determine if the change in N deposition would likely lead to the loss of one species, a detailed botanical site investigation was required to determine species composition and sensitivity to N deposition change within the 0.02ha where the threshold was reached.

D.1.4 A methodology was designed to sample the vegetation of the SAC in order to investigate the potential effects of current N deposition on the site and the presence of nitrogen-sensitive species of vascular plant and bryophyte (mosses and liverworts). The sample comprised a series of transects and plots, with parameters recorded from each plot including the species composition and abundance of vascular plants and bryophytes. A desk search for records of bryophytes was also made. Natural England was consulted on the methodology and its advice taken into consideration in the final design of the investigation. The full methodology is presented in Section D.2.

D.2 Methodology

Desk study

D.2.1 A desk study was undertaken to search for records of bryophytes within Epping Forest SAC and 200m of the ARN, available on the National Biodiversity

Network (NBN) Atlas. The 'search by polygon' feature was used to search for and download records within the Epping Thicks unit of Epping Forest SSSI (unit 105). Only those records available under the Creative Commons licence of the British Bryological Society were downloaded. There were no other sources of bryophyte records on the NBN for this area. The records were downloaded on 29 April 2020.

Field survey

D.2.2 The field survey methodology was designed to sample the vegetation of the SAC by recording vegetation composition and structure from a series of plots. The sample design and recording protocol are described below.

D.2.3 The field survey was undertaken on 7th, 9th and 18th May 2020. The survey was led by botanist David Morris MCIEEM, with assistance from arboriculturist Mark Watson.

Sample design

D.2.4 The sample was based on three 500m transects and plots spaced at 100m intervals along each transect. The transects and plots are shown on Figure A.1 in Annex D.1.

D.2.5 The transects were aligned along the gradients of modelled N deposition, with origins at the point in the north of the SAC where N deposition was modelled to exceed 0.4kgN/ha/yr. The transect lengths were designed to encompass the area where a change in N deposition could occur (within 200m of the ARN) and a further 200m area to provide a sample of the areas that were unlikely to be affected by N deposition from vehicle emissions.

D.2.6 Along each transect, 50m x 50m plots for sampling vegetation were spaced at 100m intervals. Plots along transects one and three were truncated at 400m and 300m, respectively, as plots at these locations would have been, respectively, over a wide track and outside the SAC.

D.2.7 Within the plots, vegetation was sampled using nested plots, with the 50m x 50m plot used to record the canopy and understorey layers and epiphytic bryophytes, and 15m x 15m plots to sample the field layer. Most of the plots had one nested 15m x 15m plot, located at the centre of the 50m x 50m plot. Three plots were nested within the 50m x 50m plot in the north of the SAC where N deposition was modelled to exceed 0.4kgN/ha/yr, in order to increase the representation in the sample of vegetation from this small area. Two 15m x 15m plots were also recorded from plot 2.3, as this area was found to comprise two distinct stands of vegetation. The total sample comprised thirteen 50m x 50m plots and sixteen 15m x 15m nested plots.

D.2.8 The use of nested plots to record woodland vegetation, with 50m x 50m plots used to sample canopy and understorey, follows the sampling method of the National Vegetation Classification (Rodwell, 2006). This dimension of plot was also considered appropriate to record bryophytes growing on trees (epiphytes). The dimensions of the 15m x 15m nested plots was chosen as this was the spatial resolution of the air quality modelling and is comparable to the dimensions used in the NVC for sampling the field and ground layers of woodland vegetation. The field and ground layers were also recorded from the 50m x 50m plots as the vegetation in the 15m x 15m nested plots was found during the field survey to be very species-poor and sparsely vegetated.

D.2.9 Before the field survey, the transects and plots were digitised in ArcGIS for Desktop and added to a map for use on an iPad in the field using the *Collector for ArcGIS* app. During the survey, the plots were located by using the GPS unit built into the iPad. As GPS performs poorly under tree cover, the plots were marked out with bamboo canes and a survey tape.

Recording protocol

D.2.10 All vascular plant and bryophytes species were recorded from the 50m x 50m plots. All vascular plant species in the field layer and bryophytes growing on mineral ground and trees bases (ground layer) were recorded from the 15m x 15m plots. Species were recorded by vegetation layer and microhabitat, using abundance scores appropriate to the plot size and layer / microhabitat. These are summarised in Table D.1.

D.2.11 The abundance scales used were: presence / absence; DAFOR; Domin; percentage cover and number of individuals. Presence / absence was used to record bryophytes growing on tree boles and branches and deadwood within the 50m x 50m plots. The DAFOR scale (dominant, abundant, frequent, occasional, rare) was used to score the abundance of species in the field and ground layers of 50m x 50m plots. The Domin scale (Table D.2) and was used to record the field and ground layers within 15m x 15m nested plots.

D.2.12 Percentage cover was used to quantify the abundance and shade cast by species in the canopy and understorey layers. The structure of the canopy and understorey was further recorded by counting the number of individuals of each species in the life stage categories recommended in British Standard 5837, i.e. young, semi-mature, early-mature, mature and over-mature. Features indicative of veteran trees were also noted.

D.2.13 Further parameters recorded, describing vegetation structure, are summarised in Table D.3. For each 50m x 50m plot and 15m x 15m nested plot, an appropriate habitat type using the UK Habitat Classification (UK Habitat Classification Working Group, 2018) and vegetation type using the NVC were also recorded.

D.2.14 Notes about each plot were recorded, including qualitative information about e.g. vegetation structure and patterns, management and tree health. To provide a visual record of vegetation structure and other features, representative photographs were also collected for each plot.

Table D.1 Vegetation species composition and abundance recorded from layers and microhabitats within plots

Layer / microhabitat	Plants recorded	Plot size	Abundance scale
Canopy and understorey	All saplings and older stages of growth of woody vascular plant species	50m x 50m	Percentage cover
	Ages and classes of woody vascular plant species	50m x 50m	Number of individuals
Field layer	Herbaceous vascular plants, brambles (*Rubus fruticosus* agg.) and seedlings of woody species	50m x 50m	DAFOR
		15m x 15m	Domin
Terrestrial	Bryophytes growing on soil and other non-organic substrates	50m x 50m	DAFOR
		15m x 15m	Domin
Deadwood	Bryophytes growing on non-living wood, standing or on the ground	50m x 50m	Presence / absence
Epiphytes – Tree bases	Bryophytes growing on tree roots and the lower 0.5m of tree boles	50m x 50m	DAFOR
		15m x 15m	Domin
Epiphytes – Tree boles	Bryophytes growing on the boles of trees, above the bases	50m x 50m	Presence / absence
Epiphytes – Lower branches	Bryophytes growing on tree branches accessible from the ground	50m x 50m	Presence / absence

Table D.2 Domin scale of cover-abundance

Domin score	Cover / abundance	Domin score	Cover / abundance
10	91-100%	5	11-25%
9	76-90%	4	4-10%
8	51-75%	3	<4% many individuals
7	34-50%	2	<4% several individuals
6	26-33%	1	<4% few individuals

Table D.3 Vegetation structure parameters recorded

Parameter	Plot size	Description
Canopy maximum height	50m x 50m	Approximate average height in metres from the ground to the top of the tree canopy
Canopy minimum height	50m x 50m	Approximate average height in metres from the ground to the lowest tier of the canopy and understorey layers
Bare ground	15m x 15m	Estimate of the percentage of bare ground
Litter	15m x 15m	Estimate of the percentage cover by leaf litter
Canopy cover	15m x 15m	Estimate of the percentage of the ground shaded by the canopy and understorey layers

Analysis

D.2.15 Ellenberg indicator values for fertility (Ellenberg N) published for the British vascular plant and bryophyte flora (Hill *et al.*, 2004; Hill *et al.*, 2008) were used to analyse the nitrogen sensitivity of the species recorded and to calculate statistics for plots.

Nomenclature

D.2.16 Throughout this report, nomenclature for vascular plants follows Stace (2010) and for bryophytes follows Hill *et al.* (2008).

Limitations

D.2.17 There were no limitations.

D.3 Results

Desk study

D.3.1 The results of the desk study are provided in Table D.4. Ten records of bryophytes were returned for the Epping Thicks unit of the SSSI, comprising four moss and five liverwort species. None of the species recorded has any legal protection or conservation status.

D.3.2 Six of the records were localised only to the 1km square containing Epping Thicks. The other four records were localised to 100m, recorded from the pond near the north-western edge of the unit (TL442007).

D.3.3 There were three records made since 2000, two dated 2005 and one 2009. The majority were much older.

Table D.4 Bryophyte records provided by British Bryological Society, accessed through NBN Atlas website. Downloaded 29/04/2020

Scientific name	Group	Date	Grid reference	Location remark	Occurrence remark
Calliergon cordifolium	Moss	07/2009	TL442007	Road end of pond under grey willow	-
Calliergonella cuspidata	Moss	07/1971	TL4400	-	-
Dicranum tauricum	Moss	07/1980	TL442007	On fallen oak and hornbeam by pond	-
Pseudephemerum nitidum	Moss	07/1991	TL4400	-	-
Cephaloziella hampeana	Liverwort	31/05/1968	TL4400	Deep ditch open area of golf course, with *Scapania nemorea*	Abundant, still present 2005
Pellia epiphylla	Liverwort	31/05/1968	TL4400	Deep ditch across golf course	-
Pellia epiphylla	Liverwort	07/1971	TL4400	-	-
Riccardia chamedryfolia	Liverwort	07/2005	TL442007	Under grey willow	-
Riccia fluitans	Liverwort	07/1980	TL442007	On mud and overhanging banks	-
Scapania nemorea	Liverwort	1968	TL4400	Stream bank	-

Field survey

D.3.4 The results of the field survey are provided in Annex D.2 of this report. The taxa recorded and habitat and vegetation patterns identified are described below.

Taxa recorded

D.3.5 A total of 81 taxa were recorded from the thirteen 50m x 50m plots, comprising 43 vascular plants, 32 mosses and six liverworts. The taxa recorded and frequency of occurrence in the 50m x 50m plots and 15m x 15m plots are listed in Table D.5 and Table D.6, respectively.

D.3.6 Three of the recorded vascular plants (*Betula* sp., *Epilobium* sp. and *Malus* sp.) and one liverwort (*Pellia* sp.) could only be identified to genus. Two moss taxa were recorded in the general sense (*Hypnum cupressiforme s.l.* and *Ulota crispa s.l.*). All other taxa recorded were at the rank of species.

D.3.7 None of the species recorded has any legal protection or conservation status. Butcher’s-broom (*Ruscus aculeatus*) was recorded from plot 2.2 and is listed on Annex V of the Habitats Directive, i.e. taking this species from the wild is restricted by law.

D.3.8 Five of the vascular plant species recorded are listed as indicators of ancient woodland in south-east England (Rose, 1999): the trees field maple (*Acer campestre*) and hornbeam (*Carpinus betulus*), and the herbs butcher’s-broom, remote sedge (*Carex remota*) and wood speedwell (*Veronica montana*). Except for hornbeam, these species were infrequent and of low abundance across the plots.

Habitats and vegetation

D.3.9 The habitat and vegetation types and other attributes recorded and the species diversity of the 50m x 50m and 15m x 15m plots are listed in Table D.5 and Table D.6, respectively. The raw results and photographs are provided in tables Table D.2.3 to Table D.2.17.

D.3.10 All the plots supported mature broadleaved semi-natural woodland, with two woodland habitat and vegetation types recorded. The boundary between the two types was very marked, following the route of a footpath, with mature mixed broadleaved woodland in the interior of the site to the south and younger pedunculate oak woodland lying to the north in a narrow zone around the edge of the SAC.

D.3.11 Most plots comprised the UK Habitat Classification type ‘w1c5 Beech forests on acid soils (H9120)’, an Annex I habitat and qualifying feature of Epping Forest SAC. This habitat comprised vegetation referable to the NVC plant community W15 *Fagus sylvatica-Deschampsia flexuosa* woodland. The samples of this vegetation type comprised mature high forest with a mixed tree canopy of beech (*Fagus sylvatica*), hornbeam (*Carpinus betulus*) and pedunculate oak (*Quercus robur*), with semi-mature to mature ash (*Fraxinus excelsior*) and birch

(*Betula* spp.) in former canopy gaps. Most of the trees were maidens, with large mature and over-mature beech, hornbeam and pedunculate oak trees. Old hornbeam pollards were found in some of the more southerly plots. The understorey in all the plots comprised a dense layer of holly (*Ilex aquifolium*) in various life stages and collapsed hornbeams, which together with the canopy cast a dense shade.

D.3.12 The densely-shaded ground was also covered in a deep and extensive litter layer, so that the field layer and bryophyte assemblages were extremely species-poor and sparsely vegetated (see photographs), in most plots consisting entirely of recently germinated seedlings of holly and hornbeam. The vegetation was a little richer in open areas, as in glades created by windthrow, along seasonal watercourses and footpaths, with species such as common nettle (*Urtica dioica*) and bracken (*Pteridium aquilinum*) and other ferns.

D.3.13 Bryophytes of this habitat mostly comprised small patches of the shade-tolerant mosses *Dicranella heteromalla, Hypnum cupressiforme s.l., Kindbergia praelonga, Mnium hornum* and *Pseudotaxiphyllum elegans*. These were predominantly found on tree bases and earth kept clear of leaves on banks and uprooted trees, with *Hypnum cupressiforme s.l.* and *Kindbergia praelonga* extending up the lower parts of tree boles. Richer epiphytic bryophyte assemblages were associated with well-illuminated tree boles in glades, and with ash trees. Typical epiphytic species were recorded, such as the mosses *Orthotrichum affine* and *Ulota* species, and the liverworts *Metzgeria furcata* and *Frullania dilatata*. The deadwood resource in the plots was generally too shaded and desiccated to support deadwood specialists, but *Aulacomnium androgynum* was recorded from two plots.

D.3.14 The second woodland habitat type, found in a narrow zone along the northern edge of the SAC, comprised the UK Habitat Classification type ‘w1f7 Other Lowland mixed deciduous woodland’ and the NVC plant community W10 *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland. The samples of this vegetation were dominated by early-mature pedunculate oak trees (approximately 60 years old) with frequent birch, with a very open understorey of hawthorn (*Crataegus monogyna*) and young beech and hornbeam. The canopy was light and many of the oaks appeared diseased, with reduced crowns and poor leaf expansion, so that the ground was well-illuminated. Consequently, the field layer of this vegetation was much lusher and more speciose than the deeply shaded interior of the site, but mostly comprised bramble with clonal stands of bracken. There were stands of common nettle and garlic mustard (*Alliaria petiolata*) along the boundary with High Road to the north.

D.3.15 Bryophytes in this habitat were very limited, with *Brachythecium rutabulum*, *Fissidens taxifolius, Kinbergia praelonga* and *Mnium hornum* growing on exposed earth, and patches of *Hypnum cupressiforme s.l.* on trees.

Table D.5 Summary of results for 50m x 50m plots

	Plot												
	1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6	3.2	3.3	3.4
UKHab	w1f7, w1c5	w1c5	w1c5	w1c5	w1c5	w1f7	w1f7, w1c5	w1f7, w1c5	w1c5	w1c5	w1c5	w1c5	w1c5
NVC	W10, W15	W15	W15	W15	W15	W10	W10, W15	W10, W15	W15	W15	W15	W15	W15
Maximum canopy height (m)	25	30	27	24	26	22	23	24	23	26	25	24	25
Minimum canopy height (m)	6	10	9	6	5	11	8	9	6	15	10	6	11
No. vascular plant taxa	29	7	9	9	6	17	13	11	20	10	8	5	8
No. moss taxa	16	18	18	10	6	9	7	8	15	7	8	4	15
No. liverwort taxa	1	3	3	3	0	2	1	3	2	1	0	1	2
Mean Ellenberg N total	5.3	4.4	4.6	4.8	4.7	4.9	5.0	4.7	5.0	4.9	4.9	4.5	4.4
Mean Ellenberg N vascular plants	6.0	5.0	5.2	5.1	5.0	5.4	5.6	5.2	5.9	5.1	5.0	5.2	5.1
Mean Ellenberg N bryophytes	4.4	4.2	4.4	4.5	4.3	4.1	4.1	4.3	3.9	4.7	4.8	3.8	4.1
Median Ellenberg N total	5.0	4.0	4.5	5.0	4.5	5.0	5.0	4.5	5.0	5.0	5.0	4.5	4.0
Median Ellenberg N vascular plants	6.0	5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Median Ellenberg N bryophytes	4.0	4.0	4.0	4.5	4.0	4.0	4.0	4.0	4.0	5.0	4.5	4.0	4.0
Min Ellenberg N	3	3	3	3	3	3	3	3	3	4	3	3	3
Max Ellenberg N	8	6	8	8	6	8	8	8	8	7	6	6	6

Table D.6 Summary of results for 15m x 15m plots

	Plot															
	1.1	**1.2**	**1.3**	**1.4**	**1.5**	**2.1**	**2.2**	**2.3**	**2.3a**	**2.4**	**2.5**	**2.6**	**3.1**	**3.2**	**3.3**	**3.4**
UKHab	w1f7	w1c5	w1c5	w1c5	w1c5	w1c5	w1f7	w1c5	w1f7	w1c5	w1c5	w1c5	w1f7	w1c5	w1c5	w1c5
NVC	W10	W15	W15	W15	W15	W15	W10	W15	W10	W15	W15	W15	W10	W15	W15	W15
Bare ground (%)	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	30
Litter (%)	50	98	95	95	100	95	95	95	90	95	100	85	95	90	95	60
Canopy cover (%)	70	100	85	80	100	80	60	95	80	90	90	75	60	98	95	95
No. vascular plant taxa	18	4	2	2	1	4	6	0	7	1	1	1	6	1	1	4
No. moss taxa	5	5	5	1	4	3	2	4	1	4	3	2	2	0	3	5
No. liverwort taxa	0	3	3	3	0	0	2	0	1	3	2	1	2	0	1	2
Mean Ellenberg N total	6.0	4.4	4.3	4.2	4.4	5.3	5.3	4.3	5.4	4.5	4.5	4.7	5.3	6.0	4.4	4.5
Mean Ellenberg N vascular plants	6.3	5.7	5.5	4.5	6.0	6.3	6.2	NA	5.7	6.0	6.0	6.0	6.2	6.0	6.0	5.5
Mean Ellenberg N bryophytes	5.2	3.9	4.0	4.0	4.0	4.0	4.0	4.3	4.5	4.3	4.2	4.0	4.0	NA	4.0	4.0
Median Ellenberg N total	6.0	4.0	4.0	4.0	4.0	5.0	6.0	4.0	6.0	4.5	4.5	4.0	6.0	6.0	4.0	5.0
Median Ellenberg N vascular plants	6.0	6.0	5.5	4.5	6.0	6.0	6.0	NA	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5
Median Ellenberg N bryophytes	5.0	4.0	4.0	4.0	4.0	4.0	3.5	4.0	4.5	4.0	4.0	4.0	3.5	NA	4.0	4.0
Min Ellenberg N	4	3	3	3	3	3	3	3	3	3	3	4	3	6	3	3
Max Ellenberg N	8	6	6	6	6	8	8	6	8	6	6	6	8	6	6	6

D.4 Discussion

D.4.1 The field survey results indicated that the vegetation across most of the area sampled is very uniform in species composition and structure, and supports a species-poor vascular plant and bryophyte assemblage. Across most of the area sampled, including habitat identified as qualifying habitat of the Epping Forest SAC, the field and ground layers were very sparsely vegetated due to the dense leaf litter and shade cast by the canopy and holly-dominated understorey.

D.4.2 The main vegetation pattern identified was associated with the zone of younger oak woodland along the northern edge of the SAC. The lighter canopy in this area supported a much more species-rich field layer than the deeply shaded interior of the site, a pattern seen to a lesser extent in canopy gaps in the latter.

D.4.3 The outer stand of oak woodland covers the area where air quality modelling identified a potential for exceedance of N deposition thresholds. The survey results indicate that the outer stand of oak woodland is much younger than most of the site, and this is supported by aerial photography that shows this area clear of trees in 1952 (Britain from Above, 2020).

D.4.4 The gradient in N deposition south from the direction of the M25 that might be expected to produce vegetation change was not apparent, with average Ellenberg N values similar between most of the plots (Table D.5 and Table D.6). Although species such as common nettle indicative of more fertile conditions were concentrated in presence and abundance along the northern edge of the site, the gradient in shade between this area and the interior of the site was so marked that their abundance is most likely to be primarily a result of illumination of the ground layer due to the age and structure of the woodland stand in this area. Successional stage may also be a factor, with the nutrient cycling and other soil processes associated with old stands of beech (Rodwell, 1991) not developed. If N deposition has affected the vegetation of the SAC, then the effect did not appear to extend far into the site, beyond the zone of younger oak woodland.

D.4.5 The results did not identify any vascular plant or bryophyte species that might be sensitive to N deposition. The lowest Ellenberg N value of the vascular plant taxa recorded was 3, indicative of more-or-less infertile sites (Hill, et al., 2004), but only bracken had this score. Species of intermediate fertility, scoring 4 or 5, included most of the tree species recorded, and a small number of field layer species such as broad buckler-fern (*Dryopteris dilatata*), butcher's-broom and common dog-violet (*Viola riviniana*).

D.4.6 The lowest Ellenberg N value of the bryophyte taxa recorded was 3, indicative of moderately infertile sites (Hill, et al., 2007). This included some of the calcifugous ground-layer species recorded, such as *Dicranella heteromalla* and *Polytrichastrum formosum*, and some epiphytic species such as the moss

Dicranum tauricum and the liverwort *Radula complanata*. All the epiphytic bryophytes recorded are increasing nationally as a result of reductions in acid deposition (Blockeel, et al., 2014) and are common throughout much of south-east England.

D.4.7 The desk study identified records of nine species of bryophyte from the Epping Thicks unit of the SSSI. Two of the species recorded have Ellenberg N values of 2, indicative of infertile sites (Blockeel, et al., 2014), the liverworts *Cephaloziella hampeana* and *Scapania nemorea*. The records of both species are localised only to the 1km square TL4400 and are from 1968. If these two species were still present in the SSSI unit, then based on the results of the field survey they would be unlikely to occur in the area where air quality modelling identified a potential effect as this area is likely to be too dry to support these species.

D.5 Conclusion

D.5.1 This report has presented the results of desk study and field survey to investigate the potential effects of N deposition on Epping Forest SAC and the presence of nitrogen-sensitive vascular plant and bryophyte species, within 200m of the ARN.

D.5.2 The results of the field survey indicated that the vegetation across most of the area surveyed is very uniform in species composition and structure and supports a species-poor vascular plant and bryophyte assemblage. The main vegetation pattern identified was associated with the zone of younger oak woodland along the northern edge of the SAC, where air quality modelling identified a potential for exceedance of N deposition thresholds.

D.5.3 The desk study and field survey did not identify any species likely to be sensitive to N deposition, present in the area where air quality modelling identified a potential for exceedance of N deposition thresholds.

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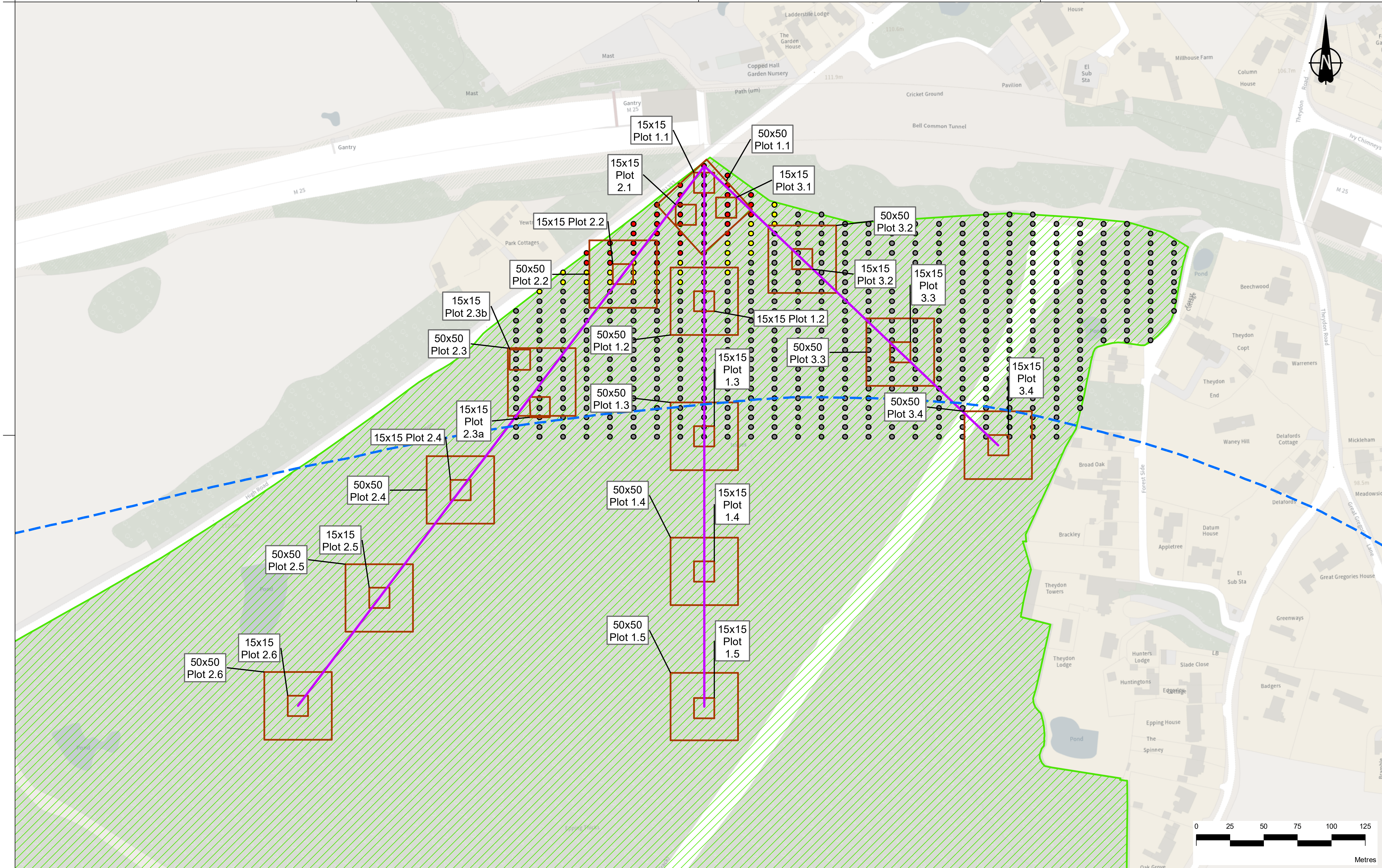
Annexes

Annex D.1 Figures

Figure A.1 Botanical survey transects and plots



Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P03	S2	22/07/2022	For Information	IP	IP	RC
P02	S2	27/07/2020	For Information	LK	IP	RC
P01	S2	21/05/2020	For Information	VG	DM	RC

LEGEND

- Epping Forest Special Area of Conservation (SAC)
- Area within 200m of the ARN - Operation (2030)

Predicted change in N deposition between Do Something (DS) and Do Minimum (DM)

- > 0.4 kgN/ha/yr
- >0.1 kgN/ha/yr
- NOx change <0.3 ug/m

Detailed botanical survey

- Transect
- Plot

Client: highways england

Project: LOWER THAMES CROSSING

5th Floor Beaufort House
15 St Botolph Street
London EC3A 7DT

Status: For Information

Original Size: A3 | Revision: P03 | Scale: 1:2,500

Drawing title: Location of the transects and quadrats inrelation to the predicted changes in nitrogen depostion

Drawing number: FIGURE 1

MXD Location: G:\GIS\SIAA PDFs\SIAA Appendix C - Figure 1 - Botanical Survey Transects and Plots.mxd

Annex D.2 Field Survey Results

Table D.2.1 Summary of vascular plant and bryophyte taxa recorded from 50m x 50m plots and Ellenberg indicator values for fertility (Ellenberg N). The Ellenberg N value for *Hypnum cupressiforme s.l.* used that for *H. andoi*.

Scientific name	English name	Ancient woodland indicator	Ellenberg N	Plot													Frequency
				1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6	3.2	3.3	3.4	
Vascular plants																	
Acer campestre	Field maple	x	6	-	-	-	-	-	-	-	-	x	-	-	-	-	8%
Acer pseudoplatanus	Sycamore	-	6	-	-	-	-	-	x	-	-	-	-	-	-	-	8%
Alliaria petiolata	Garlic mustard	-	8	x	-	-	-	-	x	x	-	-	-	-	-	-	23%
Athyrium filix-femina	Lady-fern	-	6	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Betula pendula	Silver birch	-	4	x	x	x	-	x	x	-	x	-	x	x	-	-	62%
Betula pubescens	Downy birch	-	4	x	-	-	-	-	x	x	x	-	x	x	-	x	54%
Betula sp.	A birch	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	8%
Cardamine flexuosa	Wavy bitter-cress	-	6	-	-	-	-	-	-	-	-	x	-	-	-	-	8%
Carex remota	Remote sedge	x	6	x	-	-	x	-	-	-	-	x	x	-	-	x	38%
Carpinus betulus	Hornbeam	x	6	x	x	x	x	x	x	x	x	x	x	x	x	x	100%
Circaea lutetiana	Enchanter's-nightshade	-	6	x	-	-	-	-	-	x	x	x	-	-	-	-	31%
Crataegus monogyna	Hawthorn	-	6	x	-	x	-	x	x	x	x	x	-	x	x	-	69%
Dryopteris dilatata	Broad buckler-fern	-	5	x	-	-	x	-	x	-	-	-	-	-	-	x	31%
Dryopteris filix-mas	Male-fern	-	-	x	-	-	-	-	-	-	-	x	-	-	-	-	15%

Scientific name	English name	Ancient woodland indicator	Ellenberg N	Plot													Frequency
				1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6	3.2	3.3	3.4	
Epilobium sp.	A willowherb	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Fagus sylvatica	Beech	-	5	-	x	x	x	x	-	x	x	x	x	x	x	x	85%
Fraxinus excelsior	Ash	-	6	x	x	x	-	-	x	x	-	x	x	x	-	-	62%
Galium aparine	Cleavers	-	8	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Galium palustre	Marsh-bedstraw	-	4	-	-	-	-	-	-	-	-	-	x	-	-	-	8%
Geum urbanum	Wood avens	-	7	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Glechoma hederacea	Ground-ivy	-	7	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Ilex aquifolium	Holly	-	5	x	x	x	x	x	x	x	x	x	x	x	x	x	100%
Juncus effusus	Soft-rush	-	4	x	-	-	x	-	-	-	-	-	-	-	-	-	15%
Lonicera periclymenum	Honeysuckle	-	5	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Malus sp.	An apple	-	-	x	-	-	-	-	x	x	-	-	-	-	-	-	23%
Persicaria hydropiper	Water-pepper	-	6	-	-	-	-	-	-	-	-	x	-	-	-	-	8%
Poa annua	Annual meadow-grass	-	7	-	-	-	-	-	-	-	-	x	-	-	-	-	8%
Poa trivialis	Rough meadow-grass	-	6	x	-	-	-	-	x	-	-	-	-	-	-	-	15%
Pteridium aquilinum	Bracken	-	3	-	-	x	x	-	x	x	x	-	-	-	-	-	38%
Quercus robur	Pedunculate oak	-	4	x	x	x	x	x	x	x	x	x	x	x	x	x	100%
Ranunculus repens	Creeping buttercup	-	7	-	-	-	-	-	-	-	-	x	-	-	-	-	8%
Ribes uva-crispa	Gooseberry	-	6	-	-	-	-	-	x	-	-	-	-	-	-	-	8%
Rubus fruticosus agg.	Bramble	-	6	x	-	-	-	-	x	x	x	x	-	-	-	-	38%
Rumex sanguineus	Wood dock	-	7	x	-	-	-	-	-	-	-	-	-	-	-	-	8%

Scientific name	English name	Ancient woodland indicator	Ellenberg N	Plot 1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6	3.2	3.3	3.4	Frequency
Ruscus aculeatus	Butcher's-broom	x	4	-	-	-	-	-	x	-	-	-	-	-	-	-	8%
Salix caprea	Goat willow	-	7	x	-	-	-	-	-	-	-	x	x	-	-	-	23%
Sambucus nigra	Elder	-	7	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Senecio jacobaea	Common ragwort	-	4	-	-	-	-	-	-	-	-	x	-	-	-	-	8%
Silene dioica	Red campion	-	7	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Urtica dioica	Common nettle	-	8	x	-	x	x	-	x	x	x	x	-	-	-	-	54%
Veronica montana	Wood speedwell	x	6	x	-	-	-	-	-	-	-	x	-	-	-	x	23%
Veronica serpyllifolia	Thyme-leaved speedwell	-	5	-	-	-	-	-	-	-	-	x	-	-	-	-	8%
Viola riviniana	Common dog-violet	-	4	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Mosses																	
Amblystegium serpens	-	-	6	-	-	x	-	-	-	-	-	-	-	-	-	x	15%
Atrichum undulatum	-	-	5	x	x	x	x	-	-	-	-	-	x	-	-	x	46%
Aulacomnium androgynum	-	-	4	-	x	x	-	-	-	-	-	-	-	-	-	-	15%
Brachythecium rutabulum	-	-	6	x	x	x	x	x	x	x	x	x	x	x	-	x	92%
Brachythecium velutinum	-	-	5	-	-	x	-	-	-	-	-	-	-	-	-	-	8%
Bryum capillare	-	-	4	x	x	x	-	-	-	-	-	-	-	x	-	x	38%
Cryphaea heteromalla	-	-	5	x	x	x	-	-	x	-	-	-	-	-	-	x	38%
Dicranella heteromalla	-	-	3	x	x	x	x	x	x	x	x	x	-	x	-	x	85%
Dicranoweisia cirrata	-	-	4	-	-	x	-	-	-	-	-	-	-	-	-	-	8%
Dicranum tauricum	-	-	3	-	-	-	-	-	-	-	-	x	-	-	-	-	8%

Scientific name	English name	Ancient woodland indicator	Ellenberg N	Plot													Frequency
				1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6	3.2	3.3	3.4	
Fissidens bryoides	-	-	5	x	-	-	-	-	-	-	-	-	-	-	-	-	8%
Fissidens taxifolius	-	-	5	x	-	-	-	-	-	-	-	-	x	-	-	-	15%
Hypnum cupressiforme	-	-	4	x	x	x	x	x	-	x	x	x	x	x	x	-	85%
Hypnum cupressiforme s.l.	-	-	3	x	-	-	-	-	x	-	x	x	-	-	-	x	38%
Hypnum resupinatum	-	-	4	-	x	x	-	-	-	x	-	x	-	-	-	x	38%
Isothecium alopecuroides	-	-	5	-	-	-	x	-	-	-	-	-	-	-	-	-	8%
Isothecium myosuroides	-	-	3	-	x	x	-	-	x	-	-	x	-	-	-	x	38%
Kindbergia praelonga	-	-	5	x	x	x	x	x	x	-	x	x	x	x	x	x	92%
Mnium hornum	-	-	4	-	x	x	x	x	x	x	x	x	x	x	-	x	85%
Orthotrichum affine	-	-	5	x	x	x	x	-	x	x	-	x	-	-	-	-	54%
Orthotrichum lyellii	-	-	4	x	x	-	-	-	-	-	-	-	-	-	-	-	15%
Orthotrichum pulchellum	-	-	4	-	x	-	-	-	x	-	-	x	-	-	-	-	23%
Oxyrrhynchium hians	-	-	6	-	-	-	-	-	-	-	1	-	-	-	-	-	8%
Polytrichastrum formosum	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-	8%
Pseudotaxiphyllum elegans	-	-	4	-	-	x	x	x	-	x	x	x	x	-	x	x	69%
Radula complanata	-	-	3	-	x	x	-	-	-	-	-	-	-	-	-	x	23%
Rhynchostegium confertum	-	-	6	x	x	x	x	-	-	-	-	-	-	x	-	-	38%
Thamnobryum alopecurum	-	-	6	-	-	-	-	-	-	-	-	-	-	x	-	-	8%
Ulota bruchii	-	-	4	-	-	-	-	-	-	-	-	x	-	-	-	-	8%
Ulota crispa s.l.	-	-	3	x	-	-	-	-	-	-	-	x	-	-	x	x	31%

Scientific name	English name	Ancient woodland indicator	Ellenberg N	Plot													Frequency
				1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6	3.2	3.3	3.4	
Ulota phyllantha	-	-	4	x	x	-	-	-	-	-	-	x	-	-	-	-	23%
Zygodon conoideus	-	-	5	-	x	-	-	-	-	-	-	-	-	-	-	x	15%
Liverworts																	
Calypogeia arguta	-	-	4	-	-	x	x	-	-	-	-	-	-	-	-	-	15%
Cololejeunea minutissima	-	-	4	-	x	-	-	-	-	-	-	-	-	-	-	x	15%
Frullania dilatata	-	-	4	x	x	-	-	-	x	-	x	-	-	-	-	-	31%
Lophocolea heterophylla	-	-	5	-	-	x	-	-	-	-	x	x	-	-	-	-	23%
Metzgeria furcata	-	-	3	-	x	x	x	-	x	x	x	x	-	-	x	x	69%
Pellia sp.	-	-	-	-	-	-	x	-	-	-	-	-	x	-	-	-	15%

Table D.2.2 Summary of vascular plant and bryophyte taxa recorded from 15m x 15m plots and Ellenberg indicator values for fertility (Ellenberg N). The Ellenberg N value for *Hypnum cupressiforme s.l.* was as assigned to *H. andoi*.

Scientific name	English name	Ancient woodland indicator	Ellenberg N	Plot																Frequency
				1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3a	2.3b	2.4	2.5	2.6	3.1	3.2	3.3	3.4	
Vascular plants																				
Alliaria petiolata	Garlic mustard	-	8	x	-	-	-	-	-	x	-	-	-	-	-	x	-	-	-	23 %
Betula sp.	A birch	-		-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Carex remota	Remote sedge	x	6	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Carpinus betulus	Hornbeam	x	6	x	x	x	x	x	-	-	-	x	x	x	x	-	x	x	x	85 %
Circaea lutetiana	Enchanter's -nightshade	-	6	x	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	8%
Crataegus monogyna	Hawthorn	-	6	-	-	-	-	-	-	x	-	-	-	-	-	x	-	-	-	15 %
Dryopteris dilatata	Broad buckler-fern	-	5	x	-	-	-	-	-	x	-	-	-	-	-	x	-	-	x	31 %
Dryopteris filix-mas	Male-fern	-		x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Epilobium sp.	A willowherb	-		x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Fraxinus excelsior	Ash	-	6	x	x	-	-	-	x	x	-	x	-	-	-	x	-	-	-	38 %
Galium aparine	Cleavers	-	8	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%

Scientific name	English name	Ancient woodland indicator	Ellenberg N	Plot																Frequency
				1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3a	2.3b	2.4	2.5	2.6	3.1	3.2	3.3	3.4	
Geum urbanum	Wood avens	-	7	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Glechoma hederacea	Ground-ivy	-	7	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Ilex aquifolium	Holly	-	5	-	x	x	-	-	x	-	-	x	-	-	-	-	-	-	x	31 %
Juncus effusus	Soft-rush	-	4	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Poa trivialis	Rough meadow-grass	-	6	x	-	-	-	-	-	x	-	-	-	-	-	x	-	-	-	23 %
Pteridium aquilinum	Bracken	-	3	-	-	-	x	-	-	-	-	x	-	-	-	-	-	-	-	8%
Rubus fruticosus agg.	Bramble	-	6	x	-	-	-	-	x	x	-	x	-	-	-	x	-	-	-	31 %
Rumex sanguineus	Wood dock	-	7	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Silene dioica	Red campion	-	7	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Urtica dioica	Common nettle	-	8	x	-	-	-	-	x	-	-	x	-	-	-	-	-	-	-	15 %
Veronica montana	Wood speedwell	x	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	8%
Viola riviniana	Common dog-violet	-	4	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%

Scientific name	English name	Ancient woodland indicator	Ellenberg N	Plot																Frequency
				1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3a	2.3b	2.4	2.5	2.6	3.1	3.2	3.3	3.4	
Mosses																				
Atrichum undulatum	-	-	5	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	15%
Aulacomnium androgynum	-	-	4	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Brachythecium rutabulum	-	-	6	x	-	-	-	-	-	x	x	x	-	-	-	x	-	-	-	23%
Dicranella heteromalla	-	-	3	-	x	x	-	x	x	-	x	-	x	-	-	-	-	-	x	46%
Fissidens bryoides	-	-	5	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Fissidens taxifolius	-	-	5	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8%
Hypnum cupressiforme	-	-	4	-	x	x	-	x	x	-	x	-	x	x	-	-	-	x	-	54%
Hypnum cupressiforme s.l.	-	-	3	-	-	-	-	-	-	x	-	-	-	-	-	x	-	-	-	15%
Kindbergia praelonga	-	-	5	x	x	x	x	x	x	-	-	-	x	x	-	-	-	x	x	77%
Mnium hornum	-	-	4	-	x	x	-	x	-	-	-	-	-	-	x	-	-	-	x	38%
Oxyrrhynchium hians	-	-	6	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	8%
Pseudotaxiphyllum elegans	-	-	4	-	-	x	-	-	-	-	x	-	-	x	x	-	-	x	x	38%

Table D.2.3 Field survey results for plot 1.1

Plot	1.1	**Date**	07/05/2020
50m x 50m plot			
Note	Plot encompassing edge of the SAC, across footpath. The plot spans a younger (50-100 years), likely secondary, stand of oak wood along the edge of the site, north of the footpath (UKHab w1f7, NVC W10), and more mature mixed woodland of beech, hornbeam and oak to the south (UKHab w1c5, NVC W15). The understorey of the former has an open vegetation structure, with no shrub layer, short ground vegetation and eutrophic vegetation along the very edge adjacent to High Road. Woodland to the south of the footpath with a very dense understorey dominated by holly, casting heavy shade, and very little ground vegetation. Bryophytes confined to exposed soil on banks and other areas clear of leaves. Epiphytes very poor within northern zone of vegetation, in area to south those within height above ground accessible to survey very limited due to shade of hollies, those recorded mostly on limbs fallen from the canopy. The over-mature oak and ash trees have some veteran features with crown cavities, major deadwood and basal cavities.		
UKHab	w1f7, w1c5	**NVC**	W10, W15
Canopy height maximum (m)	25	**Canopy height minimum (m)**	6
Photos			
	Mature ash tree with veteran features	Gradient of shade across footpath, with open understorey in foreground (north) and holly-dominated understorey in background (south)	

Plot	1.1	**Date**	07/05/2020
15m x 15m plot			
Note	Plot located to north of footpath, in oak-dominated woodland. Avoided disturbed path edge. Ground dominated by litter, with bryophytes present on low bank.		
UKHab	W1f7	**NVC**	W10

Bare ground %	0	**Litter %**	50	**Canopy cover %**	70

Photos

Vegetation along road edge, with abundant bramble and commonnettle

Open field layer with patches of grass and brambles, and litter-covered areas

Canopy layer (50m x 50m plot)

Scientific name	Cover (%)	Life stage / number of individuals					
		Young	Semi-mature	Early-mature	Mature	Over-mature	Veteran
Betula pendula	40	2	1	5	2	-	-
Betula pubescens	20	-	-	1	-	-	-
Carpinus betulus	70	-	-	-	-	-	-

Plot	1.1			**Date**	07/05/2020		
Crataegus monogyna	30	2	2	2	-	-	-
Fraxinus excelsior	40	-	-	-	-	1	-
Ilex aquifolium	80	15	1	8	2	-	-
Malus sp.	20	1	-	1	-	-	-
Quercus robur	60	-	2	8	2	1	-
Salix caprea	10	1	-	-	-	-	-
Sambucus nigra	5	-	-	1	-	-	-

Field layer vascular plants				
Scientific name	**15m x 15m**		**50m x 50m**	**Note**
	Domin	**DAFOR**	**DAFOR**	
Alliaria petiolata	1	R	R	
Athyrium filix-femina	-	-	R	
Carex remota	1	R	R	
Carpinus betulus	2	R	R	Seedlings
Circaea lutetiana	1	F	R	
Dryopteris dilatata	1	R	R	
Dryopteris filix-mas	1	O	R	
Epilobium sp.	1	R	R	
Fraxinus excelsior	2	R	R	Seedlings
Galium aparine	1	R	R	
Geum urbanum	2	O	R	
Glechoma hederacea	4	O	R	
Juncus effusus	1	R	R	
Lonicera periclymenum	-	-	R	

Plot	1.1	Date	07/05/2020	
Poa trivialis	4	A	LA	
Rubus fruticosus agg.	5	F	LF	
Rumex sanguineus	2	R	R	
Silene dioica	1	R	R	
Urtica dioica	5	F	LA	
Veronica montana	-	-	R	
Viola riviniana	1	R	R	

Bryophytes

Scientific name	Epiphytic				Deadwood		Terrestrial		Note
	Base		Bole	Lower branches					
	15m	50m	50m	50m	15m	50m	15m	50m	
Atrichum undulatum	-	-	-	-	-	-	1	R	-
Brachythecium rutabulum	-	-	-	-	-	-	1	R	-
Bryum capillare	-	-	-	-	x	-	-	-	On dead fallen oak limbs
Cryphaea heteromalla	-	-	-	-	x	-	-	-	On dead fallen oak limbs
Dicranella heteromalla	-	-	-	-	-	-	-	R	-
Fissidens bryoides	-	-	-	-	-	-	1	R	-
Fissidens taxifolius	-	-	-	-	-	-	1	R	-
Frullania dilatata	-	-	-	-	x	-	-	-	On dead fallen oak limbs
Hypnum cupressiforme	-	-	-	-	-	-	-	-	-

Plot	1.1				**Date**			07/05/2020	
Hypnum cupressiforme s.l.	-	x	-	-	-	x	-	R	Slender plants, *H. cf. andoi*
Kindbergia praelonga	-	x	-	-	-	x	4	-	-
Orthotrichum affine	-	-	-	-	x	-	-	-	On dead fallen oak limbs
Orthotrichum lyellii	-	-	-	-	x	-	-	-	On dead fallen oak limbs
Polytrichastrum formosum	-	-	-	-	-	-	-	R	-
Rhynchostegium confertum	-	x	-	-	-	-	-	-	-
Ulota crispa s.l.	-	-	-	-	x	-	-	-	On dead fallen oak limbs
Ulota phyllantha	-	-	-	-	x	-	-	-	On dead fallen oak limbs

Table D.2.4 Field survey results for plot 1.2

<table>
<tr><td>Plot</td><td>1.2</td><td>Date</td><td>07/05/2020</td></tr>
<tr><td colspan="4">50m x 50m plot</td></tr>
<tr><td>Note</td><td colspan="3">Similar vegetation to stand of W15 within Plot 1.1, comprising mixed canopy of ash, beech, hornbeam and oak, with dense holly understorey. Field layer comprised seedlings of trees species. Stand of semi-mature ash trees in part of plot indicate filling of former canopy gap.
Approximately 50% of the early-mature ash trees have ash canker (Pseudomonas syringae fraxini). The holly trees have sparse foliage with little lower stem growth and are most likely affected by holly leaf blight (Phytophthora ilicis).</td></tr>
<tr><td>UKHab</td><td>w1c5</td><td>NVC</td><td>W15</td></tr>
<tr><td>Canopy height maximum (m)</td><td>30</td><td>Canopy height minimum (m)</td><td>10</td></tr>
<tr><td rowspan="2">Photos</td><td></td><td colspan="2"></td></tr>
<tr><td>Understorey structure</td><td colspan="2">Semi-mature ash trees with richer epiphytic bryophyte assemblage</td></tr>
</table>

Plot	1.2	Date	07/05/2020
15m x 15m plot			
Note	Ground very sparsely vegetated due to heavy shading by holly. Abundant seedlings, but very little tree regeneration so these unlikely to persist.		
UKHab	w1c5	**NVC**	W15
Bare ground % 0	**Litter %** 98	**Canopy cover %** 100	
Photos			

Canopy layer (50m x 50m plot)							
Scientific name	**Cover (%)**	**Life stage / number of individuals**					
		Young	**Semi-mature**	**Early-mature**	**Mature**	**Over-mature**	**Veteran**
Betula pendula	30	-	1	2	-	-	-
Carpinus betulus	60	2	7	5	5	1	-
Fagus sylvatica	50	-	1	1	-	-	-
Fraxinus excelsior	40	-	2	11	5	1	-
Ilex aquifolium	70	15	14	9	5	1	-

Plot	1.2	Date	07/05/2020

Quercus robur	70	-	-	1	4	-	-

Field layer vascular plants

Scientific name	15m x 15m		50m x 50m	Note
	Domin	DAFOR	DAFOR	
Betula sp.	3	F	F	Seedlings
Carpinus betulus	3	F	F	Seedlings
Fraxinus excelsior	3	F	F	Seedlings
Ilex aquifolium	3	F	F	Seedlings

Bryophytes

Scientific name	Epiphytic				Deadwood		Terrestrial		Note
	Base		Bole	Lower branches					
	15m	50m	50m	50m	15m	50m	15m	50m	
Atrichum undulatum	-	-	-	-	-	-	-	x	-
Aulacomnium androgynum	-	x	-	-	1	x	-	-	-
Brachythecium rutabulum	-	-	x	-	-	-	-	-	-
Bryum capillare	-	-	x	-	-	-	-	-	-
Cololejeunea minutissima	-	-	x	-	-	-	-	-	On ash trees
Cryphaea heteromalla	-	-	x	-	-	-	-	-	On ash trees
Dicranella heteromalla	-	-	-	-	-	-	1	-	-
Frullania dilatata	-	-	x	-	-	-	-	-	On ash trees
Hypnum cupressiforme	1	x	x	-	-	x	-	-	-
Hypnum resupinatum	-	-	-	-	-	-	-	-	-

Plot		1.2			**Date**			07/05/2020	
Isothecium myosuroides	-	x	-	-	-	-	-	-	-
Kindbergia praelonga	-	-	-	-	-	-	1	-	-
Metzgeria furcata	-	-	x	-	-	-	-	-	-
Mnium hornum	-	-	-	-	-	-	1	-	-
Orthotrichum affine	-	-	x	-	-	-	-	-	On ash trees
Orthotrichum lyellii	-	-	x	-	-	-	-	-	On ash trees
Orthotrichum pulchellum	-	-	x	-	-	-	-	-	On ash trees
Radula complanata	-	-	x	-	-	-	-	-	On ash trees
Rhynchostegium confertum	-	x	-	-	-	-	-	-	-
Ulota phyllantha	-	-	x	-	-	-	-	-	On ash trees
Zygodon conoideus	-	-	x	-	-	-	-	-	On ash trees

Table D.2.5 Field survey results for plot 1.3

<table>
<tr><td>Plot</td><td>1.3</td><td>Date</td><td>07/05/2020</td></tr>
<tr><td colspan="4">50m x 50m plot</td></tr>
<tr><td>Note</td><td colspan="3">Mixed canopy of ash, beech, hornbeam and oak, densely layered understorey of holly casting deep shade. Fallen living and dead trees deeply shaded and sparsely vegetated with bryophytes, mostly non-specialist pleurocarps. Small glade with bracken and well-illuminated ash trees, supporting epiphyte flora.
Extensive bark damage wounds to stems of holly trees, most likely caused by deer grazing.</td></tr>
<tr><td>UKHab</td><td>w1c5</td><td>NVC</td><td>W15</td></tr>
<tr><td>Canopy height maximum (m)</td><td>27</td><td>Canopy height minimum (m)</td><td>9</td></tr>
<tr><td rowspan="2">Photos</td><td></td><td colspan="2"></td></tr>
<tr><td>Densely-layered understorey of holly</td><td colspan="2">Glade with bracken</td></tr>
<tr><td colspan="4">15m x 15m plot</td></tr>
<tr><td>Note</td><td colspan="3">Ground very sparsely vegetated due to heavy shading by holly. Abundant seedlings, but very little tree regeneration so these unlikely to persist.
15m plot sampled central area of 50m plot, away from glade.</td></tr>
</table>

Plot	1.3	**Date**	07/05/2020		
UKHab	w1c5	**NVC**	W15		
Bare ground %	0	**Litter %**	95	**Canopy cover %**	85
Photos					

Canopy layer (50m x 50m plot)							
Scientific name	**Cover (%)**	**Life stage / number of individuals**					
		Young	**Semi-mature**	**Early-mature**	**Mature**	**Over-mature**	**Veteran**
Betula pendula	40	-	-	-	1	-	-
Carpinus betulus	50	2	1	6	1	-	-
Crataegus monogyna	50	-	2	-	1	-	-
Fagus sylvatica	50	-	-	2	-	-	-
Fraxinus excelsior	40	-	-	1	2	-	-
Ilex aquifolium	85	30	30	29	12	2	-
Quercus robur	60	1	-	3	5	-	-

Plot	1.3	Date	07/05/2020	
Field layer vascular plants				
Scientific name	**15m x 15m**		**50m x 50m**	**Note**
	Domin	**DAFOR**	**DAFOR**	
Carpinus betulus	3	F	F	Seedlings
Ilex aquifolium	3	F	F	Seedlings
Pteridium aquilinum	-	-	O	-
Urtica dioica	-	-	R	-

Bryophytes									
Scientific name	**Epiphytic**				**Deadwood**		**Terrestrial**		**Note**
	Base		**Bole**	**Lower branches**					
	15m	**50m**	**50m**	**50m**	**15m**	**50m**	**15m**	**50m**	
Amblystegium serpens	-	-	x	-	-	-	-	-	On ash trees
Atrichum undulatum	-	-	-	-	-	x	-	x	-
Aulacomnium androgynum	-	-	-	-	-	x	-	-	-
Brachythecium rutabulum	-	x	-	-	-	-	-	-	-
Brachythecium velutinum	-	-	x	-	-	-	-	-	On ash trees
Bryum capillare	-	-	x	-	-	-	-	-	-
Calypogeia arguta	-	-	-	-	-	-	-	x	-
Cryphaea heteromalla	-	-	x	-	-	-	-	-	On ash trees
Dicranella heteromalla	-	-	-	-	-	-	1	-	-
Dicranoweisia cirrata	-	-	-	-	-	x	-	-	-
Hypnum cupressiforme	-	-	-	-	-	x	1	-	-

Plot		1.3			**Date**			07/05/2020	
Hypnum resupinatum	-	-	x	-	-	-	-	-	On ash trees
Isothecium myosuroides	-	-	-	-	-	x	-	-	-
Kindbergia praelonga	-	-	-	-	-	x	1	-	-
Lophocolea heterophylla	-	-	-	-	-	x	-	-	-
Metzgeria furcata	-	-	x	-	-	-	-	-	On ash trees
Mnium hornum	-	-	-	-	-	-	1	-	-
Orthotrichum affine	-	-	x	-	-	-	-	-	On ash trees
Pseudotaxiphyllum elegans	-	-	-	-	-	-	1	-	-
Radula complanata	-	-	x	-	-	-	-	-	On ash trees
Rhynchostegium confertum	-	x	-	-	-	-	-	-	-

Table D.2.6 Field survey results for plot 1.4

<table>
<tr><td>Plot</td><td colspan="2">1.4</td><td>Date</td><td>07/05/2020</td></tr>
<tr><td colspan="5">50m x 50m plot</td></tr>
<tr><td>Note</td><td colspan="4">Plot with small seasonal watercourse through middle, with large glade created by windthrow. Large areas of the plot have no remaining upper canopy layer due to windthrow damage, with young and semi-mature holly trees being prominent. Plot contains collapsed trees and standing deadwood beech stems.</td></tr>
<tr><td>UKHab</td><td colspan="2">w1c5</td><td>NVC</td><td>W15</td></tr>
<tr><td>Canopy height maximum (m)</td><td colspan="2">24</td><td>Canopy height minimum (m)</td><td>6</td></tr>
<tr><td rowspan="2">Photos</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="2">Large over-mature hornbeam</td><td colspan="2">Small seasonal watercourse</td></tr>
<tr><td colspan="5">15m x 15m plot</td></tr>
<tr><td>Note</td><td colspan="4">Ground very sparsely vegetated due to heavy shading by holly. Abundant seedlings, but very little tree regeneration so these unlikely to persist. 15m plot sampled central area of 50m plot, away from glade.</td></tr>
</table>

Plot	1.4	**Date**	07/05/2020		
UKHab	w1c5	**NVC**	W15		
Bare ground %	0	**Litter %**	95	**Canopy cover %**	80
Photos					

Canopy layer (50m x 50m plot)							
Scientific name	**Cover (%)**	**Life stage / number of individuals**					
		Young	**Semi-mature**	**Early-mature**	**Mature**	**Over-mature**	**Veteran**
Carpinus betulus	60	-	-	3	3	4	-
Fagus sylvatica	50	1	-	-	1	-	-
Ilex aquifolium	60	47	43	11	3	-	-
Quercus robur	50	-	-	4	2	-	-
Carpinus betulus	60	-	-	3	3	4	-
Fagus sylvatica	50	1	-	-	1	-	-
Ilex aquifolium	60	47	43	11	3	-	-

Plot	1.4			**Date**	07/05/2020		
Quercus robur	50	-	-	4	2	-	-

Field layer vascular plants

Scientific name	**15m x 15m**		**50m x 50m**	**Note**
	Domin	**DAFOR**	**DAFOR**	
Carex remota	-	-	R	-
Carpinus betulus	3	F	F	Seedlings
Dryopteris dilatata	-	-	R	-
Juncus effusus	-	-	R	-
Pteridium aquilinum	2	R	R	-
Urtica dioica	-	-	R	-

Bryophytes

Scientific name	**Epiphytic**				**Deadwood**		**Terrestrial**		**Note**
	Base		**Bole**	**Lower branches**					
	15m	**50m**	**50m**	**50m**	**15m**	**50m**	**15m**	**50m**	
Atrichum undulatum	-	-	-	-	-	-	-	x	-
Brachythecium rutabulum	-	x	-	-	-	-	-	-	-
Calypogeia arguta	-	-	-	-	-	-	-	x	Abundant on stream banks
Dicranella heteromalla	-	-	-	-	-	-	-	x	-
Hypnum cupressiforme	-	x	x	-	-	x	-	x	-
Isothecium alopecuroides	-	-	x	-	-	-	-	-	-
Kindbergia praelonga	-	x	-	-	-	x	1	x	-
Metzgeria furcata	-	-	x	x	-	-	-	-	-
Mnium hornum	-	-	-	-	-	-	-	x	-

Plot	1.4			**Date**	07/05/2020				
Orthotrichum affine	-	-	-	x	-	-	-	-	-
Pellia sp.	-	-	-	-	-	-	-	x	Abundant on stream banks
Pseudotaxiphyllum elegans	-	-	-	-	-	-	-	x	-
Rhynchostegium confertum	-	-	x	-	-	-	-	-	-

Table D.2.7 Field survey results for plot 1.5

Plot	1.5	**Date**	07/05/2020
50m x 50m plot			
Note	Neglected area of hornbeam pollards with beech maidens, overgrown with holly. Historic hornbeam pollards at circa 2m in height. Potential veteran beech tree with cavities, limb failures, fungal brackets and a lower secondary crown formation (stem diameter of 1,220mm).		
UKHab	w1c5	**NVC**	W10
Canopy height maximum (m)	26	**Canopy height minimum (m)**	5
Photos			
	Dense holly understorey	Hornbeam pollard	
15m x 15m plot			
Note	Ground very sparsely vegetated due to heavy shading by holly. Abundant seedlings, but very little tree regeneration so these unlikely to persist. 15m plot sampled central area of 50m plot, away from glade.		

Plot	1.5	**Date**	07/05/2020
UKHab	w1c5	**NVC**	W15

Bare ground %	0	**Litter %**	100	**Canopy cover %**	100

Photos

Canopy layer (50m x 50m plot)

Scientific name	**Cover (%)**	**Life stage / number of individuals**					
		Young	**Semi-mature**	**Early-mature**	**Mature**	**Over-mature**	**Veteran**
Betula pendula	40	-	-	1	-	-	-
Carpinus betulus	60	-	3	1	7	2	-
Crataegus monogyna	40	-	-	1	-	-	-
Fagus sylvatica	70	2	5	1	3	1	-
Ilex aquifolium	75	70	32	20	10	-	-
Quercus robur	50	-	-	1	3	-	-

Plot	1.5	Date	07/05/2020

Field layer vascular plants

Scientific name	15m x 15m		50m x 50m	Note
	Domin	DAFOR	DAFOR	
Carpinus betulus	3	F	F	Seedlings

Bryophytes

Scientific name	Epiphytic				Deadwood		Terrestrial		Note
	Base		Bole	Lower branches					
	15m	50m	50m	50m	15m	50m	15m	50m	
Brachythecium rutabulum	-	-	-	-	-	-	-	x	-
Dicranella heteromalla	-	-	-	-	-	-	1	x	-
Hypnum cupressiforme	-	-	-	-	-	-	1	x	-
Kindbergia praelonga	-	-	x	-	-	-	1	x	-
Mnium hornum	-	-	-	-	-	-	1	x	-
Pseudotaxiphyllum elegans	-	-	-	-	-	-	-	x	-

Table D.2.8 Field survey results for plot 2.1

<table>
<tr><td>Plot</td><td colspan="2">2.1</td><td colspan="2">Date</td><td>07/05/2020</td></tr>
<tr><td colspan="6">15m x 15m plot</td></tr>
<tr><td>Note</td><td colspan="5">Ground very sparsely vegetated due to heavy shading by holly. Abundant seedlings, but very little tree regeneration so these unlikely to persist. 15m plot sampled central area of 50m plot, away from glade.</td></tr>
<tr><td>UKHab</td><td colspan="2">w1c5</td><td colspan="2">NVC</td><td>W15</td></tr>
<tr><td>Bare ground %</td><td>0</td><td>Litter %</td><td>95</td><td>Canopy cover %</td><td>80</td></tr>
<tr><td>Photos</td><td colspan="3"></td><td colspan="2"></td></tr>
</table>

<table>
<tr><td colspan="5">Field layer vascular plants</td></tr>
<tr><td rowspan="2">Scientific name</td><td colspan="2">15m x 15m</td><td>50m x 50m</td><td rowspan="2">Note</td></tr>
<tr><td>Domin</td><td>DAFOR</td><td>DAFOR</td></tr>
<tr><td>Fraxinus excelsior</td><td>1</td><td>F</td><td>-</td><td>Seedlings</td></tr>
<tr><td>Ilex aquifolium</td><td>1</td><td>R</td><td>-</td><td>Seedlings</td></tr>
<tr><td>Rubus fruticosus agg.</td><td>1</td><td>R</td><td>-</td><td>-</td></tr>
</table>

Urtica dioica	1	R	-	One plant

Bryophytes

Scientific name	Epiphytic				Deadwood		Terrestrial		Note
	Base		Bole	Lower branches					
	15m	50m	50m	50m	15m	50m	15m	50m	
Dicranella heteromalla	-	-	-	-	-	-	1	-	-
Hypnum cupressiforme	-	-	-	-	1	-	-	-	-
Kindbergia praelonga	-	-	-	-	-	-	1	-	-

Table D.2.9 Field survey results for plot 2.2

<table>
<tr><td>Plot</td><td colspan="2">2.2</td><td>Date</td><td colspan="2">09/05/2020</td></tr>
<tr><td colspan="6">50m x 50m plot</td></tr>
<tr><td>Note</td><td colspan="5">Plot largely within area of oak woodland, like that described for plot 2.3. Some beech colonisation. The oaks have a high percentage of deadwood and an attenuated growth form. The apple tree recorded has a large stem diameter of 920mm and may be a potential veteran tree.</td></tr>
<tr><td>UKHab</td><td colspan="2">w1f7</td><td>NVC</td><td colspan="2">W10</td></tr>
<tr><td>Canopy height maximum (m)</td><td colspan="2">22</td><td>Canopy height minimum (m)</td><td colspan="2">11</td></tr>
<tr><td rowspan="2">Photos</td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td colspan="2">Bracken-dominated field layer</td><td colspan="3">Area north of the footpath, with birch and beech colonization and sparsely vegetated field layer</td></tr>
<tr><td colspan="6">15m x 15m plot</td></tr>
<tr><td>Note</td><td colspan="5">Canopy shading very light due to state of leaf expansion of oak trees but covers much of plot. Understorey with patchy bramble cover.</td></tr>
<tr><td>UKHab</td><td colspan="2">w1f7</td><td>NVC</td><td colspan="2">W10</td></tr>
<tr><td>Bare ground %</td><td>0</td><td>Litter %</td><td>95</td><td>Canopy cover %</td><td>60</td></tr>
</table>

Plot	2.2	Date	09/05/2020
Photos			

Canopy layer (50m x 50m plot)							
Scientific name	Cover (%)	Life stage / number of individuals					
		Young	Semi-mature	Early-mature	Mature	Over-mature	Veteran
Acer pseudoplatanus	70	-	-	1	-	-	-
Betula pendula	40	-	-	3	-	1	-
Betula pubescens	40	2	7	2	1	-	-
Carpinus betulus	50	21	1	-	-	-	-
Crataegus monogyna	40	2	2	6	5	-	-
Fraxinus excelsior	50	-	-	1	-	-	-
Ilex aquifolium	70	17	4	2	-	-	-
Malus sp.	40	-	-	-	-	1	-
Quercus robur	40	-	-	43	3	-	-

Field layer vascular plants			
Scientific name	15m x 15m	50m x 50m	Note

Plot	2.2	Date	09/05/2020	
	Domin	**DAFOR**	**DAFOR**	
Alliaria petiolata	1	R	R	-
Crataegus monogyna	1	R	R	Seedlings
Dryopteris dilatata	1	R	R	-
Fraxinus excelsior	1	O	O	Seedlings
Poa trivialis	1	R	O	-
Pteridium aquilinum	-	-	A	-
Ribes uva-crispa	-	-	R	-
Rubus fruticosus agg.	5	A	A	-
Ruscus aculeatus	-	-	R	-
Urtica dioica	-	-	R	-

Bryophytes									
Scientific name	**Epiphytic**				**Deadwood**		**Terrestrial**		**Note**
	Base		**Bole**	**Lower branches**					
	15m	**50m**	**50m**	**50m**	**15m**	**50m**	**15m**	**50m**	
Brachythecium rutabulum	-	-	-	-	-	x	1	R	-
Cryphaea heteromalla	-	-	x	-	-	-	-	-	On a sycamore tree
Dicranella heteromalla	-	-	-	-	-	-	-	R	-
Frullania dilatata	-	-	x	-	-	-	-	-	On a sycamore tree
Hypnum cupressiforme s.l.	-	x	x	-	-	x	1	R	Slender plants, *H. cf. andoi*
Isothecium myosuroides	-	R	-	-	-	-	-	-	-
Kindbergia praelonga	-	x	-	-	-	-	-	R	-
Metzgeria furcata	-	-	x	-	-	-	-	-	On a sycamore tree
Mnium hornum	-	-	-	-	-	-	-	R	-
Orthotrichum affine	-	-	x	-	-	x	-	-	On a sycamore tree
Orthotrichum pulchellum	-	-	x	-	-	-	-	-	On a sycamore tree

Table D.2.10 Field survey results for plot 2.3

Plot	2.3	**Date**	09/05/2020
50m x 50m plot			
Note	Plot covers same gradient and woodland vegetation types and structures as plot 2.4, with approximately half in each woodland type. Canopy of stand of W10 not fully out, and oak trees seem diseased, with many twigs bare of leaves, leaves only at the tops of crowns and leaves still hardly expanded; high percentage of deadwood in oak trees, with standing dead trees. Understorey of stand of W10 very open, with patchy cover by bramble. Ground vegetation sampled with two 15m plots, one in each stand, labelled 2.3a and 2.3b. List for ground vegetation and bryophytes of 50m plot given under 2.3b below.		
UKHab	w1f7, w1c5	**NVC**	W10, W15
Canopy height maximum (m)	23	**Canopy height minimum (m)**	8
Photos			
	Stand of oak woodland around and north of footpath	Holly-dominated understorey south of footpath	
15m x 15m plot (2.3a)			

<table>
<tr><td>Plot</td><td colspan="2">2.3</td><td>Date</td><td colspan="2">09/05/2020</td></tr>
<tr><td>Note</td><td colspan="5">Plot sampled ground vegetation of SE half of 50m plot. Very heavily shaded by holly. No vascular plants present, only a few smaller patches of moss.</td></tr>
<tr><td>UKHab</td><td colspan="2">w1c5</td><td>NVC</td><td colspan="2">W15</td></tr>
<tr><td>Bare ground %</td><td>0</td><td>Litter %</td><td>95</td><td>Canopy cover %</td><td>95</td></tr>
<tr><td>Photos</td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td colspan="6">15m x 15m plot (2.3b)</td></tr>
<tr><td>Note</td><td colspan="5">Canopy shading very light due to state of leaf expansion of oak trees but covers much of plot. Understorey with patchy bramble cover.</td></tr>
<tr><td>UKHab</td><td colspan="2">w1f7</td><td>NVC</td><td colspan="2">W10</td></tr>
<tr><td>Bare ground %</td><td>5</td><td>Litter %</td><td>90</td><td>Canopy cover %</td><td>80</td></tr>
</table>

Plot	2.3	**Date**	09/05/2020
Photos			

Canopy layer (50m x 50m plot)							
Scientific name	**Cover (%)**	**Life stage / number of individuals**					
		Young	**Semi-mature**	**Early-mature**	**Mature**	**Over-mature**	**Veteran**
Betula pubescens	30	-	-	1	-	-	-
Carpinus betulus	70	-	-	4	3	1	-
Crataegus monogyna	20	-	-	-	-	1	-
Fagus sylvatica	60	1	3	4	3	-	-
Fraxinus excelsior	20	-	-	-	2	-	-
Ilex aquifolium	70	35	23	19	18	-	-
Malus sp	30	-	-	-	1	-	-
Quercus robur	45	-	3	20	8	3	-

Plot	2.3	Date	09/05/2020

Field layer vascular plants

Plot 2.3a

Scientific name	15m x 15m		50m x 50m	Note
	Domin	DAFOR	DAFOR	
None recorded				

Plot 2.3b

Scientific name	15m x 15m		50m x 50m	Note
	Domin	DAFOR	DAFOR	
Alliaria petiolata	-	-	R	-
Carpinus betulus	3	F	F	Seedlings
Circaea lutetiana	1	R	O	-
Fraxinus excelsior	1	O	O	Seedlings
Ilex aquifolium	1	R	R	Seedlings
Pteridium aquilinum	2	R	R	-
Rubus fruticosus agg.	6	A	F	-
Urtica dioica	2	R	O	-

Bryophytes

Plot 2.3a

Scientific name	Epiphytic				Deadwood		Terrestrial		Note
	Base		Bole	Lower branches					
	15m	50m	50m	50m	15m	50m	15m	50m	
Brachythecium rutabulum	-	-	-	-	-	-	1	-	-
Dicranella heteromalla	-	-	-	-	-	-	1	-	-
Hypnum cupressiforme	-	-	-	-	-	-	1	-	-

Plot	2.3			**Date**		09/05/2020		
Pseudotaxiphyllum elegans	1	-	-	-	-	-	1	-	-

Plot 2.3a									
Scientific name	**Epiphytic**				**Deadwood**		**Terrestrial**		**Note**
	Base		**Bole**	**Lower branches**					
	15m	**50m**	**50m**	**50m**	**15m**	**50m**	**15m**	**50m**	
Brachythecium rutabulum	-	-	x	-	-	-	1	R	-
Dicranella heteromalla	-	-	-	-	-	-	-	R	-
Hypnum cupressiforme	-	x	x	-	-	-	-	R	-
Hypnum resupinatum	-	-	x	-	-	-	-	-	-
Metzgeria furcata	-	-	x	-	-	-	-	-	-
Mnium hornum	-	-	-	-	-	-	-	R	-
Orthotrichum affine	-	-	x	-	-	-	-	-	-
Pseudotaxiphyllum elegans	-	x	-	-	-	-	-	R	-

Table D.2.11 Field survey results for plot 2.4

<table>
<tr><td>Plot</td><td colspan="2">2.4</td><td colspan="2">Date</td><td>09/05/2020</td></tr>
<tr><td colspan="6">50m x 50m plot</td></tr>
<tr><td>Note</td><td colspan="5">Plot with light gradient from edge of SAC east into site, with corresponding zoning of vegetation. Well-illuminated outer zone (north of footpath) with young oak woodland and open understorey (referable to NVC W10). Woodland to south comprises the beech-hornbeam-oak canopy with dense holly-dominated understorey found throughout the other plots. Most of plot comprised the latter, so only this was sampled with 15m plot. Edge of site along road dominated by common nettle and garlic mustard.</td></tr>
<tr><td>UKHab</td><td colspan="2">w1f7, w1c5</td><td colspan="2">NVC</td><td>W10, W15</td></tr>
<tr><td>Canopy height maximum (m)</td><td colspan="2">24</td><td colspan="2">Canopy height minimum (m)</td><td>9</td></tr>
<tr><td rowspan="2">Photos</td><td colspan="3"></td><td colspan="2"></td></tr>
<tr><td colspan="3">Open understorey with hornbeam pollards</td><td colspan="2">Less shaded edge of plot</td></tr>
<tr><td colspan="6">15m x 15m plot</td></tr>
<tr><td>Note</td><td colspan="5">Plot sampled central area of 50m plot, with dense holly understorey</td></tr>
<tr><td>UKHab</td><td colspan="2">w1c5</td><td colspan="2">NVC</td><td>W15</td></tr>
<tr><td>Bare ground %</td><td>0</td><td>Litter %</td><td>95</td><td>Canopy cover %</td><td>90</td></tr>
</table>

Plot	2.4	Date	09/05/2020
Photos			

Canopy layer (50m x 50m plot)							
Scientific name	Cover (%)	Life stage / number of individuals					
		Young	Semi-mature	Early-mature	Mature	Over-mature	Veteran
Betula pendula	60	3	3	5	2	-	-
Betula pubescens	60	-	1	2	3	-	-
Carpinus betulus	80	5	13	14	5	-	-
Crataegus monogyna	50	1	3	1	3	-	-
Fagus sylvatica	80	-	-	6	2	-	-
Ilex aquifolium	70	20	19	21	11	1	-
Quercus robur	70	-	-	-	3	2	-

Field layer vascular plants			
Scientific name	15m x 15m	50m x 50m	Note

Plot	2.4	Date	09/05/2020

	Domin	DAFOR	DAFOR	
Carpinus betulus	3	F	O	Seedlings
Circaea lutetiana	-	-	R	-
Pteridium aquilinum	-	-	R	-
Rubus fruticosus agg.	-	-	R	-
Urtica dioica	-	-	R	-

Bryophytes

Scientific name	Epiphytic				Deadwood		Terrestrial		Note
	Base		Bole	Lower branches					
	15m	50m	50m	50m	15m	50m	15m	50m	
Brachythecium rutabulum	-	x	-	-	-	-	-	-	-
Dicranella heteromalla	-	-	-	-	-	-	1	x	-
Oxyrrhynchium hians	-	-	-	-	-	-	1	x	-
Frullania dilatata	-	-	x	-	-	-	-	-	-
Hypnum cupressiforme	-	-	-	-	1	x	-	-	-
Hypnum cupressiforme s.l.	-	-	x	-	-	-	-	-	Slender plants, *H. cf. andoi*
Kindbergia praelonga	-	x	-	-	-	-	1	x	-
Lophocolea heterophylla	-	x	-	-	-	x	-	-	-
Metzgeria furcata	-	-	x	-	-	-	-	-	-
Mnium hornum	-	-	-	-	-	-	-	-	-
Pseudotaxiphyllum elegans	-	-	-	-	-	-	-	-	-

Table D.2.12 Field survey results for plot 2.5

<table>
<tr><td>Plot</td><td colspan="3">2.5</td><td colspan="2">Date</td><td colspan="2">09/05/2020</td></tr>
<tr><td colspan="8">50m x 50m plot</td></tr>
<tr><td>Note</td><td colspan="7">Plot with northern corner on path, where there is better illumination and a richer ground flora. Becoming holly-dominated south of path, with similar poor ground flora to other plots. Some signs of holly leaf blight (Phytophthora ilicis).</td></tr>
<tr><td>UKHab</td><td colspan="3">w1c5</td><td colspan="2">NVC</td><td colspan="2">W15</td></tr>
<tr><td>Canopy height maximum (m)</td><td colspan="3">23</td><td colspan="2">Canopy height minimum (m)</td><td colspan="2">6</td></tr>
<tr><td rowspan="2">Photos</td><td colspan="3"></td><td colspan="4"></td></tr>
<tr><td colspan="3">Edge of plot, with common nettle</td><td colspan="4">Dense understorey of holly</td></tr>
<tr><td colspan="8">15m x 15m plot</td></tr>
<tr><td>Note</td><td colspan="7">Plot sampled central area of 50m plot, away from better-illuminated edge along track.</td></tr>
<tr><td>UKHab</td><td colspan="3">w1c5</td><td colspan="2">NVC</td><td colspan="2">W15</td></tr>
<tr><td>Bare ground %</td><td>0</td><td>Litter %</td><td colspan="2">100</td><td>Canopy cover %</td><td colspan="2">90</td></tr>
</table>

Plot	2.5	Date	09/05/2020
Photos			

Canopy layer (50m x 50m plot)							
Scientific name	Cover (%)	Life stage / number of individuals					
		Young	Semi-mature	Early-mature	Mature	Over-mature	Veteran
Acer campestre	50	-	1	-	-	-	-
Carpinus betulus	70	-	10	8	5	3	-
Crataegus monogyna	50	1	-	-	2	-	-
Fagus sylvatica	80	-	1	3	2	-	-
Fraxinus excelsior	50	-	1	4	1	-	-
Ilex aquifolium	60	36	30	24	9	2	-
Quercus robur	65	-	-	-	4	1	-
Salix caprea	70	-	-	-	1	-	-

Plot	2.5	Date	09/05/2020

Field layer vascular plants

Scientific name	15m x 15m		50m x 50m	Note
	Domin	DAFOR	DAFOR	
Cardamine flexuosa	-	-	R	-
Carex remota	-	-	R	-
Carpinus betulus	1	-	R	Seedlings
Circaea lutetiana	-	-	R	-
Dryopteris filix-mas	-	-	R	-
Fraxinus excelsior	-	-	R	Seedlings
Persicaria hydropiper	-	-	R	-
Poa annua	-	-	R	-
Ranunculus repens	-	-	R	-
Rubus fruticosus agg.	-	-	R	-
Senecio jacobaea	-	-	R	-
Urtica dioica	-	-	R	-
Veronica montana	-	-	R	-
Veronica serpyllifolia	-	-	R	-

Bryophytes

Scientific name	Epiphytic				Deadwood		Terrestrial		Note
	Base		Bole	Lower branches					
	15m	50m	50m	50m	15m	50m	15m	50m	
Brachythecium rutabulum	-	x	-	-	-	-	-	-	-

Plot	2.5				**Date**			09/05/2020	
Dicranella heteromalla	-	-	-	-	-	-	-	R	-
Dicranum tauricum	-	-	x	-	-	-	-	-	Hornbeam trees
Hypnum cupressiforme	-	-	x	-	-	x	1	R	-
Hypnum cupressiforme s.l.	-	-	x	-	-	-	-	-	Hornbeam trees. *H. cf. andoi*
Hypnum resupinatum	-	-	x	-	-	-	-	-	-
Isothecium myosuroides	-	-	x	-	-	-	-	-	Hornbeam trees
Kindbergia praelonga	-	-	-	-	-	-	1	R	-
Lophocolea heterophylla	-	-	-	-	-	-	-	R	-
Metzgeria furcata	-	-	x	-	-	-	-	-	-
Mnium hornum	-	-	-	-	-	-	-	R	-
Orthotrichum affine	-	-	x	-	-	-	-	-	Hornbeam trees
Orthotrichum pulchellum	-	-	x	-	-	-	-	-	Hornbeam trees
Polytrichastrum formosum	-	-	-	-	-	-	-	R	-
Pseudotaxiphyllum elegans	-	-	-	-	-	-	1	R	-
Ulota bruchii	-	-	x	-	-	-	-	-	-
Ulota crispa s.l.	-	-	x	-	-	-	-	-	Hornbeam trees
Ulota phyllantha	-	-	x	-	-	-	-	-	Hornbeam trees

Table D.2.13 Field survey results for plot 2.6

Plot	2.6	**Date**	09/05/2020
50m x 50m plot			
Note	Plot similar to all others. Much fallen hornbeam deadwood. Small glades where trees have fallen. Ash trees appears to have ash dieback (*Hymenoscyphus fraxineus*) with the top 2/3 of the trees showing no foliage. Plot contains historic hornbeam pollards and a mature beech tree with fungal decay brackets (*Ganoderma* sp.) at the base.		
UKHab	w1c5	**NVC**	W15
Canopy height maximum (m)	26	**Canopy height minimum (m)**	15
Photos	 Dense holly understorey	 Over-mature hornbeam	
15m x 15m plot			
Note	-		
UKHab	w1c5	**NVC**	W15

Plot	2.6	**Date**	09/05/2020		
Bare ground %	0	**Litter %**	85	**Canopy cover %**	75
Photos					

Canopy layer (50m x 50m plot)

Scientific name	**Cover (%)**	**Life stage / number of individuals**					
		Young	**Semi-mature**	**Early-mature**	**Mature**	**Over-mature**	**Veteran**
Betula pendula	50	3	15	7	-	-	-
Betula pubescens	50	-	5	-	-	-	-
Carpinus betulus	80	-	9	5	8	3	-
Fagus sylvatica	70	-	2	1	5	-	-
Fraxinus excelsior	40	-	3	-	-	-	-
Ilex aquifolium	90	120	75	30	12	-	-
Quercus robur	60	-	-	-	1	-	-
Salix caprea	60	-	-	1	1	-	-

Plot	2.6	Date	09/05/2020	
Field layer vascular plants				
Scientific name	**15m x 15m**		**50m x 50m**	**Note**
	Domin	**DAFOR**	**DAFOR**	
Carex remota	-	-	R	In small glade
Carpinus betulus	3	A	F	Seedlings
Galium palustre	-	-	R	In small glade

Bryophytes									
Scientific name	**Epiphytic**				**Deadwood**		**Terrestrial**		**Note**
	Base		**Bole**	**Lower branches**					
	15m	**50m**	**50m**	**50m**	**15m**	**50m**	**15m**	**50m**	
Atrichum undulatum	-	-	-	-	-	-	-	R	-
Brachythecium rutabulum	-	-	-	-	-	R	-	-	-
Fissidens taxifolius	-	-	-	-	-	-	-	R	-
Hypnum cupressiforme	-	-	R	-	-	R	-	R	-
Kindbergia praelonga	-	-	-	-	-	R	-	-	-
Mnium hornum	-	-	-	-	-	-	1	R	-
Pellia sp.	-	-	-	-	-	-	-	R	-
Pseudotaxiphyllum elegans	-	-	-	-	-	-	1	R	-

Table D.2.14 Field survey results for plot 3.1

Plot	3.1	**Date**	
15m x 15m plot			
Note	Ground very sparsely vegetated due to heavy shading by holly. Abundant seedlings, but very little tree regeneration so these unlikely to persist.		
UKHab	w1c5	**NVC**	W15

Bare ground %	0	**Litter %**	95	**Canopy cover %**	80

Photos

Field layer vascular plants

Scientific name	**15m x 15m**		**50m x 50m**	**Note**
	Domin	**DAFOR**	**DAFOR**	
Carpinus betulus	3	F	F	Seedlings
Circaea lutetiana	1	R	R	-
Fraxinus excelsior	3	F	F	Seedlings
Galium aparine	1	R	R	-

Plot	3.1	**Date**		
Ilex aquifolium	1	A	R	Seedlings
Rubus fruticosus agg.	1	R	R	Seedlings
Urtica dioica	1	R	R	Two plants

Bryophytes

Scientific name	**Epiphytic**				**Deadwood**		**Terrestrial**		**Note**
	Base		**Bole**	**Lower branches**					
	15m	**50m**	**50m**	**50m**	**15m**	**50m**	**15m**	**50m**	
Kindbergia praelonga	-	-	-	-	-	-	4	-	-
Mnium hornum	1	-	-	-	-	-	1	-	-
Hypnum cupressiforme	-	-	-	-	-	-	1	-	-
Dicranella heteromalla	1	-	-	-	-	-	1	-	-

Table D.2.15 Field survey results for plot 3.2

<table>
<tr><td>Plot</td><td colspan="2">3.2</td><td>Date</td><td colspan="2">09/05/2020</td></tr>
<tr><td colspan="6">50m x 50m plot</td></tr>
<tr><td>Note</td><td colspan="5">Oak-hornbeam woodland similar to most of other plots, with some beech and birch. Mature holly understorey, higher percentage than in other plots.</td></tr>
<tr><td>UKHab</td><td colspan="2">w1c5</td><td>NVC</td><td colspan="2">W15</td></tr>
<tr><td>Canopy height maximum (m)</td><td colspan="2">25</td><td>Canopy height minimum (m)</td><td colspan="2">10</td></tr>
<tr><td rowspan="2">Photos</td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td colspan="2">Dense understorey and more open area</td><td colspan="3">Dense holly understorey, with mature holly trees and collapsed trees</td></tr>
<tr><td colspan="6">15m x 15m plot</td></tr>
<tr><td>Note</td><td colspan="5">Ground very heavily shaded by holly.</td></tr>
<tr><td>UKHab</td><td colspan="2">w1c5</td><td>NVC</td><td colspan="2">W15</td></tr>
<tr><td>Bare ground %</td><td>0</td><td>Litter %</td><td>90</td><td>Canopy cover %</td><td>98</td></tr>
</table>

Plot	3.2	**Date**	09/05/2020
Photos			

Canopy layer (50m x 50m plot)

Scientific name	**Cover (%)**	**Life stage / number of individuals**					
		Young	**Semi-mature**	**Early-mature**	**Mature**	**Over-mature**	**Veteran**
Betula pendula	50	-	-	-	1	-	-
Betula pubescens	50	-	-	1	5	-	-
Carpinus betulus	70	-	7	6	4	-	-
Crataegus monogyna	30	-	-	-	1	-	-
Fagus sylvatica	80	-	-	-	1	-	-
Fraxinus excelsior	40	-	-	-	1	-	-
Ilex aquifolium	70	18	14	19	20	2	-
Quercus robur	60	-	-	2	4	3	-

Plot	3.2	Date	09/05/2020

Field layer vascular plants

Scientific name	15m x 15m		50m x 50m	Note
	Domin	DAFOR	DAFOR	
Carpinus betulus	3	F	F	Seedlings

Bryophytes

Scientific name	Epiphytic				Deadwood		Terrestrial		Note
	Base		Bole	Lower branches					
	15m	50m	50m	50m	15m	50m	15m	50m	
Brachythecium rutabulum	-	-	-	-	-	-	-	-	On a brick
Bryum capillare	-	-	-	-	-	-	-	-	On a brick
Dicranella heteromalla	-	-	-	-	-	-	-	R	-
Hypnum cupressiforme	-	-	-	-	-	x	-	-	-
Kindbergia praelonga	-	-	-	-	-	-	-	R	-
Mnium hornum	-	-	-	-	-	-	-	R	-
Rhynchostegium confertum	-	-	-	-	-	-	-	-	On a brick
Thamnobryum alopecurum	-	-	-	-	-	-	-	-	On a brick

Table D.2.16 Field survey results for plot 3.3

<table>
<tr><td>Plot</td><td>3.3</td><td>Date</td><td>18/05/2020</td></tr>
<tr><td colspan="4">50m x 50m plot</td></tr>
<tr><td>Note</td><td colspan="3">Very densely holly-dominated understorey and heavily shaded ground, with no field layer and scarcely any bryophytes. Higher percentage of mature holly within this plot.</td></tr>
<tr><td>UKHab</td><td>w1c5</td><td>NVC</td><td>W15</td></tr>
<tr><td>Canopy height maximum (m)</td><td>24</td><td>Canopy height minimum (m)</td><td>6</td></tr>
<tr><td>Photos</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td colspan="6">15m x 15m plot</td></tr>
<tr><td>Note</td><td colspan="5">No field layer, just seedlings of hornbeam</td></tr>
<tr><td>UKHab</td><td colspan="2">w1c5</td><td>NVC</td><td colspan="2">W15</td></tr>
<tr><td>Bare ground %</td><td>0</td><td>Litter %</td><td>95</td><td>Canopy cover %</td><td>95</td></tr>
</table>

Plot	3.3	**Date**	18/05/2020
Photos			

Canopy layer (50m x 50m plot)							
Scientific name	**Cover (%)**	**Life stage / number of individuals**					
		Young	**Semi-mature**	**Early-mature**	**Mature**	**Over-mature**	**Veteran**
Carpinus betulus	70	1	1	5	3	1	-
Crataegus monogyna	40	-	1	2	1	-	-
Fagus sylvatica	80	-	-	1	-	-	-
Ilex aquifolium	70	42	30	38	25	2	-
Quercus robur	50	-	-	3	7	1	-

Field layer vascular plants				
Scientific name	**15m x 15m**		**50m x 50m**	**Note**
	Domin	**DAFOR**	**DAFOR**	
Carpinus betulus	3	F	F	Seedlings

Plot	3.3				**Date**		18/05/2020		
Bryophytes									
Scientific name	**Epiphytic**				**Deadwood**		**Terrestrial**		**Note**
	Base		**Bole**	**Lower branches**					
	15m	**50m**	**50m**	**50m**	**15m**	**50m**	**15m**	**50m**	
Hypnum cupressiforme	-	R	-	-	1	R	-	-	-
Kindbergia praelonga	-	-	-	-	1	R	-	-	-
Metzgeria furcata	-	-	x	-	-	-	-	-	-
Pseudotaxiphyllum elegans	-	-	-	-	-	-	1	R	-
Ulota crispa s.l.	-	-	-	-	-	x	-	-	Five plants on old dead holly

Table D.2.17 Field survey results for plot 3.4

Plot	3.4	**Date**	18/05/2020
50m x 50m plot			
Note	Oak-hornbeam woodland similar to most of other plots, with some beech and birch. Mature holly understorey. Small valley through middle of plot, with lighter canopy; the 15m plot was located here. Contains two windthrow hornbeam and some standing deadwood.		
UKHab	w1c5	**NVC**	W15
Canopy height maximum (m)	25	**Canopy height minimum (m)**	11
Photos	 Dense holly understorey with light penetrating canopy gaps	 Over-mature hornbeam, with wounds from lost limbs	
15m x 15m plot			
Note	Very sparsely vegetated field layer, with bryophytes abundant on banks of small seasonal watercourse. Less litter due to slope. Canopy more-or-less complete but shade less dense than under most of the 50m plot.		
UKHab	w1c5	**NVC**	W10

Bare ground %	30	**Litter %**	60	**Canopy cover %**	95

Plot	3.4	Date	18/05/2020
Photos			

Canopy layer (50m x 50m plot)							
Scientific name	**Cover (%)**	**Life stage / number of individuals**					
		Young	**Semi-mature**	**Early-mature**	**Mature**	**Over-mature**	**Veteran**
Betula pubescens	59	-	-	1	-	-	-
Carpinus betulus	70	-	1	1	4	3	-
Fagus sylvatica	70	-	1	1	-	-	-
Ilex aquifolium	80	82	42	27	14	-	-
Quercus robur	65	-	-	4	8	-	-

Field layer vascular plants				
Scientific name	**15m x 15m**		**50m x 50m**	**Note**
	Domin	**DAFOR**	**DAFOR**	
Carex remota	-	-	R	On banks of small seasonal watercourse

Plot	3.4	**Date**	18/05/2020	
Carpinus betulus	3	F	F	Seedlings
Dryopteris dilatata	1	R	R	On banks of small seasonal watercourse
Ilex aquifolium	3	F	O	Seedlings
Veronica montana	1	R	R	-

Bryophytes									
Scientific name	**Epiphytic**				**Deadwood**		**Terrestrial**		**Note**
	Base		**Bole**	**Lower branches**					
	15m	**50m**	**50m**	**50m**	**15m**	**50m**	**15m**	**50m**	
Amblystegium serpens	-	-	x	-	-	-	-	-	On well-lit beech trunk
Atrichum undulatum	-	-	-	-	-	-	3	O	-
Brachythecium rutabulum	-	-	x	-	-	-	-	-	On well-lit beech trunk
Bryum capillare	-	-	x	-	-	-	-	-	On well-lit beech trunk
Cololejeunea minutissima	-	-	x	-	-	-	-	-	On well-lit beech trunk
Cryphaea heteromalla	-	-	x	-	-	-	-	-	On well-lit beech trunk
Dicranella heteromalla	-	-	-	-	-	-	3	O	-
Hypnum cupressiforme s.l.	-	-	x	-	-	x	-	-	*H. cf. andoi*
Hypnum resupinatum	-	-	x	-	-	-	-	-	On well-lit beech trunk
Isothecium myosuroides	-	-	x	-	-	-	-	-	On well-lit beech trunk
Kindbergia praelonga	-	-	-	-	-	x	3	O	-
Metzgeria furcata	-	-	x	-	-	-	-	-	On well-lit beech trunk
Mnium hornum	-	-	-	-	-	-	3	O	-
Pseudotaxiphyllum elegans	-	-	-	-	-	-	3	O	-
Radula complanata	-	-	x	-	-	-	-	-	On well-lit beech trunk
Ulota crispa s.l.	-	-	x	-	-	-	-	-	On well-lit beech trunk
Zygodon conoideus	-	-	x	-	-	-	-	-	On well-lit beech trunk

Appendix E LA 115 Screening Matrices

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Appendix F Planning Inspectorate Advice Note 10 Summary Table

Appendix F Planning Inspectorate Advice Note 10 Summary Table

F.1.1 Potential effects upon the European sites, which are considered within the submitted HRA report Screening report and Statement to Inform an Appropriate Assessment (Application Document 6.5) are provided in Table F.1.

Table F.1 : Effects considered within the assessment

Designation	Effects described in submission information and in the summary table
Thames Estuary and Marshes SPA	Reduction in habitat resulting in effects on bird qualifying features using supporting habitats within the SPA: • Change in air quality – vehicle emissions – construction and operation • Changes in groundwater quality and quantity – tunnel construction and operation
	Reduction in habitat resulting in effects on bird qualifying features using functionally linked land (FLL) outside the SPA: • Land take – terrestrial and aquatic (marine) environment – construction • Change in air quality – dust emissions – construction • Changes in surface water quality and quantity – construction and operation • Introduction/spread of Invasive Non-Native Species – terrestrial and marine environment
	Reduction in species resulting in effects on bird qualifying features using functionally linked land outside the SPA: • Species collision with vehicles and/or overhead utilities infrastructure (including barrier effects) – operation
	Disturbance to key species (bird qualifying features) using supporting habitats within the SPA: • Change in recreational disturbance –operation (wider visitor pressures)
	Disturbance to key species (bird qualifying features) using functionally linked land outside the SPA: • Change in recreational disturbance – construction and operation (Tilbury Fields) • Changes in noise and vibration – construction works and vehicles • Changes in noise and vibration – underwater and above ground – tunnel construction only • Changes in noise and vibration – vehicles – operation • Changes in light levels – construction and operation • Changes in visual disturbance –people/machines in eyeline – construction • Changes in visual disturbance –vehicles in eyeline – operation
Thames Estuary and Marshes Ramsar	Reduction in habitat area resulting in effects on qualifying features (Ramsar criterion 2, 5 and 6) within the Ramsar site • Change in air quality – dust emissions – construction • Changes in surface water quality and quantity – construction • Change in air quality – vehicle emissions – construction and operation • Changes in groundwater quality and quantity – tunnel construction and operation Reduction in habitat area resulting in effects on bird qualifying features (Ramsar criterion 5 & 6) using functionally linked land outside the Ramsar site: • Land take – terrestrial and aquatic (marine) environment – construction • Changes in surface water quality and quantity – operation • Introduction/spread of Invasive Non-Native Species – terrestrial and marine environment
	Reduction in species resulting in effects on bird qualifying features (Ramsar criterion 5 & 6) using functionally linked land outside the Ramsar sire: • Species collision with vehicles and/or overhead utilities infrastructure – operation
	Disturbance to key species (bird qualifying features (Ramsar criterion 5 & 6)) using supporting habitats within the Ramsar site: • Change in recreational disturbance –operation (wider visitor pressures) • Changes in noise and vibration – construction and operation • Changes in noise and vibration – underwater and above ground – tunnel construction only • Changes in light levels – construction and operation • Changes in visual disturbance –people/machines in eyeline – construction • Changes in visual disturbance –vehicles in eyeline – operation Disturbance to key species (bird qualifying features (Ramsar criterion 5 & 6)) using functionally linked land outside the Ramsar site: • Change in recreational disturbance – construction and operation (Tilbury Fields) • Changes in noise and vibration – construction • Changes in noise and vibration – underwater and above ground – tunnel construction only • Changes in light levels – construction • Changes in visual disturbance –people/machines in eyeline – construction
Epping Forest SAC	Reduction in habitat area (habitats features) within the SAC • Change in air quality - nutrient nitrogen (NOx) - vehicle emissions – construction • Change in air quality - nutrient nitrogen (NOx) - vehicle emissions – operation

Designation	Effects described in submission information and in the summary table
North Downs Woodlands SAC	Reduction in habitat area (habitats features) within the SAC • Change in air quality - nutrient nitrogen (NOx) - vehicle emissions – construction • Change in air quality - nutrient nitrogen (NOx) - vehicle emissions – operation

F.1.2 The European sites included within the assessment are:

a. Thames Estuary and Marshes SPA

b. Thames Estuary and Marshes Ramsar

c. Epping Forest SAC

d. North Downs Woodlands SAC

F.1.3 Table F.2 is summary table for the effect of the Project alone, illustrating all of the European sites and effect pathways considered in the assessment. Evidence supporting the conclusions of effects on the European site(s) and its qualifying feature(s) is referenced within the table.

F.1.4 Table F.3 is a summary table for the effect of the Project in combination with other plans and projects and illustrates all of the European sites and effect pathways considered in the assessment. Evidence supporting the conclusions of effects on the European site(s) and its qualifying feature(s) is referenced within the table.

F.1.5 The following key supports the text in Table F.2 and Table F.3.

a. N/A - Where effects are not relevant to a particular feature or no feasible pathways to an effect were found

b. N/R - HRA stage not required

c. LSE - Likely significant effect cannot be excluded

d. No LSE - Likely significant effect can be excluded

e. AEOI - Adverse effect on integrity cannot be excluded

f. No AEOI - Adverse effect on integrity can be excluded

g. Chapter XX, paragraph XX, Table X - Reference to the relevant chapter, paragraph, table in the HRA report where the supporting evidence is provided

Table F.2 Planning Inspectorate Advice Note 10 Summary Table for Effects of the Project Alone

European Site (Code)	Qualifying Features	Effect Pathway	Land take			Change in air quality – dust emissions			Introduction /spread of Invasive Non-Native Species			Changes in surface water quality and quantity – construction and operation			Change in air quality – vehicle emissions – construction and operation			Changes in groundwater quality and quantity – tunnel construction and operation			Collision with vehicles and/or utilities infrastructure - operation			Changes in noise and vibration – underwater and above ground – tunnel construction only			Changes in noise and vibration			Changes in visual disturbance			Change in light levels			Change in recreational disturbance – construction			Change in recreational disturbance – operation (Tilbury Fields visitor pressures)			Change in recreational disturbance –operation (wider visitor pressures)		
		Development Phase → HRA Stage ↓	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Thames Estuary and Marshes SPA (UK9012021)	A082 *Circus cyaneus* ; Hen harrier (Non-breeding)	Stage 1 Screening	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A394 Anser albifrons albifrons European white-fronted goose; (Non breeding)	Stage 1 Screening	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A132 Recurvirostra avosetta; Pied avocet (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.50 to 6.2.57	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.72 to 6.2.75	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.64 to 6.2.67	No LSE Chapter 6.2, paragraph 6.2.64 , 6.2.68 to 6.2.70	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.80 and 6.2.83 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	No LSE Chapter 6.2, paragraph 6.2.106 to 6.2.112	No LSE Chapter 6.2, paragraph 6.2.111 to 6.2.112	N/A	No LSE Chapter 6.2, paragraph 6.2.37 to 6.2.42	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.37 and 6.2.43 to 6.2.45	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.37 and 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.6 to 7.2.14 and paragraphs 7.2.40 to 7.2.52	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2 paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2 paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2 paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A137 Charadrius hiaticula; Ringed plover (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.50 to 6.2.57	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.72 to 6.2.75	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.64 to 6.2.67	No LSE Chapter 6.2, paragraph 6.2.64 , 6.2.68 to 6.2.70	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.80 and 6.2.83 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	No LSE Chapter 6.2, paragraph 6.2.106 to 6.2.112	No LSE Chapter 6.2, paragraph 6.2.111 to 6.2.112	N/A	No LSE Chapter 6.2, paragraph 6.2.37 to 6.2.42	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.37 and 6.2.43 to 6.2.45	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.37 and 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.6 to 7.2.14 and paragraphs 7.2.40 to 7.2.52	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2 paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2 paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2 paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A141 Pluvialis squatarola; Grey plover (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.50 to 6.2.57	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.72 to 6.2.75	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.64 to 6.2.67	No LSE Chapter 6.2, paragraph 6.2.64 , 6.2.68 to 6.2.70	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.80 and 6.2.83 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	No LSE Chapter 6.2, paragraph 6.2.106 to 6.2.112	No LSE Chapter 6.2, paragraph 6.2.111 to 6.2.112	N/A	No LSE Chapter 6.2, paragraph 6.2.37 to 6.2.42	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.37 and 6.2.43 to 6.2.45	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.37 and 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.6 to 7.2.14 and paragraphs 7.2.40 to 7.2.52	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2 paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2 paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2 paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A142 Vanellus vanellus; Lapwing (Non breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.50 to 6.2.57	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.72 to 6.2.75	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.64 to 6.2.67	No LSE Chapter 6.2, paragraph 6.2.64 , 6.2.68 to 6.2.70	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.80 and 6.2.83 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	No LSE Chapter 6.2, paragraph 6.2.106 to 6.2.112	No LSE Chapter 6.2, paragraph 6.2.111 to 6.2.112	N/A	No LSE Chapter 6.2, paragraph 6.2.37 to 6.2.42	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.37 and 6.2.43 to 6.2.45	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.37 and 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.6 to 7.2.14 and paragraphs 7.2.40 to 7.2.52	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2 paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2 paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2 paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A143 Calidris canutus; Red knot (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.50 to 6.2.57	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.72 to 6.2.75	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.64 to 6.2.67	No LSE Chapter 6.2, paragraph 6.2.64 , 6.2.68 to 6.2.70	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.80 and 6.2.83 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	No LSE Chapter 6.2, paragraph 6.2.106 to 6.2.112	No LSE Chapter 6.2, paragraph 6.2.111 to 6.2.112	N/A	No LSE Chapter 6.2, paragraph 6.2.37 to 6.2.42	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.37 and 6.2.43 to 6.2.45	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.37 and 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.6 to 7.2.14 and paragraphs 7.2.40 to 7.2.52	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2 paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2 paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2 paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A149 Calidris alpina alpina; Dunlin (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.50 to 6.2.57	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.72 to 6.2.75	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.64 to 6.2.67	No LSE Chapter 6.2, paragraph 6.2.64 , 6.2.68 to 6.2.70	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.80 and 6.2.83 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	No LSE Chapter 6.2, paragraph 6.2.106 to 6.2.112	No LSE Chapter 6.2, paragraph 6.2.111 to 6.2.112	N/A	No LSE Chapter 6.2, paragraph 6.2.37 to 6.2.42	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.37 and 6.2.43 to 6.2.45	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.37 and 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.6 to 7.2.14 and paragraphs 7.2.40 to 7.2.52	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2 paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2 paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2 paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A156 Limosa limosa islandica; Black-tailed godwit (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.50 to 6.2.57	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.72 to 6.2.75	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.64 to 6.2.67	No LSE Chapter 6.2, paragraph 6.2.64 , 6.2.68 to 6.2.70	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.80 and 6.2.83 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	No LSE Chapter 6.2, paragraph 6.2.106 to 6.2.112	No LSE Chapter 6.2, paragraph 6.2.111 to 6.2.112	N/A	No LSE Chapter 6.2, paragraph 6.2.37 to 6.2.42	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.37 and 6.2.43 to 6.2.45	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.37 and 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.6 to 7.2.14 and paragraphs 7.2.40 to 7.2.52	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2 paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2 paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2 paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A162 Tringa totanus; Common redshank (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.50 to 6.2.57	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.72 to 6.2.75	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.64 to 6.2.67	No LSE Chapter 6.2, paragraph 6.2.64 , 6.2.68 to 6.2.70	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.80 and 6.2.83 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	No LSE Chapter 6.2, paragraph 6.2.106 to 6.2.112	No LSE Chapter 6.2, paragraph 6.2.111 to 6.2.112	N/A	No LSE Chapter 6.2, paragraph 6.2.37 to 6.2.42	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.37 and 6.2.43 to 6.2.45	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.37 and 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.6 to 7.2.14 and paragraphs 7.2.40 to 7.2.52	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2 paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2 paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2 paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Waterbird assemblage	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.50 to 6.2.57	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.72 to 6.2.75	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.64 to 6.2.67	No LSE Chapter 6.2, paragraph 6.2.64 , 6.2.68 to 6.2.70	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.80 and 6.2.83 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	No LSE Chapter 6.2, paragraph 6.2.106 to 6.2.112	No LSE Chapter 6.2, paragraph 6.2.111 to 6.2.112	N/A	No LSE Chapter 6.2, paragraph 6.2.37 to 6.2.42	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.37 and 6.2.43 to 6.2.45	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.37 and 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.6 to 7.2.14 and paragraphs 7.2.40 to 7.2.52	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2 paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2 paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2 paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Thames Estuary and Marshes Ramsar	Ramsar Criterion 2 Endangered and scarce plant species	Stage 1 Screening	N/A	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.3 to 6.2.5 and paragraph 6.2.59 to 6.3.61	N/A	N/A	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.8 to 6.2.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.117 to 6.2.120	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.3 to 7.2.4 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar Criterion 2 British Red Data Book invertebrates	Stage 1 Screening	N/A	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.3 to 6.2.5 and paragraph 6.2.59 to 6.3.61	N/A	N/A	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.8 to 6.2.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.117 to 6.2.120	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.3 to 7.2.4 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar Criterion 5 Assemblages of waterfowl - overwintering	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.3 to 6.2.5 and paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.8 to 6.2.11	No LSE (Chapter 6.2, paragraph 6.2.68 to 6.2.72	N/A	No LSE Chapter 6.2, paragraph 6.2.118 to 6.2.120	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81 and 6.2.84 to 6.2.85	N/A	No LSE Chapter 6.2, paragraph 6.2.24 to 6.2.26 and paragraph 6.2.89 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.29 to 6.2.31 and paragraph 6.2.94 to 6.2.97	LSE Chapter 6.2, paragraph 6.2.98 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.29 to 6.2.31 and paragraph 6.2.94 to 6.2.97	No LSE Chapter 6.2, paragraph 6.2.101	N/A	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.107 to 6.2.111	No LSE Chapter 6.2, paragraph 6.2.107 to 6.2.109 and paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.39 to 6.2.43	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.38 and 6.2.47	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.38 and 6.2.44 to 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.8 to 7.2.16 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.3 to 7.2.4 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2, paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2, paragraph 7.2.20 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar site criterion 6 - on passage Ringed plover, Charadrius hiaticula	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.3 to 6.2.5 and paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.8 to 6.2.11	No LSE (Chapter 6.2, paragraph 6.2.68 to 6.2.72	N/A	No LSE Chapter 6.2, paragraph 6.2.117 to 6.2.120	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.24 to 6.2.26 and paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.100	N/A	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	N/A	No LSE Chapter 6.2, paragraph 6.2.38 to 6.2.43	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.38 and 6.2.47	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.38 and 6.2.44 to 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.8 to 7.2.16 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.3 to 7.2.4 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2, paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2, paragraph 7.2.6 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar site criterion 6 - on passage Black-tailed godwit, Limosa limosa islandica	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.3 to 6.2.5 and paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.8 to 6.2.11	No LSE (Chapter 6.2, paragraph 6.2.68 to 6.2.72	N/A	No LSE Chapter 6.2, paragraph 6.2.117 to 6.2.120	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.24 to 6.2.26 and paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.100	N/A	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	N/A	No LSE Chapter 6.2, paragraph 6.2.38 to 6.2.43	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.38 and 6.2.47	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.38 and 6.2.44 to 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.8 to 7.2.16 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.3 to 7.2.4 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2, paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2, paragraph 7.2.6 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar site criterion 6 - overwintering Grey plover, Pluvialis squatarola	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.3 to 6.2.5 and paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.8 to 6.2.11	No LSE (Chapter 6.2, paragraph 6.2.68 to 6.2.72	N/A	No LSE Chapter 6.2, paragraph 6.2.117 to 6.2.120	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.24 to 6.2.26 and paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.100	N/A	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	N/A	No LSE Chapter 6.2, paragraph 6.2.38 to 6.2.43	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.38 and 6.2.47	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.38 and 6.2.44 to 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.8 to 7.2.16 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.3 to 7.2.4 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2, paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2, paragraph 7.2.6 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar site criterion 6 - overwintering Red knot, Calidris canutus islandica	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.3 to 6.2.5 and paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.8 to 6.2.11	No LSE (Chapter 6.2, paragraph 6.2.68 to 6.2.72	N/A	No LSE Chapter 6.2, paragraph 6.2.117 to 6.2.120	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.24 to 6.2.26 and paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.100	N/A	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	N/A	No LSE Chapter 6.2, paragraph 6.2.38 to 6.2.43	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.38 and 6.2.47	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.38 and 6.2.44 to 6.2.46	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.8 to 7.2.16 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.3 to 7.2.4 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2, paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2, paragraph 7.2.6 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

European Site (Code)	Qualifying Features	Effect Pathway / Development Phase ➔ HRA Stage ↓	Land take C	Land take O	Land take D	Change in air quality – dust emissions C	O	D	Introduction /spread of Invasive Non-Native Species C	O	D	Changes in surface water quality and quantity – construction and operation C	O	D	Change in air quality – vehicle emissions – construction and operation C	O	D
	Ramsar site criterion 6 - overwintering Dunlin, Calidris alpina alpina	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.3 to 6.2.5 and paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.8 to 6.2.11	No LSE (Chapter 6.2, paragraph 6.2.68 to 6.2.72	N/A	No LSE Chapter 6.2, paragraph 6.2.117 to 6.2.120	No LSE Chapter 5.1, paragraph 5.1.12	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.8 to 7.2.16 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.3 to 7.2.4 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar site criterion 6 - overwintering Common redshank, *Tringa totanus*	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.3 to 6.2.5 and paragraph 6.2.59 to 6.3.61	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.8 to 6.2.11	No LSE (Chapter 6.2, paragraph 6.2.65 to 6.2.70	N/A	No LSE Chapter 6.2, paragraph 6.2.117 to 6.2.120	No LSE Chapter 5.1, paragraph 5.1.12	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2, paragraph 7.2.8 to 7.2.16 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.3 to 7.2.4 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Epping Forest SAC (UK0012720)	4010 Northern Atlantic wet heaths with *Erica tetralix*	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 5.1, Plate 5.1a and paragraph 5.1.23	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	4030 European dry heaths	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 5.1, Plate 5.1a and paragraph 5.1.23	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	9120 Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrub layer (Quercion robori-petraeae or Ilici-Fagenion)	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.126 to 6.2.130	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.54 to 7.2.57 and paragraphs 7.2.63 to 7.2.68	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	1083 Stag beetle Lucanus cervus	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.126 to 6.2.130	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraphs 7.2.54 to 7.2.57 and paragraphs 7.2.63 to 7.2.68	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
North Downs Woodland SAC (UK0030225)	H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco Brometalia*) ; Dry grasslands and scrublands on chalk or	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 5.1, Plate 5.1b and paragraph 5.1.23	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.132 to 6.2.136	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.132 to 6.2.136	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

European Site (Code)	Qualifying Features	Effect Pathway / Development Phase ➔ HRA Stage ↓	Changes in groundwater quality and quantity – tunnel construction and operation C	O	D	Collision with vehicles and/or utilities infrastructure - operation C	O	D	Changes in noise and vibration – underwater and above ground – tunnel construction only C	O	D	Changes in noise and vibration C	O	D	Changes in visual disturbance C	O	D
	Ramsar site criterion 6 - overwintering Dunlin, Calidris alpina alpina	Stage 1 Screening	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.24 to 6.2.26 and paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.100	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2, paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar site criterion 6 - overwintering Common redshank, *Tringa totanus*	Stage 1 Screening	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.13 to 6.2.18	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.79 to 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.24 to 6.2.26 and paragraph 6.2.88 to 6.2.90	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	LSE Chapter 6.2, paragraph 6.2.97 to 6.2.102	N/A	LSE Chapter 6.2, paragraph 6.2.9 to 6.2.31 and paragraph 6.2.93 to 6.2.96	No LSE Chapter 6.2, paragraph 6.2.97 to 6.2.100	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31, paragraphs 7.2.35 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	No AEoI: Chapter 7.2, paragraphs 7.2.32 to 7.2.36 and paragraphs 7.2.40 to 7.2.52	N/R	No AEoI Chapter 7.2, paragraph 7.2.22 to 7.2.31 and paragraphs 7.2.40 to 7.2.52	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Epping Forest SAC (UK0012720)	4010 Northern Atlantic wet heaths with *Erica tetralix*	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	4030 European dry heaths	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	9120 Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrub layer (Quercion robori-petraeae or Ilici-Fagenion)	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	1083 Stag beetle Lucanus cervus	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
North Downs Woodland SAC (UK0030225)	H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco Brometalia*) ; Dry grasslands and scrublands on chalk or	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

European Site (Code)	Qualifying Features	Effect Pathway / Development Phase ➔ HRA Stage ↓	Change in light levels C	O	D	Change in recreational disturbance – construction C	O	D	Change in recreational disturbance – operation (Tilbury Fields visitor pressures) C	O	D	Change in recreational disturbance –operation (wider visitor pressures) C	O	D
	Ramsar site criterion 6 - overwintering Dunlin, Calidris alpina alpina	Stage 1 Screening	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	N/A	No LSE Chapter 6.2, paragraph 6.2.38 to 6.2.43	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.38 and 6.2.47	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.38 and 6.2.44 to 6.2.46	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2, paragraph 7.2.6 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar site criterion 6 - overwintering Common redshank, *Tringa totanus*	Stage 1 Screening	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	No LSE Chapter 6.2, paragraph 6.2.34 to 6.2.35 and paragraph 6.2.105 to 6.2.111	N/A	No LSE Chapter 6.2, paragraph 6.2.38 to 6.2.43	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.38 and 6.2.47	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.38 and 6.2.44 to 6.2.46	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI: Chapter 7.2, paragraph 7.2.6 and paragraphs 7.2.40 to 7.2.52	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Epping Forest SAC (UK0012720)	4010 Northern Atlantic wet heaths with *Erica tetralix*	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	4030 European dry heaths	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	9120 Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrub layer (Quercion robori-petraeae or Ilici-Fagenion)	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	1083 Stag beetle Lucanus cervus	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
North Downs Woodland SAC (UK0030225)	H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco Brometalia*) ; Dry grasslands and scrublands on chalk or	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

Table F.3 Planning Inspectorate Advice Note 10 Summary Table for Effects of the Project In combination with other Plans and Projects

European Site (Code)	Qualifying Features	Effect Pathway	Land take			Change in air quality – dust emissions			Introduction /spread of Invasive Non-			Changes in surface water quality and quantity –			Change in air quality – vehicle emissions – construction			Changes in groundwater quality and quantity – tunnel			Collision with vehicles and/or utilities			Changes in noise and vibration –			Changes in noise and vibration			Changes in visual disturbance			Change in light levels			Change in recreational disturbance –			Change in recreational disturbance –			Change in recreational disturbance		
		Development Phase → HRA Stage ↓	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Thames Estuary and Marshes SPA (UK9012021)	A082 *Circus cyaneus* ; Hen harrier (Non-breeding)	Stage 1 Screening	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A394 Anser albifrons albifrons European white-fronted goose; (Non breeding)	Stage 1 Screening	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	No LSE Chapter 5.2, Table 5.6	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A	N/A	No LSE Chapter 5.2, Table 5.6	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A132 Recurvirostra avosetta; Pied avocet (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.76 to 6.2.77	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81and paragraph 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19 and table 7.4 to table 7.7	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A137 Charadrius hiaticula; Ringed plover (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.76 to 6.2.77	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81and paragraph 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19 and table 7.4 to table 7.7	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A141 Pluvialis squatarola; Grey plover (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.76 to 6.2.77	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81and paragraph 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19 and table 7.4 to table 7.7	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A142 Vanellus vanellus; Lapwing (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.76 to 6.2.77	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81and paragraph 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19 and table 7.4 to table 7.7	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A143 Calidris canutus; Red knot (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.76 to 6.2.77	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81and paragraph 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19 and table 7.4 to table 7.7	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A149 Calidris alpina alpina; Dunlin (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.76 to 6.2.77	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81and paragraph 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19 and table 7.4 to table 7.7	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A156 Limosa limosa islandica; Black-tailed godwit (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.76 to 6.2.77	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81and paragraph 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19 and table 7.4 to table 7.7	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	A162 Tringa totanus; Common redshank (Non-breeding)	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.76 to 6.2.77	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81and paragraph 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19 and table 7.4 to table 7.7	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Waterbird assemblage	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.76 to 6.2.77	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	No LSE Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	No LSE Chapter 5.1, paragraph 5.1.12 to 5.1.13	N/A	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	No LSE Chapter 5.1, paragraph 5.1.9 to 5.1.11	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81and paragraph 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19 and table 7.4 to table 7.7	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and table 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Thames Estuary and Marshes Ramsar	Ramsar Criterion 2 Endangered and scarce plant species	Stage 1 Screening	N/A	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.6 to 6.2.7 and paragraph 6.2.62 to 6.3.63	N/A	N/A	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.12	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.120 to 6.2.123 and table 6.11	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.5	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar Criterion 2 British Red Data Book invertebrates	Stage 1 Screening	N/A	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.6 to 6.2.7 and paragraph 6.2.62 to 6.3.63	N/A	N/A	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.12	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.120 to 6.2.123 and table 6.11	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.5	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ramsar Criterion 5 Assemblages of waterfowl	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.6 to 6.2.7 and paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.12	No LSE (Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 6.2, paragraph 6.2.120 to 6.2.123 and table 6.11	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81 and 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.26 to 6.2.27 and paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.35 to 6.2.36 and paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19, and table 7.4 to 7.7	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.5	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Ringed plover, Charadrius hiaticula	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.6 to 6.2.7 and paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.12	No LSE (Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 6.2, paragraph 6.2.120 to 6.2.123 and table 6.11	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81 and 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.26 to 6.2.27 and paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.35 to 6.2.36 and paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19, and table 7.4 to 7.7	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.5	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Black-tailed godwit, Limosa limosa islandica	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.6 to 6.2.7 and paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.12	No LSE (Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 6.2, paragraph 6.2.120 to 6.2.123 and table 6.11	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81 and 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.26 to 6.2.27 and paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.35 to 6.2.36 and paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19, and table 7.4 to 7.7	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.5	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Grey plover, Pluvialis squatarola	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.6 to 6.2.7 and paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.12	No LSE (Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 6.2, paragraph 6.2.120 to 6.2.123 and table 6.11	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81 and 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.26 to 6.2.27 and paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.35 to 6.2.36 and paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19, and table 7.4 to 7.7	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.5	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Red knot, Calidris canutus islandica	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.6 to 6.2.7 and paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.12	No LSE (Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 6.2, paragraph 6.2.120 to 6.2.123 and table 6.11	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81 and 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.26 to 6.2.27 and paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.35 to 6.2.36 and paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19, and table 7.4 to 7.7	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.5	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Dunlin, Calidris alpina alpina	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.6 to 6.2.7 and paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.12	No LSE (Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 6.2, paragraph 6.2.120 to 6.2.123 and table 6.11	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81 and 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.26 to 6.2.27 and paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.35 to 6.2.36 and paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19, and table 7.4 to 7.7	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.5	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	Common redshank, *Tringa totanus*	Stage 1 Screening	LSE Chapter 6.2, paragraph 6.2.51 to 6.2.58	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.6 to 6.2.7 and paragraph 6.2.62 to 6.3.63	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.73 to 6.2.76	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.12	No LSE (Chapter 6.2, paragraph 6.2.70 to 6.2.71	N/A	No LSE Chapter 6.2, paragraph 6.2.120 to 6.2.123 and table 6.11	No LSE Chapter 5.1, paragraph 5.1.12	N/A	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	No LSE Chapter 5.1, Table 5.1 and Chapter 6.2, paragraph 6.2.19 to 6.2.20	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.80 to 6.2.81 and 6.2.84	N/A	No LSE Chapter 6.2, paragraph 6.2.26 to 6.2.27 and paragraph 6.2.90 to 6.2.91	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	LSE Chapter 6.2, paragraph 6.2.102 to 6.2.103	N/A	LSE Chapter 6.2, paragraph 6.2.31 to 6.2.32 and paragraph 6.2.102 to 6.2.103	No LSE Chapter 6.2, paragraph 6.2.104	N/A	No LSE Chapter 6.2, paragraph 6.2.35 to 6.2.36 and paragraph 6.2.112 to 6.2.113	No LSE Chapter 6.2, paragraph 6.2.112 to 6.2.113	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.48	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.47	N/A
		Stage 2 Appropriate Assessment	No AEoI Chapter 7.2 paragraph 7.2.15 to 7.2.19, and table 7.4 to 7.7	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.5	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	No AEoI Chapter 7.2 paragraph 7.2.37 to 7.2.39, table 7.11 and 7.12	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.21	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Epping Forest SAC (UK0012720)	4010 Northern Atlantic wet heaths with *Erica tetralix*	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 5.2, Plate 5.1 and paragraph 5.2.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	4030 European dry heaths	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 5.2, Plate 5.1 and paragraph 5.2.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	9120 Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrub layer (Quercion robori-petraeae or Ilici-Fagenion)	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.129	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.58 to 7.2.62 and table 7.19	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	1083 Stag beetle Lucanus cervus	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	LSE Chapter 6.2, paragraph 6.2.129	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	No AEoI Chapter 7.2 paragraph 7.2.58 to 7.2.62 and table 7.19	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
North Downs Woodland SAC (UK0030225)	H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco Brometalia*) ; Dry grasslands and scrublands on chalk or	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 5.2, Plate 5.1 and paragraph 5.2.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	H9130. Asperulo-Fagetum beech forests; Beech forests on neutral to rich soils	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.135 to 6.2.136	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
	H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland	Stage 1 Screening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No LSE Chapter 6.2, paragraph 6.2.135 to 6.2.136	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Stage 2 Appropriate Assessment	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		Stage 3 Derogations	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

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