



Thurrock Flexible Generation Plant

Habitats Regulations Assessment Report

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Summary

The objective of this report is to collate and provide sufficient information to enable the Secretary of State to undertake a Habitats Regulations Assessment (HRA) of the potential effects of the DCO application for Thurrock Flexible Generation Plant on the Natura 2000 network. It provides sufficient standalone information, with references to other more detailed sections where necessary, for the Secretary of State to be able to make an informed decision on the potential effects of the proposed development on Natura 2000 sites.

Qualifications

This document has been prepared by Mike Barker, a Fellow of the Chartered Institute of Ecology and Environmental Management and a Chartered Environmentalist, who has over

twenty five years' experience of ecological impact assessment, Hannah Knight, an Associate Member of the Chartered Institute of Ecology and Environmental Management with five years' experience of ecological impact assessment, including HRA, and Matt Fasham, a Chartered Environmentalist and full Member of the Chartered Institute of Ecology and Environmental Management, who has fifteen years' experience of environmental impact assessment including HRA.

It has been reviewed by Mike Armitage BSC, a Chartered Environmentalist and Member of the Chartered Institute of Ecology and Environmental Management, who has 23 years' experience in ecology, specialising in ornithology in coastal and marine environments, including Habitats Regulations Assessments.

Contributions on air quality were provided by Dr Nick Betson CEnv MCIEEM who has over 14 years' experience in the assessment of effects of air quality on terrestrial habitats.

Glossary

Term	Definition
Biodiversity Action Plan	The UK Government's response to the Convention on Biological Diversity, which the UK signed in 1992 in Rio de Janeiro and ratified in 1994. The Convention on Biological Diversity requires signatory countries to identify, develop and enforce action plans to conserve, protect and enhance biological diversity. The UK BAP addresses this requirement. Local BAPs have been produced by many counties, to detail measures to conserve, protect and enhance local/county biological diversity.
Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
Enhancement	An ecological enhancement is the modification of a site which increases the site's capacity to support target plants or animals.
European Protected Species	The animal species listed in Annex IV(a) to the Habitats Directive and the plant species listed in Annex IV(b) to the Habitats Directive.
Environmental Quality Standard	The Environmental Quality Standard (EQS) is the threshold below which impacts due to changes in air quality do not occur according to current knowledge. Three different EQS are referred to: critical level (a concentration - used in relation to gaseous pollutants), a critical load (CL, nutrient nitrogen deposition rate used in relation to pollutants deposited on the ground) and a critical load function (CLF - a description of deposition of acidifying compounds).
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
Habitats Regulations Assessment	The Habitats Regulations, and Offshore Marine Conservation Regulations where applicable, require competent authorities, before granting consent for a plan or project, to carry out an Appropriate Assessment (AA) in circumstances where the plan or project is likely to have a significant effect on a European site or a European Marine site (either alone or in combination with other plans or projects). Habitats Regulations Assessment (HRA) refers to the whole process of assessment, including the AA stage (where one is required). For Hornsea Three, a Report to Inform Appropriate Assessment (RIAA) has been prepared to accompany the application for development consent (document reference A5.2).
Local Biodiversity Action Plan	Local BAPs have been produced by many counties, to detail measures to conserve, protect and enhance local/county biological diversity.
Local Nature Reserve	A local authority designation under the National Parks and Access to the Countryside Act 1949 (as amended), and in consultation with relevant statutory nature conservation agencies.
Local Wildlife Site	Alternative title to Wildlife Site, as defined below. Defined in local and structure plans under the Town and Country Planning system. The designation is a material consideration when planning applications are being determined.
National Nature Reserve	Designated under the National Parks and Access to the Countryside Act 1949 (as amended) and Wildlife and Countryside Act 1981 (as amended). Support examples of some of the most important natural and semi-natural ecosystems in Great Britain. Managed to conserve habitats and species within them, and to provide scientific study opportunities.

Term	Definition
Non-statutory designated sites	Non-statutory designated sites are sites which have been designated due to their nature conservation interest, typically through the local planning process, which are usually protected by planning policies but not legally protected.
Priority Habitats	UK Biodiversity Action Plan priority habitats are those identified as being the most threatened and requiring conservation action under the UK BAP.
Priority Species	UK Biodiversity Action Plan priority species were those that were identified as being the most threatened and requiring conservation action under the UK BAP.
Ramsar Convention	The Convention on Wetlands of International Importance especially as Waterfowl Habitat of 2 February 1971 (as amended) which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
Ramsar site	Wetlands of international importance, designated under the Ramsar Convention.
Site of Importance for Nature Conservation	Alternative title to Wildlife Site, as defined below. Defined in local and structure plans under the Town and Country Planning system. The designation is a material consideration when planning applications are being determined.
Site of Nature Conservation Importance	Alternative title to Wildlife Site, as defined below. Defined in local and structure plans under the Town and Country Planning system. The designation is a material consideration when planning applications are being determined.
Sites of Special Scientific Interest	Sites designated by Natural England under the Wildlife and Countryside Act 1981 (as amended) as areas of land of special interest by reason of any of their flora, fauna, or geological or physiographical features.
Special Areas of Conservation	A site of Community importance designated under Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora through a statutory, administrative and/or contractual act where the necessary conservation measures are applied for the maintenance or restoration, at a favourable conservation status, of the natural habitats and/or the populations of the species for which the site is designated.
Special Protection Area	An area which has been identified as being of international importance and designated under Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds for the breeding, feeding, wintering or the migration of rare and vulnerable bird species found within European Union countries.
Statutory designated sites	Sites which have been designated under UK and in some cases European or international legislation which protects areas identified as being of special nature conservation importance.
Wildlife Site	Local authority designation for sites of local conservation interest. Designation criteria can vary between areas, as can titles which include Local Wildlife Site, Local Nature Conservation Site, Site of Importance for Nature Conservation or Site of Nature Conservation Importance. They are defined in local and structure plans under the Town and Country Planning system and are a material consideration when planning applications are being determined.

Term	Definition
Woodland	As described under the Phase 1 habitat survey guidelines (JNCC, 2010); vegetation dominated by trees more than 5 m high when mature, forming a distinct, although sometimes open, canopy. In Natural England's guidelines for Environmental Stewardship (Natural England, 2013, native woodland is defined as a group of trees with overlapping canopies covering at least 0.1 ha, at least half of which are native species.
Works areas	The areas within which all works associated with the construction, operation and decommissioning of the proposed Flexible Generation Plant are undertaken, including access, drainage and landscaping.

Acronyms

Unit	Description
AGI	Above ground installation
BAP	Biodiversity Action Plan
BEIS	Department for Business, Energy and Industrial Strategy
CEMP	Construction Environmental Management Plan
CL	Critical Load or Critical Level (as applicable)
CLF	Critical Load Function
CoCP	Code of Construction Practice
DCO	Development Consent Order
DECC	(former) Department of Energy and Climate Change
DMRB	Design Manual for Roads and Bridges
ECoW	Ecological Clerk of Works
EEA	European Economic Association
EIA	Environmental impact assessment
EMP	Ecological Management Plan
EPS	European Protected Species
EQS	Environmental Quality Standard
GCN	Great crested newt
HSI	Habitat Suitability Index
LBAP	Local Biodiversity Action Plan
LNR	Local Nature Reserve

Unit	Description
LoWS	County Wildlife Site
LPA	Local Planning Authority
LTC	Lower Thames Crossing
NE	Natural England
NERC	Natural Environment and Rural Communities
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
NTS	National Transmission System
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
rMCZ	recommended Marine Conservation Zone
SAC	Special Area of Conservation
SoCC	Statement of Community Consultation
SoS	Secretary of State
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TEC	Tilbury Energy Centre
VER	Valued Ecological Receptor
WCA 1981	The Wildlife and Countryside Act 1981 (as amended)
WSI	Written Scheme of Investigation

Units

Unit	Description
ha	Hectare (10,000 m ²)
km	Kilometre (distance)
m	Metre (distance)

1. Introduction

1.1 Background

- 1.1.1 This document is intended to provide sufficient information to enable the Secretary of State to undertake a Habitats Regulations Assessment (HRA) of the potential effects of the Development Consent Order (DCO) application for Thurrock Flexible Generation Plant on the Natura 2000 network.
- 1.1.2 This information applies to the proposed development described in full in Volume 2, Chapter 2: Project Description of the Environmental Statement (ES, application document A6).
- 1.1.3 The proposed development comprises the construction and operation of:
- reciprocating gas engines with rated electrical output totalling 600 MW;
 - batteries with rated electrical output of 150 MW and storage capacity of up to 600 MWh;
 - gas and electricity connections;
 - creation of temporary and permanent private access routes for construction haul and access in operation, including a permanent causeway for the delivery of abnormal indivisible loads (AILs) by barge; and
 - designation of exchange Common Land and habitat creation or enhancement for protected species translocation and biodiversity gain.

1.1 Purpose of this report

- 1.1.1 The need for an Appropriate Assessment is set out in Article 6(3) of the Habitats Directive and interpreted into British law by Regulation 63 of the Conservation of Species and Habitats Regulations (2017) (see Table 1.1).

Table 1.1: Legislative Basis for a Habitats Regulations Assessment.

The legislative basis for Habitat Regulations Assessment		
Habitats Directive	Article 6(3)	Any plan or project not directly connected with or necessary to the management of a Special Protection Area (SPA) or Special Area of Conservation (SAC) but likely to have a significant effect thereon, either individually or in-combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.

The legislative basis for Habitat Regulations Assessment		
Habitats Regulations	Regulation 63	A competent authority, before deciding to give any consent for a plan or project which is likely to have a significant effect on a European site shall make an appropriate assessment of the implications for the site in view of that site's conservation objectives

- 1.1.2 The Habitats Directive applies the precautionary principle to relevant designated areas, in so much as plans and projects can only be permitted after having ascertained that there will be no adverse effect on the integrity of an SPA or SAC, collectively termed Natura 2000 sites.
- 1.1.3 It is Government policy (as outlined in Section 174 of the National Planning Policy Framework, 2019) for sites designated under the Convention on Wetlands of International Importance (Ramsar sites) to be treated as having equivalent status to Natura 2000 sites. As such, information to inform an Appropriate Assessment needs to cover features of any relevant Ramsar site. Similarly, in accordance with Government advice, proposed SPAs (pSPA) should be treated as having protection under the Habitats Regulations. On this basis, therefore, the term Natura 2000 sites is used throughout the document as a collective term for all such sites.
- 1.1.4 In undertaking an assessment, competent authorities (in this case the appropriate Secretary of State) must have regard to both direct and indirect effects on an interest feature of the Natura 2000 site, as well as cumulative effects. This may include consideration of features and issues outside the boundary of a Natura 2000 site. The Department for Communities and Local Government and Planning Inspectorate guidance states that an assessment should be proportionate to the geographical scope of the plan or project and that it need not be done in any more detail, or using more resources, than is useful for its purpose (DCLG, 2006; Planning Inspectorate (PINS), 2016).
- 1.1.5 Plans and projects for which it is not possible to conclude that there would be no adverse effect on the integrity of Natura 2000 sites may still be permitted if there are no alternatives and there are Imperative Reasons of Overriding Public Interest (IROPI) as to why they should go ahead. In such cases, compensation would be necessary to ensure the overall integrity of the site network.
- 1.1.6 A recent Court of Justice of the European Union (CJEU) judgment (Case C-323/17, known as People Over Wind) ruled that Article 6(3) of the Habitats Directive should be interpreted as meaning that mitigation/avoidance measures should only be considered within the framework of an appropriate assessment and not at a screening stage. This has been highlighted by a recent note by PINS (Note 05/2018) to their inspectors.

2. Scope and Objectives

2.1 Objectives

2.1.1 While it is the responsibility of the competent authority to determine whether it can be concluded there is no adverse effect, it is the responsibility of applicants to submit sufficient information to enable such a determination to be made.

2.1.2 The objective of this report is therefore to collate and provide sufficient information to enable the Secretary of State to undertake a Habitat Regulations Assessment (HRA) of the potential effects of the Thurrock Flexible Generation Plant, on the Natura 2000 network. It draws upon information within the Environmental Statement (application document A6), notably Volume 3, Chapter 9: Onshore Ecology, but purposely does not repeat the detail contained within the Environmental Statement. Instead, it provides sufficient standalone information, with references to other more detailed sections where necessary, for the Secretary of State to be able to make an informed decision on the potential effects of the proposed development on Natura 2000 sites.

2.2 Scope

2.2.1 All Natura 2000 sites shown to be linked to the proposed development through a known 'pathway' have been included in the scope of a Habitats Regulations Assessment.

2.2.2 No Natura 2000 sites or Ramsar sites lie wholly or partly within the boundary of the area covered by the application boundary. The locations of the Natura 2000 sites in relation to the application boundary can be seen in Figure 2.1.

2.2.3 Based on the nature of the proposed development and the findings of the technical chapters of the Environmental Statement, it has been decided that the following Natura 2000 and Ramsar sites require consideration as to whether they could be affected:

- Thames Estuary and Marshes SPA;
- Thames Estuary and Marshes Ramsar;
- Medway Estuary and Marshes SPA;
- Medway Estuary and Marshes Ramsar;
- Benfleet and Southend Marshes SPA;
- Benfleet and Southend Marshes Ramsar;
- Peter's Pit SAC; and
- North Downs Woodland SAC.

2.2.4 Key activities in the development programme are:

- site preparation and enabling works;
- main construction;
- commissioning; and
- decommissioning.

2.2.5 Decommissioning will comprise the rendering inoperable of the Generating Plant and removal/demolition of key plant and equipment. An appropriate plan for the decommissioning of the Proposed Development to protect the environment will be developed as a requirement of the Environmental Permit to operate the site.

2.2.6 At this stage, the prediction of the nature of such effects is not possible. However, they could include a range of activities that would be similar to those undertaken during construction and would therefore be subject to any necessary mitigation/avoidance measures which may be similar to those identified in Section 6 below. On this basis, the activities of decommissioning and demolition of the Thurrock Flexible Generation Plant and effects that may arise from such activities are considered to be analogous to those arising in construction.



Figure 2.1: Natura 2000 sites within 15 km of the Thurrock Flexible Generation Plant main development site.

3. Methodology

3.1 Key principles

3.1.1 The key principles adopted during the collation and analysis of information are set out in Table 3.1.

Table 3.1: Key Principles Underpinning the Assessment Methodology.

Key Principles Underpinning the Assessment Methodology	
Principle	Rationale
Use of best available existing information	We will use best available existing information to inform the assessment. This will include ecological information gathered on behalf of Thurrock Power, information made available through production of the Environmental Statement and information from other sources, including Natural England, British Trust for Ornithology, and others.
Proportionality	We will ensure that the level of detail provided in the assessment reflects the level of detail in the application for development consent (i.e. that the assessment is proportionate).
Consultation	We will ensure continued consultation with Natural England and other stakeholders during production of the assessment and ensure that we take on board their comments.
Transparency in the assessment process	We will endeavour to keep the process as open, transparent and simple as possible while ensuring an objective and rigorous assessment in compliance with the Habitats Directive, Habitats Regulations and emerging best practice.
Audit trail	We will ensure that the process followed and the conclusions reached are clearly documented so there is a clear audit trail.

3.2 Process

3.2.1 The stages of HRA are described below, adapted from Government guidance. The stages are essentially iterative, being revisited as necessary in response to more detailed information, recommendations and any relevant changes to the plan until no significant adverse effects remain.

Stage 1 – Qualifying Interest Features

3.2.2 Collect information on identified Natura 2000 and Ramsar sites and their conservation objectives.

3.2.3 The qualifying interest features for the sites assessed in this report have been obtained via the citation details on the JNCC/Natural England websites. The conservation objectives provide the basis for determining what is currently causing, or may cause, a significant effect, and for informing the scope of appropriate assessments. Natural England has not produced Conservation Advice packages, including Conservation Objectives, for Ramsar sites. This is because it is considered that the Conservation Advice packages for overlapping SPAs will in most cases be sufficient to support the management of Ramsar interests.

3.2.4 In addition to qualifying interest features, it is necessary to explore the environmental features and conditions required to maintain the integrity of the Natura 2000 sites, as well as both current condition and trends in environmental processes.

Stage 2 – Likely Significant Effect

3.2.5 The second stage is to determine whether there are any Likely Significant Effects (LSEs) on Natura 2000 sites as a result of the proposed development in the absence of mitigation/avoidance measures. This is essentially a risk assessment to decide whether a more detailed assessment is required and, if so, the scope of the issues and features to be addressed. This involves identifying the potential pathways through which the Development Consent Order (DCO) application could affect the interest features of relevant Natura 2000 sites, and then assessing in broad terms the magnitude of each impact to determine whether a significant effect is likely.

3.2.6 The main purpose of this stage is to screen out those aspects of the proposal which would not be likely to give rise to significant effects, and to screen out features of each relevant Natura 2000 site that are not likely to be significantly affected. Judgements have been based on sound reasoning and within the context of best available knowledge on the various ways in which development of the nature proposed could impact on the interest features of the relevant Natura 2000 sites. Judgements are made in the absence of mitigation/avoidance measures, in line with the People over Wind ruling. If it cannot be concluded with confidence that adverse effects are unlikely, then under the precautionary principle, it is assumed that the issue requires more detailed consideration.

Stage 3 – Appropriate Assessment

3.2.7 The Appropriate Assessment will assess the likely significant effects of the proposed development on the conservation objectives of relevant Natura 2000 and Ramsar sites and determine whether no adverse effect can be concluded both alone and in combination with other plans or projects.

- 3.2.8 When a plan or project cannot be 'screened out' as being unlikely to have a significant effect on a Natura 2000 site, it is necessary to explore whether there are any adverse effects and, if so, devise suitable avoidance and mitigation measures to be able to conclude no adverse effect. Experience suggests that the best approach to addressing this is on a site by site basis, with avoidance / mitigation measures focused on the environmental conditions needed to maintain site integrity.

Stage 4 – In-combination Assessment

- 3.2.9 The Habitats Regulations require that a decision to grant permission can only be made once the Competent Authority is satisfied that no adverse effects on the integrity of the Natura 2000 sites in question are likely, both alone and in-combination with other plans and projects. Therefore, Stage 4 of the HRA process requires the identification of other plans and projects that might affect the interest features of the relevant Natura 2000 sites in combination with the proposed development and decide whether there any adverse effects that might occur in-combination (collectively) that did not occur when considered alone.

4. Stage 1 – Qualifying Interest Features

Thames Estuary and Marshes SPA and Ramsar

- 4.1.1 The boundary of the Thames Estuary and Marshes SPA and Ramsar site lies just under 1.02 km from the area covered by the proposed development site.
- 4.1.2 The Thames Estuary and Marshes consists of an extensive mosaic of grazing marsh, saltmarsh, mudflats and shingle characteristic of the estuarine habitats of north Kent and south Essex. Freshwater pools and some areas of woodland provide additional variety and complement the estuarine habitats. Whilst the majority is situated in Kent along the south shore of the Thames estuary, additional areas are located along the north shore of the Thames Estuary in Essex.
- 4.1.3 The Thames Estuary and Marshes Ramsar site was designated in 2000. In addition to qualifying under Criterion 5 as it is used regularly by over 20,000 waterfowl in any season and under Criterion 6 as it is used regularly by 1% or more of the biogeographic populations of migratory species of waterfowl, it also qualifies under Criterion 2a of the Ramsar Convention by supporting a number of species of rare plants and animals (Table 4.1).

Table 4.1: Qualifying Plant and Invertebrate Species for the Thames Estuary and Marshes Ramsar Site.

Ramsar Criteria	Scientific Name	Species Name
Nationally rare plant species	<i>Chenopodium chenopodioides</i>	Saltmarsh Goosefoot
Nationally scarce plant species	<i>Alopecurus bulbosus</i> <i>Bupleurum tenuissimum</i> <i>Carex divisa</i> <i>Hordeum marinum</i> <i>Inula crithmoides</i> <i>Polypogon monspeliensis</i> <i>Puccinellia fasciculata</i> <i>Puccinellia rupestris</i> <i>Salicornia pusilla</i> <i>Stratiotes aloides</i> <i>Trifolium glomeratum</i> <i>Trifolium squamosum</i> <i>Zostera angustifolia</i> <i>Zostera noltii</i>	Bulbous Foxtail Slender Hare's-ear Divided Sedge Sea Barley Golden Samphire Annual Beard Grass Borrer's Saltmarsh-grass Stiff Saltmarsh-grass Glasswort Water Soldier Clustered Clover Sea Clover Narrow-leaved Eelgrass Dwarf Eelgrass
Endangered invertebrate species	<i>Bagous longitarsis</i>	A weevil

Ramsar Criteria	Scientific Name	Species Name
Vulnerable invertebrate species	<i>Henestaris halophilus</i> <i>Bagous cylindrus</i> <i>Polystichus connexus</i> <i>Erioptera bivittata</i> <i>Hybomitra expollicata</i> <i>Lejops vittata</i> <i>Poecilobothrus ducalis</i> <i>Pteromicra leucopeza</i> <i>Philanthus triangulum</i> <i>Lestes dryas</i>	A groundbug A weevil A ground beetle A cranefly A horse fly A hoverfly A dancefly A snail killing fly A solitary wasp A damselfly
Rare invertebrate species	<i>Cercyon bifenestratus</i> <i>Hydrochus elongates</i> <i>H.ignicollis</i> <i>Ochthebius exaratus</i> <i>Hydrophilus piceus</i> <i>Malachius vulneratus</i> <i>Philonthus punctus</i> <i>Telmatophilus brevicollis</i> <i>Campsicnemus magius</i> <i>Haematopota bigoti</i> <i>Stratiomys longicornis</i> <i>Baryphyma duffeyi.</i>	A water beetle A water beetle A water beetle A water beetle A water beetle A beetle A rove beetle A fungus beetle A fly A horsefly A soldier fly A spider

- 4.1.4 The qualifying bird interest features listed in the SPA and Ramsar site citations, together with the criteria used for this assessment (in line with Natural England advice, this is whichever provides the strongest protection) are presented in Table 4.2.

Table 4.2: Qualifying Bird Species of the Thames Estuary and Marshes.

Species Name	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Annex 1 Species Regularly Wintering in Numbers of European Importance				
Avocet	<i>Recurvirostra avosetta</i>	283 representing 28.3% of British wintering population	-	283
Hen Harrier	<i>Circus cyaneus</i>	7 representing 1.0% of the British wintering population	-	7

Species Name	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Migratory species regularly occurring on passage				
Ringed Plover	<i>Charadrius hiaticula</i>	1,324 individuals - passage 2.6% Europe/ Northern Africa (win)	595 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9- 2002/3)	595
Migratory species regularly occurring over winter				
Grey Plover	<i>Pluvialis squatarola</i>	2,593 representing 1.7% of the East Atlantic wintering population	1,643 representing 1.8% of the GB population	1,643
Knot	<i>Calidris canutus</i>	4,848 representing 1.4% of Northeast Canada/ Greenland/Iceland/ North West Europe population	7,279 representing 1.6% of the population	4,848
Dunlin	<i>Calidris alpina</i>	29,646 representing 2.1% of North Siberia/Europe/ West Africa population	15,171 representing 1.1% of the population	15,171
Black-tailed Godwit	<i>Limosa limosa</i>	1,699 representing 2.4% of the Iceland breeding population	1,640 representing 4.6% of the Iceland breeding population	1,640
Redshank	<i>Tringa totanus</i>	3,251 representing 28.3% of the Eastern Atlantic wintering population	1,178 representing 1% of the GB population	1,178
Assemblage regularly supporting over 20,000 waterfowl		75,019	45118 (5 year peak mean 1998/99 – 2002/03)	45,118

- 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; and
- the distribution of the qualifying features within the site.

Marine Component of the Thames Estuary and Marshes SPA

4.1.6 The three key supporting sub-features (habitats) are:

- mudflats;
- saltmarsh; and
- intertidal shingle.

4.1.7 Mudflats are a rich source of invertebrates and provide the main feeding ground for wintering species such as dunlin, knot and black-tailed godwit, which occur on the SPA in internationally important numbers, and the other nationally important waterfowl species which contribute to the waterfowl assemblage. In addition, mudflats do support plant life, including algae and some very limited eel-grass and algae. These can be valuable as food for wildfowl, especially when inland feeding sites are frozen. Mudflats also provide important roosting areas for internationally important assemblages of waterfowl and its qualifying species.

4.1.8 Saltmarsh is not extensive in the Thames Estuary and Marshes SPA, but nevertheless provides important high tide roost sites for the internationally important assemblage of waterfowl and its qualifying species. Upper saltmarsh in particular provides high tide roost sites. The vegetation varies because the plants at each level within its vertical profile are adapted to their particular degree of tidal exposure. Also in parts, the vegetation varies because of grazing by domestic livestock. Where the vegetation is kept short by grazing livestock, wildfowl which are themselves grazers, including teal, can feed. Where there is shallow water within the saltings, it is especially suitable for dabbling duck.

4.1.9 Small areas of intertidal shingle and cobble beaches on the south bank of the Thames provide important roost sites for wading birds displaced from the mudflats at high tide.

4.1.10 Subject to natural change, the conservation objective for these sub-features is to maintain them in favourable condition.

North Downs Woodland SAC

4.1.11 The boundary of the North Downs Woodland SAC site lies 9.54 km south of the application boundary.

4.1.5 The Conservation Objectives for the SPA (NE 2019a) are to 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;

4.1.12 The qualifying interest features include mature *Asperulo-Fagetum* beech forests and *Taxus baccata* woods of the British Isles, which are both Annex I Priority Habitats.

4.1.13 Also present (although not a primary reason for site selection) is the Annex I Priority Habitat semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites). This priority habitat type comprises calcareous grasslands containing an important assemblage of rare and scarce orchid species.

4.1.14 The conservation objectives for the site (NE 2019b) are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the favourable conservation status of its qualifying features, by maintaining or restoring:

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

Benfleet and Southend Marshes SPA and RAMSAR

4.1.15 Located 12.94 km north west of the application boundary, the habitat in this SPA/Ramsar is similar to the Thames Estuary and Marshes. It is made up of several intertidal, subtidal and terrestrial habitat types that birds rely upon for loafing, roosting and foraging. In many locations the presence of a seawall separates the terrestrial parts of the site (such as freshwater and coastal grazing marsh) from the intertidal and marine zones (mixed and coarse sediments, saltmarsh, sand and mud flats, shell banks and seagrass beds).

Table 4.3: Qualifying bird features of the Benfleet and Southend Marshes

Species Name	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Migratory species regularly occurring over winter				
Dark-bellied Brent goose	<i>Branta bernicla bernicla</i>	7,200+ representing 4% of the world population	4,532 representing 2.1% of the population	4,532
Grey Plover	<i>Pluvialis squatarola</i>	2,500 representing 1% of the East Atlantic wintering population	1,710 representing 3.2% of the GB population	1,710

Species Name	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Knot	<i>Calidris canutus</i>	8,400 representing 2% East Atlantic Flyway population	6,307 representing 1.4% of the population	6,307
Dunlin	<i>Calidris alpina</i>	11,000 representing 3% of British	N/a	11,000
Ringed Plover	<i>Charadrius hiaticula</i>	430 representing 2% of the British population	N/a	430
Assemblage regularly supporting over 20,000 waterfowl		30,400	32,867	30,400

4.1.16 The conservation objectives for the site (NE 2019c) are to 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; and,
- the distribution of the qualifying features within the site.

Medway Estuary and Marshes SPA and RAMSAR

4.1.17 The Medway Estuary (11.03 km to the south east of the application boundary) feeds into and lies on the south side of the outer Thames Estuary in Kent, south-east England. It forms a single tidal system with the Swale and joins the Thames Estuary between the Isle of Grain and Sheerness. It has a complex arrangement of tidal channels, which drain around large islands of saltmarsh and peninsulas of grazing marsh.

Table 4.4: Medway Estuary and Marshes Ramsar Qualifying Plant and Invertebrate species

Ramsar Criteria	Scientific Name	Species Name
Nationally scarce plants	<i>Hordeum marinum</i>	Sea Barley
	<i>Parapholis incurve</i>	Curved hard-grass
	<i>Polypogon monspeliensis</i> ,	Annual beard-grass
	<i>Puccinellia fasciculata</i> ,	Borrer's saltmarsh-grass
	<i>Bupleurum tenuissimum</i>	Slender hare's-ear
	<i>Trifolium squamosum</i> ,	Sea Clover
	<i>Chenopodium chenopodioides</i>	Saltmarsh goose-foot
	<i>Inula crithmoides</i>	Golden Samphire
	<i>Sarcocornia perennis</i>	Perennial glasswort
	<i>Salicornia pusilla</i>	One-flowered glasswort
Nationally scarce invertebrates	<i>Polistichus connexus</i>	A ground beetle
	<i>Cephalops perspicuous</i>	A fly
	<i>Poecilobothrus ducalis</i>	A dancefly
	<i>Anagnota collini</i>	A fly
	<i>Baris scolopacea</i>	A weevil
	<i>Berosus spinosus</i>	A water beetle
	<i>Malachius vulneratus</i>	A beetle
	<i>Philonthus punctus</i>	A rove beetle
	<i>Malacosoma castrensis</i>	The ground lackey moth
	<i>Atylotus latistriatus</i>	A horsefly
	<i>Campsicnemus magius</i>	A fly
	<i>Cantharis fusca</i>	A soldier beetle
<i>Limonia danica</i>	A crane fly	

Table 4.5: Qualifying Bird Species of Medway Estuary and Marshes

	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Annex 1 Species Regularly Breeding in Numbers of European Importance				
Avocet	<i>Recurvirosta avosetta</i>	28 pairs representing 7% of the breeding population in Britain	-	28 pairs
Little Tern	<i>Sterna albifrons</i>	24 pairs representing 1% of the breeding population in Britain	-	24 pairs

	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Annex 1 Species Regularly Wintering in Numbers of European Importance				
Avocet	<i>Recurvirosta avosetta</i>	70 representing 7% of the population in Britain	-	70
Annex 1 Species Regularly On Passage in Numbers of European Importance				
Grey Plover	<i>Pluvialis squatarola</i>	4,810 representing 3.2% of East Atlantic Flyway population and 22.9% of the British winter population	3,103 individuals, representing an average of 1.2% of the population	3,103
Redshank	<i>Tringa totanus</i>	4,810 representing 2.7% of East Atlantic Flyway population and 5.5% of the British winter population	3,709 individuals, representing an average of 1.4% of the population	3,709
Migratory Species Regularly Wintering in Numbers of European Importance				
Dark-bellied Brent Goose	<i>Branta bernicla bernicla</i>	4,130 representing 2.4% of the world population and 4.6% of British winter population	2,575 representing 1.1% of the population	2,575
Shelduck	<i>Tadorna tadorna</i>	5,900 representing 2.3% of the North West European population and 7.9% of the British winter population	2,627 representing 3.3% of the GB population	2,627
Pintail	<i>Anas acuta</i>	980 representing 1.4% of the North West European wintering and 3.9% of the British winter population	1,118 representing 1.8% of the population	980
Ringed Plover	<i>Charadrius hiaticula</i>	740 representing 1.4% of the East Atlantic Flyway population and 3.2% of the British wintering population	540 representing 1.6% of the GB population	540
Knot	<i>Calidris canutus</i>	3,690 representing 1.0% of the East Atlantic Flyway and 1.6% of the British wintering population	3,021 representing 1.0% of the GB population	3,021

	Scientific Name	SPA Citation	Ramsar	Assessment Criteria
Dunlin	<i>Calidris alpina</i>	22,900 representing 1.6% of the East Atlantic Flyway and 5.3% of the British wintering population	8,263 representing 1.4% of the GB population	8,263
Regularly supports in winter a diverse assemblage of wintering species	-	53,900	47,637	47,637
Diverse assemblage of breeding migratory waterfowl	-	No number on citation	N/a	-

4.1.18 The 1993 citation for the Medway Estuary and Marshes SPA (NE 2019d) lists 18 species of waterfowl within the over-wintering assemblage occurring in internationally- or nationally-important numbers:

- Dark-bellied Brent Goose;
- Shelduck;
- Pintail;
- Ringed Plover;
- Grey Plover;
- Knot;
- Dunlin;
- Redshank;
- Great Crested Grebe;
- Wigeon;
- Teal;
- Shoveler;
- Oystercatcher;
- Black-tailed Godwit;
- Curlew;
- Spotted Redshank;
- Greenshank; and
- Turnstone.

4.1.19 The Citation also lists 18 species comprising the diverse assemblage of wintering species:

- Red-throated Diver;
- Great Crested Grebe;
- Cormorant;
- Shelduck;
- Mallard;
- Teal;
- Shoveler;
- Pochard;
- Oystercatcher;
- Ringed Plover;
- Dunlin;
- Redshank;
- Bewick's Swan;
- Hen Harrier;
- Merlin;
- Golden Plover;
- Short-eared Owl; and
- Kingfisher.

4.1.20 With respect to the breeding assemblage, the Citation lists the following species:

- Oystercatcher;
- Lapwing;
- Ringed Plover;
- Redshank;
- Shelduck;
- Mallard;
- Teal;
- Shoveler; and
- Common Tern.

4.1.21 The Conservation Objectives for the SPA (NE 2019d) are to 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; and,
- the distribution of the qualifying features within the site.

Peter's Pit SAC

- 4.1.22 Peter's Pit is an old chalk quarry situated in the North Downs in north Kent, with large ponds situated amongst grassland, scrub and woodland, 13.15 km south east of the application boundary. The ponds have widely fluctuating water levels and large great crested newt *Triturus cristatus* populations have been recorded breeding here.
- 4.1.23 The site is designated as it supports large breeding populations of great crested newt.
- 4.1.24 The conservation objectives for the site (NE 2019e) are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features by maintaining or restoring:
- the extent and distribution of qualifying natural habitats;
 - the structure and function of habitats of qualifying species;
 - the supporting processes on which the habitats of qualifying species rely;
 - the population of qualifying species; and
 - the distribution of qualifying species within the site.

5. Stage 2 – Likely Significant Effect

5.1 Screening of Likely Significant effects

5.1.1 This section deals with the screening of likely significant negative effects on the qualifying feature and sub-features of the relevant Natura 2000 and Ramsar sites as a result of the construction, operation and decommissioning of the proposed development. The environmental pathways that could lead to a significant effect may be summarised as:

- direct loss or damage of habitats within a designated site or of nearby areas used by interest species, including functionally linked land;
- change in management regimes (e.g. grazing / mowing) of habitats within a designated site or of nearby areas used by interest species;
- urbanisation that results in over shadowing, reduction of sight lines or which hinders flight paths;
- changes in air quality;
- changes in water quality;
- other hydrological changes, including in the balance of saline and non-saline conditions;
- disturbance (activity, recreation, noise and lighting); and
- introduction or spread of non-native invasive species.

5.1.2 The possibility of the proposed development having a likely significant effect on any of the designated sites identified in Section 4 is discussed for each of these impact pathways in turn below.

5.1.3 Screening matrices for all the sites identified in Section 3 above are provided in Appendix B.

Direct loss or damage of habitats used by interest species

5.1.4 As the development is a minimum of 1.02 km away from closest designated site (the Thames Estuary and Marshes SPA / Ramsar) the proposed development will not result in any direct loss of any designated habitat within any of the designated sites.

5.1.5 There is no evidence that the terrestrial elements of the proposed development site regularly support significant numbers of roosting wintering birds either of qualifying individual species or assemblages of the Thames Estuary and Marshes SPA / Ramsar. Surveys of terrestrial land potentially considered to be functionally linked land with respect to the Thames Estuary and Marshes SPA were undertaken. These surveys found no evidence that species associated with the SPA were present on fields within or adjacent to the site, and no significant populations of terrestrial wintering birds were identified.

5.1.6 There have been a series of surveys undertaken since 2007 which have been reviewed (Bioscan 2016/17; RWE 2017/18 [located in the Environmental Statement (application document A6) Volume 6, Appendix 9.2: Third Party Survey Reports]). The data from these sources indicates sporadic to occasional use by low numbers of SPA species in the intertidal area in the vicinity of the proposed causeway. Higher aggregations of waders and wildfowl were recorded outside and to the east of the survey area and further east within the SPA itself.

5.1.7 An updated survey of wintering birds within the intertidal zone has been undertaken covering the September 2019 to March 2020 period (Volume 6, Appendix 9.4: Foreshore Wintering Bird Surveys 2019-20). The assessment of the utilisation of habitat within and adjacent to the intertidal causeway in Zone G by wintering birds in the 2019-20 winter period (Volume 6, Appendix 9.4) determined that the area is not generally in use by significant numbers of most species of birds. Of the species which are qualifying features of the Thames Estuary & Marshes SPA, Avocet, Black-tailed Godwit, Dunlin, Redshank and Ringed Plover were recorded during the surveys.

5.1.8 The intertidal habitats within and adjacent to the proposed development are considered to be Functionally Linked Land (FLL) with respect to the Thames Estuary & Marshes SPA.

5.1.9 Assessment of the impacts of construction on habitats in the intertidal zone are provided in Environmental Statement Volume 3, Chapter 17: Marine Environment. There will be a temporary loss of up to 1.4 ha of intertidal mudflat for dredging for the vessel grounding pocket. This will recover following cessation of dredging, with infilling of the dredge pocket, with full recovery expected within two years.

5.1.10 There will also be a long-term loss of c. 610m² of saltmarsh habitat and 0.35 ha of intertidal mudflat for the causeway itself, which will be decommissioned at the end of the end of the TFGP life (35 years by design), or sooner if an alternative access for delivery of replacement gas engines by road emerges during the operational life of the plant.

- 5.1.11 In addition, over the lifetime of the causeway its presence is likely to cause accretion of sediment downstream in the shelter of the causeway and over time there may be some 'natural' colonisation of this accretion area by saltmarsh species, as described in ES Chapter 17: Marine Environment. It is estimated that the maximum amount of accreted mudflat that might develop into saltmarsh over the lifetime of the causeway is 1.1 ha, i.e. up to the area of the formerly proposed managed saltmarsh creation. There may in practice be less or no colonisation, but this 1.1 ha is taken to be the precautionary maximum figure for assessment. In the longer term, when the causeway is decommissioned (which would occur if a viable road alternative for Abnormal Indivisible Load delivery becomes available or otherwise at the end of the flexible generation plant's operating lifetime), then the process of sediment accretion would be reversed. Once the previous flow regime is restored by the removal of the causeway, accreted sediment would start to erode and eventually the condition of the habitats in the vicinity of the causeway would revert to the existing baseline.
- 5.1.12 There will therefore be some loss of FLL mudflat habitat in the short and long term.
- 5.1.13 In order to contextualise this impact, the total resource of mudflat habitat within the Thames Estuary and Marshes SPA and in FLL within and adjacent to the TFGP has been estimated.
- 5.1.14 An estimate of the total area of mudflat within the Thames Estuary & Marshes SPA was derived from the English Nature Regulation 33 advice note (<http://publications.naturalengland.org.uk/file/3346937>) which states that "mudflats are extensive within the estuary, with over 2,250 ha on the south bank and c. 260 ha at Mucking". An estimate of 2,510 ha of mudflat within the SPA is therefore made.
- 5.1.15 Secondly, the amount of mudflat outside of the SPA which could reasonably be considered as Functionally Linked Land (FLL) and accessible to the birds using the TFGP site was made. The Natural England Priority Habitat Layer for 'mudflats' was used, but it is clear from a comparison with aerial photos that the 'mudflat' habitat layer does not include all mudflats down to mean low water. An additional estimate of this additional area of mudflat was therefore also made.
- 5.1.16 Potential mudflat FLL was measured from the SPA westwards to Tilbury Fort, on both banks of the river. Within the intertidal works area surveyed for Volume 6: Appendix_17.1:_Phase 1 Intertidal Survey Report and Benthic Ecology Desktop Review, the extent of mudflat from this survey was used, as the survey measured a larger extent of mudflat within the survey area than was obtained from the estimate derived using the NE Priority Habitat GIS layer and mean low water.
- 5.1.17 The areas measured are shown on Figure 5.1.
- 5.1.18 A summary of the mudflat areas measures is provided in Table 5.1. Approximately 94.87 ha of potentially FLL mudflat is present, which including the 2,510 ha of SPA mudflat brings the total area to 2,605 ha of mudflat.
- 5.1.19 The temporary loss (2 year duration) of mudflat for the barge berthing pocket is 1.5% of the FLL and 0.05% of the total mudflat resource. The longer-term loss of habitat for the causeway itself is 0.37% of the potential FLL and 0.015% of the total mudflat resource. The maximum potential longer term loss of mudflat via saltmarsh naturally colonising sediment accreting in the shelter of the causeway is 1.16% of the potential FLL and 0.04% of the total mudflat resource. Losses of mudflat from the causeway and sediment accretion would be reversed after the causeway is decommissioned.
- 5.1.20 As the loss of mudflat is outside of the SPA and only a small proportion of the available habitat resource, it is not considered that this represents a significant loss of habitat for qualifying features of the SPA. It is concluded that the effects of direct habitat loss on qualifying features of any nearby designated sites can be screened out.

Table 5.1. Mudflat areas in the vicinity of the TFGP

	NE 'Mudflat' Priority Habitat layer (ha)	Additional mudflat to MLW (ha)	Total mudflat (ha)
Causeway			0.38
Barge pocket			1.42
Potential saltmarsh accretion area			1.1
Works area excluding causeway, barge pocket and potential saltmarsh accretion area			2.4
0-500m east of works area (disturbance impact zone)	3.26	0.92	4.18
0-500m west of works area (disturbance impact zone)	2.1	0.11	2.21
North shore east of disturbance zone (outside SPA)	18.83	33.26	52.09
North shore west of disturbance zone (outside SPA)	6.07	0.3	6.37
South shore (outside SPA)	21.52	3.2	24.72
Total			94.87
Thames Estuary & Marshes SPA mudflat			2510
Total mudflats SPA & FLL combined			2604.87

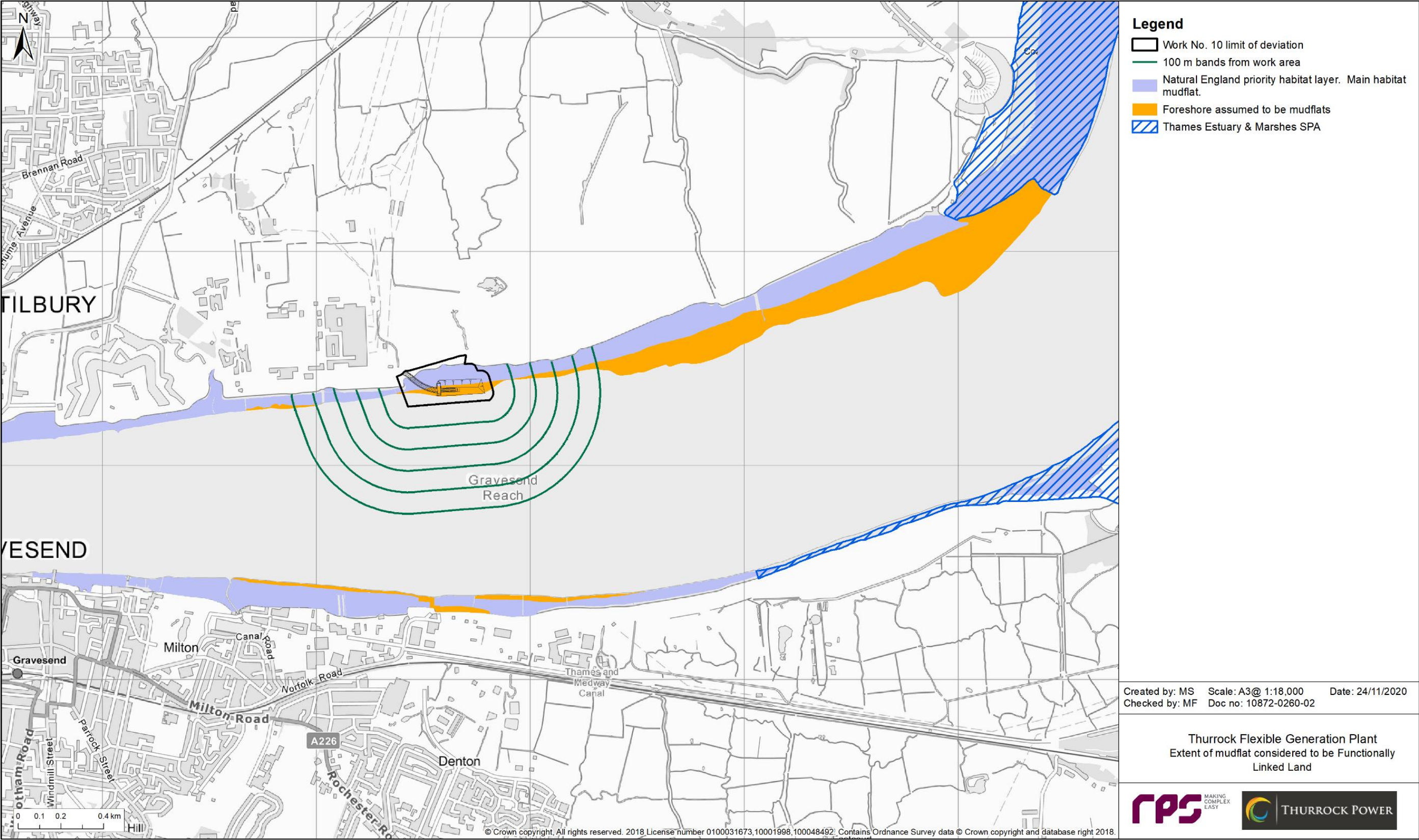


Figure 5.1. Mudflat within and adjacent to the TFGP site

Change in habitat management regimes

- 5.1.21 The majority of the existing land use immediately surrounding and in the vicinity of the proposed development site is agricultural land and inert landfilling to the east, a substation, former power station and industrial docks to the south and west, and agricultural land, railway and common land to the north.
- 5.1.22 The current management regimes for the SPA / Ramsar sites focus on maintaining the habitats for the qualifying breeding and waterbird assemblages (Natural England, 2019a), while the SACs' objectives focus on maintaining the Annex I habitats or habitats that support Annex II species.
- 5.1.23 Given the distance from the application boundary to any of the designated sites, the proposed development will result in no change to current management regimes of any sub-feature of an SPA, Ramsar site or SAC during either the construction or operation of the flexible generation plant.
- 5.1.24 Therefore, impacts occurring from a change in habitat management regimes can be screened out, as no likely significant effects are anticipated.

Loss of future space to allow for managed realignment

- 5.1.25 This potential effect is only relevant to the Thames Estuary sites. There is evidence that rising sea levels are causing intertidal habitats, notably saltmarsh and mudflats, to migrate landwards across all the designated sites under consideration. However, such landward migration can be rendered impossible due the presence of sea walls and other flood defences, resulting in a reduction in both the extent and quality of some sub-features through coastal squeeze. The removal or landward relocation of defences is seldom possible in existing built up areas and new development which takes place immediately behind sea walls and flood defences can result in it no longer being possible to move the defences landwards to accommodate replacement of eroded or drowned out intertidal habitats.
- 5.1.26 The proposed development site is located on a mixture of farmland and common land, which is predominantly low-lying. No area of the site is currently considered for future managed re-alignment as part of the current Thames Estuary 2100 Plan (EA 2012). If this were to change in the future, given that the application site is 1.02 km from the SPA / Ramsar site, there is considerable land between the application site and the designated site to accommodate further realignment.
- 5.1.27 On this basis, therefore, it can be concluded that impacts occurring from a loss of future space can be screened out, as no likely significant effects are anticipated on the Thames Estuary and Marshes SPA / Ramsar site.

Urbanisation

- 5.1.28 Industrial development has the potential to overshadow areas of habitat within designated sites, or areas used by the interest features of such sites, as well as to obstruct flight paths and lines of sight, reducing the appeal of the habitat or increasing the risk of fatalities through collisions.
- 5.1.29 The main development site is 2.62 km from the visible part of the intertidal area within the Thames Estuary and Marshes SPA / Ramsar site, which supports populations of waterbirds. There is therefore no potential for the development to overshadow any of the habitats for which the SPA / Ramsar site has been designated.
- 5.1.30 Surveys of land potentially considered to be functionally linked land with respect to the Thames Estuary and Marshes SPA have been undertaken. These surveys found no evidence that species associated with the SPA were present on fields within or adjacent to the site, and no significant populations of terrestrial wintering birds were identified.
- 5.1.31 As set out above in paragraphs 5.1.6 and 5.1.7, surveys for wintering birds within the intertidal zone indicate sporadic to occasional use by SPA species in the intertidal area in the vicinity of the proposed causeway.
- 5.1.32 As such it is considered very unlikely that any flight paths of birds coming / going from the SPA will be blocked as a result of the development. This is strengthened by the fact that the Tilbury2 port development (under construction) is located immediately south and west of the proposed development, which is likely to deter bird species from using the immediate surrounds.
- 5.1.33 Therefore, any impacts occurring from increased urbanisation can be screened out, as no likely significant effects are anticipated upon the Thames Estuary and Marshes.
- 5.1.34 All other designated sites are a considerable distance from the site; as such, no likely significant effect is predicted due to increased urbanisation.

Air quality

- 5.1.35 The two air quality issues during construction are dust and increased traffic emissions, while those during operation are increased traffic and emissions from the gas engine exhaust stacks.

5.1.36 Levels of understanding of air quality effects on semi-natural habitats and qualifying interest species of Natura 2000 sites are relatively in their infancy. The Air Pollution Information System (APIS) is a publicly available support tool for UK conservation and regulatory agencies, industry and local authorities to help assess the potential effects of air pollutants on habitats and species. It aims to enable a consistent approach to air pollution assessment across the UK. This specifically includes informing assessments required under the Habitats Regulations. Consequently, reference has been made to the information contained within the APIS website where relevant.

Construction dust

5.1.37 The potential for dust release exists during the construction phase, with potential sources including site clearance, earthworks and vehicle movements.

5.1.38 For sensitive ecological receptors, the IAQM guidance (Holman *et al.*, 2014) on the assessment of dust from demolition and construction sets 50 m as the distance from the site boundary and from the site traffic route(s) within which there could potentially be nuisance dust and PM₁₀ effects.

5.1.39 The boundary of the closest designated site (Thames Estuary and Marshes SPA and Ramsar) is over 1 km to the east of the proposed development site; therefore, there is no pathway for construction dust to reach any of the designated sites.

5.1.40 Therefore, the impact of construction dust on the designated sites can be screened out, as no likely significant effects are anticipated.

Traffic – Construction & Operation

5.1.41 The major impacts of air pollutants on coastal habitats and grasslands in the UK as a result of traffic are ozone, nitrogen deposition and acidification. According to the Department for Transport's Transport Analysis Guidance, the contribution of vehicle emissions from the roadside to local pollution levels is not significant beyond 200 metres from a road (HA 2007). This is therefore the distance that has been used to determine whether Natura 2000 and Ramsar sites are likely to be significantly affected by traffic emissions associated with the proposed development.

5.1.42 The roads to be used during both construction and operation of the proposed development are located over 200 m from the designated site boundary. Therefore, the issue of pollution from traffic is screened out from further assessment as it can be concluded that it will not have a likely significant effect on any of the designated sites.

Operational emissions

5.1.43 The principal source of operational emissions will be gases exhausted from the stacks of gas reciprocating engine generator sets.

5.1.44 The methods for screening of potential likely significant effects with respect to operational emissions are described in Volume 3, Chapter 12: Air Quality of the ES while the data relating to designated sites is presented in Volume 6, Appendix 12.1: Air Quality Impacts on Ecological Receptors of the ES.

5.1.45 For all pollutants (NO_x, nutrient nitrogen deposition and acid deposition), either the Predicted Environmental Concentration (PEC) did not exceed the Environmental Quality Standard (EQS) or the Process Contribution (PC) was <1% of the EQS for almost all of the ecological interest features of designated sites in the study area.

5.1.46 The one exception is nutrient nitrogen deposition and acid deposition for Ringed Plover within the Thames Estuary & Marshes SPA/Ramsar where the maximum PC is >1% of the EQS and the PEC would exceed the relevant CL/CLF. The CL/CLF used in the assessment is taken from the Site-Relevant Critical Load tool on APIS and is for acidic coastal stable dune grassland. This habitat type does not occur within the Thames Estuary and Marshes SPA/Ramsar; indeed the main associations of this species within the SPA are the grazing marsh and inter-tidal mudflats, in particular at Mucking Flats near east Tilbury and further east at Allhallows-on-Sea (Frost *et al.* 2016). Such habitats are not susceptible to either acid or nutrient nitrogen deposition on the basis that they are both high-nutrient systems (as demonstrated by a high critical load of 20-30 kgN.ha⁻¹.yr⁻¹) and brackish (or salt water) and therefore more alkaline.

5.1.47 On this basis, it is considered that the data on APIS are not directly relevant to the population of Ringed Plover using the SPA where a higher critical load/CLF would be more appropriate, given the habitat associations of this species in this geographic location. Therefore, there is no potential for a likely significant effect on Ringed Plover using the Thames Estuary and Marshes SPA as a result of emissions to air from the proposed facility.

5.1.48 Therefore, given that no effect is predicted on either of the Annex 1 species for The Thames Estuary and Marshes SPA (Avocet or Hen Harrier) and no effect is predicted on the designated habitats or species within the SPA or the SAC, impacts occurring from operational air quality issues on all designated sites can be screened out, as no likely significant effects are anticipated.

5.1.49 Air quality data with respect to the Peter's Pit SAC, Medway Estuary & Marshes SPA/Ramsar and Benfleet and Southend Marshes SPA/Ramsar have not specifically been modelled. Given that the critical levels for NO_x, SO₂ and NH₃ are universal (i.e. the same for all vegetation) and no effect is predicted at sites closer to the proposed development, no effect from these gases is predicted at these more distant sites.

5.1.50 Peter's Pit comprises a matrix of woodland, scrub and grassland with large ponds supporting breeding great crested newts. APIS does not provide details of critical loads/critical load function for the fresh water habitats present. However, no effect is predicted on the much closer woodland habitats at the North Downs Woodland SAC and, as such, no effect on this site is predicted due to changes in nutrient nitrogen/acid deposition.

5.1.51 The habitats present within the Benfleet and Southend Marshes SPA/Ramsar and Medway Estuary & Marshes SPA/Ramsar are similar to those within the much closer Thames Estuary & Marshes SPA/Ramsar. Given that no effect is predicted at the Thames Estuary & Marshes SPA/Ramsar due to changes in nutrient nitrogen deposition or acid deposition, no effect is predicted at the Benfleet and Southend Marshes SPA/Ramsar.

Water quality

5.1.52 The quality of the water entering Natura 2000 and Ramsar sites is an important determinant of habitat condition and hence the species they support. Poor water quality can have a range of ecological impacts.

5.1.53 Given the proximity of the Thames Estuary and Marshes SPA / Ramsar site, likely significant effects from construction and operation of the flexible generation plant cannot be excluded, as the site is linked to the SPA / Ramsar site via a series of drainage ditches, which run from the land around the proposed development site to the River Thames.

5.1.54 Therefore, this will be taken through to Stage 3 (Appropriate Assessment) for the SPA / Ramsar site for all interest features.

5.1.55 All other sites considered here are a minimum of 10 km away from the application site and are not linked to the site via any hydrological or ecological pathways; therefore, no impacts upon the other sites are anticipated.

5.1.56 Effects on water quality due to dredging and mobilisation of sediment during construction of the causeway have been assessed in Volume 3, Chapter 17: Marine Environment and Volume 6, Appendices 17.2: Hydrodynamic Modelling and Sediment Assessment and 17.3: Water Framework Directive Assessment. These assessments have not predicted a deterioration in Thames Estuary water quality due to the proposed development and therefore no effect on the SPA / Ramsar site is likely.

Hydrological changes

5.1.57 The proposed development site will be suitably drained via a surface water management plan, which will utilise the existing drainage ditches in the surrounding area. These ditches will ultimately reach the SPA / Ramsar site, and the River Thames, and therefore, likely significant effects on the site cannot be ruled out.

5.1.58 Therefore, this will be taken through to Stage 3 (Appropriate Assessment) for the SPA / Ramsar site for all interest features.

5.1.59 Potential changes to the hydrology of the Thames (and therefore associated designated sites) could occur due to the construction of the causeway. However, as set out in the marine environment assessment of the Environmental Statement (particularly Volume 6, Appendices 17.2: Hydrodynamic Modelling and Sediment Assessment and 17.3: Water Framework Directive Assessment), no such changes are predicted. As such, effects due to changes in hydrology from the construction of the causeway can be screened out.

5.1.60 All other sites considered here are a minimum of 10 km away from the application site and are not linked to the site via any hydrological or ecological pathways; therefore, no impacts upon the other sites are anticipated.

Disturbance

5.1.61 Disturbance can be caused by noise (both during operation and construction) activity, recreation, and lighting. The application site is 1.02 km from the closest designated site boundary; therefore, impacts from construction or operation of the main Zone A development such as lighting, recreation and activity can be screened out, due to the separation distance between their boundaries and the designated sites.

Noise and visual disturbance – Construction (main site)

5.1.62 The Thames Estuary and Marshes SPA / Ramsar cited bird species have the potential to be impacted during the construction stage via ground clearance, vehicle movements and piling. Very loud noise and percussive noises have the potential to disturb birds, increasing time spent alert and in flight, reducing the available time to feed and increasing mortality.

5.1.63 The construction activity that would give rise to the largest potential noise effect is percussive piling, if employed for the main development site of the flexible generation plant. All other construction activities would generate noise at a lower magnitude.

5.1.64 A review of studies on impacts of piling noise on birds (e.g. Cutts *et al.* 2009; Cutts *et al.* 2013; Owens 1997; Postlethwaite & Stephenson 2012; Smit & Visser 1993; Wright *et al.* 2010) provides a range of thresholds for varying magnitude of impacts (Table 5.2).

Table 5.2: Piling noise criteria for birds.

Noise Level Range, dB L _{Amax} F	Magnitude of impact
≤ 65	Negligible
> 65 to ≤ 75	Minor
> 75 to ≤ 85	Moderate
> 85	Major

5.1.65 Noise contour modelling for percussive piling has been assessed in Volume 3, Chapter 11: Noise and Vibration of the ES and the impacts on birds are considered in Chapter 9: Ecology of the ES; this indicates that noise levels from piling would reduce to approximately 65 dB L_{Amax} at around 650 m from the source of piling noise, taken to be the main development site boundary. No piling would be required for construction of the causeway. There would therefore be no significant increase in noise levels at the Thames Estuary and Marshes SPA / Ramsar site, which is c 2.4 km at the closest distance from Zone A where piling activities would occur. There is also no potential for visual disturbance impacts on the SPA itself during construction.

5.1.66 It is not therefore considered that there would be significant effects from construction noise on this or any other designated sites or any birds within them.

5.1.67 The southern tip of the main development site is approximately 900 m from the sea wall at the shortest distance (immediately south). The closest distance for piling activities during construction is higher, at approximately 1.05 km. There would therefore be no impact on the low numbers of wintering birds that are designated features of the SPA which occasionally forage in the intertidal zone outside of the SPA boundary from piling noise or associated visual disturbance. Surveys have confirmed that the arable lands within the potential piling noise impact zone are not used by wintering birds associated with the SPA.

5.1.68 No significant effects are therefore predicted from construction noise or visual disturbance associated with the construction of the development within Zone A on Thames Estuary and Marshes SPA / Ramsar site or any breeding or wintering birds within it or that are using the foreshore.

5.1.69 Given the distance to the other designated sites considered here, any noise impacts can be screened out, due to the separation distance between the boundary and the designated sites.

Noise and visual disturbance – Construction (Zone G causeway)

5.1.70 Construction of the causeway and its subsequent use for deliveries of the gas engines to the Zone A construction site could result in noise and disturbance effects on wintering birds using the intertidal zone in the vicinity of the Zone G causeway.

5.1.71 Construction of the causeway would take approximately six months. If construction of the causeway overlaps with the September – March period, there is potential for noise and visual disturbance to qualifying species for the Thames Estuary and Marshes SPA/Ramsar.

5.1.72 In addition, during use of the causeway for the flexible generation plant construction period, barge deliveries may occur in one phase of 60 deliveries or in two separate phases of 30 deliveries each, and again there is potential for disturbance to qualifying species for the Thames Estuary and Marshes SPA/Ramsar to occur.

5.1.73 The assessment of the utilisation of the foreshore in the vicinity of the causeway area by wintering birds in the 2019-20 winter period (Volume 6, Appendix 9.4) determined that the area is not generally in use by significant numbers of most species of birds, although five of the qualifying species for the Thames Estuary and Marshes SPA (Avocet, Black-tailed Godwit, Dunlin, Redshank and Ringed Plover) were recorded over the course of the September 2019 – March 2020 wintering bird surveys. As set out in Volume 6, Appendix 9.4, Black-tailed Godwit were not present in sufficient numbers for a Likely Significant Effect to be identified on this species, and the other qualifying species (Hen Harrier, Grey Plover and Knot) were not recorded during surveys within 500m of the works area.

5.1.74 Avocets were present in the vicinity of the causeway from November – March with a maximum count of 49 birds. The potential for disturbance effects from causeway construction and use on Avocet as a qualifying feature of the Thames Estuary & Marshes SPA will therefore be taken through to Stage 3 (Appropriate Assessment).

5.1.75 The maximum count of Dunlin in the vicinity of the causeway was 124 from a single hour out of a 6-hour survey period, but it was only recorded on four out of 14 surveys, with the three other counts near the causeway being 10 or below, indicating only sporadic use of the habitat potentially affected.

- 5.1.76 Redshank were absent entirely from the causeway and adjacent area in 11 of the 14 surveys, with 3 birds recorded on two occasions and 5 birds on another occasion. This indicates that the area likely to be affected by construction and use of the causeway is only sporadically used by very low numbers of Redshank.
- 5.1.77 A maximum count of 65 Ringed Plover was recorded. Ringed Plover were absent entirely from the vicinity of the causeway in 9 of the 14 surveys, with the other four counts ranging from 2-25 birds. This indicates that the area likely to be affected by construction and use of the causeway is only sporadically used by Ringed Plover.
- 5.1.78 Although survey results indicate only sporadic use of the mudflats in the vicinity of the causeway by these three species, as a precautionary basis following consultation with Natural England, the potential for disturbance effects from causeway construction and use on Dunlin, Redshank and Ringed Plover as qualifying features of the Thames Estuary & Marshes SPA will therefore also be taken through to Stage 3 (Appropriate Assessment).

Noise and visual disturbance – Operational

- 5.1.79 Under normal operating conditions, the Flexible Generation Plant will produce a low hum, rather than any loud, sudden noises that might elicit a disturbance response from interest-feature birds using the intertidal areas of the SPA/Ramsar sites in the surrounding area. Noise modelling for the operational phase of the proposed development indicates that predicted noise level from the proposed development in operation at the boundary of the SPA/Ramsar site will be <35 dB L_{Af, Tr} (Volume 4, Chapter 11: Noise and Vibration of the ES), well below any threshold for disturbance (Cutts *et al.* 2013).
- 5.1.80 Given the circa 900 m distance of the Flexible Generation Plant from the foreshore and fact there is no movement associated with its operation aside from 4-6 shift staff and occasional reagent deliveries, there is no potential for visual disturbance.
- 5.1.81 Therefore, the issue of operational noise and visual disturbance from the flexible generation plant can be screened out from further assessment as it can be concluded that it will not be likely to have a significant effect on any of the designated sites.
- 5.1.82 The causeway could be used during the facility's operational phase for a barge delivery in the exceptional circumstance where a large plant item needed to be replaced due to failure. There is potential for disturbance to wintering birds if this were to occur while they are present in the vicinity of the causeway. However, in light of the low numbers of wintering birds recorded and the fact that such disturbance would be an exceptional or one-off event, not a routine or sustained use of the causeway, there is judged to be no likely significant effect from use of the causeway during the operational period.

- 5.1.83 The causeway itself will potentially have a continued effect until it is removed via displacement of birds if the passive presence of the causeway deters birds from feeding on otherwise suitable habitat nearby. The potential for disturbance effects from causeway presence during the operational period on Avocet, Dunlin, Redshank and Ringed Plover as qualifying features of the Thames Estuary & Marshes SPA will therefore be taken through to Stage 3 (Appropriate Assessment).

Introduction or spread of non-native invasive species

- 5.1.84 The movement of people and traffic, as well as importation of material and plants to a site, can result in the introduction of non-native species to a site. No non-native species are currently known to be present on site.
- 5.1.85 Given this, the issue of introducing and spread of non-native species is therefore screened out from further consideration in this assessment on the grounds of not likely to have a significant effect on any of the designated sites.

6. Stage 3 – Appropriate Assessment

6.1 Summary of the outcomes from Stage 2

6.1.1 A summary of the outcomes of Stage 2 is presented in Table 6.1, and Appropriate Assessment for the relevant impact pathways provided below this. Citation details for the Thames Estuary and Marshes SPA/Ramsar site are provided in Appendix A. Mitigation (Stage 4) is also included where appropriate. Integrity matrices are provided in Appendix B.

Table 6.1: Summary of Stage 2 Conclusions.

Impact Pathway	Screening Outcome	Designated Site	Feature
Direct loss of habitats	No Likely Significant Effect		
Change in management regimes	No Likely Significant Effect		
Loss of future space for managed realignment	No Likely Significant Effect		
Urbanisation	No Likely Significant Effect		
Air quality (construction dust)	No Likely Significant Effect		
Air quality (operational emissions)	No Likely Significant Effect		
Water quality	Significant effect cannot be excluded	The Thames Estuary and Marshes SPA / Ramsar	All
Hydrological changes	Significant effect cannot be excluded	The Thames Estuary and Marshes SPA / Ramsar	All
Disturbance (all forms) from construction and operation of the main development	No Likely Significant Effect		
Disturbance (noise and visual) from use of the Zone G causeway during construction	Significant effect cannot be excluded	The Thames Estuary and Marshes SPA / Ramsar	Avocet Dunlin Redshank Ringed Plover
Disturbance (visual) from presence of the Zone G causeway during operation	Significant effect cannot be excluded	The Thames Estuary and Marshes SPA / Ramsar	Avocet Dunlin Redshank Ringed Plover

Impact Pathway	Screening Outcome	Designated Site	Feature
Introduction or spread of non-native invasives	No Likely Significant Effect		

6.2 Water quality

6.2.1 Poor water quality can result in a range of impacts. At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour. Some industrial chemicals are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.

6.2.2 Eutrophication, the enrichment of plant nutrients in water, increases plant growth with high levels of macroalgal growth potentially smothering the mudflats used as feeding areas by qualifying bird species. The decomposition of organic matter that often accompanies eutrophication can deoxygenate water. In the marine environment, nitrogen is the limiting plant nutrient and so eutrophication is associated with discharges containing available nitrogen.

6.2.3 Because the surface water drainage links to the existing ditch system associated with the adjacent agricultural land and which leads to the Thames Estuary and Marshes SPA / Ramsar site, measures are required to prevent the release of contaminated water into the SPA, directly or otherwise.

6.2.4 Measures will be adopted during the construction phase to minimise the risk of contaminated runoff, silt and pollutants reaching watercourses. Further details of pollution control measures are provided in Volume 3, Chapter 15: Hydrology and Flood Risk of the ES and in the Code of Construction Practice (CoCP, application document A8.6). Impacts are assessed in Volume 3, Chapter 9: Onshore Ecology of the ES.

6.2.5 A site-wide surface water pollution prevention system will be developed to prevent the discharge of any contaminated surface water from the flexible generation plant in operation. The key measures to prevent water pollution are as follows:

- the surface water drainage, including the primary gravity drainage channels and associated systems around the boundary of the site will connect to the existing drainage channels via a sustainable drainage balancing and containment feature;
- appropriate treatment (e.g. settlement) and pollution prevention measures (e.g. interceptors) will be provided to prevent polluted flows from being discharged into any of the designated sites (SPA / Ramsar); and

- any chemical storage on site will be suitably bunded and emergency containment features will be incorporated within the sustainable drainage design to allow and spills to be controlled and dealt with on-site.

6.2.6 The overall philosophy for the design of the surface water pollution prevention system for the site is to manage surface water sustainably and to ensure that discharged waters do not constitute a pollution risk. This is described in the Conceptual Drainage Strategy, application document A7.3. Discharges to water and environmental management of the flexible generation plant, including safe storage of potentially polluting substances and spillage response procedures, will be regulated through the Environmental Permit for the facility in operation.

6.2.7 Implementation of these measures during both the construction and operational phases of the proposed development limits the risk of a significant pollution incident. Following implementation of mitigation measures, no adverse effect on site integrity of the Thames Estuary and Marshes SPA/Ramsar site is anticipated as a result of the proposed development.

6.3 Hydrological changes

6.3.1 As set out in the Conceptual Drainage Strategy (application document A7.3), drainage ditches removed by the proposed development will be replaced with a reconfigured ditch network that will not alter the hydrological regime overall outside the main development site itself. Runoff from the flexible generation plant will be suitably managed via an attenuation system such that the greenfield runoff rate is not exceeded.

6.3.2 With implementation of mitigation measures, no adverse effect on site integrity of the Thames Estuary and Marshes SPA/Ramsar site is anticipated as a result of the proposed development.

6.4 Disturbance (noise and visual) - causeway construction

Summary of bird surveys

6.4.1 Full details of bird surveys carried out in the 2019-20 winter period are provided Volume 6, Appendix 9.4. A review of wintering bird surveys undertaken in 2016/17 for Tilbury2 and 2016/17 and 2017/18 for RWE has been undertaken (ES Volume 6, Appendix 9.1: Ecological Desk Study and Survey Report and Volume 6, Appendix 9.2: Third Party Survey Reports).

6.4.2 Table 6.2 below summarises survey results from the 2016/17, 2017/18 and 2019/20 wintering bird surveys. Counts given are the maximum counts recorded within the works area and the 500 m buffer zone in each month.

Table 6.2. Summary of wintering bird survey results

Max count in month	Avocet	Dunlin	Redshank	Ringed Plover
2019-2020^a				
Sept	0	10	0	65
Oct	0	7	0	6
Nov	44	0	3	0
Dec	49	124	5	0
Jan	13	0	0	0
Feb	12	1	0	25
Mar	23	0	0	19
2017-2018^b				
Sept	N/a	N/a	N/a	N/a
Oct	0	0	0	0
Nov	0	0	1	0
Dec	0	0	1	0
Jan	2	0	0	0
Feb	8	0	0	0
Mar	3	0	0	0
2017-2018^c				
Sept	0	0	0	0
Oct	0	0	0	0
Nov	0	0	1	0
Dec	0	0	0	0
Jan	3	1	0	0
Feb	6	0	0	0
Mar	5	0	0	0
2016-2017^c				
Sept	N/a	N/a	N/a	N/a
Oct	N/a	N/a	N/a	N/a
Nov	0	0	0	0
Dec	0	0	1	0
Jan	0	0	7	0
Feb	0	0	0	0
Mar	0	0	0	0

N/a: no survey data available

a: RPS survey; b: RWE survey (Volume 6, Appendix 9.2: Third Party Survey Reports); c: Tilbury2 survey (Bioscan, 2018)

- 6.4.3 Table 6.3 provides the maximum count across all surveys in each of the three survey periods, and expresses that maximum count as a percentage of the SPA / Ramsar citation populations and the current 5-year mean peak population count for the SPA (obtained from WeBS data).
- 6.4.4 The locations of the peak counts of Avocet, Dunlin, Redshank and Ringed Plover within the works area plus 500 m buffer in each month of the 2019-2020 wintering bird surveys are provided in Figure 6.1 (avocet), Figure 6.2 (dunlin), Figure 6.3 (redshank) and Figure 6.4 (ringed plover).

Table 6.3. Peak counts of birds and SPA/Ramsar citation populations

Species			Survey counts				Percentages (of SPA/Ramsar citation population size)			
			Peak count 19-20	Peak count 17-18	Peak count 16-17	Mean peak count	Peak count 19-20	Peak count 17-18	Peak count 16-17	Mean peak count
Avocet	SPA citation population	283	49	8	0	19	17.31	2.83	0.00	6.71
	Ramsar citation pop	n/a					n/a	n/a	n/a	
	5 year mean peak SPA count 14/15-18/19	3177					1.54	0.25	0.00	0.60
Dunlin	SPA citation population	29646	124	8	0	44	0.42	0.03	0.00	0.15
	Ramsar citation pop	15171					0.82	0.05	0.00	0.29
	5 year mean peak SPA count 14/15-18/19	11850					1.05	0.07	0.00	0.37
Redshank	SPA citation population	3251	5	0	7	4	0.15	0.00	0.22	0.12
	Ramsar citation pop	1178					0.42	0.00	0.59	0.34
	5 year mean peak SPA count 14/15-18/19	492					1.02	0.00	1.42	0.81
Ringed plover	SPA citation population	1324	65	0	0	21.67	4.91	0.00	0.00	1.64
	Ramsar citation pop	595					10.92	0.00	0.00	3.64
	5 year mean peak SPA count 14/15-18/19	391					16.62	0.00	0.00	5.54

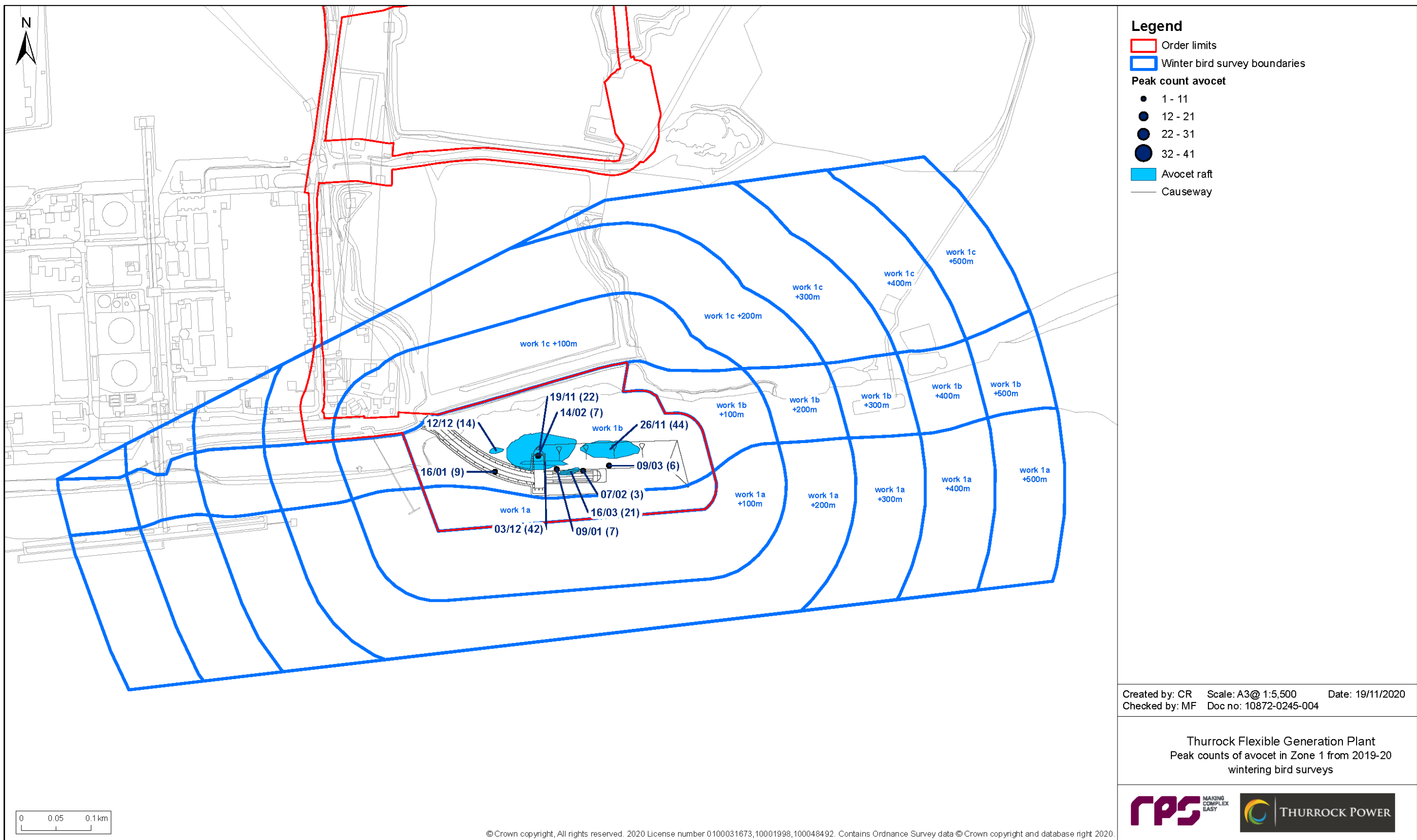


Figure 6.1: Location of avocet peak counts in works area + 500m buffer 2019-20

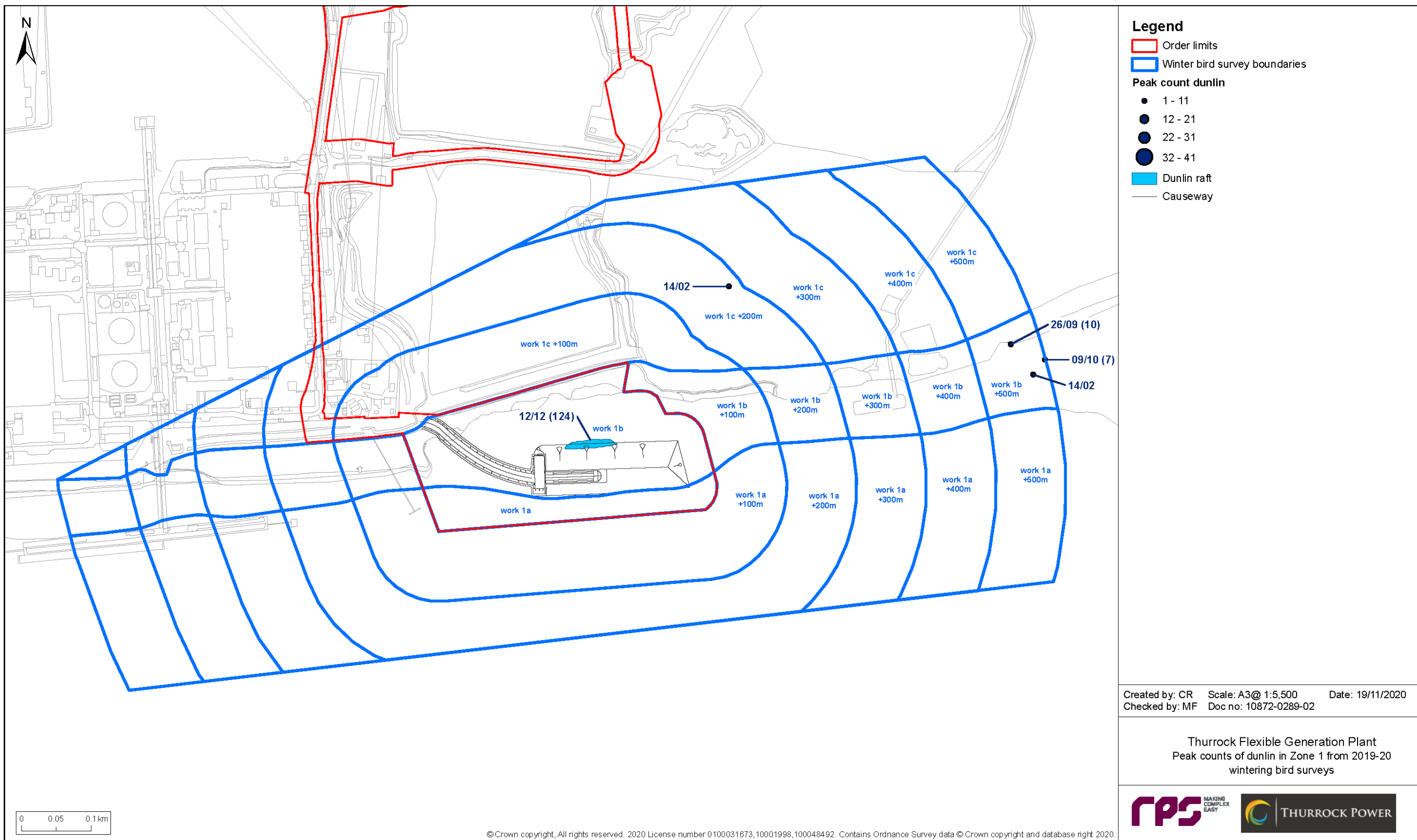


Figure 6.2: Location of dunlin peak counts in works area + 500m buffer 2019-20

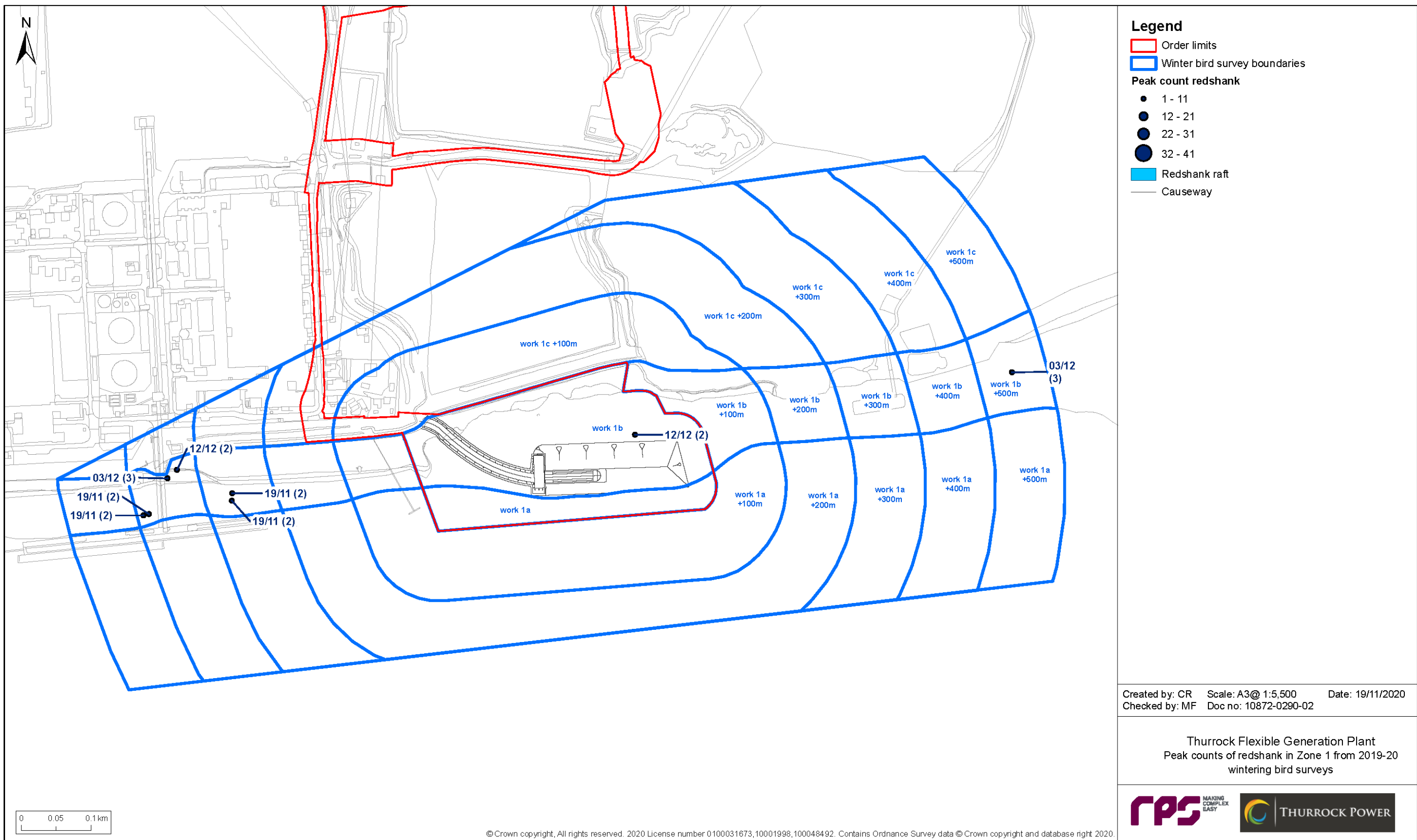


Figure 6.3: Location of redshank peak counts in works area + 500m buffer 2019-20

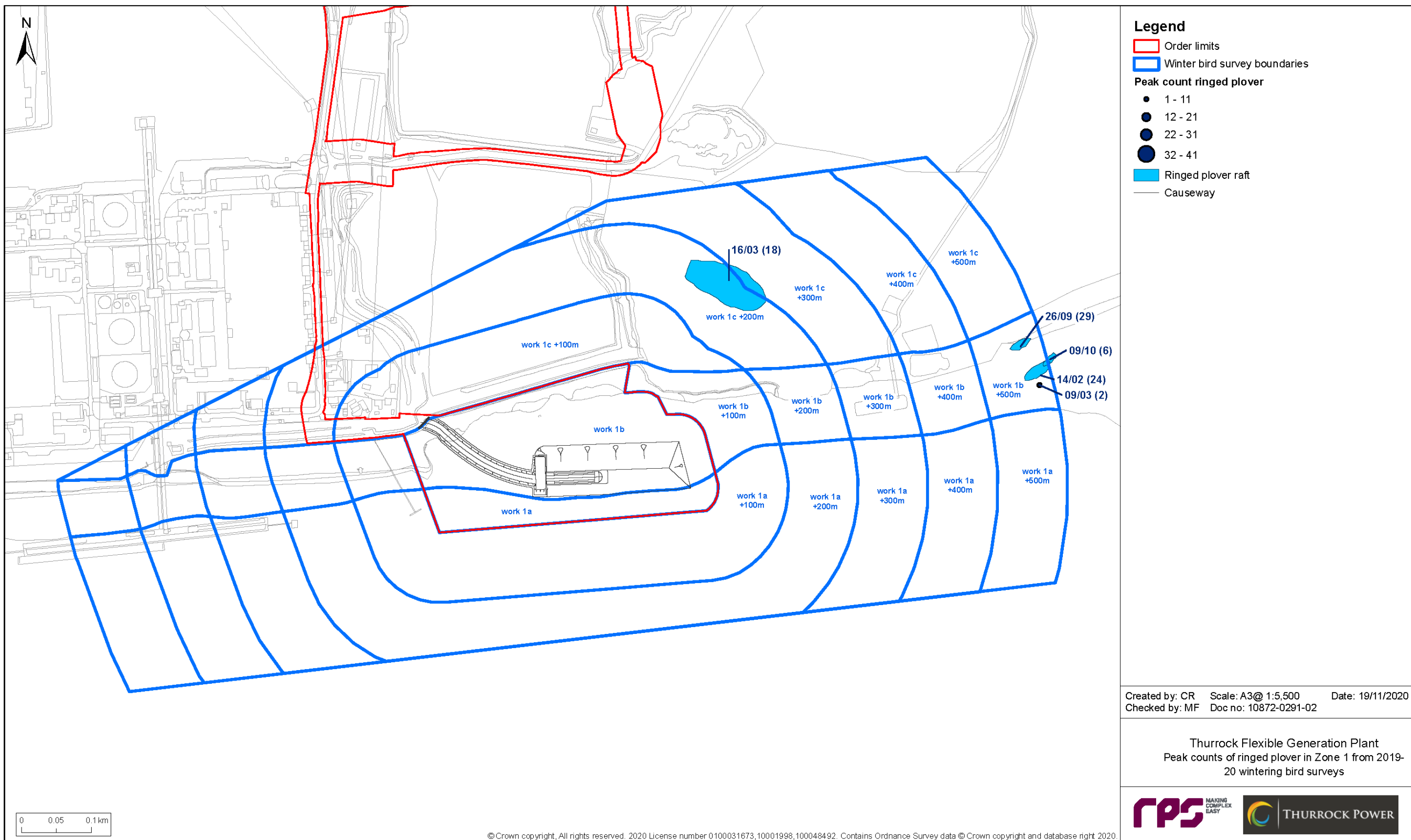


Figure 6.4: Location of ringed plover peak counts in works area + 500m buffer 2019-20

Potential effect distances for bird species

- 6.4.5 With regard to noise disturbance, estimated noise levels associated with the construction of the causeway were assessed in the ES (Volume 3, Chapter 11: Noise and Vibration), and the noise contours are shown on Figure 6.5. This figure indicates that noise levels reduce to 40-49 dB(A) at approximately 200 m from the works area. The noise thresholds for piling (Table 5.2) indicate that a noise level of <65dB is likely to have a negligible impact on birds. Piling will not be used in the construction of the causeway – noise will be generated by operation of construction plant and vehicles. Impacts from noise are therefore unlikely to be significant in isolation except in the immediate vicinity of the causeway itself while it is under construction.
- 6.4.6 For the purposes of assessing potential impacts from construction and use of the causeway, the potential zone of impacts from visual or noise disturbance is taken to be the works area plus up to a 500 m buffer zone which is considered to be the maximum distance over which noise or disturbance impacts would occur for Avocets.
- 6.4.7 Guidance on appropriate buffer zones for three of the four species assessed in this section (Dunlin, Redshank and Ringed Plover) has been taken from the Waterbird Disturbance Mitigation Toolkit (WDMT) accessed online via <http://bailey.persona-pi.com/Public-Inquiries/M4%20-%20Revised/11.3.67.pdf>.
- 6.4.8 The WDMT describes Dunlin as a relatively tolerant species of moderate and high level visual disturbance, and the WDMT recommends that “birds that are closer than 75 m should be considered when commencing works and efforts should be made to avoid high level disturbance at such time if possible, especially if it includes workers on the mudflat/fronting intertidal zone” and “Dunlin are not particularly sensitive to noise stimuli and as such a noise level of 72dB measured at the bird is acceptable but with caution above 60dB”. Based on this assessment and the estimated noise levels associated with causeway construction, it is not considered that disturbance events from causeway construction on Dunlin would extend beyond 200 m from the works area.
- 6.4.9 Redshank are described as being relatively tolerant of visual disturbance but with a high sensitivity to noise disturbance. The WBMT recommends that “birds that are closer than 100 m of works should be considered when commencing works and efforts should be made to avoid high level disturbance at such time if possible, especially if it includes workers on the mudflat/fronting intertidal zone. Redshank are particularly sensitive to noise stimuli, especially in conjunction with visual stimuli. As such a noise of up to 70dB is acceptable at the bird but with caution above 55dB (60dB in a highly disturbed area).” Based on this assessment and the estimated noise levels associated with causeway construction, it is not considered that disturbance events from causeway construction on Redshank would extend beyond 200 m from the works area.
- 6.4.10 Ringed Plover are described as very tolerant of moderate and high level visual disturbance, and not to be very sensitive to noise stimuli: “at distances of over 100 m from activity birds rarely showed any sign of disturbance and appeared often unperturbed when other species in their vicinity were reacting”. Based on this assessment and the estimated noise levels associated with causeway construction, it is not considered that disturbance events from causeway construction on Ringed Plover would extend beyond 100 m from the works area.

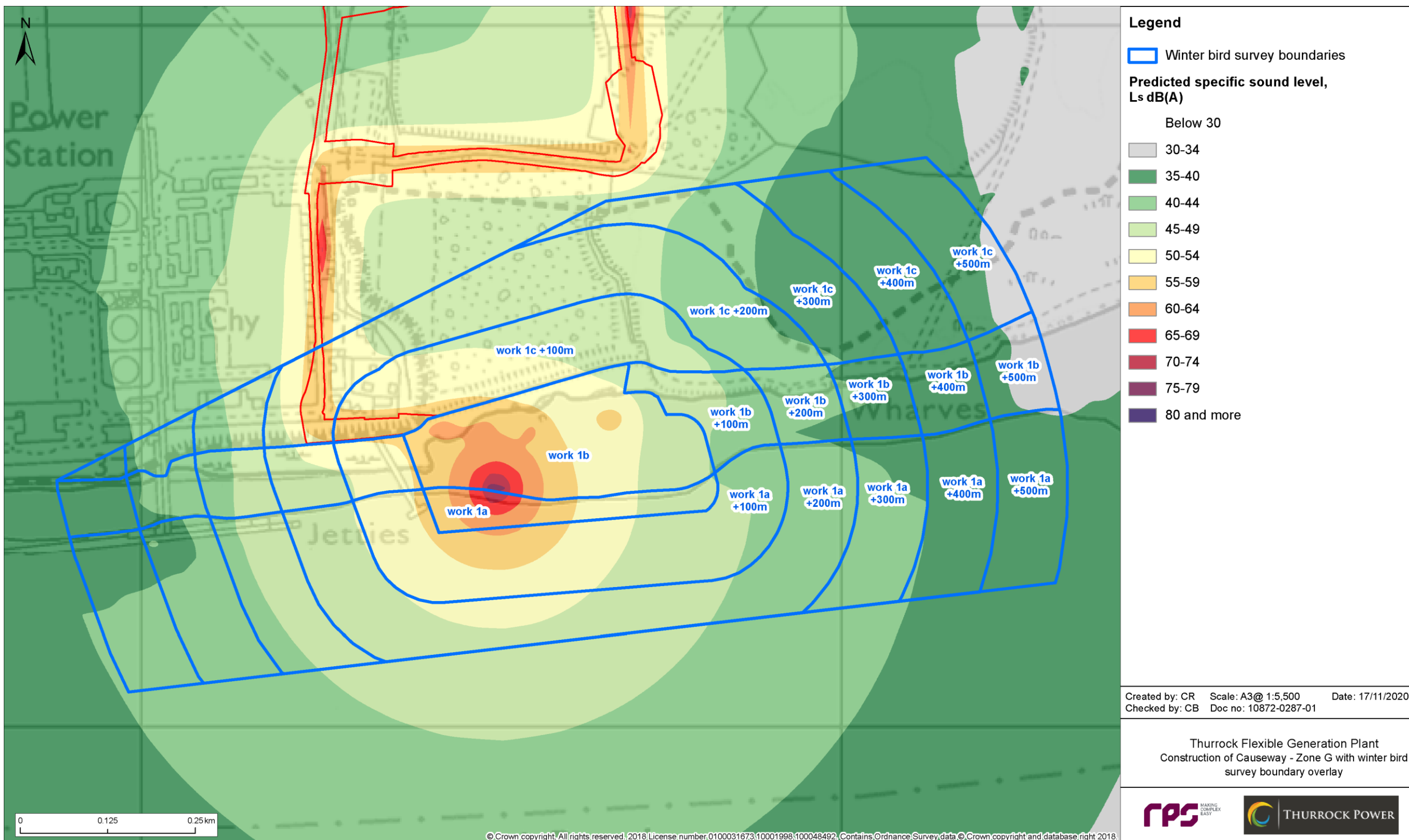


Figure 6.5. Noise contours for causeway construction

Assessment of construction scenarios

- 6.4.11 Construction of the causeway would take approximately six months. As the programme for construction of the development is not currently certain, assessment has been undertaken of twelve different construction scenarios, assuming that construction might start in any month.
- 6.4.12 To examine the potential effect of the temporary loss of the works area and up to 500 m buffer on birds, the use of the site by Avocet, Dunlin, Redshank and Ringed Plover has been assessed in terms of the potential number of 'bird days' lost during these 12 different construction scenarios. On a precautionary basis the survey data from 2019-20 is used for this analysis as these counts were the highest of the three survey periods summarised in Table 6.2.
- 6.4.13 The peak count of each species recorded in any given month is converted to 'bird days' by multiplying the peak count for a given month by the number of days in that month. This gives a precautionary estimate (because the metric is based on the peak count recorded by surveys) of the number of bird days potentially affected in each month, and summing the total number of affected bird days for each month provides a total number of affected bird days for each of the construction scenarios.
- 6.4.14 To assess the potential impact of this loss of bird days, WeBS data of monthly 5-year peak counts for the Thames Estuary and Marshes SPA / Ramsar for September – March for the years 2014/15 - 2018/19 has been obtained for all four species, converted to bird days as above, and summed, to give a comparison against which the potential loss of bird days for each construction scenario can be assessed.
- 6.4.15 The above assessment is considered with reference to the conservation objectives for the Thames Estuary & Marshes SPA, which are:
- 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;*
1. *The extent and distribution of the habitats of the qualifying features*
 2. *The structure and function of the habitats of the qualifying features*
 3. *The supporting processes on which the habitats of the qualifying features rely*
 4. *The population of each of the qualifying features, and*
 5. *The distribution of the qualifying features within the site.*

Avocet

- 6.4.16 Table 6.4 shows the peak count within the potential disturbance area for Avocet (works area + 500 m) for each month of the 2019-20 bird surveys and the number of bird days these peak counts represent. This gives a precautionary upper estimate of affected bird days in each month. The table also shows the 5-year monthly Thames Estuary and Marshes SPA mean peak count for the 2014/15-2018/19 period (obtained from WeBS data), and the number of bird days that this represents.

Table 6.4. Avocet use of potential impact area (counts and bird days) 2019-2020

	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days
Peak count in impact area	0	0	44	49	13	12	23	
Bird days	0	0	1320	1519	403	336	713	4291
5 year monthly mean count for SPA (WeBS data)	2755	1487	471	579	590	825	890	
Bird-days	82650	46097	14130	17949	18290	23100	27590	229806

- 6.4.17 Table 6.5 shows the number of potential bird days affected in each of the 12 potential construction scenarios, and expresses that as a percentage of the total number of bird days determined from the WeBS count data for the Thames Estuary and Marshes SPA.

Table 6.5. Avocet bird days potentially affected in different construction scenarios

Construction period		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days	Total bird days as % of SPA total
Start	Finish									
Apr	Sep	0							0	0
May	Oct	0	0						0	0
Jun	Nov	0	0	1320					1320	0.57
Jul	Dec	0	0	1320	1519				2839	1.24
Aug	Jan	0	0	1320	1519	403			3242	1.41
Sep	Feb	0	0	1320	1519	403	336		3578	1.56
Oct	Mar		0	1320	1519	403	336	713	4291	1.87
Nov	Apr			1320	1519	403	336	713	4291	1.87
Dec	May				1519	403	336	713	2971	1.29
Jan	Jun					403	336	713	1452	0.63
Feb	Jul						336	713	1049	0.46

Construction period		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days	Total bird days as % of SPA total
Start	Finish									
Mar	Aug							713	713	0.31

6.4.18 Table 6.5 shows that there are two potential scenarios (construction commencing in April or May) which do not overlap with the period within which the Avocets were recorded using the construction site in 2019/20. The two scenarios with the highest effect are construction commencing in October or November, as these overlap with the two months when highest counts were recorded. These highest-impact scenarios involve a potential impact on 1.87% of the total bird days in the SPA.

6.4.19 Taking these two scenarios as the potential maximum impact on Avocet, the potential effect is assessed with reference to the conservation objectives as set out in paragraph 6.4.15.

Conservation Objective 1:

6.4.20 The extent of short and long term habitat loss for causeway construction is summarised in Table 5.1. Considering that the affected area is not within the SPA and represents a very small proportion of available mudflat outside and within the SPA as a whole, this is considered de minimis and it can reasonably be concluded that there will be no adverse effect on the integrity of The Thames Estuary and Marshes SPA with regard to Avocet from habitat loss.

Conservation Objectives 2 and 3:

6.4.21 An assessment of the impacts of the causeway on marine processes has been undertaken for the Environmental Statement (Volume 3, Chapter 17), and this assessment concluded that there would be no significant effects on the SPA. It can therefore reasonably be concluded that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA with regard to Avocets from changes to structure, function or supporting processes of habitats.

Conservation Objective 4:

6.4.22 This objective relates to the population of each of the qualifying features, of which Avocet is one species. The consideration is whether the construction of the causeway, for any of the ten scenarios that result in the loss of some Avocet bird-days within the functionally linked land within the potential disturbance area, would result in an Adverse Effect on Integrity.

6.4.23 Temporary disturbance (one winter season) of a small proportion of the total population of Avocets using habitats outside the SPA is extremely unlikely to cause a material decrease in the survival or productivity of the individuals affected. This is because:

- i. There is alternative habitat outside the zone of impact of the causeway construction to accommodate displaced birds, both within the SPA and in other functionally linked habitats, assuming that the alternative available habitat is not at carrying capacity. In the context of the increasing trend in the wintering Avocet population, the SPA does not appear to be at carrying capacity.
- ii. The analyses reported above are made on the basis that the zone of impact within 500 m of the source of disturbance is rendered completely unusable by wintering avocet. However, construction activity will not take place throughout the day and night and so foraging resources within the zone of impact are available to Avocets during hours of darkness and on Sundays when construction is not taking place. The construction of the causeway does not therefore result in the complete loss of resources for wintering Avocets in that area.

6.4.24 If there is no decrease in survival or productivity of individuals, there will be no decrease in the population, and it can be reasonably concluded that there would be no Adverse Effect on Integrity of the Thames Estuary and Marshes SPA.

6.4.25 In the unlikely event that there is some degree of reduction in the survival or productivity of individuals in the population as a result of temporary displacement from the zone of impact, then the question is whether or not this might represent an adverse effect on the integrity of the SPA. The Supplementary Advice on Conservation Objectives (SACO)¹ states that in relation to non-breeding population abundance:

“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.”

¹ Viewed online at <https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9012021&SiteName=&SiteNameDisplay=Thames+Estuary+and+Marshes+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAAarea=&NumMarineSeasonality=8>

6.4.26 It is clear that the construction of the causeway will not result in a decline in the non-breeding population of the SPA below 283 individuals, because the current population is much larger (latest 5-year mean peak of 3,177 birds) and the proportion of that population potentially affected is relatively small. Given the robust nature and positive trend in the non-breeding Avocet population of the SPA, it is also reasonable to conclude that the 'worst-case construction scenario' will not result in a deterioration of the population from its current level because it is a temporary impact and the long-term viability of the population will not be undermined.

6.4.27 The remaining area of foraging habitat at and around the SPA will maintain a population which continues to achieve the SPA's conservation aims – the SPA would continue to support a robust population of Avocets that contributes to the non-breeding bird assemblage feature.

6.4.28 It can therefore reasonably be concluded that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA from changes to the population of Avocet.

Conservation Objective 5:

6.4.29 The proposals will not result in any changes to the distribution of qualifying features within the SPA and therefore this conservation objective will not be affected.

Summary

6.4.30 In view of the above, it can reasonably be concluded, beyond reasonable scientific doubt, that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA even during the 'worst case construction scenario' where construction overlaps with the period of highest recorded use by Avocet.

Dunlin

6.4.31 Table 6.6 shows the peak count within the potential disturbance area for Dunlin (works area + 200 m) for each month of the 2019-20 bird surveys and the number of bird days these peak counts represent. This gives a precautionary upper estimate of affected bird days in each month. The table also shows the 5-year monthly Thames Estuary and Marshes SPA mean peak count for the 2014/15-2018/19 period (obtained from WeBS data), and the number of bird days that this represents.

Table 6.6. Dunlin use of potential impact area (counts and bird days) 2019-2020

	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days
Peak count in impact area	0	0	0	124	0	1	0	

	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days
Bird days	0	0	0	3844	0	28	0	3872
5 year monthly mean count for SPA (WeBS data)	518	2476	8681	8889	11236	8423	4620	
Bird-days	15,540	76,756	260,430	27,5559	348,316	235,844	143,220	1,355,665

6.4.32 Table 6.7 shows the number of potential bird days affected in each of the 12 potential construction scenarios, and expresses that as a percentage of the total number of bird days determined from the WeBS count data for the Thames Estuary and Marshes SPA.

Table 6.7. Dunlin bird days potentially affected in different construction scenarios

Construction period		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days	Total bird days as % of SPA total
Start	Finish									
Apr	Sep	0							0	0
May	Oct	0	0						0	0
Jun	Nov	0	0	0					0	0
Jul	Dec	0	0	0	3844				3844	0.28
Aug	Jan	0	0	0	3844	0			3844	0.28
Sep	Feb	0	0	0	3844	0	28		3872	0.29
Oct	Mar		0	0	3844	0	28	0	3872	0.29
Nov	Apr			0	3844	0	28	0	3872	0.29
Dec	May				3844	0	28	0	3872	0.29
Jan	Jun					0	28	0	28	0.002
Feb	Jul						28	0	28	0.002
Mar	Aug							0	0	0.00

6.4.33 Table 6.7 shows that there are four potential construction scenarios which do not overlap with the period within which Dunlin were recorded using the construction site in 2019/20, and two where there was negligible Dunlin presence. The six scenarios with the highest impact involve construction commencing between July and December inclusive.

6.4.34 Taking these six scenarios as the potential maximum impact on Dunlin, the potential effect is assessed with reference to the conservation objectives as set out in paragraph 6.4.15.

Conservation Objective 1:

6.4.35 The extent of short and long term habitat loss for causeway construction is summarised in Table 5.1. Considering that the affected area is not within the SPA and represents a very small proportion of available mudflat outside and within the SPA as a whole, this is considered de minimis and it can reasonably be concluded that there will be no adverse effect on the integrity of The Thames Estuary and Marshes SPA with regard to Dunlin from habitat loss.

Conservation Objectives 2 and 3:

6.4.36 An assessment of the impacts of the causeway on marine processes has been undertaken for the Environmental Statement (Volume 3, Chapter 17), and this assessment concluded that there would be no significant effects on the SPA. It can therefore reasonably be concluded that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA with regard to Dunlin from changes to structure, function or supporting processes of habitats.

Conservation Objective 4:

6.4.37 This objective relates to the population of each of the qualifying features, of which Dunlin is one species. The consideration is whether the construction of the causeway, for any of the eight scenarios that result in the loss of some Dunlin bird-days within the functionally linked land within the potential disturbance area, would result in an Adverse Effect on Integrity.

6.4.38 Temporary disturbance (one winter season) of a small proportion of the total population of Dunlin using habitats outside the SPA is extremely unlikely to cause a material decrease in the survival or productivity of the individuals affected. This is because:

- i. The highest count of Dunlin, of 124 birds, is very much an outlier when placed in the context of the bird surveys as a whole. The count of 124 birds was recorded in a single hour of a six hour survey, and only one other record of a single dunlin was recorded from the likely disturbance zone during the 2019-20 surveys. During the 2016-17 and 2017-18 surveys reviewed for the ES, 1 Dunlin was the highest count recorded in the vicinity of the causeway.
- ii. As noted above for Avocet, there is alternative habitat outside the zone of impact of the causeway construction to accommodate the small number of displaced birds.
- iii. As noted above for Avocet, the analyses reported above are made on the basis that the zone of impact within 200 m of the source of disturbance is rendered completely unusable by wintering Dunlin, whereas the construction of the causeway would not result in the complete loss of resources for wintering Dunlins in that area.

6.4.39 If there is no decrease in survival or productivity of individuals, there will be no decrease in the population, and it can be reasonably concluded that there would be no Adverse Effect on Integrity of the Thames Estuary and Marshes SPA.

Conservation Objective 5:

6.4.40 The proposals will not result in any changes to the distribution of qualifying features within the SPA and therefore this conservation objective will not be affected.

Summary

6.4.41 In view of the above, it can reasonably be concluded, beyond reasonable scientific doubt, that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA even during the 'worst case construction scenario' where construction overlaps with the period of highest recorded use by dunlin.

Redshank

6.4.42 Table 6.8 shows the peak count within the potential disturbance area for Redshank (works area + 200 m) for each month of the 2019-20 bird surveys and the number of bird days these peak counts represent. This gives a precautionary upper estimate of affected bird days in each month. The table also shows the 5-year monthly Thames Estuary and Marshes SPA mean peak count for the 2014/15-2018/19 period (obtained from WeBS data), and the number of bird days that this represents.

Table 6.8. Redshank use of potential impact area (counts and bird days) 2019-2020

	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days
Peak count in impact area	0	0	0	2	0	0	0	
Bird days	0	0	0	62	0	0	0	62
5 year monthly mean count for SPA (WeBS data)	246	214	278	239	317	264	246	
Bird-days	7380	6634	8340	7409	9827	7392	7626	54608

6.4.43 Table 6.9 shows the number of potential bird days affected in each of the 12 potential construction scenarios, and expresses that as a percentage of the total number of bird days determined from the WeBS count data for the Thames Estuary and Marshes SPA.

Table 6.9. Redshank bird days potentially affected in different construction scenarios

Construction period		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days	Total bird days as % of SPA total
Start	Finish									
Apr	Sep	0							0	0
May	Oct	0	0						0	0
Jun	Nov	0	0	0					0	0
Jul	Dec	0	0	0	62				62	0.11
Aug	Jan	0	0	0	62				62	0.11
Sep	Feb	0	0	0	62				62	0.11
Oct	Mar		0	0	62				62	0.11
Nov	Apr			0	62				62	0.11
Dec	May				62				62	0.11
Jan	Jun								0	0
Feb	Jul								0	0
Mar	Aug								0	0

6.4.44 Table 6.9 shows that there are six potential scenarios (construction commencing between January – June inclusive) which do not overlap with the period within which Redshank was recorded using the construction site in 2019/20. The other six scenarios commencing between July and December involve potential disturbance of only 2 birds (62 bird days, or 0.11% of the total bird days for the SPA).

6.4.45 Taking these six scenarios as the potential maximum impact on Redshank, the potential effect is assessed with reference to the conservation objectives as set out in paragraph 6.4.15.

Conservation Objective 1:

6.4.46 The extent of short and long term habitat loss for causeway construction is summarised in Table 5.1. Considering that the affected area is not within the SPA and represents a very small proportion of available mudflat outside and within the SPA as a whole, this is considered de minimis and it can reasonably be concluded that there will be no adverse effect on the integrity of The Thames Estuary and Marshes SPA with regard to Redshank from habitat loss.

Conservation Objectives 2 and 3:

6.4.47 An assessment of the impacts of the causeway on marine processes has been undertaken for the Environmental Statement (Volume 3, Chapter 17), and this assessment concluded that there would be no significant effects on the SPA. It can therefore reasonably be concluded that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA with regard to Redshank from changes to structure, function or supporting processes of habitats.

Conservation Objective 4:

6.4.48 This objective relates to the population of each of the qualifying features, of which Redshank is one species. The consideration is whether the construction of the causeway, for any of the six scenarios that result in the loss of some Redshank bird-days within the functionally linked land within the potential disturbance area, would result in an Adverse Effect on Integrity.

6.4.49 Temporary disturbance (one winter season) of a very small proportion of the total population of Redshanks using habitats outside the SPA is extremely unlikely to cause a material decrease in the survival or productivity of the individuals affected. This is because:

- i. The number of birds affected is extremely low.
- ii. There is alternative habitat outside the zone of impact of the causeway construction to accommodate the very small number of displaced birds, both within the SPA and in other functionally linked habitats.
- iii. The analyses reported above are made on the basis that the zone of impact within 200 m of the source of disturbance is rendered completely unusable by wintering Redshank, whereas the construction of the causeway does not result in the complete loss of resources for wintering Redshank in that area.

6.4.50 If there is no decrease in survival or productivity of individuals, there will be no decrease in the population, and it can be reasonably concluded that there would be no Adverse Effect on Integrity of the Thames Estuary and Marshes SPA.

Conservation Objective 5:

6.4.51 The proposals will not result in any changes to the distribution of qualifying features within the SPA and therefore this conservation objective will not be affected.

Summary

6.4.52 In view of the above, it can reasonably be concluded, beyond reasonable scientific doubt, that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA even during the ‘worst case construction scenario’ where construction overlaps with the period of recorded use by Redshank.

Ringed plover

6.4.53 Table 6.10 shows the peak count within the potential disturbance area for Ringed Plover (works area + 100 m) for each month of the 2019-20 bird surveys and the number of bird days these peak counts represent. This gives a precautionary upper estimate of affected bird days in each month. The table also shows the 5-year monthly Thames Estuary and Marshes SPA mean peak count for the 2014/15-2018/19 period (obtained from WeBS data), and the number of bird days that this represents.

Table 6.10. Ringed plover use of potential impact area (counts and bird days) 2019-2020

	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days
Peak count in impact area	18	0	0	0	0	0	0	
Bird days	540	0	0	0	0	0	0	540
5 year monthly mean count for SPA (WeBS data)	357	188	130	63	40	42	19	
Bird-days	10710	5828	3900	1953	1240	1176	589	25396

6.4.54 Table 6.11 shows the number of potential bird days affected in each of the 12 potential construction scenarios, and expresses that as a percentage of the total number of bird days determined from the WeBS count data for the Thames Estuary and Marshes SPA.

Table 6.11. Ringed plover bird days potentially affected in different construction scenarios

Construction period		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days	Total bird days as % of SPA total
Start	Finish									
Apr	Sep	540							540	2.13
May	Oct	540	0						540	2.13
Jun	Nov	540	0	0					540	2.13
Jul	Dec	540	0	0	0				540	2.13
Aug	Jan	540	0	0	0	0			540	2.13
Sep	Feb	540	0	0	0	0	0		540	2.13
Oct	Mar		0	0	0	0	0	0	0	0
Nov	Apr			0	0	0	0	0	0	0
Dec	May				0	0	0	0	0	0
Jan	Jun					0	0	0	0	0
Feb	Jul						0	0	0	0

Construction period		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total bird days	Total bird days as % of SPA total
Start	Finish									
Mar	Aug							0	0	0

6.4.55 Table 6.11 shows that there are six potential scenarios (construction commencing in October to March inclusive) which do not overlap with the period within which Ringed Plovers were recorded using the construction site in 2019/20. The other six scenarios commencing between April and September involve potential for loss of 540 bird days, or 2.13% of the total available in the SPA.

6.4.56 Taking these scenarios as the potential maximum impact on Ringed Plover, the potential effect is assessed with reference to the conservation objectives as set out in paragraph 6.4.15.

Conservation Objective 1:

6.4.57 The extent of short and long term habitat loss for causeway construction is summarised in Table 5.1. Considering that the affected area is not within the SPA and represents a very small proportion of available mudflat outside and within the SPA as a whole, this is considered de minimis and it can reasonably be concluded that there will be no adverse effect on the integrity of The Thames Estuary and Marshes SPA with regard to Ringed Plover from habitat loss.

Conservation Objectives 2 and 3:

6.4.58 An assessment of the impacts of the causeway on marine processes has been undertaken for the Environmental Statement (Volume 3, Chapter 17), and this assessment concluded that there would be no significant effects on the SPA. It can therefore reasonably be concluded that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA with regard to Ringed Plover from changes to structure, function or supporting processes of habitats.

Conservation Objective 4:

6.4.59 This objective relates to the population of each of the qualifying features, of which Ringed Plover is one species. The consideration is whether the construction of the causeway, for any of the six scenarios that result in the loss of some Ringed Plover bird-days within the functionally linked land within the potential disturbance area, would result in an Adverse Effect on Integrity.

6.4.60 Temporary disturbance (one winter season) of a small proportion of the total population of Ringed Plovers using habitats outside the SPA is extremely unlikely to cause a material decrease in the survival or productivity of the individuals affected. This is because:

- i. The highest count of Ringed Plover within the potential disturbance zone, of 18 birds, was of birds recorded on terrestrial land north of the sea wall, not on the mudflats (Figure 6.4). These birds would not be in the line of sight of works taking place on the mudflat and therefore less likely to be disturbed by construction.
- ii. The count of 18 birds is very much an outlier when placed in the context of the bird surveys as a whole. During the 2016-17 and 2017-18 surveys reviewed for the ES, no Ringed Plovers were recorded in the vicinity of the causeway during any of the surveys.
- iii. There is alternative habitat outside the zone of impact of the causeway construction to accommodate the small number of displaced birds, both within the SPA and in other functionally linked habitats.
- iv. The analyses reported above are made on the basis that the zone of impact within 100 m of the source of disturbance is rendered completely unusable by passage or wintering Ringed Plover. However, construction activity does not result in the complete loss of resources for Ringed Plovers in that area.

6.4.61 If there is no decrease in survival or productivity of individuals, there will be no decrease in the population, and it can be reasonably concluded that there would be no Adverse Effect on Integrity of the Thames Estuary and Marshes SPA.

6.4.62 It can therefore reasonably be concluded that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA from changes to the population of Ringed Plover.

Conservation Objective 5:

6.4.63 The proposals will not result in any changes to the distribution of qualifying features within the SPA and therefore this conservation objective will not be affected.

Summary

6.4.64 In view of the above, it can reasonably be concluded, beyond reasonable scientific doubt, that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA even during the 'worst case construction scenario' where construction overlaps with the period of highest recorded use by Ringed Plover.

² Accessed online at <https://basc.org.uk/advice/severe-weather-and-waterfowl-shooting/>

Conclusion

6.4.65 In view of the assessment presented above, it can be concluded, beyond reasonable scientific doubt, that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA from construction of the causeway.

6.4.66 It is not therefore considered that specific mitigation measures are required to avoid an adverse effect on integrity. Nevertheless, the Applicant would seek to minimise impacts, as follows:

- Construction would avoid the period of peak winter bird activity if possible; and
- Low-noise plant including electric plant would be used where practicable to minimise noise generation.
- Works would not be undertaken between dusk to dawn, and no lighting will be used on the causeway.
- Subject to monitoring of bird activity (undertaken during construction of the causeway) confirming that this is necessary, works would cease in the event that 14 consecutive days of freezing temperatures occur (as per guidance on cessation of wildfowl shooting during severe weather²). Construction work would recommence once three consecutive days of non-freezing temperatures occurred, after which it would cease again if 14 consecutive days of freezing temperatures occurred.

6.5 Disturbance (noise and visual) – use of the causeway during flexible generation plant construction (all bird species)

6.5.1 A total of up to sixty barge deliveries for gas engines and other large components use the causeway. This will result in a total of 120 barge movements to and from the causeway. The barges will dock on the causeway at high tide, when the mudflats are covered and therefore not in use by foraging birds. The barges will also depart at high tide and therefore again no disturbance impacts on birds using the mudflats would occur as a result of the barge movements.

6.5.2 Any disturbance events will therefore occur at low tide when the engines are unloaded. The sequence of events for each unloading will comprise:

- 1) A crane will lift out a section of the sea wall and, depending on barge model, may also move down to the causeway to lower the barge unloading ramp.

- 2) The loaded self-propelled transporter vehicle from the barge will move the engine to beyond the sea wall and up to the main development site. An empty transporter will move down the causeway onto the barge.
 - 3) The barge front will be closed and the mobile crane will then move back up the causeway and replace the sea wall gate.
- 6.5.3 These operations will take approximately 1-2 hours to complete. This is the period within which disturbance impacts on birds might occur; birds would be displaced, probably moving eastwards to mudflats closer to the SPA.
- 6.5.4 The barge deliveries may occur in one phase or in two separate phases of 30 deliveries each. Based on the winter months when Avocets were present during the survey, the worst case scenario to consider in terms of concentrated disturbance events would be for each set of 30 movements to occur in two consecutive November – March periods.
- 6.5.5 It is expected that the deliveries would be between 1-3 days apart, and therefore each phase of 30 deliveries could last for 1-3 months. Therefore disturbance events are of relatively short duration and intermittent with up to two days between each event. Even if deliveries are one day apart, that only directly affects every other tidal cycle, and birds would have the opportunity to feed on the mudflats at night.
- 6.5.6 Clearly, if timing allows, deliveries could be undertaken outside of the period when wintering birds are present, in which case no disturbance events to wintering birds would occur. However, this would be a highly onerous restriction on use of the causeway, as the delivery period depends on the charter availability of a suitable ro-ro barge, port facilities for the abnormal load trans-shipment, and the Applicant's construction programme.
- 6.5.7 If deliveries occur inside that period, some displacement of birds to areas of alternative habitat will be expected. Over the course of a 6 hour period (3 hours each side of low tide), disturbance events would occur for 1-2 hours, i.e. between 17-30% of a tidal cycle. Birds could return to feed when the disturbance events have ceased.
- 6.5.8 Given the large amount of mudflat habitat available within and outside the SPA, and the relatively small area likely to be affected by disturbance, it is considered that the small number of displaced birds would be able to find alternative foraging habitat reasonably close by in other parts of the estuary.

- 6.5.9 There is therefore not predicted to be any decline in the wintering bird population associated with the SPA as a result of disturbance impacts associated with barge deliveries.
- 6.5.10 In view of the above, it can be concluded, beyond reasonable scientific doubt, that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA from use of the causeway during the construction of the flexible generation plant.

6.6 Disturbance (visual) from presence of the causeway during operation

- 6.6.1 The causeway may remain in place for up to the 35 year design lifetime of the flexible generation plant, although decommissioning and removal of it will take place sooner if alternative access for AILs becomes possible, as per the requirement in DCO Schedule 2.
- 6.6.2 The presence of the causeway will therefore have a continued effect until it is removed. Studies examining the passive effect of structures on the foraging behaviour of birds are limited. The Waterbird Disturbance Mitigation Toolkit (WDMT)³ states that Ringed Plover, Dunlin and Redshank will forage extremely close to plant (<50m) during construction works. The disturbance effect of the causeway when it is physically present but not being built or in active use would certainly not be any greater than the effect from its construction or use (as assessed in Section 6.4), and would very likely be smaller. Given this, the conclusion of the assessment presented in Section 6.4 and the low numbers and frequency of occurrence of Ringed Plover, Dunlin and Redshank recorded using the area in the vicinity of the causeway, it is concluded that no adverse effect on the integrity of the Thames Estuary and Marshes SPA would result from the presence of the causeway itself for these species during the operational phase.

³ Cutts *et al* (2009), Accessed online via <http://bailey.persona-pi.com/Public-Inquiries/M4%20-%20Revised/11.3.67.pdf>

- 6.6.3 Avocet are not included in the WDMT, but again it is considered that the passive effect of the causeway would not be any greater than the effect from construction or use of the causeway and is likely to be smaller. The passive effect of the causeway would, therefore, be similar or smaller to the effect predicted for construction and use of the causeway, just operating over a longer time period. Whilst there may be some minor reduction in overall fitness due to reduced food intake and increased competition, it is unlikely to affect the survival of individuals. This is in the context of an increasing (but with variable WeBS peak counts) background population. Therefore, for the same reasons presented above in Sections 6.4.16-6.4.30), the SPA population of Avocet will be maintained above 283 individuals in the medium-long term even if there is some displacement of birds from the vicinity of the causeway, and it is therefore concluded that no adverse effect on the integrity of the Thames Estuary and Marshes SPA would result from the presence of the causeway itself for Avocets.
- 6.6.4 In view of the above, it can be concluded, beyond reasonable scientific doubt, that there will be no adverse effect on the integrity of the Thames Estuary and Marshes SPA from presence or use of the causeway during the operation of the flexible generation plant.

6.7 Conclusion

- 6.7.1 Following the Appropriate Assessment provided above, and provision of mitigation measures as appropriate, it is concluded that the Thurrock Flexible Generation Plant will not undermine the conservation objectives of Natura 2000 sites, and there will be no adverse effect on site integrity.

7. In-combination assessment

7.1 Introduction

- 7.1.1 Article 6(3) of the Habitats Directive requires that, prior to granting consent, a competent authority has to be satisfied that a plan or project will not have a significant adverse effect on the integrity of Natura 2000 sites either alone or in combination with other plans or projects. Therefore, this section of the HRA provides the consideration of the potential for such in combination effects with other plans or projects in the area.
- 7.1.2 Cumulative effects of the proposed development with other proposed developments near the site that are currently in the planning process or have been approved but are not yet constructed have been reviewed for relevance with respect to European designated sites.
- 7.1.3 The process of identifying other consented or proposed developments and screening to create a shortlist of those having potential for cumulative effects with Thurrock Flexible Generation Plant is described in Volume 2, Chapter 4: Environmental Impact Assessment Methodology and Volume 4, Chapter 18: Cumulative Effects Assessment Introduction and Screening of the ES. Chapter 18 lists the shortlisted cumulative developments and the tier they have been assigned (guiding the weight that the decision-maker may place on each development's likelihood of being realised) in accordance with PINS Guidance Note 17.
- 7.1.4 Two Nationally Significant Infrastructure Projects (NSIPs) are on land adjacent to and in some places overlapping with the Thurrock Flexible Generation Plant application boundary. The consented Tilbury2 port expansion adjacent to the west is under construction. The Lower Thames Crossing (LTC) motorway and link road to the east and north is in the process of EIA and public consultation.
- 7.1.5 Outline planning permission has been granted for several residential and mixed-use developments expanding Linford and East Tilbury in the direction of Thurrock Flexible Generation Plant. However, these are generally further than 500 m from the Flexible Generation Plant site and so are unlikely to have direct cumulative effects on habitats or most species groups. These non-NSIP projects are also in-land, so avoid disturbance effects on the inter-tidal habitats and wintering birds and also do not affect the coastal grassland strip which is of value to the invertebrate assemblage

7.1.6 Should all of these developments proceed, Thurrock Flexible Generation Plant's main development site would be close to temporary or permanent works for the two NSIPs. Its gas connection point to Feeder 18 could be adjacent to the expanded outskirts of East Tilbury and the pipeline route and accesses could cross land to be developed for the LTC.

7.1.7 An assessment of the cumulative ecological impacts of the Thurrock Flexible Generation Plant is set out in Volume 4, Chapter 21: Onshore Ecology of the ES. A list of other projects and plans (with planning application reference) considered within the CEA is provided in that chapter but most of these developments do not have potential direct or indirect effects on the Natura 2000 designated sites. Where they do, they are assessed here, in-combination with the Thurrock Flexible Generation Plant.

7.2 In-combination construction effects

Impacts on designated sites

- 7.2.1 There is potential for greater disturbance and displacement effects on mobile species, particularly breeding and wintering birds, that could occur if construction for the other NSIPs overlaps with that of the proposed development, or for these effects to last for a greater duration if construction is sequential.
- 7.2.2 In terms of potential additional effects for overlapping construction, the assessment of noise levels indicates that even in the maximum design scenario of percussive piling for Thurrock Flexible Generation Plant construction, noise levels from this activity would not give rise to significantly elevated noise levels at the Thames Estuary and Marshes SPA. Even if piling were to occur for all developments simultaneously (i.e. a doubling of maximum noise), given the distance involved, the resulting noise levels at the SPA would only increase by circa 3 dB L_{Amax} , given the logarithmic nature of noise propagation.
- 7.2.3 Therefore, impacts occurring from cumulative noise effects can be screened out, as no likely significant effects are anticipated on the Thames Estuary and Marshes SPA / Ramsar site.
- 7.2.4 Surveys of terrestrial land potentially considered to be functionally linked land with respect to the Thames Estuary and Marshes SPA have been undertaken. These surveys found no evidence that species associated with the SPA were present on fields within or adjacent to the proposed development boundary, and no significant populations of terrestrial wintering birds were identified. As such, no cumulative effects are possible on terrestrial wintering birds.

- 7.2.5 The PEIR and Environmental Impacts Update for the Lower Thames Crossing indicates that a jetty for deliveries of material to the LTC construction site might be constructed on the north side of the Thames within Area 1 of the bird survey compartments surveyed by RPS in 2019-20 (Volume 6, Appendix 9.4) and therefore close to the Zone G causeway. Construction and use of this jetty could potentially result in an in-combination effect if it overlaps with construction and use of the Zone G causeway. However, the jetty location shown on LTC plans appears to overlap with the existing jetty in use by the Ingrebourne Valley land raising operation, and so may in fact represent continued use of that existing jetty.
- 7.2.6 As numbers of wintering birds in the vicinity of the Zone G causeway are generally low, it is not considered that there would be in-combination effects on the majority of species. The potential for an in-combination effect on Avocet, Dunlin, Redshank and Ringed Plover has been given further consideration.
- 7.2.7 It is possible that the construction or use of the Zone G causeway could overlap with the construction or use of the LTC jetty. If this occurs, given that the jetty and the causeway would be in close proximity, the result would be the displacement of the same number of birds as would result from the construction or use of the Zone G causeway on its own, and hence no additional in-combination effect would occur.
- 7.2.8 If the construction and use of the LTC jetty occurs after the Zone G causeway has ceased being in use, the result would be the same number of birds being displaced for a longer period.
- 7.2.9 However, given the large amount of mudflat habitat available within and outside the SPA, and the relatively small area likely to be affected by disturbance even if the periods of use of the jetty and causeway are contiguous, it remains the case that the small number of displaced birds would be able to find alternative foraging habitat reasonably close by in other parts of the estuary.
- 7.2.10 On this basis it is considered that in-combination construction impacts would not elevate the scale of effects on birds associated with the SPA in a way that is likely to result in an Adverse Effect on Integrity of the Thames Estuary and Marshes SPA.

7.3 In-combination operational effects

- 7.3.1 There is potential for cumulative air quality impacts resulting from the additional traffic generated by other developments and from air pollutant emissions of other combustion and power generation development proposals. The results from the modelling of these potential impacts are presented in ES Volume 4, Chapter 25: Air Quality cumulative assessment.

- 7.3.2 These data show that, for the majority of interest features, either the cumulative PCis <1% of the EQS or the PEC is <EQS and, as such, no significant effects are predicted.
- 7.3.3 The only exceptions to this are for the following features:
- Thames Estuary and Marshes SPA - *Charadrius hiaticula* (Europe/Northern Africa – wintering) Ringed Plover (A137) (both nutrient nitrogen and acid deposition); and
 - North Downs Woodlands SAC – *Taxus baccata* woods of the British Isles (H91J0) (nutrient nitrogen deposition).
- 7.3.4 As described above, the CL/CLF used in the assessment for Ringed Plover is taken from the Site-Relevant Critical Load tool on APIS and is for acidic coastal stable dune grassland. This habitat type does not occur within the Thames Estuary and Marshes SPA; indeed the main associations of this species within the SPA are the grazing marsh and inter-tidal mudflats, in particular at Mucking Flats near east Tilbury and further east at Allhallows-on-Sea (Frost *et al.*, 2016). Such habitats are not highly susceptible to either acid or nutrient nitrogen deposition on the basis that they are both high nutrient systems (as demonstrated by a high critical load of 20-30 kgN.ha⁻¹.yr⁻¹) and brackish (or salt water) and therefore more alkaline.
- 7.3.5 On this basis, it is considered that the data on APIS is not directly relevant to the population of Ringed Plover using the SPA where a higher critical load/critical load function would be more appropriate, given the habitat associations of this species in this geographic location. Therefore, there is no potential for a likely significant effect on Ringed Plover using the Thames Estuary and Marshes SPA as a result of cumulative emissions to air.
- 7.3.6 With respect to the interest feature at the North Downs Woodland SAC, the critical load used in the assessment (5 kgN.ha⁻¹.yr⁻¹) is the lowest found on APIS for any habitat type and represents coniferous woodland on the very poorest soils with strong lichen/free-living algal communities. APIS notes that unless such lichen communities are present within the site, then 10 kgN.ha⁻¹.yr⁻¹ is a more appropriate critical load for coniferous woodland in the UK (APIS 2019). Using this value, the cumulative PC becomes 1% of the critical load and, as such, insignificant.
- 7.3.7 Thurrock Flexible Generation Plant will result in permanent loss of arable land and grazing land. There is therefore the potential for cumulative losses of these habitat types, which could include losses of arable land considered to be functionally linked land for birds associated with the Thames Estuary and Marshes SPA/Ramsar. Surveys to assess this have not identified any bird interest features using this land. As such, no cumulative effects are predicted.

7.4 Decommissioning effects

Main development decommissioning

- 7.4.1 Decommissioning of Thurrock Flexible Generation Plant, if that were to occur after its expected initial 35 years of operation, may overlap with the operational phases of other developments, most significantly the NSIPs Tilbury2 and the Lower Thames Crossing (as these developments do not have an estimated lifetime in that it is expected they would remain permanently operational).
- 7.4.2 In that situation, there may be some limited potential for additional disturbance to species in the local area from decommissioning works combined with disturbance from traffic and other operations associated with both developments. However, surveys indicate that decommissioning the main plant would not result in disturbance to species associated with Natura 2000 sites, and therefore it is not considered that this would give rise to effects of a magnitude or significance greater than that assessed for Thurrock Flexible Generation Plant alone. No likely significant effects are therefore predicted.

Causeway decommissioning

- 7.4.3 Causeway decommissioning will occur either at the end of the design operational lifetime of the project (35 years), or potentially sooner if a suitable alternative option for delivery of gas engines becomes available (ES Addendum: Assessment of Causeway Decommissioning).
- 7.4.4 Decommissioning of the causeway is expected to involve the following works.
- i. Deconstruction of the causeway structure, including removal of the security gate/fence, dismantling the concrete slabs and stone gabion foundations, and transporting this material for re-use or disposal.
 - ii. Reinstating the permanent sea defence wall where the access gate had been inserted during causeway construction.
 - iii. Restoring the mudflat and coastal saltmarsh area from the causeway footprint and barge berthing pocket (if the latter has not already refilled by natural accretion).
- 7.4.5 The decommissioning plant used and timescale for the work is expected to be similar to that required for construction, and on that basis the impacts associated with decommissioning are expected to be similar to those assessed above.
- 7.4.6 Therefore, provided that numbers of birds regularly using habitats in the vicinity of the causeway do not significantly change, the decommissioning of the causeway would not have an adverse effect on the integrity of the Thames Estuary and Marshes SPA.

- 7.4.7 Given the potentially long length of time before decommissioning would occur, additional wintering bird surveys would be undertaken prior to decommissioning, to inform the Causeway Decommissioning Plan, and if surveys indicate a significant change to the level of bird use of the foreshore in the vicinity of the causeway, an updated HRAR would be produced, and where necessary may involve restrictions on works during some or all of the winter period. Any necessary mitigation would be confirmed through the Causeway Decommissioning Plan at the time.

8. Conclusion

- 8.1.1 Information to enable an Appropriate Assessment of the Thurrock Flexible Generation Plant development has been provided.
- 8.1.2 The screening stage identified no Likely Significant Effects on Natura 2000 sites in the absence of mitigation with the exception of water quality and hydrological impacts on the Thames Estuary and Marshes SPA / Ramsar, and noise and visual disturbance from construction and use of the causeway on the qualifying features Avocet, Dunlin, Redshank and Ringed Plover of the Thames Estuary and Marshes SPA / Ramsar.
- 8.1.3 These potential effects were taken forward to Appropriate Assessment stage where appropriate mitigation was identified to address the risk of significant effects occurring.
- 8.1.4 The proposed mitigation in the form of surface water management features and pollution control safeguards will together ensure that there will be no significant adverse effect on the integrity of the Thames Estuary and Marshes SPA / Ramsar from water quality and hydrological impacts.
- 8.1.5 The assessment of the impacts of causeway construction and use concluded that there would be no adverse significant adverse effect on the integrity of the Thames Estuary and Marshes SPA / Ramsar and no mitigation was therefore required. Measures to minimise impacts from causeway construction and use should this overlap with the passage / wintering bird season, will nevertheless be implemented as best practice.

9. References

APIS (2019) Nitrogen Deposition: Saltmarsh <http://www.apis.ac.uk/node/968> [accessed 12/12/19]

Bioscan (2018) Habitats Regulations Assessment (HRA) Stage 2 Report Appendix 9: Proposed port terminal at former Tilbury Power Station: Tilbury2 note on winter bird use of the intertidal area. [Online] Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR030003/TR030003-000995-Port%20of%20Tilbury%20London%20-%20Habitats%20Regulations%20Stage%20%20report%20-%20Clean.pdf> [Accessed 02 December 2019]

Cutts, N., A. Phelps, and D. Burdon. (2009) Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance, Report to Humber INCA. ZBB710-F-2009. Institute of Estuarine and Coastal Studies University of Hull.

Cutts, N., Hemingway, K. & Spencer, J. (2013) Waterbird disturbance mitigation toolkit. Institute of Estuarine and Coastal Studies, University of Hull.

DCLG (2006) Planning for the Protection of European Sites: Appropriate Assessment. Department for Communities and Local Government.

Environment Agency (2012) Thames Estuary 2100 Plan. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/322061/LIT7540_43858f.pdf [accessed 12/12/19]

Frost, T. M., Austin, G. E., Calbrade, N. A., Holt, C. A., Mellan, H. J., Hearn, R. D., Stroud, D. A., Wotton, S. R. and Balmer, D. E. (2016) Waterbirds in the UK 2014/15: The Wetland Bird Survey Thetford: BTO, RSPB and JNCC, in association with WWT.

Hayhow, D.B., Ausden, M.A., Bradbury, R.B., Burnell, D., Copeland, A.I., Crick, H.Q.P., Eaton, M.A., Frost, T., Grice, P.V., Hall, C., Harris, S.J., Morecroft, M.D., Noble, D.G., Pearce-Higgins, J.W., Watts, O. & Williams, J.M. *The state of the UK's birds 2017*. RSPB, BTO, WWT, DAERA, JNCC, NE and NRW, Sandy.

Highways Agency (2007) Design Manual for Roads and Bridges, HA 207/07, Vol. 11, Section 3, Part 1 Air Quality.

Holman *et al.* (2014) Guidance on the assessment of dust from demolition and construction. <https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf> [accessed 12/12/19]

Musgrove, A.J., Austin, G.E., Hearn, R.D., Holt, C.A., Stroud, D.A. & Wotton, S.R. (2011). Overwinter population estimates of British waterbirds. *British Birds*, 104, 364-397.

Natural England (2019a) Thames Estuary & Marshes SPA Conservation Objectives <http://publications.naturalengland.org.uk/publication/4698344811134976> [accessed 12/12/19]

Natural England (2019b) North Downs Woodlands SAC Conservation Objectives <http://publications.naturalengland.org.uk/publication/5717001544663040> [accessed 12/12/19]

Natural England (2019c) Benfleet and Southend Marshes SPA Conservation Objectives <http://publications.naturalengland.org.uk/publication/5954477588742144> [accessed 12/12/19]

Natural England (2019d) Medway Estuary & Marshes SPA Citation <http://publications.naturalengland.org.uk/publication/6672791487119360> [accessed 12/12/19]

Natural England (2019e) Peters Pit SAC Conservation Objectives <http://publications.naturalengland.org.uk/publication/4817478370721792> [accessed 12/12/19]

Owens, N. W. (1997) Responses of Wintering Brent Geese to Human Disturbance. *Wildfowl* 28 (28):10.

PINS (2018) Consideration of avoidance and reduction measures in Habitats Regulations Assessment: People over Wind, Peter Sweetman v Coillte. PINS NOTE 05/2018. The Planning Inspectorate, Bristol.

Postlethwaite, B. & Stephenson, S. (2012) Grimsby River Terminal Construction – Pile Noise Monitoring and Bird Behaviour Observations. L-30062-S02-REPT-001. Xodus Group.

Smit, C.J. & Visser, G.J. (1993) Effects of disturbance on shorebirds: a summary of existing knowledge from the Dutch Wadden Sea and Delta. *Wader Study Group Bulletin*, numéro special, 68, pp.6-19.

Wright, M.D. Goodman, P. & Cameron, T.C. (2010) Exploring behavioural responses of shorebirds to impulsive noise. *Journal: Wildfowl* (2010) 60: pp 150 -167. Wildfowl and Wetlands Trust.

Appendix A Natura 2000 site citations

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

Name: Thames Estuary and Marshes

Unitary Authority/County: Essex County Council, Gravesham Borough Council, Kent County Council, Medway Council, and Thurrock Borough Council.

Consultation proposal: Mucking Flats and Marshes SSSI and South Thames Estuary and Marshes SSSIs have been recommended as a Special Protection Area because of the site's European ornithological interest.

The Thames Estuary and Marshes Special Protection Area is a wetland of European importance comprising a mosaic of intertidal habitats, saltmarsh, coastal grazing marshes, saline lagoons and chalk pits. The site provides wintering and breeding habitats for important assemblages of wetland bird species, particularly wildfowl and waders as well as supporting migratory birds on passage. The site forms part of the wider Thames Estuary together with other classified SPAs in both Essex and Kent.

Boundary of SPA: The SPA boundary is within or coincident with the above SSSI boundaries. See SPA map for further detail.

Size of SPA: The SPA covers an area of 4,838.94 ha.

European ornithological importance of the SPA: Thames Estuary and Marshes SPA is of European importance because:

a) the site qualifies under **article 4.1** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the GB populations of the following species listed on Annex I, in any season:

Annex I species	5 year peak mean 1993/94 - 1997/98	% GB population
Avocet <i>Recurvirostra avosetta</i>	283 individuals - wintering	28.3% GB
Hen Harrier <i>Circus cyaneus</i>	7 individuals - wintering	1.0% GB

b) the site qualifies under **article 4.2** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the biogeographical populations of the following regularly occurring migratory species (other than those listed on Annex I), in any season:

Species	5 year peak mean 1993/94 - 1997/98	% of population
Ringed Plover <i>Charadrius hiaticula</i>	1,324 individuals - passage	2.6% Europe/ Northern Africa (win)
Grey Plover <i>Pluvialis squatarola</i>	2,593 individuals - wintering	1.7% Eastern Atlantic (wintering)
Dunlin <i>Calidris alpina alpina</i>	29,646 individuals - wintering	2.1% N Siberia/Europe/ W Africa
Knot <i>Calidris canutus islandica</i>	4,848 individuals - wintering	1.4% NE Can/Grl/ Iceland/NW Eur
Black-tailed Godwit <i>Limosa limosa islandica</i>	1,699 individuals - wintering	2.4% Iceland (breeding)
Redshank <i>Tringa totanus totanus</i>	3,251 individuals - wintering	2.2% Eastern Atlantic (wintering)

c) the site qualifies under **article 4.2** of the Directive (79/409/EEC) as it is used regularly by over 20,000 waterfowl in any season:

Period	Season	Population
1993/94 - 1997/98	Wintering	75,019

Non-qualifying species of interest

Other Annex 1 species which regularly occur on the site in non-qualifying numbers are breeding Common Tern *Sterna hirundo*, and passage and wintering Bewick's Swan *Cygnus columbianus bewickii*, Golden Plover *Pluvialis apricaria*, Ruff *Philomachus pugnax*, Short-eared Owl *Asio flammeus* and Kingfisher *Alcedo atthis*.

The site also supports nationally important populations of Shelduck *Tadorna tadorna*, Teal *Anas crecca*, Pintail *Anas acuta*, Gadwall *Anas strepera*, Shoveler *Anas clypeata*, Tufted Duck *Aythya fuligula* and Pochard *Aythya ferina*.

Status of SPA

The Thames Estuary and Marshes SPA was classified on 31 March 2000.

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[Home](#) > [UK](#) > [UK Protected Sites](#) > [Special Protection Areas](#) > [SPA Reviews](#) > [Second Review](#) > SPA Review site accounts

SPA description

(information as published 2001)

Thames Estuary and Marshes



Country	England
Unitary Authority	Medway, Thurrock, Kent
SPA status	Classified 31/03/2000
Latitude	51 29 08 N
Longitude	00 35 47 E
SPA EU code	UK9012021
Area (ha)	4838.94
Component SSSI/ASSIs	Mucking Flats and Marshes South Thames Estuary and Marshes

The Thames Estuary and Marshes SPA is located on the south side of the Thames Estuary in southern England. The marshes extend for about 15 km along the south side of the 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 mud-flats. The estuary and adjacent grazing marsh areas support an important assemblage of wintering waterbirds including grebes, geese, ducks and waders. The site is also important in spring and autumn migration periods.

Qualifying species

For individual species accounts visit the [Species Accounts section](#)

This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Over winter;

Avocet *Recurvirostra avosetta*, 276 individuals representing at least 21.7% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)

Hen Harrier *Circus cyaneus*, 7 individuals representing at least 0.9% of the wintering population in Great Britain (5 year mean 93/4-97/8)

This site also qualifies under **Article 4.2** of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

On passage;

Ringed Plover *Charadrius hiaticula*, 559 individuals representing at least 1.1% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Over winter;

Ringed Plover *Charadrius hiaticula*, 541 individuals representing at least 1.1% of the wintering Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Assemblage qualification: A wetland of international importance.

The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl

Over winter, the area regularly supports 33,433 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Redshank *Tringa totanus*, Black-tailed Godwit *Limosa limosa islandica*, Dunlin *Calidris alpina alpina*, Lapwing *Vanellus vanellus*, Grey Plover *Pluvialis squatarola*, Shoveler *Anas clypeata*, Pintail *Anas acuta*, Gadwall *Anas strepera*, Shelduck *Tadorna tadorna*, White-fronted Goose *Anser albifrons albifrons*, Little Grebe *Tachybaptus ruficollis*, Ringed Plover *Charadrius hiaticula*, Avocet *Recurvirostra avosetta*, Whimbrel *Numenius phaeopus*.

Note:

Many designated sites are on private land: the listing of a site in these pages does not imply any right of public access.

Note that sites selected for waterbird species on the basis of their occurrence in the breeding, passage or winter periods also provide legal protection for these species when they occur at other times of the year.

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**European Site Conservation Objectives for
Thames Estuary and Marshes Special Protection Area
Site Code: UK9012021**

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

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, and,
- The distribution of the qualifying features within the site.

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

- A082 *Circus cyaneus*; Hen harrier (Non-breeding)
- A132 *Recurvirostra avosetta*; Pied avocet (Non-breeding)
- A137 *Charadrius hiaticula*; Ringed plover (Non-breeding)
- A141 *Pluvialis squatarola*; Grey plover (Non-breeding)
- A143 *Calidris canutus*; Red knot (Non-breeding)
- A149 *Calidris alpina alpina*; Dunlin (Non-breeding)
- A156 *Limosa limosa islandica*; Black-tailed godwit (Non-breeding)
- A162 *Tringa totanus*; Common redshank (Non-breeding)
- Waterbird assemblage

This is a European Marine Site

This SPA is a part of the Thames Estuary and Marshes European Marine Site (EMS). These Conservation Objectives should be used in conjunction with the Regulation 35 Conservation Advice document for the EMS. For further details about this please visit the Natural England website at: <http://www.naturalengland.org.uk/ourwork/marine/protectandmanage/mpa/european/sites.aspx> or contact Natural England's enquiry service at enquiries@naturalengland.org.uk or by phone on 0845 600 3078.

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2010 (the "Habitats Regulations") and Article 6(3) of the Habitats Directive. They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment' including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where this is available) will also provide a framework to inform the management of the European Site under the provisions of Articles 4(1) and 4(2) of the Wild Birds Directive, and the prevention of deterioration of habitats and significant disturbance of its qualifying features required under Article 6(2) of the Habitats Directive.

These Conservation Objectives are set for each bird feature for a [Special Protection Area \(SPA\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving the aims of the Wild Birds Directive.

Publication date: 30 June 2014 (Version 2). This document updates and replaces an earlier version dated 29 May 2012 to reflect Natural England's Strategic Standard on European Site Conservation Objectives 2014. Previous references to additional features identified in the 2001 UK SPA Review have also been removed.

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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:

- 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.
- 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.
- 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:

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DD MM YY

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

Designated: 31 March 2000

3. Country:

UK (England)

4. Name of the Ramsar site:

Thames Estuary and Marshes

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

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

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

a) Site boundary and area:

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

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

Ramsar Information Sheet: UK11069	Page 1 of 11	Thames Estuary and Marshes
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Produced by JNCC: Version 3.0, 13/06/2008

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:

- hard copy (required for inclusion of site in the Ramsar List): yes -or- no ;
- an electronic format (e.g. a JPEG or ArcView image) Yes
- 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.

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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 occurring at levels of National importance are given in Section 22

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

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

a) biogeographic region:
Atlantic

b) biogeographic regionalisation scheme (include reference citation):
Council Directive 92/43/EEC

16. Physical features of the site:

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

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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.

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.

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)

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 *Imula crithmoides*, annual beard grass *Polygonum 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, <i>Tachybaptus ruficollis ruficollis</i> , 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, <i>Egretta garzetta</i> , West Mediterranean	54 individuals, representing an average of 3.2% of the GB population (5 year peak mean 1998/9-2002/3)
Ruff, <i>Philomachus pugnax</i> , 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, <i>Tringa nebularia</i> , 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, <i>Tadorna tadorna</i> , NW Europe	1238 individuals, representing an average of 1.5% of the GB population (5 year peak mean 1998/9-2002/3)
Gadwall, <i>Anas strepera strepera</i> , NW Europe	359 individuals, representing an average of 2% of the GB population (5 year peak mean 1998/9-2002/3)
Northern shoveler, <i>Anas clypeata</i> , 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, <i>Rallus aquaticus</i> , Europe	6 individuals, representing an average of 1.3% of the GB population (5 year peak mean 1998/9-2002/3)
Pied avocet, <i>Recurvirostra avosetta</i> , 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, <i>Tringa erythropus</i> , 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 crane fly *Erioptera bivittata*, a crane fly *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*.

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

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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	+	

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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-nitrified 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)	+	

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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

Appendix B Screening and integrity matrices

Evidence for likely significant effects on their qualifying features is detailed within the footnotes to the screening matrices below.

Matrix Key:

✓ = Likely significant effect cannot be excluded until further studies carried out

× = Likely significant effect can be excluded

C = construction

O = operation

D = decommissioning

Where effects are not applicable to a particular feature they are greyed out. Note that decommissioning effects are only likely if the functionally linked land supports birds from the Thames Estuary and Marshes SPA, which is not considered to be the case.

Matrix 1 – Screening of Likely Significant Effects: The Thames Estuary and Marshes SPA

Name of European Site	The Thames Estuary and Marshes Special Protection Area																													
EU Code	UK9012021																													
Distance to Proposal site	1.02 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Annex 1 Species Regularly Wintering in Numbers of European Importance - Avocet	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	√ _k	√ _m	√ _k	x _j	x _j	x _j			
Annex 1 Species Regularly Wintering in Numbers of European Importance – Hen Harrier	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	x _l	x _i	x _l	x _j	x _j	x _j			
Migratory species regularly occurring on passage – Ringed plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	√ _k	√ _m	√ _k	x _j	x _j	x _j			
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Grey Plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	x _l	x _i	x _l	x _j	x _j	x _j			
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Dunlin	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	√ _k	√ _m	√ _k	x _j	x _j	x _j			
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Knot	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	x _l	x _i	x _l	x _j	x _j	x _j			

Name of European Site	The Thames Estuary and Marshes Special Protection Area																													
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European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Black-tailed Godwit	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Redshank	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	√ _k	√ _m	√ _k	x _j	x _j	x _j			
Regularly supporting over 20,000 waterfowl over winter	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	x _i	x _i	x _i	x _j	x _j	x _j			

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	No likely significant effect from direct loss of habitat on any interest feature within the SPA. The Proposal Site is over 1 km from the designated area boundary (para 5.1.4)..
b.	Given the distance from the SPA, the DCO application will result in no change to current management regimes of any supporting habitat of the SPA during either the construction or operation (para 5.1.21 - 5.1.24).
c.	The site is set back inland and is considered to be an area benefiting from defences (EA, 2018). It is over 1 km from the Thames Estuary & Marshes SPA. No loss of land for managed realignment is therefore anticipated (para 5.1.25 - 5.1.32).
d.	The built development (the main buildings) is 2.62 km from the visible part of the intertidal area within the Thames Estuary and Marshes SPA which supports populations of waterbirds. There is therefore no potential for the development to overshadow any of the habitats for which the SPA has been designated. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (para 5.1.29)
e.	It is anticipated that the majority of dust generated during construction or decommissioning would be deposited in the area immediately surrounding the source (up to 50 metres away) and that construction and operational traffic are far enough away from the designated site not to have a LSE. The boundary of the SPA site is 1 km to the east of the proposal site and therefore no likely significant effect is predicted on any interest feature (para 5.1.37 - 5.1.40).
f.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (para 5.1.43 - 5.1.48).
g.	The proposal site is currently drained via a series of ditches which will need to be modified and areas of hardstanding and buildings introduced. Therefore, without mitigation hydrological changes to the ditches that feed eventually into the SPA or areas which support SPA species cannot be discounted at the screening stage (para 5.1.57 - 5.1.59).
h.	The proposal site is currently drained via a series of ditches, which ultimately drain into the Thames Estuary and Marshes SPA & Ramsar Therefore, without mitigation, water quality changes to the ditches that feed eventually into the SPA or areas which supports SPA species cannot be discounted at the screening stage (para 5.1.52 - 5.1.54).
i.	Given the distance between the proposal site and the SPA, no likely significant effect on any interest feature within the SPA itself is predicted from disturbance, construction noise or operational noise (para 5.1.62 - 5.1.81).
j.	There are no non-native invasive species currently known to be in the area. No final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (para 5.1.84 - 5.1.85).
k.	Potential for construction of the causeway to affect wintering birds present in the vicinity of the causeway that were recorded using the site during surveys in 2019-20, and this effect cannot be discounted at the screening stage (paras 5.1.70 - 5.1.78)
l.	Although the potential for noise and visual disturbance during construction and use of the causeway would potentially affect Functionally Linked Land associated with the SPA, no evidence of this species was recorded during bird surveys (para 5.1.73)
m.	Potential for presence of the causeway after completion of construction to affect wintering birds present in the vicinity of the causeway that were recorded using the site during surveys in 2019-20, and this effect cannot be discounted at the screening stage (para 5.1.83)

Name of European Site	The Thames Estuary and Marshes Ramsar																													
Ramsar code	UK9012021																													
Distance to Proposal site	1.02 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - Dunlin	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	√ _k	√ _m	√ _k	x _j	x _j	x _j			
Ramsar Criterion 6 - Species Regularly occurring in Numbers of International Importance – Grey plover (wintering)	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	x _l	x _i	x _l	x _j	x _j	x _j			
Ramsar Criterion 6 - Species Regularly occurring on passage in Numbers of International Importance – Redshank	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	√ _g	√ _g	√ _g	√ _h	√ _h	√ _h	√ _k	√ _m	√ _k	x _j	x _j	x _j			

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	No likely significant effect from direct loss of habitat on any interest feature. The Proposal Site is over 1km from the designated area boundary. (para 5.1.4).
b.	Given the distance from the Ramsar, the DCO application will result in no change to current management regimes of any supporting habitat of the Ramsar site during either the construction or operation (para 5.1.21 - 5.1.24).
c.	The site is set back inland and is considered to be an area benefiting from defences (EA, 2018). It is over 1km from the Thames Estuary & Marshes Ramsar. No loss of land for managed realignment is therefore anticipated (para 5.1.26 - 5.1.27).
d.	The proposed building is 2.62 km from the visible part of the intertidal area within the Thames Estuary and Marshes Ramsar site which supports populations of waterbirds. There is therefore no potential for the development to overshadow any of the habitats for which the Ramsar has been designated. No likely significant effect on any interest feature from increased urbanisation is therefore predicted (para 5.1.29 - 5.1.33).
e.	It is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that construction and operational traffic are far enough away from the designated site not to have an LSE. The boundary of the Ramsar site is 1 km to the east of the Proposal Site and therefore no likely significant effect is predicted on any interest feature (para 5.1.37 -5.1.40).

Code in Matrix above	Evidence supporting conclusions
f.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (para 5.1.43 - 5.1.48).
g.	The Proposal site is currently drained via a series of ditches which will need to be modified and areas of hardstanding and buildings introduced. Therefore, without mitigation hydrological changes to the ditches that feed eventually into the Ramsar or areas which supports Ramsar species cannot be discounted at the screening stage (para 5.1.57 - 5.1.58).
h.	The Proposal site is currently drained via a series of ditches. Therefore, without mitigation water quality changes to the ditches that feed eventually into the Ramsar site or areas which supports Ramsar species cannot be discounted at the screening stage (para 5.1.52 - 5.1.54).
i.	Given the distance between the proposal site and the SPA, no likely significant effect on any interest feature within the SPA itself is predicted from disturbance, construction noise or operational noise (para 5.1.62 - 5.1.81).
j.	The no non-native invasive species currently known to be in the area. No final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (para 5.1.84 - 5.1.85).
k.	Potential for construction of the causeway could affect wintering birds present in the vicinity of the causeway that were recorded using the site during surveys in 2019-20, and this effect cannot be discounted at the screening stage (paras 5.1.70 - 5.1.78)
l.	Although the potential for noise and visual disturbance during construction and use of the causeway would potentially affect Functionally Linked Land associated with the SPA, no evidence of this species was recorded during bird surveys (para 5.1.73)
m.	Potential for presence of the causeway after completion of construction of the causeway to affect wintering birds present in the vicinity of the causeway that were recorded using the site during surveys in 2019-20, and this effect cannot be discounted at the screening stage (para 5.1.83)

Matrix 3 – Screening Matrix Screening of Likely Significant Effects: Medway Estuary and Marshes SPA

Name of European Site	Medway Estuary and Marshes SPA																													
Site code	UK9012031																													
Distance to Proposal site	11.5 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Regularly supporting more than 1% of the GB breeding population of an Annex 1 species in summer – Avocet	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Regularly supporting more than 1% of the GB breeding population of an Annex 1 species in summer – Little tern	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Annex 1 Species Regularly Wintering in Numbers of European Importance - Avocet	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Annex 1 Species Regularly on Passage in Numbers of European Importance – Grey Plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Annex 1 Species Regularly on Passage in Numbers of European Importance – Redshank	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory Species Regularly Wintering in Numbers of European Importance - Dark-bellied Brent Goose	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			

Name of European Site	Medway Estuary and Marshes SPA																													
Site code	UK9012031																													
Distance to Proposal site	11.5 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Migratory Species Regularly Wintering in Numbers of European Importance - Shelduck	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory Species Regularly Wintering in Numbers of European Importance - Pintail	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory Species Regularly Wintering in Numbers of European Importance - Ringed plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory Species Regularly Wintering in Numbers of European Importance - Knot	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory Species Regularly Wintering in Numbers of European Importance - Dunlin	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Regularly supports in winter a diverse assemblage of wintering species	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			

Name of European Site	Medway Estuary and Marshes SPA																													
Site code	UK9012031																													
Distance to Proposal site	11.5 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Regularly supports over 20,000 waterfowl	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Diverse assemblage of breeding migratory waterfowl	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	No likely significant effect from direct loss of habitat on any interest feature. The Proposal Site is 11.5km from the designated area boundary. (para 5.1.4 - 5.1.5).
b.	Given the distance from the SPA, the DCO application will result in no change to current management regimes of any supporting habitat of the SPA during either the construction or operation (para 5.1.23).
c.	The SPA is 11.5 km from the application boundary, and therefore, no LSE arising from managed realignment are considered (para 5.1.26 - 5.1.27).
d.	The SPA is at a considerable distance from the DCO application site, and therefore, no LSE are predicted from increased urbanisation (para 5.1.34).
e.	It is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that construction and operational traffic are far enough away from the designated site not to have an LSE. The boundary of the SPA is 11.5 km to the south of the Proposal Site and therefore no likely significant effect is predicted on any interest feature (para 5.1.37 - 5.1.40).
f.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (para 5.1.49).
g.	The SPA is a minimum of 11.5 km from the DCO application boundary and is not linked to the site via any ecological or hydrological pathways; therefore, no impacts are anticipated (para 5.1.60).
h.	The SPA is a minimum of 11.5 km from the DCO application boundary and is not linked to the site via any ecological or hydrological pathways; therefore, no changes to water quality are anticipated (para 5.1.55).
i.	Given the distance between the proposal site and the SPA, no likely significant effect on any interest feature is predicted from disturbance, construction noise or operational noise (para 5.1.69, 5.1.81).

Code in Matrix above	Evidence supporting conclusions
j.	There are no non-native invasive species currently known to be in the area. No final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (para 5.1.84 - 5.1.85).

Matrix 4 – Screening Matrix Screening of Likely Significant Effects: Medway Estuary and marshes RAMSAR

Name of European Site	Medway Estuary and Marshes Ramsar																													
Ramsar code	UK11040																													
Distance to Proposal site	11.5 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Ramsar Criterion 2 - Nationally rare and scarce plant species	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 2 - Nationally scarce invertebrates	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 5 – Overwinter assemblage of international importance	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Regularly on Passage in Numbers of International Importance – Grey Plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Species Regularly on Passage in Numbers of International Importance –Redshank	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - Dark-bellied Brent Goose	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			

Name of European Site	Medway Estuary and Marshes Ramsar																													
Ramsar code	UK11040																													
Distance to Proposal site	11.5 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - Shelduck	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance – Pintail	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - Ringed plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - Knot	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Regularly Wintering in Numbers of International Importance - Dunlin	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	No likely significant effect from direct loss of habitat on any interest feature. The Proposal Site is 11.5km from the designated area boundary. (para 5.1.4).
b.	Given the distance from the SPA, the DCO application will result in no change to current management regimes of any supporting habitat of the SPA during either the construction or operation (para 5.1.23).
c.	The SPA is 11.5 km from the application boundary, and therefore, no LSE arising from managed realignment are considered (para 5.1.25).
d.	The SPA is at a considerable distance from the DCO application site, and therefore, no LSE are predicted from increased urbanisation (para 5.1.34).
e.	It is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that construction and operational traffic are far enough away from the designated site not to have an LSE. The boundary of the SPA is 11.5 km to the south of the Proposal Site and therefore no likely significant effect is predicted on any interest feature (para 5.1.40).
f.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (para 5.1.49).
g.	The SPA is a minimum of 11.5 km from the DCO application boundary and is not linked to the site via any ecological or hydrological pathways; therefore, no impacts are anticipated (para 5.1.60).
h.	The SPA is a minimum of 11.5 km from the DCO application boundary and is not linked to the site via any ecological or hydrological pathways; therefore, no changes to water quality are anticipated (para 5.1.55).
i.	Given the distance between the proposal site and the SPA, no likely significant effect on any interest feature is predicted from disturbance, construction noise or operational noise (para 5.1.69, 5.1.81).
j.	There are no non-native invasive species currently known to be in the area. No final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (para 5.1.84 - 5.1.85).

Matrix 5 – Screening of Likely Significant Effects: North Downs Woodland SAC

Name of European Site	North Downs Woodland SAC																													
Site code	UK0030225																													
Distance to Proposal site	14.25 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Annex 1 habitats qualifying feature: <i>Asperulo-Fagetum</i> beech forests	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Annex 1 habitats qualifying feature: <i>Taxus baccata</i> woods of the British Isles (priority feature)	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Annex 1 habitats qualifying feature: Semi-natural dry grasslands & scrubland facies on calcareous substrates (<i>Festuo-Brometalia</i>) – important orchid sites	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	No likely significant effect from direct loss of habitat on any interest feature. The Proposal Site is over 10 km from the designated area boundary. (para 5.1.4).
b.	Given the distance from the SAC, the DCO application will result in no change to current management regimes of any supporting habitat of the SAC site during either the construction or operation (para 5.1.23).
c.	The SAC is 10.4 km from the application boundary, and therefore, no LSE arising from managed realignment are considered (para 5.1.25).
d.	The SAC is at a considerable distance from the DCO application site, and therefore, no LSE are predicted from increased urbanisation (para 5.1.34).
e.	It is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that construction and operational traffic are far enough away from the designated site not to have an LSE. The boundary of the SAC site is 10.4 km to the south of the Proposal Site and therefore no likely significant effect is predicted on any interest feature (para 5.1.40).
f.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (para 5.1.49).
g.	The SAC is a minimum of 10km from the DCO application boundary, and is not linked to the site via any ecological or hydrological pathways; therefore, no impacts are anticipated (para 5.1.60)
h.	The SAC is a minimum of 10km from the DCO application boundary, and is not linked to the site via any ecological or hydrological pathways; therefore, no changes to water quality are anticipated (para 5.1.55)
i.	Given the distance between the proposal site and the SAC, no likely significant effect on any interest feature is predicted from disturbance, construction noise or operational noise (para 5.1.69, 5.1.81).
j.	The no non-native invasive species currently known to be in the area. No final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (para 5.1.84 - 5.1.85).

Matrix 6 – Screening Matrix Screening of Likely Significant Effects: Benfleet and Southend Marshes SPA

Name of European Site	Benfleet and Southend Marshes Special Protection Area																													
Site code	UK9009171																													
Distance to Proposal site	14.9 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	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
Migratory species regularly occurring on passage – Dark-bellied Brent Goose	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory species regularly occurring on passage – Ringed plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Grey Plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Dunlin	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Knot	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Regularly supporting over 20,000 waterfowl over winter	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	No likely significant effect from direct loss of habitat on any interest feature. The Proposal Site is 14.9km from the designated area boundary. (para 5.1.4).
b.	Given the distance from the SPA, the DCO application will result in no change to current management regimes of any supporting habitat of the SPA during either the construction or operation (para 5.1.23).
c.	The SPA is 14.9 km from the application boundary, and therefore, no LSE arising from managed realignment are considered (para 5.1.25)
d.	The SPA is at a considerable distance from the DCO application site, and therefore, no LSE are predicted from increased urbanisation (para 5.1.34).
e.	It is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that construction and operational traffic are far enough away from the designated site not to have an LSE. The boundary of the SPA site is 14.9 km to the south of the Proposal Site and therefore no likely significant effect is predicted on any interest feature (para 5.1.40)
f.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (para 5.1.51).
g.	The SPA is a minimum of 14.9 km from the DCO application boundary, and is not linked to the site via any ecological or hydrological pathways; therefore, no impacts are anticipated (para 5.1.60)
h.	The SPA is a minimum of 14.9 km from the DCO application boundary, and is not linked to the site via any ecological or hydrological pathways; therefore, no changes to water quality are anticipated (para 5.1.55)
i.	Given the distance between the proposal site and the SPA, no likely significant effect on any interest feature is predicted from disturbance, construction noise or operational noise (para 5.1.69, 5.1.81).
j.	The no non-native invasive species currently known to be in the area. No final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (para 5.1.84 - 5.1.85).

Matrix 7 – Screening Matrix Screening of Likely Significant Effects: Benfleet and Southend Marshes RAMSAR

Name of European Site	Benfleet and Southend Marshes Ramsar																													
Site code	UK11006																													
Distance to Proposal site	14.9 km																													
European site features	Likely effects of NSIP																													
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species					
	C	O	D	C	O	D	C	O	D	C		D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Ramsar Criterion 5 – Overwinter assemblage of international importance	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - Dark-bellied brent goose	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Species Regularly occurring on passage in Numbers of International Importance – Grey plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			
Ramsar Criterion 6 - Species Regularly occurring on passage in Numbers of International Importance –Knot	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _c	x _c	x _d	x _d	x _d	x _e	x _f	x _e	x _g	x _g	x _g	x _h	x _h	x _h	x _i	x _i	x _i	x _j	x _j	x _j			

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	No likely significant effect from direct loss of habitat on any interest feature. The Proposal Site is 14.9km from the designated area boundary. (para 5.1.4).
b.	Given the distance from the Ramsar, the DCO application will result in no change to current management regimes of any supporting habitat of the Ramsar during either the construction or operation (para 5.1.23).
c.	The Ramsar is 14.9 km from the application boundary, and therefore, no LSE arising from managed realignment are considered (para 5.1.25).
d.	The Ramsar is at a considerable distance from the DCO application site, and therefore, no LSE are predicted from increased urbanisation (para 5.1.34).
e.	It is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that construction and operational traffic are far enough away from the designated site not to have an LSE. The boundary of the Ramsar site is 14.9 km to the south of the Proposal Site and therefore no likely significant effect is predicted on any interest feature (para 5.1.40).
f.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (para 5.1.51).
g.	The Ramsar is a minimum of 14.9 km from the DCO application boundary and is not linked to the site via any ecological or hydrological pathways; therefore, no impacts are anticipated (para 5.1.60).
h.	The Ramsar is a minimum of 14.9 km from the DCO application boundary, and is not linked to the site via any ecological or hydrological pathways; therefore, no changes to water quality are anticipated (para 5.1.55).
i.	Given the distance between the proposal site and the Ramsar site, no likely significant effect on any interest feature is predicted from disturbance, construction noise or operational noise (para 5.1.69, 5.1.81).
j.	The no non-native invasive species currently known to be in the area. No final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (para 5.1.84 - 5.1.85).

Matrix 8 – Screening Matrix Screening of Likely Significant Effects: Peter’s Pit SAC

Name of European Site	Peter’s Pit Special Area of Conservation																																			
Site code	UK0030237																																			
Distance to Proposal site	14.7 km																																			
European site features	Likely effects of NSIP																																			
	Direct loss or damage of habitats used by interest species			Change in Habitat Management Regime			Loss of future space to allow for managed realignment			Urbanisation			Air quality			Hydrological Changes			Water quality			Disturbance – noise and visual			Introduction or spread of non-native invasive species											
	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						
Annex II species that are a primary reason for site selection: 1166 Great crested Newt	x	a	a	x	b	b	x	c	c	x	d	d	x	e	e	x	f	g	x	g	g	x	h	h	x	i	i	x	i	i	x	j	j	x	j	j

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	No likely significant effect from direct loss of habitat on any interest feature. The Proposal Site is 14.7 km from the designated area boundary. (para 5.1.4).
b.	Given the distance from the SAC, the DCO application will result in no change to current management regimes of any supporting habitat of the SAC during either the construction or operation (para 5.1.23).
c.	The SAC is 14.7 km from the application boundary, and therefore, no LSE arising from managed realignment are considered (para 5.1.25).
d.	The SAC is at a considerable distance from the DCO application site, and therefore, no LSE are predicted from increased urbanisation (para 5.1.34).
e.	It is anticipated that the majority of dust generated during construction would be deposited in the area immediately surrounding the source (up to 50 metres away) and that construction and operational traffic are far enough away from the designated site not to have an LSE. The boundary of the SAC is 14.7 km to the south of the Proposal Site and therefore no likely significant effect is predicted on any interest feature (para 5.1.40).
f.	No likely significant effects from operational emissions are predicted on any interest feature or supporting habitat as all process contributions are <1% and/or the predicted environmental concentration is less than the Environmental Quality Standard (para 5.1.50).
g.	The SAC is a minimum of 14.7 km from the DCO application boundary and is not linked to the site via any ecological or hydrological pathways; therefore, no impacts are anticipated (para 5.1.60)
h.	The SAC is a minimum of 14.7 km from the DCO application boundary, and is not linked to the site via any ecological or hydrological pathways; therefore, no changes to water quality are anticipated (para 5.1.55).
i.	Given the distance between the proposal site and the SAC, no likely significant effect on any interest feature is predicted from disturbance, construction noise or operational noise (para 5.1.69, 5.1.81).
j.	The no non-native invasive species currently known to be in the area. No final planting is proposed that could inadvertently import non-native invasive to site, as such no likely significant effect is predicted (para 5.1.84 - 5.1.85).

Matrix 9 – Integrity matrices: The Thames Estuary and Marshes SPA

Name of European Site	The Thames Estuary and Marshes Special Protection Area											
EU Code	UK9012021											
Distance to Proposal site	1.02 km											
	Adverse effect on integrity											
European site features	Hydrological Changes			Water quality			Disturbance – noise and visual			In-combination effects		
	C	O	D	C	O	D	C	O	D	C	O	D
Annex 1 Species Regularly Wintering in Numbers of European Importance - Avocet	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _i	x _e	x _f	x _g	x _h
Annex 1 Species Regularly Wintering in Numbers of European Importance – Hen Harrier	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _d	x _d	x _d
Migratory species regularly occurring on passage – Ringed plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _i	x _e	x _f	x _g	x _h
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Grey Plover	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _d	x _d	x _d
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Dunlin	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _i	x _e	x _f	x _g	x _h
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Knot	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _d	x _d	x _d	x _d	x _d
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Black-tailed Godwit	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _d	x _d	x _d
Migratory Wintering species regularly occurring in internationally-important numbers over winter – Redshank	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _i	x _e	x _f	x _g	x _h
Regularly supporting over 20,000 waterfowl over winter	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _f	x _g	x _h

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	<p>A site-wide surface water management system will be developed to balance water flows and prevent the discharge beyond existing green field rates from the site. The overall philosophy for the design of the surface water system for the site is to manage surface water sustainably and to ensure that discharged waters do not constitute a flood risk. The volume of water discharged will not be any higher than the levels of that which currently exist.</p> <p>Measures to protect the water environment during construction are summarised in the Outline Code of Construction Practice (Application Document Number A8.6) Sections 6.11 and 6.12.</p> <p>A conceptual drainage strategy for the operational site has been produced (Application Document Number: A2.10).</p> <p>Therefore, a conclusion of no adverse effect on integrity can be reached, once this mitigation is included (para 6.3.2).</p>
b.	<p>A site-wide surface water pollution prevention system will be developed to prevent the discharge of any contaminated surface water from the site. The overall philosophy for the design of the surface water pollution prevention system for the site is to manage surface water sustainably and to ensure that discharged waters do not constitute a pollution risk.</p> <p>Measures to protect the water environment during construction are summarised in the Outline Code of Construction Practice (Application Document Number A8.6) Sections 6.11 and 6.12.</p> <p>A conceptual drainage strategy for the operational site has been produced (Application Document Number: A2.10).</p> <p>Therefore, a conclusion of no adverse effect on integrity can be reached, once this mitigation is included (para 6.2.3 - 6.2.7)</p>
c.	<p>An assessment of the potential impacts from noise and visual disturbance has been undertaken which has concluded that construction and use of the causeway would not have significant impacts on the integrity of the SPA (Sections 6.4 and 6.5)</p>
d.	<p>Species / assemblage excluded from potential LSE at screening stage (Matrices 1 and 2)</p>
e.	<p>Decommissioning effects for the causeway would be of similar magnitude as for construction (Para 7.4) and therefore as per the assessment of construction effects (Sections 6.4 and 6.5), a conclusion on no adverse effect on integrity can be reached.</p>
f.	<p>The assessment of noise levels indicate that even in the maximum design scenario of percussive piling for TFGP construction, noise levels from this activity would not give rise to significantly elevated noise levels at the Thames Estuary and Marshes SPA or at the area of functionally linked foreshore habitat (5.1.62 to 5.1.69). An assessment of in-combination effects has concluded that no significant additional effects would occur (7.2)..</p>
g.	<p>Operational noise levels would not result in significant effects on the SPA from elevated noise levels at the Thames Estuary and Marshes SPA or at the area of functionally linked foreshore habitat (5.1.79 - 5.1.82). An assessment of in-combination effects has concluded that no significant additional effects would occur.</p>
h.	<p>Noise levels for decommissioning are assumed to be no greater than for construction. As the assessment of noise and visual disturbance has concluded that no significant adverse effect would occur, no in-combination effects are expected (Para 7.4)</p>
i	<p>An assessment of the potential impacts from noise and visual disturbance has been undertaken which has concluded that presence and use of the causeway during the operational phase would not cause a reduction in the survival of individuals and therefore would not have an adverse impact on the integrity of the SPA (Section 6.6)</p>

Matrix 10 – Integrity matrices: The Thames Estuary and Marshes Ramsar Site

Name of European Site	Thames Estuary and Marshes Ramsar											
Ramsar code	UK11069											
Distance to Proposal site	1.02 km											
	Adverse effect on integrity											
European site features	Hydrological Changes			Water quality			Disturbance – noise and visual			In-combination effects		
	C	O	D	C	O	D	C	O	D	C	O	D
Ramsar Criterion 2 - Nationally rare and scarce wetland plant species	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _f	x _g	x _h
Ramsar Criterion 2 - Nationally vulnerable and rare Wetland invertebrate assemblage	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _f	x _g	x _h
Ramsar Criterion 5 – Overwinter assemblage of international importance	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _d	x _d	x _d
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - Black-tailed Godwit (wintering)	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _d	x _d	x _d
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - Ringed Plover	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _i	x _e	x _f	x _g	x _h
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - Knot	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _d	x _d	x _d
Ramsar Criterion 6 - Species Regularly Wintering in Numbers of International Importance - Dunlin	x _a	x _a	x _a	x _b	x _b	x _b	x _c	x _i	x _e	x _f	x _g	x _h
Ramsar Criterion 6 - Species Regularly occurring in Numbers of International Importance – Grey plover (wintering)	x _a	x _a	x _a	x _b	x _b	x _b	x _d	x _d	x _d	x _d	x _d	x _d

Name of European Site	Thames Estuary and Marshes Ramsar											
Ramsar code	UK11069											
Distance to Proposal site	1.02 km											
Ramsar Criterion 6 - Species Regularly occurring on passage in Numbers of International Importance – Redshank	x a	x a	x a	x b	x b	x b	x c	x i	x e	x f	x g	x h

Evidence supporting conclusions

Code in Matrix above	Evidence supporting conclusions
a.	<p>A site-wide surface water management system will be developed to balance water flows and prevent the discharge beyond existing green field rates from the site. The overall philosophy for the design of the surface water system for the site is to manage surface water sustainably and to ensure that discharged waters do not constitute a flood risk. The volume of water discharged will not be any higher than the levels of that which currently exist.</p> <p>Measures to protect the water environment during construction are summarised in the Outline Code of Construction Practice (Application Document Number A8.6) Sections 6.11 and 6.12.</p> <p>A conceptual drainage strategy for the operational site has been produced (Application Document Number: A2.10).</p> <p>Therefore, a conclusion of no adverse effect on integrity can be reached, once this mitigation is included (para 6.3.2).</p>
b.	<p>A site-wide surface water pollution prevention system will be developed to prevent the discharge of any contaminated surface water from the site. The overall philosophy for the design of the surface water pollution prevention system for the site is to manage surface water sustainably and to ensure that discharged waters do not constitute a pollution risk.</p> <p>Measures to protect the water environment during construction are summarised in the Outline Code of Construction Practice (Application Document Number A8.6) Sections 6.11 and 6.12.</p> <p>A conceptual drainage strategy for the operational site has been produced (Application Document Number: A2.10).</p> <p>Therefore, a conclusion of no adverse effect on integrity can be reached, once this mitigation is included (para 6.2.3 - 6.2.7)</p>
c.	<p>An assessment of the potential impacts from noise and visual disturbance has been undertaken which has concluded that construction and use of the causeway would not have significant impacts on the integrity of the SPA (Sections 6.4 and 6.5)</p>
d.	<p>Species / assemblage excluded from potential LSE at screening stage (Matrices 1 and 2)</p>
e.	<p>Decommissioning effects for the causeway would be of similar magnitude as for construction (Para 7.4) and therefore as per the assessment of construction effects (Sections 6.4 and 6.5), a conclusion on no adverse effect on integrity can be reached.</p>
f.	<p>The assessment of noise levels indicate that even in the maximum design scenario of percussive piling for TFGP construction, noise levels from this activity would not give rise to significantly elevated noise levels at the Thames Estuary and Marshes Ramsar or at the area of functionally linked foreshore habitat (5.1.62 to 5.1.69). An assessment of in-combination effects has concluded that no significant additional effects would occur (7.2).</p>
g.	<p>Operational noise levels would not result in significant effects on the Ramsar from elevated noise levels at the Ramsar site or at the area of functionally linked foreshore habitat (5.1.79 - 5.1.82). An assessment of in-combination effects has concluded that no significant additional effects would occur.</p>
h.	<p>Noise levels for decommissioning are assumed to be no greater than for construction. As the assessment of noise and visual disturbance has concluded that no significant adverse effect would occur, no in-combination effects are expected (Para 7.4)</p>
i.	<p>An assessment of the potential impacts from noise and visual disturbance has been undertaken which has concluded that presence and use of the causeway during the operational phase would not cause a reduction in the survival of individuals and therefore would not have an adverse impact on the integrity of the SPA (Section 6.6)</p>