

Revisions

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r021_00	Issued for DCO Submission	WC/ER	24/12/2020	EDP/LRCH
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Executive Summary

This Shadow Habitats Regulations Assessment (HRA) Report has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of London Resort Company Holdings Limited (hereafter referred to as “the Applicant”).

An HRA was considered necessary to assess potential impacts upon nearby designated sites. The scope of the Proposed Development and its positioning within the Thames Gateway means that adverse impacts upon such sites are likely.

This HRA aims to provide relevant technical information to enable competent authorities to discharge their functions under Regulations 7 (competent authorities) and 61 (requirement to carry out an appropriate assessment) of the Conservation of Habitats and Species Regulations (2017; The Habitats Regulations) in relation to the Development Consent Order (DCO) application process for the London Resort.

It describes the potential for effects on European Sites as a result of the Proposed Development of the Project Site. European Sites are Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) designated under the Birds and Habitats Directives, but also include sites designated under the Ramsar Convention on Wetlands of International Importance (1971, Ramsar Sites).

The HRA describes the baseline conditions at the Project Site, including the presence of part of an internationally significant bird population associated with European Sites, and the presence of habitat “functionally linked” to those sites (i.e. important to the birds for which those sites are designated) along the estuary foreshore and at Black Duck and Botany Marshes.

It then describes potential sources of effects upon European Sites arising from the development of the Project Site. These are then considered within Stage 1 of the HRA process, ‘Screening’. Likely Significant Effects (LSE) are screened in or out based on the context of inherent mitigation, construction methodology, planned habitat enhancements and operational conditions at the Project Site. LSE screened in are then considered against proposed additional mitigation in order to rule out negative effects upon the integrity of European Sites during Stage 2 of the assessment, ‘Appropriate Assessment’.

In Stage 1 of the assessment, the following LSE are screened in and progressed to Stage 2:

- Disturbance effects upon functionally linked land during construction and operation;
- Direct loss and damage to functionally linked land during construction;
- Water quality effects upon Thames Estuary and Marshes and Medway Estuary and Marshes SPA/Ramsar sites during construction; and
- Water and air quality effects upon functionally linked land during construction.

The assessment finds that, after consideration of mitigation measures within Stage 2: Appropriate Assessment, the Proposed Development of the Project Site will have no significant effect upon the integrity of European Sites either alone or in combination with other developments.

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Chapter One ◆ INTRODUCTION

- 1.1. This Shadow Habitats Regulations Assessment (HRA) has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of London Resort Company Holdings Limited (hereafter referred to as 'the Applicant') and through consultation with Natural England. Correspondence received from Natural England is included as Annex 1.0 to this report.
- 1.2. The Project does not meet the criteria of a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. However, on certain criteria being satisfied, Section 35 of the Planning Act 2008 sets out that the Secretary of State may give a direction for development to be treated as requiring Development Consent. On 09 May 2014 the Secretary of State for Communities and Local Government issued a Section 35 Direction confirming that the London Paramount Entertainment Resort (now the London Resort) qualifies as a nationally significant business or commercial project for which development consent is required under the Planning Act 2008. The Applicant must thus apply to the Secretary of State for a Development Consent Order (DCO), and an EIA has been undertaken to help inform the Secretary of State's decision on this application. The Secretary of State for Communities and Local Government is therefore the competent authority.
- 1.3. This report will be submitted alongside Chapter 12 (Terrestrial and Freshwater Ecology) of the Environmental Statement (ES; Document Reference 6.1.12) and cross references with other ES appendices and figures where relevant.

PURPOSE OF THIS REPORT

- 1.4. An HRA was considered necessary to assess potential impacts upon nearby designated sites. The scope of the Proposed Development and its positioning within the Thames Gateway mean that adverse impacts upon such sites are likely.
- 1.5. This HRA aims to provide relevant technical information to enable competent authorities to discharge their functions under Regulations 7 (competent authorities) and 61 (requirement to carry out an appropriate assessment) of the Conservation of Habitats and Species Regulations (2017; The Habitats Regulations) in relation to the DCO application process for the London Resort.
- 1.6. The Proposed Development spans land across the Swanscombe Peninsula, Ebbsfleet Valley and A2 corridor in Kent and part of the Port of Tilbury in Essex (hereafter referred to as 'the Project Site').
- 1.7. It describes the potential for 'Likely Significant Effects' (LSE) on European Sites to arise as a result of the Proposed Development of the Project Site at each stage of the HRA process. European Sites are Special Protection Areas (SPAs) and Special Areas of Conservation

(SACs) designated under the Birds and Habitats Directives, but also include sites designated under the Ramsar Convention on Wetlands of International Importance (1971, Ramsar Sites)¹.

Stage 1: Screening

- 1.8. Each European site will be considered in the context of the Proposed Development and screened for any LSE. This stage of the report presents the findings of the screening assessment undertaken to identify likely significant effects of the Proposed Development on European sites. A Screening Matrix is included, which sets out a brief description of the project, details of the European sites which may be impacted, and an assessment of any likely effects on the European sites.

Stage 2: Appropriate Assessment

- 1.9. Those LSE screened in will then be subject to progression to Stage 2: Appropriate Assessment. Under the Habitats Regulations, the Secretary of State is required to carry out an appropriate assessment if there are deemed to be LSE on European sites when considered alone or in combination with other projects, and where those LSE arise from a plan or project not directly connected with or necessary to the management of that site or sites. This stage of the assessment therefore forms a statement to inform an appropriate assessment (SIAA). It will inform the appropriate assessment to be carried out by the Secretary of State as the competent authority. The SIAA assesses the potential impacts that were identified as having a LSE on European sites at Stage 1, and determines whether it is possible to ascertain that the project would have no adverse effect on the integrity of those sites.

¹ Paragraph 176 of the NPPF: Ministry of Housing, Communities and Local Government (July 2018). National Planning Policy Framework.

Chapter Two ◆ METHODOLOGY

GUIDANCE AND COMMON STANDARDS FOLLOWED

- 2.1 This assessment has been undertaken with reference to established guidance set out for NSIPs in:
- PINS Advice Note 10²;
 - Guidance issued by PINS in May 2018 following the ‘People Over Wind’ case³;
 - Natural England’s Operational Standard for HRA⁴;
 - Guidance specific to estuaries and coasts published by the European Commission⁵; and
 - Guidance for ecological impact assessment published the Chartered Institute of Ecology and Environmental Management^{6,7}.

ASSESSMENT PROCESS

- 2.2 European Sites considered within this HRA are detailed within Chapter 4 of this report. Each European site within the Project Site’s Zone of Influence (ZOI) will be considered sequentially through up to four stages, as follows.

Stage 1: Screening

- 2.3 This considers the possibility for LSE to occur based on a high-level analysis of risks, taking into account the spatial relationship between impact sources and designated sites (and functionally linked habitats and species), the magnitude of changes predicted with regard to atmospheric, coastal/estuarine and freshwater receptor pathways (with reference to the relevant specialist studies), and any physical or other relationships between the Project Site and each European Site. Stage 1 screening for LSE considers the project both

² Advice note ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects (<https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/06/Advice-note-10v4.pdf>) accessed 19.08.2020

³ CJEU 12 April 2018 People Over Wind and Sweetman v Coillte Teoranta (C-323/17)

⁴ Natural England Standard: HRA Habitats Regulations Assessment (HRA) (NESTND026) V1.1 December 2017

⁵ European Commission (2011). Guidance for the Implementation of the Birds and Habitats Directives in Estuaries and Coastal Zones (with particular attention to port development and dredging). Accessed August 2020 via [REDACTED]

⁶ CIEEM (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

⁷ CIEEM (2010). Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal. Chartered Institute of Ecology and Environmental Management, Winchester

alone and in-combination with other projects. Annex 2.0 contains the completed Stage 1 screening matrices.

- 2.4 If it can be confidently predicted on the basis of objective information that no LSE are identified for all the European Sites considered, then HRA stages 2-4 are not required and the report would take the form of a No Significant Effects Report.
- 2.5 The April 2018 judgment of *People over Wind and Sweetman*⁸ ruled that mitigation measures intended to avoid or reduce the harmful effects of the plan or project on a European Site could not be considered at the Stage 1 screening stage. Therefore, in this HRA report, such measures will only be taken into account as part of Stage 2: Appropriate Assessment.

Stage 2: Appropriate Assessment

- 2.6 If Stage 1 identifies LSE upon a European Site, an assessment of the effects of the project upon the site(s)'s conservation objectives/interest features is carried out either from the project alone or in combination with other plans or projects, which cannot be discounted. Conservation objectives for European/Ramsar Sites are defined and published by Natural England and assessments will refer to relevant objectives as necessary. The assessment will include sufficient information to enable an Appropriate Assessment (AA) to be undertaken by the competent authority and will detail mitigation designed to reduce or eliminate identified LSE upon those European Sites screened into the assessment. LSE screened in are set out within the Integrity Matrices included as Annex 3.0, along with reasoning set out in footnotes for decisions made within the matrices.
- 2.7 HRA Stages 3 and 4 will be required if Stage 2 concludes that the project adversely affects the integrity of European Site(s), or when adverse effects on integrity cannot be ruled out based on the evidence available, either from the project alone or in combination with other plans or projects, which cannot be discounted.

Stage 3: Consideration of Alternative Solutions

- 2.8 Stage 3 requires the consideration of alternatives, which may include locating the Proposed Development at an alternative location or changes to the design to eliminate residual LSE or not constructing the Proposed Development at all.

Stage 4: Imperative Reasons of Overriding Public Interest

- 2.9 Stage 4 is engaged where measures to avoid LSE are not possible/viable, to assess whether the project is justified by 'Imperative Reasons of Overriding Public Interest' (IROPI). If the competent authority is satisfied that the project must be carried out for IROPI, the project may still be carried out.

⁸ CJEU 12 April 2018 *People Over Wind and Sweetman v Coillte Teoranta* (C-323/17)

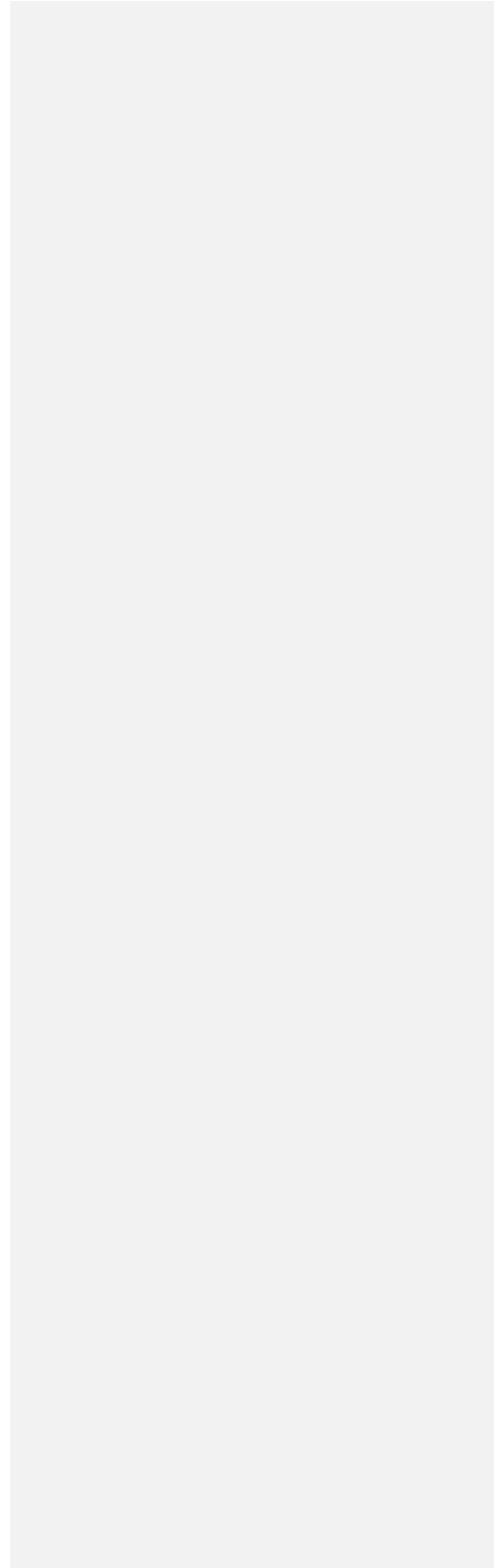
Stage 5: Compensatory Measures

- 2.10 After progression through Stages 1-4, the HRA must include an assessment of the project against any proposed compensatory measures.

CONSULTATION

- 2.11 This Shadow HRA has been prepared in consultation with the relevant Statutory Nature Conservation Body, namely Natural England. Natural England's advice in respect of selection of European Sites, screening of likely significant effects, and avoidance and mitigation measures has been obtained through the following:
- Natural England response EIA Scoping Report (provided in Appendix 12.5 *Consultation responses to the 2020 EIA Scoping request (Relevant to Terrestrial and Freshwater Ecology)*; Document Reference 6.2.12.5);
 - Natural England response to Preliminary Environmental Information Report (provided in Appendix 12.6: *Statutory consultee responses to the Preliminary Environmental Information Report (Relevant to Terrestrial and Freshwater Ecology)*; Document Reference 6.2.12.6); and
 - Natural England comments on EDP's draft Shadow HRA provided via its Discretionary Advice Service (letter dated 19 October 2020, copy provided as Annex 1.0 to this report).

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Chapter Three ◆ HRA STAGE 1: PROJECT DESCRIPTION

LOCATION AND CONTEXT

- 3.1 The extent of the DCO Order Limits are identified in Figures 2.1 and 2.2 (Document References 6.3.2.1 and 6.3.2.2). The Kent Project Site on the Swanscombe Peninsula and its transport connections to the south extend across the border between the boroughs of Dartford and Gravesham in Kent, and has a frontage on the River Thames. It has an area of 387.53 hectares (ha) and lies mostly in the designated area of the Ebbsfleet Garden City, established in March 2015. The supporting transport and visitor facilities at Tilbury, in the unitary borough of Thurrock in Essex, would occupy a further 25.54 ha of land at the Essex Project Site.
- 3.2 The Project Site does not include or directly abut any European Sites, the locations of which are shown on the Statutory Designated Sites plan (Document Reference 6.3.12.2). The closest European designation is the Thames Estuary and Marshes SPA/Ramsar, which is located approximately 3.3km/2.8km from the Essex Project Site at its closest point (6.0km/4.8km from the Kent Project Site).

SUMMARY PROJECT DESCRIPTION

- 3.3 A full project description is contained within Chapter 3 of the ES (Document Reference 6.1.3). A brief summary is given below. Elements most relevant to the assessment of possible LSE upon nearby European/Ramsar Site(s) have been included in greater detail.

Overall Summary of Development Proposals

- Land remediation – the DCO will provide for the remediation of contaminated areas of the Kent and Essex Project Sites, including the capping of Cement Kiln Dust (CKD) and contaminated river dredgings, the relocation or improved treatment and management of industrial waste tips and the profiling of land for the purposes of the Proposed Development;
- The Leisure Core – at the heart of the Proposed Development on the Kent Project Site will be the resort itself. This will be developed on the Swanscombe Peninsula. 82ha of land across two phases, primarily within previously developed areas. The developable area also covers Botany Marsh (west) and the Channel Tunnel Rail Link (CTRL) Wetland;
- Landscape – a hard and soft landscape strategy, including amenity water features such as ponds and watercourses, will provide the setting for rides, attractions and amenities within the leisure core;
- Comprehensive landscape works and planting are proposed on the periphery of the

London Resort. A perimeter service road, pedestrian and cycle routes and security requirements around the leisure core will be integrated into the landscape treatment;

- Car parks – the proposed total parking provision would occupy a gross land area of 12.6ha. Parking for visitors and hotel guests will be split between the Kent and Essex Project Sites in a ratio of approximately 3:1;
- A dedicated vehicular access to the resort is proposed from the A2(T);
- Hotel accommodation – four hotels will be located within the resort, one of which will be located directly adjacent to Black Duck Marsh within existing wetland habitat;
- Back of house areas;
- People Mover – a 3.1km people mover route is proposed between Ebbsfleet International Station, the resort and the ferry terminal on the Swanscombe Peninsula;
- Transport Interchange – the proposed transport interchange adjacent to Ebbsfleet International Station will be up to 2.4ha in area;
- Local transport links – a network of pedestrian and cycle routes will be provided on the Swanscombe Peninsula and will connect to the adjacent residential areas of Eastern Quarry, Ebbsfleet Central, Greenhithe, Swanscombe and Northfleet;
- River transport infrastructure – remedial works will be carried out to the existing Bell Wharf on the north-eastern side of the Swanscombe Peninsula to enable use for construction and service deliveries and the removal of waste. The wharf will include ro-ro access and, potentially, a crane. A new floating pontoon jetty is proposed between Bell Wharf and Ingress Park for use by Thames Clippers' passenger ferry services between the resort and central London and passenger ferry services from Tilbury. Dedicated facilities for passengers will also be provided at the ferry terminal at the Essex Project Site;
- Service infrastructure – the Proposed Development will incorporate comprehensive provisions for service infrastructure provision, incorporating:
 - A dedicated combined heat and power (CHP) energy centre with an electrical generation capacity of up to 30MW. The CHP plant will occupy a site up to 2,400m² in area with a building footprint of up to 1,500m². The CHP building will be up to 18m high to ridge, with a stack up to 40m in height;
 - An electricity sub-station with a capacity of up to 60 Mega Volt Amps (MVA). The substation will occupy a site up to 2,500m² in area with a building footprint of up to 1,600m². In case connections need to be made to the electricity distribution network through existing substations, the substations at Springhead off Talbot Lane close to the A2(T), and at Pepper Hill to the west of the A262 Hall Road, are included in the draft DCO Order Limits;

- A dedicated waste management facility on a site up to 1ha in area, containing a materials recovery facility (MRF), an anaerobic digestion plant and ancillary offices;
 - A sewer connection to an off-site wastewater treatment works operated by Southern Water; and
 - Sustainable drainage systems across the Proposed Development to manage surface water flows and minimise the risk of pollution to the water environment. These systems might include systems to feed water to surrounding marshes in order to maintain hydrological regimes and sustain marshland wildlife habitats.
- Flood defence works – the Kent Project Site will be defended from future flood events by building, improving and extending the existing earth berm around the resort. These works will accord with the Environment Agency’s Thames Estuary 2100 strategy for managing tidal flood risk in the Thames Estuary;
 - Security and safety provisions;
 - Related housing – 500 dwellings, located within an abandoned chalk pit, known as Craylands Lane Pit;
 - Demolition of existing buildings and structures within the DCO Order Limit;
 - Removal or relocation of existing utility supplies and existing drainage/pipelines;
 - Drainage works;
 - Lighting;
 - Public art;
 - Hard and soft landscape works, incorporating earth shaping and planting;
 - Works to protect features of archaeological and paleontological interest; and
 - Ancillary emergency response facilities (i.e. medical and fire points).
- 3.4 The vast majority of development activity (and therefore potential impacts on European Sites) will take place within the Kent Project Site. Works within the Essex Project Site will be extremely limited, comprising the extension of the existing floating pontoon within an active dockside.

Construction Activities

- 3.5 If the DCO is made, construction of the Project is anticipated to start in 2022 with the first phase of the London Resort opening in 2024. The DCO application is accompanied by an outline Construction Method Statement (CMS; Document Reference 6.2.3.1) which

explains how it is envisaged that the London Resort and its supporting infrastructure would be built.

3.6 In summary the construction of the Proposed Development will occur over two main phases and would include:

- security set up activities;
- ecological management including habitat protection and species relocation;
- project site clearance;
- ground treatment and remediation activities;
- activities relating to management and control of licenced waste tips;
- soil investigation work and treatment;
- archaeological investigations;
- construction of vehicle haulage routes;
- improvements to the existing Bell Wharf;
- construction of laydown, storage compounds and welfare areas;
- establishment of a materials stores and plants;
- on-site temporary facilities for construction workers (including parking, residential accommodation, staff rooms, changing rooms, toilets, medical facilities etc.);
- identification, relocation, and enhancement of utility infrastructure;
- diversion of some existing drainage features;
- Import of construction plant and materials; and
- Export of construction waste.

3.7 The principle construction activities would include:

- bulk earthworks, excavation, filling and tunnelling;
- temporary works to enable development;
- drainage works, pumping stations and pollution management systems;
- underground services and infrastructure services works;

- highways, cycleways, footways, hard landscaping;
- bridges, culverts, civil engineering structures;
- fencing, barriers, signage;
- foundation works and piling;
- substructure and superstructure works;
- roof structures and roof covering;
- cladding and envelope;
- internal and external walls
- mechanical and electrical services including plant, equipment and distribution;
- specialist services including PA, television, security systems, CCTV systems, data and communications systems;
- primary and secondary fit out;
- miscellaneous secondary and architectural metalwork;
- resort rides, equipment and facilities;
- off-site reinforcement of utilities and their connections;
- renewable energy systems; and
- landscape works.

3.8 The CMS is accompanied by a Construction Environmental Management Plan (CEMP; Document Reference 6.2.3.2) and a Construction Transport Management Plan (CTMP; Document Reference 6.2.9.2).

The Resort in Operation

3.9 The London Resort is designed to cater for up to 6.5 million visitors per year with Gate One open only, and up to 12.5 million visitors per year with Gates One and Two in operation. It will be a destination with a global profile, with up to 35% of visitors projected to come from overseas.

3.10 Visitors will arrive at the Resort by a range of transport modes including train, car, coach and ferry. The Resort layout will aim to lead them intuitively to their destination of choice, which might be the hotels, the retail, dining and entertainment area outside the payline and Gates One and Two. LRCH is reviewing the means by which travel to the Resort by non-car modes can be incentivised, including ticketing and Gate entry strategies.

- 3.11 Visitors might come for one day or opt to stay in one of the Resort's hotels for a longer visit. With its transport terminals and the retail, dining and entertainment area all outside the paylines for Gates One and Two, it is intended also that the Resort will be attractive to afternoon or evening visitors from the local area and beyond. The proposals include connections to pedestrian routes to encourage local visits, including the comprehensive enhancement of Pilgrims' Way from Swanscombe.
- 3.12 Inside the Gates, visitors will be offered rides, shows and attractions based around IP brands with a global profile. These will include film, television and computer gaming as well as attractions bespoke to the London Resort. From time to time, attractions will be updated or replaced to ensure that the Resort always has a fresh appeal to visitors, and flexibility will be sought in the DCO to this end.
- 3.13 Outside the Gates visitors will be attracted by the retail, dining and entertainment facilities, the Water Park and events in the e-Sports Coliseum and Conference Centre, which will include business and exhibition events as well as concerts, shows and sports events. By locating these attractions outside the secure 'payline' for Gates One and Two LRCH hopes that local people will enjoy single-purpose visits to the Resort – for example, for a meal or a show – rather than having to buy a ticket for full entry to the Resort.
- 3.14 The Resort will be a significant employer. In respect of day-to-day operations the Resort will have complex shift patterns reflecting the wide range of services provided. For example, much maintenance activity will be concentrated in the early morning or overnight before visitors arrive. Hospitality and catering will likely run over two full-time shifts covering the period from morning to late evening, and security will be a 24 hour operation. Provision for 500 staff car parking spaces is made in the back-of-house area but most Resort staff will be required to travel to work by non-car-based transport modes

MITIGATION MEASURES EMBEDDED IN PROJECT DESIGN

- 3.15 The DCO application for the Proposed Development is accompanied by an ES, which describes consideration of alternative sites (Document Reference 6.1.4), embedded avoidance measures to limit the magnitude of environmental effects, including habitat enhancements and those from noise and vibration (Document Reference 6.1.15), land and water transport (Document References 6.1.9 and 6.1.10), air quality (Document Reference 6.1.16) and ground and surface water pollution (Document Reference 6.1.17 and 18). Also accompanying the ES is a Construction Environmental Management Plan (CEMP; Document Reference 6.2.3.2), and an Outline Construction Method Statement (CMS; Document Reference 6.2.3.1).
- 3.16 These collectively detail the avoidance measures that have been embedded within the design or proposed methodologies as a means to reduce environmental effects arising from the development of the Project Site.
- 3.17 The following important habitats are to be retained, enhanced and/or maintained throughout the construction and operational phases of development:

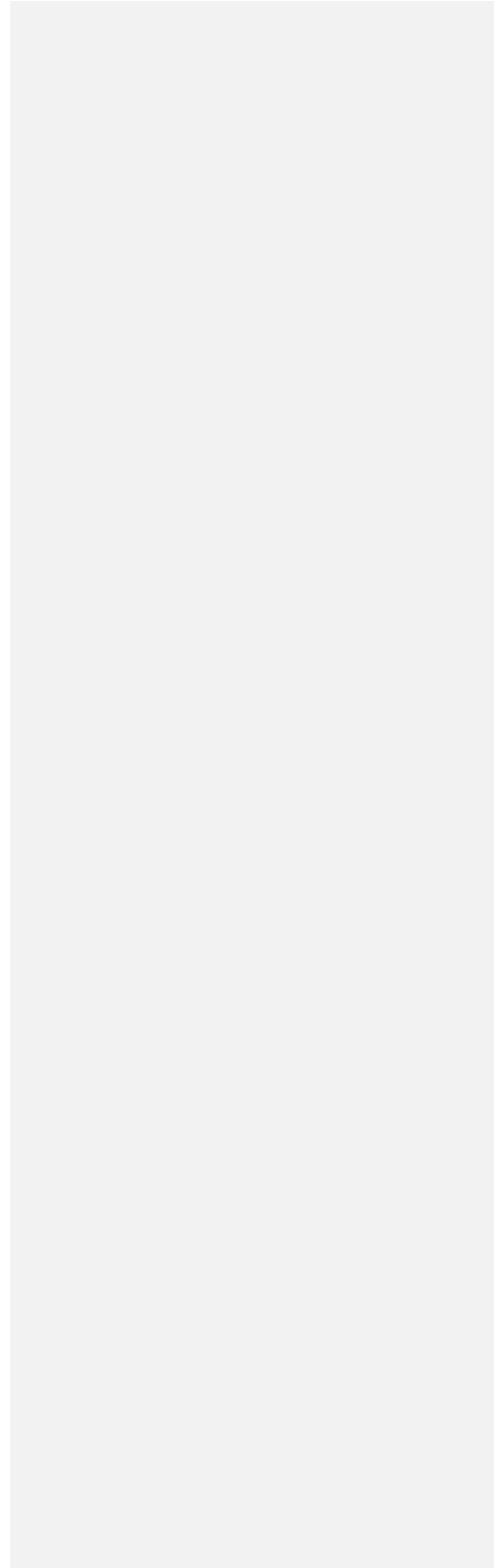
- ~~18.8123.19~~ha of Open Mosaic Habitat (OMH) on Previously Developed Land (includes a mosaic of ephemeral vegetation, bare ground, grassland and some scattered scrub) (~~26.1834.5~~%);
- ~~31.05ha of grassland/scrub mosaic (not including that within areas of OMH) (66.22%);~~
- ~~12.05ha—01ha~~ of Floodplain Wetland Mosaic (FWM; includes areas of coastal/floodplain grazing marsh priority habitat as well as reedbed, ditches and small areas of scrub) (~~45.3015~~%);
- ~~00.55ha—56ha~~ of ditches (not including those found within FWM) (~~30.106~~%);
- ~~1112.96ha—18ha~~ of reedbed (not including that found within FWM) (~~5657.2729~~%);
- ~~5.41.678~~ha of uncontaminated ponds/lakes (not including that found within FWM) (~~56.62.2755~~%);
- ~~20.87ha—96ha~~ of woodland (~~8281.6165~~%);
- ~~44.60ha—48ha~~ of dense scrub (~~5553.5303~~%); and
- ~~7.18ha—2ha~~ of saltmarsh (87.648%).

3.18 The key ecological areas of the Project Site to be retained ~~(and enhanced where possible)~~ are:

- Saltmarsh on the north-west and north-east fringes of the Swanscombe Peninsula;
- OMH on Previously Developed Land on the former Broadness Saltmarsh;
- Black Duck Marsh (reedbed and open water) on the western side of Swanscombe Peninsula; and
- Botany Marsh East (Floodplain Wetland Mosaic including reedbed, grassland and scrub) on the eastern side of Swanscombe Peninsula.

3.19 Such embedded avoidance measures are taken into account, where appropriate, in considering the potential for adverse effects on integrity at Stage 2: Appropriate Assessment in this HRA report. The DCO and documents secured as requirements in the DCO, including the Landscape Strategy (Document Reference 6.2.11.7), Ecological Mitigation and Management Framework (Document Reference 6.2.12.3) and species-specific mitigation strategies enclosed within it, provide mechanisms for ensuring the delivery of these measures as part of the Proposed Development.

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Chapter Four ◆ HRA STAGE 1: SELECTION OF EUROPEAN SITES

DEFINING MAXIMUM ZONES OF INFLUENCE FOR EFFECTS ARISING FROM THE PROJECT

Air and Water Quality Effects

4.1 The maximum Zol for air and water quality effects arising from the Proposed Development has been defined with reference to the relevant chapters of the ES (Air quality, Document Reference 6.1.16; Water resources and flood risk, Document Reference 6.1.17; and, Soils, hydrogeology and ground conditions, Document Reference 6.1.18). The Zols are defined, from the source of the effect, as follows:

- Air quality:
 - Road impacts – 200m of road that experiences 1000 Average Annual Daily Traffic (AADT) or more increase (2038 scenario used as a worst case, based upon the assessment made within Chapter 16 of the ES);
 - Point source – 2km (National and Local sites), 10km (International sites); and
 - Construction impacts – 50m of the construction area or route used by construction vehicles up to 500m from the DCO Order Limits.
- Water quality (sediment circulation) – precautionarily defined as 30km from the point of impact.

Disturbance Effects

4.2 The Zols for disturbance effects have been defined with reference to the relevant chapters of the ES (River transport and Noise and vibration, Document References 6.1.10 and 15 respectively).

4.3 Given the proximity of the Project Site to the Thames Estuary and Marshes SPA/Ramsar (3.3km), this information is supplemented by the studies on the existing local baseline studies for noise and a visitor survey for North Kent, undertaken in 2011⁹. The Zol for recreational disturbance is based on the average distance travelled to visit the North Kent marshes (i.e. the area including both the Thames Estuary and Marshes SPA/Ramsar and the Medway Estuary and Marshes SPA/Ramsar) as set out in the aforementioned visitor survey.

⁹ Fearnley, H. & Liley, D. (2011). North Kent Visitor Survey Results. Footprint Ecology.

- 4.4 Similarly, in relation to the Thames Estuary and Marshes SPA/Ramsar, a maximum zone of influence for disturbance effects from lighting, noise and from movement or human sources specific to qualifying species has been defined with the assistance of the Waterbird Disturbance Mitigation Toolkit¹⁰ (also referred to as TIDE), a copy of which is included as Annex 4.0.
- 4.5 As recreational and physical disturbance effects are anticipated to be caused primarily by humans and river transport, the effects have the potential to move well beyond the DCO Order Limits. Recreational and disturbance effects therefore have the potential to cause effects at two spatial scales. The Zols set out below are derived from the range to which potential effect sources from the Project Site are likely to travel. At a smaller scale, each potential effect source is given a 'local zone of influence' (local Zol), within which effects may be triggered on relevant qualifying features. The local Zol, i.e. the distance from the bird at which an effect is triggered, for recreational/physical disturbance to birds is defined by reference to the maximum response distances of the relevant species, and for noise, by the predicted decibel outputs of the most disturbing activities (i.e. piling) so is 'worst case' in its application.
- 4.6 Some species will be more resistant to disturbance than others, by reference to established studies as cited in TIDE, and therefore, for these species the range of potentially disturbing effects may be smaller than allowed for. For all species considered, the Zol for noise and human disturbance of birds is wider than for disturbance from lighting. A synthesis of studies on bird disturbance¹¹ found that birds react to less than 10% of disturbance events over 600m away. Therefore, this has been set as the Zol for visual disturbance by boats, although visual disturbance within an industrialised setting is likely to be less significant due to habituation. The assessment in this HRA report is therefore undertaken on a 'worst case' basis. These distances will be used to determine effects upon relevant species from the source of the effect within the general Zols defined below.
- 4.7 The Zols for noise, light and recreational disturbance are defined as follows:
- Noise disturbance – 300m from the DCO Order Limits or 100m from ferry routes (navigable channel between Westminster Pier and the London Resort and between the Kent and Essex Project Sites);
 - Visual disturbance (by boats) – 600m from ferry routes (navigable channel between Westminster Pier and the London Resort and between the Kent and Essex Project Sites). Proposed ferry routes are included within Section 5 of the preliminary Navigation Risk Assessment (NRA);
 - Light disturbance – 300m from the DCO Order Limits; and

¹⁰ Waterbird Disturbance Mitigation Toolkit (Institute of Estuarine and Coastal Studies (IECS) University of Hull, 2013) (TIDE toolkit)

¹¹ Cutts, N., Phelps, A. & Burdon, D. (2009). Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Institute of Estuarine and Coastal Studies, University of Hull

- Recreational disturbance – 6.5km of the DCO Order Limits, 500m from effect source (local Zol).

Effects on Functionally Linked Habitats

- 4.8 With reference to Natural England guidance set out in NECR207¹², there is a need to consider 'functionally linked' populations where they have been identified beyond the boundaries of the designated sites, in addition to populations of species occurring within the boundaries of the European Sites themselves.
- 4.9 Winter bird surveys at the Project Site indicate that a number of habitats within the Kent Project Site are potentially functionally linked to both the Thames Estuary and Marshes SPA/Ramsar and the Medway Estuary and Marshes SPA/Ramsar sites. Details of the Project Site's ecological baseline, including winter bird survey and assessment of functional linkage with the SPAs, can be found in Document Reference 6.2.12.1.
- 4.10 In defining functionally linked habitats, the Natural England guidance states that:
- 'The critical distance was usually the species-specific, maximum recorded foraging distance, or in some cases the known flight paths, which varied considerably from one species to another. No standard cut off distance from an SPA could be used as a surrogate for the risk of a significant effect.'*
- 4.11 Data on maximum recorded foraging distance for each individual species was not forthcoming, but some geese species are known to travel up to 15km from roosts to forage¹³. The potential Zol was therefore set at 15km in relation to effects on Functionally Linked Habitat (i.e. land up to 15km from the boundaries of a European Site that is used regularly by qualifying species from that site should be assessed).
- 4.12 Where established methodologies or outputs from quantitative studies are not available, professional judgment has been applied, taking into account factors such as distance, rates of attenuation and dilution, prevailing tidal and atmospheric conditions, and the existing industrialised nature of the Thames Estuary and individual species' habituation and sensitivity.

European and/or Ramsar Sites within Potential Zone of Influence

- 4.13 Based on the potential maximum range at which identified effects have the potential to be significant, taking account of the modelled outputs and assessments, the need to consider the potential for likely significant effects has been identified for the following European Sites, as shown on Figure 12.3 (Document Reference 6.3.12.3):
- Thames Estuary and Marshes SPA/Ramsar;

¹² Functional linkage: How areas that are functionally linked to European sites have been considered when they may be affected by plans and projects - a review of authoritative decisions NECR207 (2016) Natural England

¹³ Mitchell, C. 2012. Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland. Wildfowl and Wetlands Trust/Scottish Natural Heritage Report, Slimbridge. 108pp.

- Medway Estuary and Marshes SPA/Ramsar sites;
- North Downs Woodlands SAC; and
- Peters Pit SAC.

4.14 A summary of the qualifying features of each designation are set out below. The full citations for each designation can be found at Annex 5.0.

4.15 It should be noted that no significant effects are considered to be likely in respect of European Sites in devolved administrations or within other EEA states.

Thames Estuary and Marshes SPA/Ramsar

4.16 As mentioned previously, the Thames Estuary and Marshes Ramsar is situated approximately 3.3km to the east of the Essex Project Site and 4.8km from the Kent Project Site. It is designated under Ramsar criteria 2 ('a wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities'), 5 ('a wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds') and 6 ('a wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird') for the following interest features:

- Supports more than 20 British Red Data Book invertebrates and populations of the GB Red Book endangered least lettuce (*Latuca saligna*), as well as the vulnerable slender hare's-ear (*Bupleurum tenuissimum*), divided sedge (*Carex divisa*), sea barley (*Hordeum marinum*), Borrer's saltmarsh-grass (*Puccinellia fasciculata*), and dwarf eelgrass (*Zostera noltei*);
- Assemblages of international importance – peak winter counts of 45,118 waterfowl;
- Black-tailed godwit (*Limosa limosa islandica*) – supports 4.5% of the population during Spring/Autumn;
- Dunlin (*Calidris alpina alpina*) – supports 1.1% of the population during Winter; and
- Knot (*Calidris canutus islandica*) – supports 1.6% of the population during Winter.

4.17 The site also supports flora and fauna notable at the national level, including:

- Peak spring counts of greenshank (*Tringa nebularia*), little egret (*Egretta garzetta*), little grebe (*Tachybaptus ruficollis*) and ruff (*Philomachus pugnax*);
- Peak winter counts of shelduck (*Tadorna tadorna*), gadwall (*Anas strepera*), shoveler (*Anas clypeata*), avocet (*Recurvirostra avosetta*), spotted redshank (*Tringa erythropus*) and water rail (*Rallus aquaticus*); and

- A number of nationally important and rare invertebrate species.
- 4.18 The Thames Estuary and Marshes SPA is situated 3.3km from the Essex Project Site and 6.0km from the Kent Project Site, and is designated for the following qualifying features:
- Qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance over winter of:
 - Avocet (*Recurvirostra avosetta*) – 28.3% of the wintering population in Great Britain; and
 - Hen Harrier (*Circus cyaneus*) – at least 1% of the population in Great Britain.
 - Also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:
 - Over winter: Dunlin (*Calidris alpina alpina*) – 2.1% of the population;
 - Over winter: Knot (*Calidris canutus*) – 1.4% of the population;
 - Over winter: Black-tailed godwit (*Limosa limosa islandica*) – 2.4% of the population;
 - Over winter: Grey plover (*Pluvialis squatarola*) – 1.7% of the population;
 - Over winter: Common redshank (*Tringa totanus*) – 2.2% of the population; and
 - On passage: Ringed plover (*Charadrius hiaticula*) – 2.6% of the population.
 - 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 75,019 waterfowl.

Medway Estuary and Marshes SPA/Ramsar

- 4.19 Medway Estuary and Marshes Ramsar/SPA is located approximately 13.1km to the south-east of the Essex Project Site and 16.4km from the Kent Project Site. A summary of the reasons for designation for this designation is provided below.
- 4.20 The Medway Estuary and Marshes Ramsar is designated under criteria 2, 5 and 6 for the following interest features:
- The site supports a number of species of rare plants and animals. The site holds several nationally scarce plants and a total of at least twelve British Red Data Book species of wetland invertebrates;

- An international important waterfowl assemblage of greater than 20,000 birds (65,496);
 - Dark-bellied brent goose (*Branta bernicla bernicla*) – supports 1.1% of the population in Winter;
 - Dunlin – supports 1.9% of the population in Winter;
 - Grey plover – supports 1.9% of the population in Winter;
 - Knot – supports 0.2% of the population in Winter;
 - Pintail – supports 1.2% of the population in Winter;
 - Common redshank – supports 2.1% of the population in Winter;
 - Ringed plover – supports 1.6% of the population in Winter;
 - Shelduck – supports 1.5% of the population in Winter; and
 - Black-tailed godwit – supports 1.5% of the population in Winter.
- 4.21 The site also supports populations of flora and fauna notable at the national level, including:
- Peak counts during winter of avocet (*Recurvirostra avosetta*), cormorant (*Phalacrocorax carbo*), curlew, greenshank (*Tringa nebularia*), little grebe (*Tachybaptus ruficollis*), oystercatcher (*Haematopus ostralegus*), spotted redshank, teal and wigeon (*Anas penelope*);
 - Peak counts during breeding of avocet, common tern and little tern; and
 - A number of nationally important invertebrates, namely: *Polystichus connexus*, *Cephalops perspicus*, *Peocilobothrus ducalis*, *Anagnota collini*, *Baris scolopocea*, *Berosus spinosus*, *Malachius vulneratus*, *Philonthus punctus*, *Malacostoma castrensis*, *Atylotus latistriatus*, *Campsicnemus magius*, *Cantharis fusca* and *Limonia danica*.
- 4.22 The Medway Estuary and Marshes SPA is designated for the following interest features:
- Qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance over winter of:
 - Avocet – 24.7% of the GB population; and
 - Bewick’s swan (*Cygnus columbianus bewickii*) – 0.2% of the GB population.
 - Also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of following species over winter:

- Black-tailed godwit – 1.5% of the population;
 - Common redshank – 2.1% of the population;
 - Curlew – 1.7% of the GB population;
 - Dark-bellied brent goose (*Branta bernicla bernicla*) – 1.1% of the population;
 - Dunlin – 1.9% of the population;
 - Greenshank (*Tringa nebularia*) – 2.6% of the GB population;
 - Grey plover – 1.9% of the population;
 - Knot – 0.2% of the population;
 - Oystercatcher – 1% of the GB population;
 - Pintail – 1.2% of the population;
 - Ringed plover – 1.6% of the population;
 - Shelduck – 1.5% of the population;
 - Shoveler – 0.8% of the population;
 - Teal – 1.3% of the GB population;
 - Turnstone (*Arenaria interpres*) – 0.9% of the population; and
 - Wigeon – 1.6% of the GB population.
- 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; and
 - Over winter the area regularly supports: 65,496 waterfowl including red-throated diver (*Gavia stellata*), great crested grebe, cormorant, Bewick's swan, dark-bellied brent goose, shelduck, wigeon, teal, mallard, pintail, shoveler, pochard (*Aythya farina*), oystercatcher, avocet, ringed plover, grey plover, lapwing, knot, dunlin, black-tailed godwit, curlew, redshank, greenshank and turnstone.
 - Also qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of following species during the breeding season:
 - Avocet – 6.2% of the GB population; and,
 - Little Tern (*Sterna albifrons*) – 1.2% of the GB population.

- Assemblage qualification: A wetland of international importance. The area qualifies under Article 4.2 of the Directive (79/409/EEC) by:
 - Regularly supporting, in summer, a diverse assemblage of breeding migratory waterfowl including oystercatcher, lapwing, ringed plover, redshank, shelduck, mallard, teal, shoveler, pochard and common tern;

4.23 The European Site Conservation Objectives for both SPAs are attached at Annex 5.0 and are as follows:

‘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.’*

North Downs Woodlands SAC

4.24 The North Downs Woodlands SAC is situated approximately 8km south-east of the Kent Project Site and 9.7km from the Essex Project Site. It is designated based on the following qualifying features:

- Annex I habitats that are a primary reason for selection:
 - 9130 Asperulo-Fagetum beech forests; and
 - 91J0 Taxus baccata woods of the British Isles * Priority feature.

4.25 The conservation objectives for the SAC are as follows:

‘Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

Peter's Pit SAC

4.26 Peter's Pit SAC is situated approximately 12.8km south-east of the Kent Project Site and 13.8km from the Essex Project Site. It is designated for the following qualifying features:

- Annex II species that are a primary reason for selection of this site:
 - Great crested Newt for which this is considered to be one of the best areas in the United Kingdom.

4.27 The conservation objectives for the SAC are as follows:

'Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- *The extent and distribution of the habitats of qualifying species;*
- *The structure and function of the habitats of qualifying species;*
- *The supporting processes on which the habitats of qualifying species rely;*
- *The populations of qualifying species; and*
- *The distribution of qualifying species within the site.'*

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Chapter Five ◆ HRA STAGE 1: POTENTIAL IMPACT SOURCES

- 5.1 Potential impact sources from the Proposed Development (either alone or in combination) are discussed in turn below. All potential impacts are associated with the Kent Project Site. The nature and scale of works proposed within the Essex Project Site are such that no impacts on European Sites could be generated.

SITES WHERE NO POTENTIAL EFFECTS ARE IDENTIFIED

- 5.2 Due to a lack of effect-receptor pathways between Peter's Pit SAC and the Project Site and the reasons for designation, no adverse effects of any kind are considered likely as a result of the Proposed Development, as set out in Annex 2.0. Peter's Pit SAC has therefore been screened out from the HRA; a conclusion that is supported by Natural England in its consultation response on 19 October 2020 (see Annex 1.0).
- 5.3 With respect to The North Downs Woodlands SAC, the only identified potential effect-receptor pathway relating to the Proposed Development is air quality effects from increased traffic movements along relevant parts of the road network during operation.
- 5.4 The North Downs SAC may be subdivided into two discrete land parcels characterised by the boundaries of its component SSSI's; Halling to Trottscliffe Escarpment SSSI and Wouldham to Detling Escarpment SSSI. Both land parcels are spatially separated from one another by circa 7km.
- 5.5 As set out with Air Quality Assessment (ES Chapter 16 *Air Quality*; Document Reference 6.1.16), for construction the SAC is not within 350m of the site boundary and/or within 20m of the kerb of a road used by construction traffic and any impacts can be ruled as insignificant. In terms of operation, the SAC and component Halling to Trottscliffe Escarpment SSSI is over 10km from the energy centre point source and over 200m from the roadside of any roads predicted to experience an increase of >1000 AADT, such that impacts upon this particular land parcel comprising the SAC can be ruled insignificant.
- 5.6 With respect to Wouldham to Detling Escarpment SSSI the overlapping component of the SAC is over 10km from the energy point centre but is located within 153m of the A229 at its closest, westernmost extent and within 15m of the A249 at its easternmost extent.
- 5.7 With respect to the A229, 0.007% of the SAC land area lies within the ZoI of the road whilst 1.2% of SAC land area lies within 200m of the A249. Given the small extent of habitat located with the potential ZoI of main road, the potential for significant negative effects upon the favourable conservation status of the SAC is considered unlikely, whilst those SSSI units (units 26 and 15) in proximity to the A229 and A429 remain in favourable condition.

- 5.8 Significant air quality impacts on the North Woodlands SAC during both operation and construction alone have therefore been ruled out. However, there remains the potential for significant negative effects in combination with other committed development, and is considered further within this document.

IMPACTS ARISING FROM THE PROJECT THAT HAVE THE POTENTIAL TO GIVE RISE TO EFFECTS WITHIN EUROPEAN/RAMSAR SITES

Direct Effects

- 5.9 The intervening distances (as detailed in Chapter 4) between the Project Site and the Thames Estuary and Marshes SPA/Ramsar, Medway Estuary and Marshes SPA/Ramsar, Peter's Pit SAC and North Downs Woodland SAC negate the potential for direct effects on any of these designated sites. Direct adverse effects within all European/Ramsar Sites are consequently screened out.

Indirect Effects during Construction and Operation

- 5.10 The intervening distances between the Project Site and the identified European Sites also substantially reduce the scope for indirect effects. Furthermore, the majority of possible impact sources, and those with the greatest magnitude are situated at a greater distance from the closest designated sites, i.e. within the Kent Project Site. The reduced effect due to these intervening distances on potential impact sources such as disturbance caused by shipping, human movement within the Project Site and activity, noise and lighting originating within the Project Site is substantial and allows these effects to be screened out.
- 5.11 Potential indirect impact sources which require more detailed consideration in relation to the Thames Estuary and Marshes SPA/Ramsar, Medway Estuary and Marshes SPA/Ramsar are described in turn below.

Effects with Potential to Cause Disturbance of Species within the SPA/Ramsar Sites

Disturbance – Visual/Human Activity

- 5.12 Visitor surveys to identify the likely zone of influence for recreational disturbance around the Thames, Medway and Swale Estuaries found that the majority of visitors come from within 6km¹⁴. It was therefore concluded that residential development within a 6km radius will result in increased access to the SPA/Ramsar Sites and that, in combination, a likely significant effect from disturbance cannot be ruled out. The Project Site lies within 6km of the SPA/Ramsar Sites and up to 500 dwellings of 4-6 bedrooms will be provided for staff of the resort. There is therefore potential for significant recreational effects within the SPA/Ramsar Sites as a result of additional visitors.

¹⁴ Fearnley, H. & Liley, D. (2011) North Kent Visitor Survey Results. Footprint Ecology / Greening the Gateway

Effects with Potential to Cause Damage/Deterioration of Habitat within the SPA/Ramsar Sites

Water and/or Sediment Quality

- 5.13 The construction of new and/or expanded marine structures and possible associated capital and maintenance dredging has the potential to influence water quality within the Thames, both in terms of suspended sediment loads and through the risk of mobilising any contaminants currently bound in sediments. Redistribution of contaminants in this way could result in contamination affecting habitats within the Thames Estuary and Marshes SPA/Ramsar Site via sediment transport and re-deposition, or could increase the bioavailability (e.g. to aquatic organisms) of contaminants, causing potential effects on cited interest features further up the food chain (bio-magnification) or via direct toxicity. This effect is likely to be limited due to the design of marine structures and small extent of proposed dredging works.
- 5.14 The construction activities within the development footprint have the capacity to introduce or mobilise environmental contaminants via a range of activities (e.g. elevated construction dust; increased quantity and affected quality of surface water run-off; use or application of non-biodegradable toxic chemicals, etc.), particularly with the contaminated nature of the Project Site. Potential impacts on either of the SPA or Ramsar sites are considered to more likely upon functionally linked habitats within the Project Site and in its immediate surroundings, although impacts are possible if contaminants enter the Thames.
- 5.15 The proposed Surface Water Drainage Strategy (Document Reference 6.2.17.2) has the capacity to increase and alter water discharges to the Thames which may potentially impact on the functionally linked habitat. It also has the capacity to introduce or mobilise contaminants present as a result of increased activity within the Project Site (e.g. surface run-off from increased vehicle movement, operational spillages) which could affect water and sediment quality in the Thames and have knock-on effects on the downstream European/Ramsar Sites.
- 5.16 The mouth of the River Medway, and therefore the receptor pathway into the SPA/Ramsar site is located approximately 33km downstream from the Project Site, and it is therefore considered highly unlikely that any contaminants entering the water or being mobilised as a result of the Proposed Development would have any significant negative effects upon the designated sites associated with the river. However, LSE cannot be ruled out due to the potential for disturbed sediments flowing downstream or pollution originating from the Project Site entering the Thames.

Air Quality

- 5.17 Emissions from road and non-road traffic and shipping in and around the Project Site will disperse towards the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar by virtue of the prevailing westerly and south-westerly wind direction. However, increased shipping traffic generated by the new ferry terminals, once operational, is considered unlikely to bring emissions sources closer to the SPA/Ramsar

Sites as the increase in shipping traffic will predominantly relate to movements from Tilbury to the Kent Project Site and west to London.

- 5.18 With reference to the Air Quality Assessment, which is based on a traffic model which incorporates traffic data from relevant cumulative schemes, neither SPAs are within 350m of the site boundary and/or within 20m of the kerb of a road used by construction traffic any impacts can be ruled insignificant. In terms of operation, as the SPAs are >200m from the roadside of roads predicted to experience an increase of >1000 AADT, the impact can be ruled insignificant. The Thames Estuary and Marshes SPA/Ramsar is within 10km of the energy centre point source, however the predicted impact is less than 1% of the relevant critical loads and critical level and can therefore be ruled insignificant.
- 5.19 Potential road traffic air quality effects have also been considered in-combination with other relevant plans and projects. The only European sites within 200m of the affected road network is the Thames Estuary and Marshes SPA/Ramsar and North Downs Woodland SAC. The former is located adjacent to the proposed Lower Thames Crossing NSIP.
- 5.20 The Lower Thames Crossing is currently in the process of being designed and therefore, owing to the introduction of such a significant highways scheme, will be subject to its own Appropriate Assessment taking into account the detailed scheme design and ventilation shafts. However, the increase in traffic resulting from the Proposed Development on this road link is predicted to be 30 AADT (well below the 1,000 AADT DMRB criteria), any in-combination air quality impacts can be ruled insignificant.
- 5.21 With respect to the North Downs SAC, the following proposed schemes considered the potential for air quality impacts arising upon the North Downs Woodland SAC:
- Thames Enterprise Park, Former Coryton Oil Refinery - 18/01404/OUT; and
 - Thurrock Flexible Generation Plant, by Thurrock Plant Ltd.

5.22 However, owing the spatial distance of each proposed development scheme from the SAC and/or the absence of affected roads within 200m of this designation, the North Downs Woodland SAC was scoped out of further assessment. As such and with respect to the Project Site, any in-combination air quality impacts from additional traffic generated by other developments and from air pollutant emissions of other combustion and power generation development proposals can be ruled insignificant.

Invasive Non-native Species

5.225.23 Construction works (in particular shipping movements) have the capacity to introduce or encourage the spread of Invasive Non-Native Species (INNS) that could potentially impact on the SPA and Ramsar Site features.

IMPACTS ON FUNCTIONALLY LINKED FEATURES WITH THE POTENTIAL TO GIVE RISE TO INDIRECT EFFECTS ON EUROPEAN/RAMSAR SITE

5-235.24 As noted in Chapter 4, a number of habitat features within and surrounding the Project Site have been identified and being potentially functionally linked to the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar sites.

5-245.25 In this case, the main consideration is cited species making use of both on-site wetland habitat and (predominantly intertidal) habitats along the estuary front and between the Essex and Kent Project Sites, which are closer than the designated SPA/Ramsar boundaries, and thereby at higher risk of exposure to identified potentially significant impacts emanating from the project site. The need to broaden impact assessments out to consider functionally linked features is an established principle in HRA.

5-255.26 The DCO order limits encompasses relatively narrow areas of intertidal habitat that (in common with all such intertidal areas along this reach of the Thames) are used by certain qualifying interest features of the SPA/Ramsar site. It is worth noting that these habitats exist in an already heavily industrialised context.

5-265.27 A highly precautionary approach has been taken based on the assumption that SPA/Ramsar cited bird species using on-site wetland and intertidal areas close to the Project Site for feeding and/or refuge will to an extent form part of the nationally or internationally significant assemblages that form the qualifying or interest features for the nearby SPA/Ramsar designations. LSE on these assemblages outside of the designated area could therefore give rise to indirect significant effects within the designated sites, potentially up to and including threats to the continuance of favourable conservation status and thus site integrity.

5-275.28 Although the health of populations of plant and invertebrate populations outside of designated sites undoubtedly has an effect on the conservation status of populations within them, given the distance between the Kent Project Site and the Ramsar sites in question (c.4.8km for the Thames Estuary and Marshes Ramsar and c.16.4km for the Medway Estuary and Marshes Ramsar), it is considered highly unlikely that there is a functional link in relation to those species for which either Ramsar is designated under Criterion 2 of the Ramsar Convention. For this reason, the potentially functionally linked land within and adjacent to the Kent Project Site is considered for its ornithological interest only.

5-285.29 For the purposes of this assessment, Botany Marsh West, Black Duck Marsh, the Estuary foreshore between Bell Wharf and the tip of the Swanscombe Peninsula and at Tilbury, and the West Thurrock Lagoons and Marshes SSSI are considered to be functionally linked to either the Thames Estuary & Marshes or Medway Estuary and Marshes SPA/Ramsar sites.

5-295.30 Taking the above into account, the following potential impact sources are considered to be of most relevance to assessing whether LSE on the European/Ramsar Site are possible via effects limited to functionally linked habitats or species.

Effects with Potential to Cause Disturbance of Species using Functionally Linked Habitat

Disturbance – Shipping

5-305.31 Increased shipping traffic and/or any significant operational changes (e.g. changes in size, type, movement or duration of associated waterborne vessels) generated by the construction of the Resort will generate approximately 2000 additional movements between the Essex and Kent Project Sites per year, with a worst-case scenario of approximately 3650 additional movements per year. In addition, construction staff transport will generate an additional 16 daily movements, or 6000 movements per year. However, an increase in movements along shipping lanes close to the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar Sites are not anticipated as existing movements of materials into Tilbury are expected to be sufficient.

5-345.32 Once operational, an increase of approximately 69 ferry movements (42 between the Essex Project Site and Kent Project Site and 27 between the Kent Project Site and Westminster Pier) each way per day is anticipated. In addition, up to 2,000 service vessels or waste barges movements per year are expected. This will result in a total increase of approximately 32,000-33,000 movements between Essex and Kent and 20,000 between the Project Site and Westminster Pier, on top of the existing 8,000 movements made by the Tilbury Ferry and 20,000-30,000 commercial shipping movements in the Thames around the Project Site. This is an increase of almost 140% in shipping traffic, which has the potential to cause significant disturbance impacts in proximity to functionally linked habitats and could exacerbate any current disturbing effect that shipping traffic has on cited fauna such as birds

Disturbance – Visual/Human Activity

5-325.33 Disturbance triggered by human presence and/or movement associated with both the construction of the Resort and during its operational phase may have a disturbance effect on species feeding on nearby intertidal habitats (as set out in Table 5-1 below), and where such species form part of the wider populations underpinning the SPA/Ramsar Site network, there is potential for indirect significant effects. Use of the Public Rights of Way (PRoW) along the foreshore and within the Swanscombe Peninsula are considered unlikely to increase significantly as a direct result of the Proposed Development, however, related housing for staff will increase the local population and the recreational routes within the Resort may encourage visitor usage. Therefore, this may have the effect of increasing recreational use around functionally linked habitats at Black Duck Marsh and along the estuary foreshore.

Disturbance - Noise and Lighting

5-335.34 There is considered to be no likelihood of significant disturbance effects from increased noise or light pollution directly on any of the European/Ramsar Sites in respect of noise generation or lighting emissions from the Project Site itself due to the attenuating effect of distance. As noted above, no additional shipping movements are anticipated along the Thames and noise impacts from construction shipping upon European Sites

themselves is therefore extremely unlikely due to distance from the Project Site. During operation, such effects will be limited to functionally linked habitats outside of the designated sites but will be generated by the operation of resort rides, support infrastructure, Thames Clipper movements and other entertainment facilities.

5.345.35 The sensitivity of individual SPA and Ramsar citation species as set out in the Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects¹⁵ (included as Annex 4.0) is summarised in Table 5-1 below. However, caution should be applied in relying on general data as in some cases noise disturbance effects can differ based on the frequency range of noise events. However, birds in environments with high levels of existing disturbance, such as the Thames Gateway, can become habituated to some disturbance effects.

Table 5-1: Sensitivity of SPA/Ramsar Citation Species to Disturbance (TE and M = Thames Estuary and Marshes, ME and M = Medway Estuary and Marshes).

Species (SPA/Ramsar Association)	Presence within Functionally Linked Habitat	Species Sensitivity	Susceptibility to Noise/Construction Disturbance	Susceptibility to Human Disturbance
Avocet (TE and M, ME and M – Winter and ME and M – breeding)	Adjacent Estuary only recorded during winter and passage not breeding season	Moderate sensitivity likely, but high sensitivity assumed for precautionary reasons in absence of empirical data.	Limited data available but considered likely to be highly sensitive to noise stimuli. The most conservative data from the species below are therefore used to define likely threshold effects distances.	Limited data available, but considered tolerant of highly visual disturbance. The most conservative data from the species below are therefore used to define likely threshold effects distances.
Bewick’s swan (ME and M - Winter)	None	Moderate sensitivity likely, but high sensitivity assumed for precautionary reasons in absence of	Limited data available but considered likely to be highly sensitive to noise stimuli. The most conservative data from the species below are	Limited data available, but considered tolerant of highly visual disturbance. The most conservative data from the species below are therefore used to define likely threshold effects distances.

¹⁵ Cutts, N., Hemingway, K. and Spencer, J. (2013) *Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects*. Institute of Estuarine and Coastal Studies (IECS)

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		empirical data.	therefore used to define likely threshold effects distances.	
Black-tailed godwit (TE and M – Spring, Autumn and Winter, ME and M – Winter only)	Estuary	Moderate sensitivity	Moderately sensitive to noise stimuli. From a 100m distance, 110-115dB at source is likely to create a high-level disturbance impact.	Limited data available, but considered tolerant of moderate visual disturbance
Little Tern (ME and M – breeding only)	None (one flyover recorded)	High sensitivity ¹⁶	Limited data available but considered likely to be highly sensitive to noise stimuli. The most conservative data from the species below are therefore used to define likely threshold effects distances.	Limited data available, but considered tolerant of highly visual disturbance. The most conservative data from the species below are therefore used to define likely threshold effects distances.
Curlew (ME and M - Winter)	Estuary	Moderate sensitivity	Moderately sensitive to noise stimuli, noise required to create a high-level disturbance would be 107-112dB at 100m, increasing to 117-122dB at 300m.	Particularly intolerant of people, allowing approach to a range of 120-300m before flushing when confronted with a lone walker on the mudflat. This figure may rise to 550m in a disturbed environment when facilitation effects occur.
Dark-bellied brent goose (ME and M - Winter)	None	High sensitivity to noise disturbance, but react variably to	Brent Geese are very sensitive to noise, minimum approach distance no less than 100m. At 100m noise required to create	Feeding geese will tolerate disturbance relatively nearby, with an average of 105m for first reaction. When roosting or loafing, geese are more sensitive and will

¹⁶ Norman R.K & Saunders D.R. 1969. Status of Little Terns in Great Britain and Ireland in 1967. British Birds 62; 4-13

		visual disturbance	high level disturbance would be 110-115dB at source and thus not particularly prohibitive. This increases to 120 125dB at 300m.	react to disturbances within 350m.
Dunlin (TE and M, ME and M – Winter)	Estuary	Low sensitivity	Dunlin are not particularly sensitive and a noise level of 72dB at the bird is considered acceptable (caution above 60dB). A source noise threshold of 102-107dB can be applied at c.50m (caution above 92dB).	Will allow approach as close as 50-90m before flushing when confronted with a lone walker on mudflat. Dunlin are very tolerant of moderate/high level visual disturbance.
Greenshank (ME and M - Winter)	None	Moderate sensitivity likely, but high sensitivity assumed for precautionary reasons in absence of empirical data.	Limited data available but considered likely to be highly sensitive to noise stimuli. The most conservative data from the species below are therefore used to define likely threshold effects distances.	Limited data available, but considered tolerant of highly visual disturbance. The most conservative data from the species below are therefore used to define likely threshold effects distances.
Grey plover (TE and M, ME and M - Winter)	None	Moderate sensitivity	Given the limited data available, a precautionary approach is taken in setting likely response thresholds. From a 150m distance, 115-120dB at source is likely to create a high-level	Will allow approach as close as 50-100m before flushing when confronted with a lone walker on mudflat. Tolerant of moderate and high-level visual disturbance.

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			disturbance impact; from 500m distance it would be 125- 130dB.	
Hen harrier (TE and M - Winter)	None	Moderate-high sensitivity to noise; Low sensitivity to human/visual disturbance	The various studies of disturbance on hen harrier (and conspecifics) suggest safe stand-off distances from construction activity to be anything between 60 and 600m, although some of these studies relate to breeding activity during which the species is typically more sensitive.	As with noise/construction disturbance, albeit safe human disturbance standoff distances likely to be >60m.
Knot (TE and M, ME and M – Winter)	None	High sensitivity to noise; Tolerant of visual disturbance	Knot are resilient to works activity in general but sensitive to noise stimuli. A noise level of 70dB at the bird is considered acceptable (caution above 55dB). A source noise threshold of 100-105dB can applied at c.50m (caution above 87-92dB).	Birds react to walkers at <75m when roosting. Knot are tolerant of moderate/high level visual disturbance.
Common Tern (ME and M – breeding only)	None	High sensitivity assumed for precautionary reasons in absence of empirical data.	Limited data available but considered likely to be highly sensitive to noise stimuli. The most conservative data from the species below are therefore used to define likely	Limited data available, but considered tolerant of highly visual disturbance. The most conservative data from the species below are therefore used to define likely threshold effects distances.

			threshold effects distances.	
Oystercatcher (ME and M - Winter)	Estuary	Moderate sensitivity	A standard approach should be applied, with noise up to 72dB acceptable at the bird but with caution used at levels of above 55dB (60dB in a highly disturbed area). As Oystercatcher will forage up to within 50m of plant, this means that a source noise threshold of 105-110dB may be possible but applied with caution at levels above 87-92dB.	Oystercatcher are relatively tolerant of disturbance and will habituate. Flush distance in typical estuary of 25-200m dependent on stimuli (people cause most extreme reaction). Agricultural/construction vehicles average 60m threshold.
Pintail (ME and M - Winter)	None	Moderate sensitivity likely, but high sensitivity assumed for precautionary reasons in absence of empirical data.	Limited data available but considered likely to be highly sensitive to noise stimuli. The most conservative data from the species below are therefore used to define likely threshold effects distances.	Limited data available, but considered tolerant of highly visual disturbance. The most conservative data from the species below are therefore used to define likely threshold effects distances.
Redshank (TE and M, ME and M - Winter)	Estuary	High sensitivity to noise; Tolerant of visual disturbance	Redshank are resilient to works activity in general but sensitive to noise stimuli. A noise level of 70dB at the bird is considered acceptable (caution	Will allow approach as close as 70-115m before flushing when confronted with a lone walker on mudflat.

			above 55dB). A source noise threshold of 100-105dB can be applied at c.50m (caution above 87-92dB).	
Ringed plover (TE and M - passage, ME and M - Winter)	Estuary – spring passage	Low sensitivity; extremely tolerant with habituation	Ringed plover appear not to be sensitive to noise stimuli and habituate rapidly. A noise level of 75dB at the bird is considered acceptable (caution above 60dB). A source noise threshold of 107-112dB can applied at c.50m (caution above 93 98dB).	Will allow approach as close as 30-50m before flushing when confronted with a lone walker on mudflat. Very tolerant of moderate/high level visual disturbance.
Shelduck (ME and M - Winter)	Botany Marsh, Estuary	High sensitivity	The minimum approach distance can be expected to be no less than 150m. At 150m, works noise required to create a high level of disturbance at this range would be 115-120dB at source and thus not particularly prohibitive unless undertaking pilling. This would increase to 125-130dB at 500m.	Very wary and sensitive to visual disturbance, typically no closer than 300m from construction work and visual disturbance up to 500m.
Shoveler (ME and M - Winter)	Botany Marsh, Black Duck Marsh	Moderate sensitivity likely, but high sensitivity assumed for	Limited data available but considered likely to be highly sensitive to noise stimuli. The most	Limited data available, but considered tolerant of highly visual disturbance. The most conservative data from the species below are

		precautionary reasons in absence of empirical data.	conservative data from the species below are therefore used to define likely threshold effects distances.	therefore used to define likely threshold effects distances.
Teal (ME and M - Winter)	Estuary, Black Duck Marsh, Botany Marsh	Moderate sensitivity likely, but high sensitivity assumed for precautionary reasons in absence of empirical data.	Limited data available but considered likely to be highly sensitive to noise stimuli. The most conservative data from the species below are therefore used to define likely threshold effects distances.	Limited data available, but considered tolerant of highly visual disturbance. The most conservative data from the species below are therefore used to define likely threshold effects distances.
Turnstone (ME and M - Winter)	Estuary	Low sensitivity	A noise of up to 75dB appears acceptable at the bird, with caution suggested over 60dB. They will forage extremely close to plant (<50m and often within 10m), which means that a source noise threshold of 107-112dB can be applied with caution possible above 93-98dB. However, high noise levels at source (c. 120db) are probably acceptable for birds foraging at distance.	Tolerant of people as close as 30-50m.

Wigeon (ME and M - Winter)	Estuary, Black Duck Marsh	Moderate sensitivity likely, but high sensitivity assumed for precautionary reasons in absence of empirical data.	Limited data available but considered likely to be highly sensitive to noise stimuli. The most conservative data from the species below are therefore used to define likely threshold effects distances.	Limited data available, but considered tolerant of highly visual disturbance. The most conservative data from the species below are therefore used to define likely threshold effects distances.
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Effects with Potential to Cause Damage/Deterioration of Habitat within Functionally Linked Land

Habitat Loss/Damage

5-355.36 The predicted temporary loss of 0.32ha of intertidal saltmarsh habitat to facilitate the construction of the new jetty at the Kent Project Site and losses of 14.55ha of coastal and floodplain grazing marsh at Botany Marsh West and 0.94ha of reedbeds around the edges of Black Duck Marsh will significantly reduce the extent of functionally-linked habitat in the local area. This could give rise to implications for population carrying capacity of intertidal and wetland birds due to a reduction in available refuge/foraging habitat.

Sediment Circulation and Deposition Patterns

5-365.37 The construction of new and/or expanded marine structures and associated capital and maintenance dredging has the potential to interfere with coastal and estuarine processes, including patterns of sediment circulation, accretion and deposition, although such effects are anticipated to be minor given the scale and type of structures (i.e. piles rather than flat surfaces). As discussed above, the distance from the Essex Project Site to the near shore of the Thames Estuary and Marshes SPA/Ramsar is 3.3km, and effects upon the designation itself are considered unlikely. However, where such processes underpin the morphology, extent and condition of functionally linked habitats, such as mudflat and saltmarsh, there is the potential for any changes to give rise to a significant effect.

5-375.38 Additionally, there is potential for increased sediment load within on-site waterbodies and within the Thames as a result of exposed soils during construction. Deposition of these sediments on functionally linked habitats could result in significant changes to nutrient load, the physical characteristics of mudflats and saltmarsh, vegetation associated with those habitats, and hydrology.

Changes in Hydrology

5.385.39 The construction of the Proposed Development will necessitate significant changes to the hydrological regime within the DCO Order Limits. This will involve the drainage and infill of the Channel Tunnel Rail Link wetland, a small area of marshland to the south-east of Black Duck Marsh and other low-lying, seasonally inundated areas. The Surface Water Drainage Strategy (Document 6.2.17.2) has been designed such that the hydrology of on-site marshland will be maintained where possible.

Air Quality

5.395.40 Construction and operational traffic and dust created as a result of construction, increased ferry traffic and emissions associated with energy production have the potential to negatively affect functionally linked habitats within and surrounding the Project Site through deposition.

5.405.41 However, no retained functionally linked habitats lie within 200m of a proposed or existing road and off-road traffic will be well below the 1000 AADT threshold. Effects due to increased construction traffic have therefore been screened out of this assessment. In terms of operation, as the site is >200m from the roadside of roads predicted to experience an increase of >1000 AADT, the impact of increased traffic can be ruled insignificant. With regards to contribution to air quality impacts from the energy centre, following dispersion modelling the predicted impact at both sites is <1% of minimum critical load and critical level for all retained habitats and can therefore be ruled insignificant.

5.415.42 Therefore, the air quality impacts on functionally linked land are only taken forward for construction traffic and dust created as a result of construction.

Invasive Non-native Species

5.425.43 Construction works and (in particular shipping) have the capacity to introduce or encourage the spread of INNS that could potentially impact functionally linked habitat.

IMPACTS FROM DECOMMISSIONING

5.435.44 The DCO application is for a permanent form of development and no decommissioning is envisaged. Therefore, potential impacts arising from decommissioning have been scoped out of this HRA report.

CONCLUSIONS

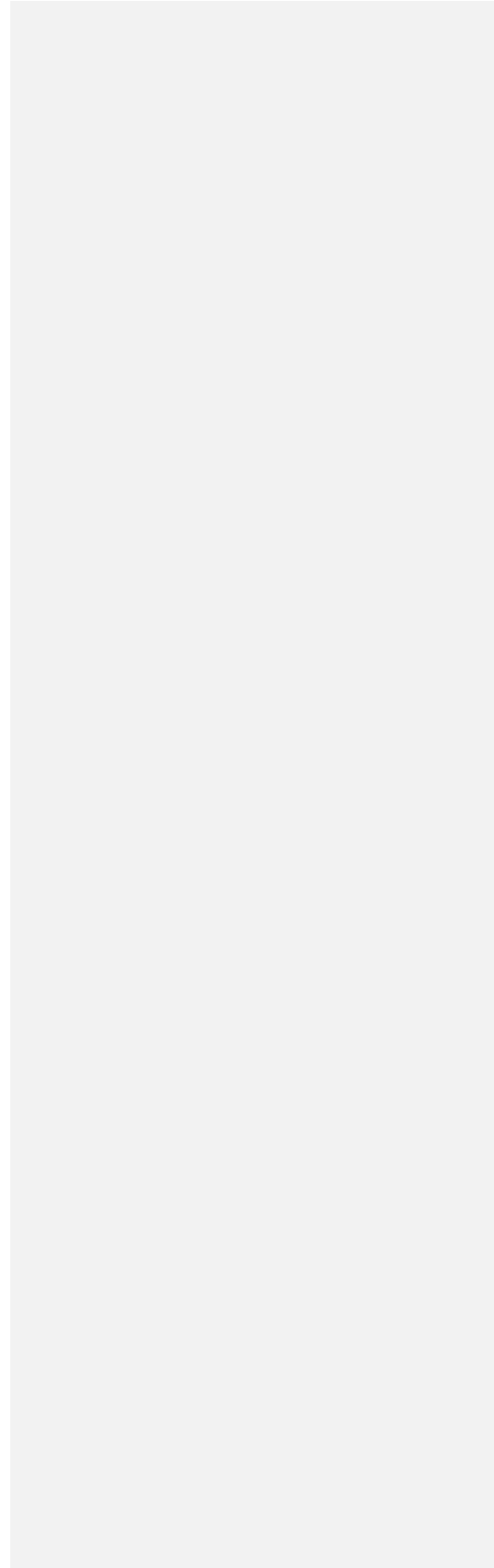
5.445.45 There is no potential for either direct or indirect impacts upon the North Downs Woodlands and Peter's Pit SACs. These two designated sites are therefore not considered further within this HRA.

5.455.46 Annex 2.0 contains the completed Stage 1 screening matrices for the Thames Estuary and Marshes and Medway Estuary and Marshes SPA and Ramsar Sites, adopting the format set out in PINS Advice Note 10.

5.465.47 The disparate sources of potentially significant effects have been compressed into a number of broad categories in line with the approach recommended in Advice Note 10.

5.475.48 For each qualifying feature and potentially significant effect, evidence supporting the conclusions indicated in the matrix (either 'likely significant effect **cannot** be excluded' – denoted by a "√" or 'likely significant effect **can** be excluded' – denoted by a "X" in the matrix) is provided in footnotes a-l of the matrix and not replicated here.

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Chapter Six ◆ HRA STAGE 2: MITIGATION MEASURES TO COUNTER PREDICTED IMPACTS

- 6.1 Mitigation measures designed to limit the environmental impact of the Proposed Development are contained within the CEMP, CMS, Landscape Management Plan (LMP), EMMF and CTMP (Documents 6.2.3.2 and 3.1, 6.2.11.8, 6.2.12.3 and 6.2.9.2 respectively), and other development control documents, where appropriate, which are secured under requirements in the draft DCO. Those measures that have specific relevance to mitigating against damage to European Sites are summarised here.

ON-SITE MITIGATION – CONSTRUCTION PHASE

Timing of Works

- 6.2 Construction works will be timed in order to mitigate against effects upon qualifying features.
- 6.3 Therefore, areas of Coastal/Floodplain Grazing Marsh in Botany Marsh West will be cleared during the Summer months (April to September inclusive). Where breeding or young birds (i.e. pre-fledged goslings/ducklings/chicks) are present, works will be delayed until such time as work can be carried out without damage to nests.
- 6.4 Although works causing in excess of 55dB of noise at Bell's Wharf and 70dB of noise at Gate 2 will be limited to Summer where possible, to avoid disturbance of Wintering birds sheltering at Black Duck Marsh and the existing wharf, it is acknowledged that due to the construction schedule, this may not be possible in all cases.

Pollution, Disturbance and INNS Control Measures

- 6.5 Standard dust suppression measures will be employed in order to limit the spread and deposition of construction dust across sensitive, functionally linked habitats within and surrounding the Project Site.
- 6.6 Ecological Protection Zones (EPZs) will be established around retained habitats through the use of temporary exclusion barriers such as tree protection and Teflon fencing, with appropriate signage, to ensure that all construction activities are excluded.
- 6.7 Construction activities within 8 metres of watercourses and waterbodies will be prohibited, or with specific working methodologies employed and supervised for any necessary works within this protection zone.
- 6.8 All enabling/construction works will be undertaken in accordance with pollution prevention guidance notes and publications. Pollution Prevention Guidelines (PPGs) are

currently archived on the National Archives website¹⁷ and are considered to represent the most up-to-date good practice guidance notes. In summary, pollution control measures will include:

- Measures to be implemented to prevent and deal with pollution incidents;
- Security to prevent vandalism-related pollution incidents;
- Drip trays and bunds around fuel storage and refuelling areas;
- Appropriate wheel washing facilities and road cleaning regime; and
- Silt fencing and settlement lagoons/soakaways to prevent silt runoff.

6.9 General waste management will be employed to avoid the contamination of surface water or habitats surrounding the construction zone.

6.10 Measures to reduce the impacts of noise and vibration during construction will be implemented, including:

- Selecting quieter plant and equipment;
- Turning equipment off when they are not in use;
- Providing enclosures around fixed plant like power generators or using mains power;
- Ensuring that all plant and equipment is well maintained;
- Keep internal haul routes well maintained and avoid steep gradients;
- Use rubber linings in chutes and dumpers to reduce impact noise;
- Minimise drop heights of materials;
- Start plant up sequentially rather than simultaneously;
- Move fixed plant away from identified noise sensitive receptors;
- Modify existing plant with noise attenuation packages such as acoustic enclosures and attenuators;
- Avoid using diesel power generators and use local electricity grid wherever possible;
- For impact driven piling, a non-metallic dolly between the hammer and the driving helmet should be used;

¹⁷ Available via: <http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx>

- Introducing an acoustic shroud for impact driven piles;
 - Choose a quieter piling method;
 - Avoiding unnecessary revving of engines;
 - Substitute plant and/or methods with less obtrusive plant and/or methods;
 - Where reasonably practical, move vibrating equipment away from identified Noise Sensitive Receptors (NSRs);
 - Vibration isolation of stationary plant;
 - Selecting less intrusive methods of piling;
 - Employ cut-off trenches which are analogous to noise barriers; and
 - Pre-auguring before installing the piles.
- 6.11 Access for construction personnel will be limited within EPZs surrounding functionally linked habitat at Black Duck Marsh and along the estuary front, where possible.
- 6.12 An outline lighting strategy is included within the CEMP (Document Reference 6.2.3.2).
- 6.13 The Applicant will enact a Bird Monitoring Response Strategy in order to react dynamically to unpredicted disturbance responses. Where noise levels are expected to exceed 55 decibels within Functionally Linked Habitat (i.e. during piling or dredging works), an Ecological Clerk of Works will monitor the response of any cited birds and enact additional mitigation where necessary, such as enforcing restricted works during high tide, when waterfowl are pushed closer to the DCO Order Limits.
- 6.14 Control of INNS during remediation works prior to construction will mitigate against the risk of spread into functionally linked habitat and downstream towards European Sites. Waste management measures for removed vegetation and impacted soils will be put into place to achieve this. These measures are set out within the CMS and CEMP (Document References 6.2.3.1 and 6.2.3.2).

ON-SITE MITIGATION – OPERATIONAL PHASE

Disturbance Control Measures

- 6.15 During operation, noise impacts will be mitigated through:
- Design of rides through deliberate placement of ‘scream zones’;
 - Strict noise specifications at design to eliminate clanking;
 - Placement of buildings to reduce noise spread;

- Limiting the sound pressure level of loudspeaker systems to levels below the existing ambient noise level at NSRs;
 - Optimising line array loudspeaker directivities to control noise emissions within the London Resort entertainment locations, reducing noise spill out of the external areas; and
 - Design external events spaces, so that loudspeakers are directed away from existing NSRs.
- 6.16 An Artificial Lighting Environmental Impact Assessment has been prepared for the Proposed Development by Buro Happold. This sets out a lighting strategy and design principles which will ensure that the retained intertidal and marsh habitats within the Project Site which are important for the SPA/Ramsar bird populations remain in the following Environmental Lighting Zones:
- River Thames and Intertidal Zone – Environmental Zone E1 (Typical of relatively uninhabited rural areas. No artificial lighting. Maintain the river in its current condition); and
 - Black Duck, Botany and Broadness Marshes - Environmental Zone E2 (Typical of sparsely uninhabited rural areas. No lighting sources visible from animal habitats. Protect the natural areas that are to be conserved and enhanced).

Pollution Control

- 6.17 Permanent foul drainage at the Kent Project Site will discharge to a dedicated on-site wastewater treatment works located on the north-east side of the Swanscombe Peninsula. At the Essex Project Site, permanent foul drainage would discharge into the existing Anglian Water drainage network.
- 6.18 Operational waste will be removed from the Resort and disposed of through recycling or land-fill.

Management of Recreational Activity

- 6.19 As noted previously, the level of increased recreational activity outside of the Leisure Core is anticipated to be relatively low. However, the increased activity that does occur as a result of Related Housing and occasional visits by Resort visitors will be managed in order to limit its impacts upon functionally linked habitat at Black Duck Marsh and along the estuary foreshore.
- 6.20 The London Resort presents a unique opportunity to engage Resort visitors from across the world in environmental awareness and education, through sustainable and inclusive access to nature. However, public access will be managed within certain habitats to prevent disturbance to ecologically sensitive habitats and species. The measures proposed to manage access and recreation are embedded within the Landscape Strategy (Document Reference 6.2.11.7) and include the following:

- A network of trails and footpaths are included within areas of Green Infrastructure (GI). The type of trail/path will to some extent determine the amount of recreational activity that can be tolerated within certain areas of GI. For example, compacted/hoggin pathways will be used at the periphery of the saltmarsh at the northern tip of the peninsula to prevent access by wheeled transport, whereas wider hardstanding paths will be used adjacent to the Resort away from sensitive habitats, e.g. Pilgrim's Way;
- New boardwalks and jetties will be built through new wetland habitats, with designed landscape buffers (such as reedbed and wet woodland), to improve public access at the same time as minimising disturbance;
- Fencing, screening and creation of other natural features (e.g. ditches) to prevent public access to the most sensitive habitats (e.g. intertidal habitats);
- Viewing platforms, hides and interpretation boards to raise awareness of visitors to the unique landscape and ecology of the Peninsula;
- Environmental education events for Resort visitors, local residents and schools;
- Maintenance of all publicly accessible areas (outside of the Resort), to address potential negative effects of recreation, such as littering, trampling and dog fouling; and
- Regular monitoring of all publicly accessible areas outside the Resort, to ensure recreational activities are being appropriately controlled and managed.

Habitat Enhancement and Creation Measures

6.21 Habitat enhancement and creation measures are detailed in full within the EMMF (Document Reference 6.2.12.3). The main enhancements and habitat creation to benefit SPA/Ramsar qualifying species are summarised below.

6.22 Existing ditches will be re-profiled in order to create greater structural diversity to benefit invertebrate prey. This measure will also encourage the growth of aquatic plants for consumption by herbivorous species.

6.23 Approximately ~~5.312.65~~ha of new reedbed will be created around the Proposed Development's periphery, ~~along with c.1ha of new ditches~~. This aquatic habitat will create additional opportunities for certain species, notably ducks.

~~6.24 Further reedbed and ditches will be created through the enhancement of Botany Marsh East. This area is currently dominated by dry reedbed, grassland verges and scrub. Enhancement measures will include:~~

- ~~• The excavation of ditches for new water vole habitat;~~
- ~~• Sensitive management of existing grazing marsh habitat and ditches;~~

- ~~A slight increase in the water table to re-connect aquatic habitats to the wider network; and~~
- ~~Scrub management to break-up large blocks and create new wetland habitat.~~

~~6-256.24~~ Approximately 3.04ha of new saltmarsh habitat will be created through the managed realignment of the coastline. This saltmarsh will extend existing habitat inland. Existing saltmarsh will be restored through the removal of litter and through management of contaminants (i.e. Cement Kiln Dust).

~~6-266.25~~ Reedbed in Black Duck Marsh will be enhanced through the creation of scrapes and ponds, allowing greater opportunities for waterfowl seeking refuge overnight or at high-tide.

Management of Retained and Enhanced Habitats

~~6-276.26~~ Scrub habitats will be managed rotationally, including those within wetland mosaics and reedbed. This will limit encroachment, allowing for continued use by waterfowl and waders, whilst maintaining benefits for Schedule 1 species such as marsh harrier and Cetti's warbler.

~~6-286.27~~ Water quality will be improved through removal of contaminants as part of the Surface Water Drainage Strategy (Document Reference 6.2.17.2).

OFF-SITE MITIGATION

Contribution to SAMMS

~~6-296.28~~ A Strategic Access Management and Monitoring Strategy (SAMMS) has been implemented across the Thames, Medway and Swale estuaries (see Annex 6.0). This strategy ensures that recreational pressures on the three SPA/Ramsar sites relating to those estuaries is managed sufficiently, through a combination of education, access restrictions, enhancement and ranger presence. This is implemented through financial contributions from developers. A formal decision was made by Gravesham Borough Council in 2015 which set the contribution at £223.58 per dwelling within 6km of the SPA/Ramsar sites or for "larger sites" within 10km, which has since been raised to £250.39 per dwelling. Dartford Borough Council have adopted this approach, defining a "larger" development as above 100 units. The proposed residential development within the Project Site is situated within the 6km buffer, and therefore an appropriate financial contribution to the SAMMS to offset the recreational impact of the increased residential population upon both SPA/Ramsar sites will be secured via s106 agreement attached to the DCO consent.

Creation/Enhancement of Functionally Linked Habitat

~~6-306.29~~ Potential indirect effects resulting from the net loss of habitat, which has been identified on a precautionary basis to be functionally linked to the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar, will be mitigated by

the creation or enhancement of new habitat within the functional range of the SPA bird species.

~~6.316.30~~ Areas of land on the Isle of Sheppey ~~are being considered for opportunities have been secured for the purposes of off-site SPA mitigation and~~ inquiries into ~~further~~ off-site land availability and offsetting schemes in the ~~local Swanscombe~~ area are ongoing, ~~however, a series of off-site mitigation principles An Ecological Compensation Framework (ECF) (Document Reference 6.2.12.10) have been drawn produced up for the Project which are set out in the General Principles for Offsite Ecological Mitigation (Document Reference 6.2.12.10), that sets out measures designed to compensate for habitat losses on the Project Site and mitigate against impacts upon SPA bird species using some of the habitats being lost protected species and sites. Those principles which are specific to the mitigation of potential effects identified in respect of the Residual Adverse effects upon the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar will be mitigated primarily through the provision of enhanced/restored habitat on two sites on the Isle of Sheppey are listed and expanded upon below, details of which are included within Annexes 1 and 2 of the ECF.~~

Proximity to the Project Site

~~6.32~~ The off-site mitigation land would be as close to the Project Site as is possible whilst also fulfilling other principles. The closest possible land will not necessarily be targeted if it cannot logistically be enhanced to create wetland habitat, a fundamental requirement of the mitigation habitat.

Within the Greater Thames Marshes Nature Improvement Area

~~6.336.31~~ The ~~identified~~ off-site mitigation land ~~would is be~~ situated within the Greater Thames Marshes Nature Improvement Area (NIA)¹⁸. The habitat lost within the Project Site is ~~also~~ situated within the NIA, and the off-site mitigation land ~~should will~~ assist in achieving the aims of the NIA.

Near to, or within, the functional range of birds using the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar

~~6.346.32~~ The off-site mitigation land ~~would be is~~ situated ~~adjacent to the Swale SPA/Ramsar, and as close as possible to one or both of the European Sites affected by the Proposed Development~~ the Thames Estuary and Marshes SPA/Ramsar site/SSSI and Medway Estuary and Marshes SPA/Ramsar site/SSSI and are situated ~~are~~ 12.7km north-west and 8.1km west respectively. ~~Therefore, in this way,~~ it can be ensured that there are no significant residual negative effects upon those sites through loss of functionally linked habitat.

¹⁸ Nature Improvement Areas are a network of large scale areas in which specific biodiversity goals are promoted in order to restore the natural landscape. The Greater Thames Marshes NIA aims to create and enhance grazing marsh, salt marsh and mudflat habitats.

~~As detailed in the ECF and associated Annexes, Comprise at least partially former marshland i.e. low-lying and capable of being restored to marshland~~

~~6.25 6.33 The off-site mitigation land would contain at least enough significant areas of low-lying, former marshland, which will be re-wetted and enhanced to offset the loss of wetland habitat within the Project Site. This would be achieved through the targeted "re-wetting" of those areas and through groundworks and planting where considered necessary. The off-site mitigation strategy would aim for a includes 2:1 ratio for creation of habitat relative to the total loss of wetland in excess of the proposed loss of wetland habitats within the Project Site. This would equal approximately 1.88ha of reedbed and 20.1ha of grazing marsh.~~

6.26 As well as the negotiations on securing off site habitat mitigation the Applicant is also considering the potential for financial contribution as part of the overall ecological mitigation strategy. In the event that on site impacts could not be fully offset through the restoration of off site land, e.g. through lack of suitable available land, a suitable financial contribution would be agreed through consultation with Natural England and any other relevant stakeholders. This may take the form of an agreed sum to be paid towards an existing or developing ecological enhancement project local to the Project Site. The payment could be made to facilitate a particular project (for example a wetland or woodland establishment scheme) or to fund land management over a longer time period. The payment amount would be agreed with the local authority and body responsible for the project and would form part of a s106 agreement attached to the DCO consent.

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6.27 It should be noted that the final off site mitigation 'package' may take the form of a combination of both payments and land acquisition and thus the quantum of land areas and payments would be adjusted accordingly.

Chapter Seven ◆ HRA STAGE 2: APPROPRIATE ASSESSMENT

STAGE 2 INTEGRITY MATRICES

- 7.1 For the reasons set out in Chapter 5, it is only necessary to consider certain potentially adverse effects on the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar sites within Stage 2: Appropriate Assessment, having screened out all other effects/European Sites at Stage 1.
- 7.2 The following LSE have been identified at Stage 1 and therefore progressed to Stage 2 of the assessment:
- Disturbance effects upon land functionally linked to both the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar during construction and operation;
 - Damage to both European Sites from water quality effects during construction;
 - Direct loss of habitat functionally linked to both European Sites during construction;
 - Damage to habitat functionally linked to both European Sites through air quality and water quality effects during construction; and
 - In combination effects during construction and operation.
- 7.3 Annex 3.0 contains the completed Stage 2 integrity matrices for the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar sites, adopting the format set out in PINS Advice Note 10. These have been completed with reference to the qualifying features and conservation objectives for these European Sites as set out in Chapter 4.
- 7.4 For each qualifying feature and potential adverse effect on integrity, evidence supporting the conclusions indicated in the matrix (either 'likely significant effect **cannot** be excluded' – denoted by a "✓" or 'likely significant effect **can** be excluded' – denoted by a "X" in the matrix) is provided in footnotes a-e of the matrix and not replicated here.
- 7.5 As the Matrices and supporting footnotes demonstrate, once the proposed avoidance and mitigation measures outlined in Chapter 6 are taken into account, likely significant effects on Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar sites can be excluded.

CONCLUSIONS OF STAGE 2 APPROPRIATE ASSESSMENT

- 7.6 The Stage 2 assessment has concluded on the basis of objective information (detailed within Annex 3.0: Integrity Matrices), that the Proposed Development will not adversely affect the integrity of either the Thames Estuary and Marshes SPA/Ramsar or Medway Estuary and Marshes SPA/Ramsar when considered alone.
- 7.7 The potential for in-combination effects with other plans or projects has also been considered with reference to the cumulative sites identified within Chapter 21: Cumulative Assessment (Document Reference 6.1.21) of the ES. On the basis that the Proposed Development will not result in likely significant effects, and that the other relevant plans and projects will also avoid or mitigate significant effects upon the integrity of Thames Estuary and Marshes SPA/Ramsar or Medway Estuary and Marshes SPA/Ramsar, it is concluded that no in-combination effects are likely.
- 7.8 As a result of these findings there is no requirement to take the HRA further to Stages 3 and 4.

Chapter Eight ◆ OVERALL CONCLUSION

- 8.1 The HRA has concluded that potential impact sources could give rise to adverse effect on the Thames Estuary and Marshes and Medway Estuary and Marshes SPA and Ramsar Sites. All other European sites and Ramsar sites were excluded from potential impacts.

POTENTIAL FOR LIKELY SIGNIFICANT EFFECTS ON THE THAMES ESTUARY AND MARSHES AND MEDWAY ESTUARY AND MARSHES SPA AND RAMSAR SITES

- 8.2 The Stage 1 assessment process has been able to exclude the possibility of significant effects on the Thames Estuary and Marshes and Medway Estuary and Marshes SPA and Ramsar Sites, from the following possible sources:
- Disturbance (whether from lighting, human disturbance, noise or shipping traffic) to any qualifying interest bird species using habitats within the SPA and/or Ramsar Site designation boundaries (construction or operational phase);
 - Habitat Damage within the Medway Estuary and Marshes SPA and Ramsar Site in either the construction or operational phase and habitat damage within the Thames Estuary and Marshes SPA and Ramsar Site during the operational phase;
 - Habitat loss or damage to functionally linked habitat for the Medway Estuary and Marshes SPA and Ramsar site during the operational phase; and
 - Disturbance to avocet, hen harrier, ringed plover, knot, grey plover, dunlin, Bewick's swan, curlew, greenshank, oystercatcher, pintail, shelduck, wigeon and dark-bellied brent goose using the functionally linked land in either the construction or operational phase.
- 8.3 However, for the following potential effects, the possibility of these being significant cannot be excluded beyond reasonable scientific doubt, or a precautionary approach has been taken to considering their likelihood:
- Disturbance to black-tailed godwit, redshank, teal, shoveler, turnstone and to the overall assemblage of wildfowl using functionally linked habitats;
 - Damage to habitats within the Thames Estuary and Marshes SPA and Ramsar Site due to temporary or permanent minor changes in estuarine processes, temporary changes in water quality, temporary or permanent changes in air pollution (construction or operational phase), construction/operational waste and pollutants, and the possibility of heightened risk of introduction of invasive non-native species (INNS);
 - Direct loss or damage to functionally linked habitats outside the SPAs and Ramsar Sites and in proximity to the Project Site from the same sources, with possible consequences for bird populations associated with the SPAs, and bird, flora and invertebrate fauna

associated with the Ramsar Sites; and

- Disturbance or damage to habitats within the SPA and/or Ramsar Site or to functionally linked habitats outside the designation boundaries from in-combination effects arising from The Project alongside other consented or planned projects.

CONSEQUENCES FOR INTEGRITY OF THE THAMES ESTUARY AND MARSHES AND MEDWAY ESTUARY AND MARSHES SPA AND RAMSAR SITES

- 8.4 The Stage 2: Appropriate Assessment process has considered the possibility of adverse effects on the integrity of the Thames Estuary and Marshes and Medway Estuary and Marshes SPA Ramsar Sites, either alone or in combination with other projects, from the likely significant effects that could not be ruled out at Stage 1.
- 8.5 For the reasons given in Annex 3.0 of this report, it is concluded that the competent authority can be sufficiently certain on the basis of the evidence and reasons given in this report that adverse effects from the Proposed Development will not occur on the integrity of either the Thames Estuary and Marshes or Medway Estuary and Marshes SPA and Ramsar Sites, either alone or in combination with other projects. As such, there is no requirement to progress to Stage 3 or 4 of the HRA process.

Annexes

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Annex 1.0 CORRESPONDENCE WITH NATURAL ENGLAND

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Date: 19 October 2020
Our ref: 330436
Your ref: -



James Bird
edp Ltd

Customer Services
Hornbeam House
Crewe Business Park
Electra Way
Crewe
Cheshire
CW1 6GJ

T 0300 060 3900

By email only, no hard copy to follow

Dear James Bird

Discretionary Advice Service (charged advice)
Contract reference UDS7110
The London Resort - Shadow Habitats Regulations Assessment

Thank you for seeking advice on the Shadow Habitats Regulations Assessment, the advice in this letter is being provided as part of Natural England's Discretionary Advice Service.

This advice is provided in accordance with the quotation and signed agreement dated 16 June 2020 and is based upon the information contained within the following document:

- Shadow Habitats Regulations Assessment dated September 2020 (document reference edp5988_r021b)
- The London Resort Baseline Wintering Bird Report dated May 2020 (document reference edp5988_r003b)

The opportunity to provide advice on the Shadow Habitats Regulations Assessment (HRA) at this stage is welcomed. Reference is made throughout the document to the environmental statement, the impact assessment and the mitigation measures detailed within this. Whilst it is acknowledged that some information on the proposed mitigation and compensation measures was provided within the Preliminary Environmental Information Report consultation, Natural England sought clarity and more detailed information on a number of key areas in their recent formal response. As this more detailed information has not yet been provided and the environmental statement has, understandably, not yet been shared my comments are necessarily limited in scope to the conclusions of the Shadow HRA. I will of course be pleased to provide further, more detailed advice when the detailed mitigation and compensation measures can be shared.

Section 3.5 of the Shadow HRA suggests that a number of embedded avoidance and mitigation measures have been incorporated into the design to reduce the environmental impacts resulting from the scheme. It would be helpful for the full details of the avoidance and mitigation measures to be shared and I will then be able to provide more detailed comments on the Shadow HRA.

Section 3.6 of the Shadow HRA refers to a number of 'habitat enhancement' measures that are detailed within the Ecological Mitigation and Management Framework. These measures appear to be habitat management measures to facilitate mitigation rather than purely habitat enhancements and it would be helpful if clarity were provided. In addition, it would be helpful for the Ecological Mitigation and Management Framework to be shared when it is available so that I can provide more detailed advice.

Section 3.7 of the Shadow HRA details the proposals for habitat creation and management offsite, such measures would normally be considered compensation (rather than mitigation) measures. It is unclear from the Shadow HRA whether the offsite habitat compensation measures are for impacts to the functionally linked land used by birds associated with the Special Protection Areas (SPA) and Ramsar Sites and/or wider environmental impacts. For impacts to Special Protection Areas, Special Areas of Conservation and, as a matter of Government policy, Ramsar Sites, proposals must demonstrate the robust consideration of alternative approaches with a lesser or no impact for the development. Such alternative approaches could include the location, design, layout and construction, for example. If no such alternatives are possible then the Secretary of State will need to determine whether there are imperative reasons of overriding public interest sufficient to override the harm to the site when considering the application. It is at this stage that the provision of compensatory habitat measures would normally be considered for impacts to designated sites.

Section 3.8 of the Shadow HRA suggests that 'the applicant is also looking at the potential for financial contribution towards the improvement of offsite habitats and habitats within the SPA and Ramsar sites. These could be delivered in conjunction with offsite mitigation or instead of'. It is not normally acceptable to undertake mitigation works (in the broadest sense) for development impacts within a designated site and again, these measures would appear to be offsite compensation. It would be helpful if clarity were provided on the nature and scale of the impacts and the measures that are being proposed to avoid and fully mitigate them.

Sections 4.1-4.5 of the Shadow HRA provide a summary of the onsite ecological baseline. On a general point, the consideration of impacts to the designated sites north of the Thames does not seem to be considered within this section. Given the Thames Estuary and Marshes SPA and Ramsar Site covers both the Kent and Essex coastline, I would recommend that the HRA needs to reflect the potential impacts to the designated sites as a whole. As mentioned in Natural England's formal response to the Preliminary Environmental Information Report, surveys of both the Kent and Essex sites and habitat which may be indirectly impacted should be provided within the environmental statement, and where necessary, considered within the Shadow HRA.

As mentioned in Natural England's statutory advice in relation to the 2020 Environmental Impact Assessment Scoping request and the Preliminary Environmental Information Report, a minimum of two years of recent wintering bird survey information would normally be required for a development such as this where significant impacts are likely to result. The reliance on data from 2012/13 and 2019/20 may not provide a sufficiently robust baseline for the environmental statement and Habitats Regulations Assessment. This is particularly important as the wintering bird surveys have centred on the Kent site despite other developments highlighting that the intertidal areas in close proximity to the Essex site support significant numbers of birds associated with the designated sites. It may be possible to supplement these surveys with data collected for other projects in the vicinity of the Kent and Essex sites which I would recommend is explored.

Section 4.8 of the Shadow HRA makes reference to the use of the Waterbird Disturbance Mitigation Toolkit (TIDE toolkit University of Hull, 2013) to define the zone of influence of the project for birds associated with the SPAs and Ramsar Sites. The consideration of impacts needs to be considered in the context of the local, site specific situation. Whilst the TIDE Toolkit may provide a helpful overview, the site specific situation and impacts must be considered fully within the environmental statement and the HRA. This should be based upon robust survey information including broader environmental parameters such as, but not necessarily limited to, baseline noise and light levels to understand the likely impacts resulting from any changes during construction and operation.

Section 4.23 of the Shadow HRA does not include the breeding bird species associated with the Medway Estuary and Marshes SPA and Ramsar Site. It would seem appropriate for these to be included within the Shadow HRA. If the survey results suggest there may be a functional linkage for both wintering and breeding birds, then this will need to be considered within the environmental statement and the Shadow HRA.

My advice, based upon other schemes and the information currently provided for this project, is that

impacts to Peter's Pit Special Area of Conservation (SAC) are unlikely to result from this proposal (Section 5.5).

I note that Section 5.7 of the Shadow HRA states that 'Increased shipping traffic generated by the new ferry terminals, once operational, is considered unlikely to bring emissions sources closer to the SPA/Ramsar Sites as the increase in shipping traffic will predominantly relate to movements from Tilbury to the Kent Project Site and west to London'. Such assumptions will need to be fully evidenced and robustly tested through the environmental statement process. Where this indicates that impacts may result, they should then be considered through the Shadow HRA.

Section 5.8 of the Shadow HRA discounts the need to consider the potential for traffic generated air quality impacts to the North Downs Woodland SAC due to the M2 motorway being 700 metres from the SAC. The A229 and A259 trunk roads which link the M2/A2 corridor and the M20 both lie within 200 metres of areas of the North Downs Woodland. I would therefore recommend that the assessment considers whether the project will result in an increase in vehicle movements along these roads which may result in air quality impacts, either alone or in-combination with other plans or projects both during construction and operation of the scheme.

In relation to air quality, Section 5.9 of the Shadow HRA states that 'Construction traffic and dust created as a result of construction, increased ferry traffic and emissions associated with energy production have the potential to negatively affect functionally linked habitats within and surrounding the Project Site through deposition. No functionally linked habitats lie within 200m of a proposed or existing road, and effects due to increased road traffic have therefore been scoped out of this assessment'. Whilst it may be the case that no functionally linked land falls within 200 metres of a road (details of the areas considered to be functionally linked have yet to be shared), this section also makes reference to impacts from dust, ferry traffic and emissions from the energy facility. As such, I would recommend that the full suite of air quality impacts need to be considered. Once greater detail is available, it may be possible to screen these out but at present, based on the information currently shared it is not possible for me to concur with the approach suggested.

As mentioned above, care needs to be taken in relying upon the TIDE Toolkit without consideration of the local situation, particularly in relation to noise. It is generally accepted that an increase in noise levels of 3dB when considered against the existing background levels could be significant and would warrant further investigation to understand if an impact would result. I would therefore recommend that Table EDP 5.1 (Section 5.14) needs to fully reflect the local situation with reference made to the baseline conditions for both the Kent and Essex sites for a broad range of environmental parameters (including, for example, noise and light levels). This combined with the ecological survey information will provide a detailed baseline. The assessment of impacts, during both construction and operation, against these environmental parameters at the site specific level can then be included within the environmental statement and, where required, the Shadow HRA. My advice is that this would allow a more robust assessment of impacts based on the site specific circumstances.

Section 5.23 of the Shadow HRA details habitat loss, however as mentioned above in the absence of the detailed survey information and clarity on the area of the site that is considered to be functionally linked to the SPAs and Ramsar Sites, I am not able to advise on the extent of impacts.

The Shadow HRA details that recreational disturbance to the habitat on the Swanscombe Peninsula is unlikely to result from the London Resort (Section 5.24). I understand that as part of the landscape strategy for the Resort, a series of recreational routes are proposed which would suggest that opportunities for people to engage with the rich environment surrounding the Resort will be promoted which is welcomed as part of a wider green infrastructure strategy. Given this, an assessment of the potential impacts from recreational disturbance to the remaining areas of functionally linked land would appear appropriate. In addition, given the residential elements of the scheme in Kent, there is the potential for impacts to result from recreational disturbance to the Thames Estuary and Marshes, the Medway Estuary and Marshes and The Swale SPAs and Ramsar Sites. This should be reflected within the environmental statement and the Shadow HRA.

Details of the impacts and mitigation measures are available on the Birdwise North Kent website at [REDACTED]

Sections 5.25 and 5.26 of the Shadow HRA detail the 'Summary of Potential Impacts Including Maximum Extents'. In the absence of the information mentioned previously (including the baseline and predicted environmental parameters and the relevant chapters of the environmental statement which detail the embedded and specific mitigation measures), it is not possible at present for me to provide comments on this section at present.

Similarly, I am not able to provide detailed advice in relation to Tables A5.1-5.5 (the Screening Matrices for the Thames Estuary and Marshes and the Medway Estuary and Marshes SPAs and Ramsar Sites) and Tables A6.1-6.5 (the integrity matrices). Reference is made within the footnotes to the matrices regarding mitigation measures detailed within the environmental statement. As mentioned previously, Natural England requested further detail in their response to the statutory Preliminary Environmental Information Report, once this is available I will of course be pleased to provide further advice.

On a general note, it would be helpful if clarity were provided on the significance criteria that have been used for screening the species which were considered further within the matrices. Not all species associated with the designated sites where noteworthy numbers of birds were recorded were recorded during either of the survey periods appear to have been considered within the Shadow HRA matrices. It would therefore be helpful if clarity were provided on how the decisions within Sections 8.3 and 8.4 of the Shadow HRA were reached.

On a formatting point, it is difficult to cross reference the information within the Shadow HRA and the survey results contained in the Winter Bird Baseline Report. It appears that there may be differences in the figures quoted within the Shadow HRA and the Winter Bird Baseline Report in relation to some of the individual species peak counts when considered as a percentage of the SPA/Ramsar Site listed populations. For example, some of the figures in relation to species using the intertidal area detailed within footnotes 'c' and 'd' to Tables EDP A5.2-A5.5 of the Shadow HRA appear to differ from the peak count percentages quoted within Table EDP 4.1 (Comparison of Winter Intertidal Survey Results Between 2012/13 and 2019/20) or Table EDP 4.3 (Comparison of Winter High Tide Survey Results Between 2012/13 and 2019/20) of the Winter Bird Survey Report. It would be helpful if further clarity could be provided on the counts that have been used within the Shadow HRA.

Once the information in relation to the environmental parameters, more detailed information in relation to likely environmental impacts from the Resort and greater clarity on the avoidance and mitigation measures can be shared, then I will of course be pleased to provide more detailed advice on the Shadow HRA.

The advice provided in this letter has been through Natural England's Quality Assurance process.

The advice provided within the Discretionary Advice Service is the professional advice of the Natural England adviser named below. It is the best advice that can be given based on the information provided so far. Its quality and detail is dependent upon the quality and depth of the information which has been provided. It does not constitute a statutory response or decision, which will be made by Natural England acting corporately in its role as statutory consultee to the competent authority after an application has been submitted. The advice given is therefore not binding in any way and is provided without prejudice to the consideration of any statutory consultation response or decision which may be made by Natural England in due course. The final judgement on any proposals by Natural England is reserved until an application is made and will be made on the information then available, including any modifications to the proposal made after receipt of discretionary advice. All pre-application advice is subject to review and revision in the light of changes in relevant considerations, including changes in relation to the facts, scientific knowledge/evidence, policy, guidance or law. Natural England will not accept any liability for the accuracy, adequacy or

Annex 2.0 STAGE 1 SCREENING MATRICES

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Table A2.1: Definitions of Potential Effects Considered in the Habitat Regulations Assessment

Designation	Presented in Matrices as:	Effects Described
Thames Estuary and Marshes Ramsar	Disturbance (within Ramsar site)	Disturbance (noise and lighting) associated with increased shipping traffic, giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 2 or 6 and within designated area
		Disturbance (from shipping/ferry movements) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 and within designated area
	Disturbance (outside of Ramsar site)	Disturbance (noise and lighting) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat
		Disturbance (from shipping/ferry movements) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat
		Disturbance (human movement or activity) giving rise to displacement, behavioural changes or physiological stress to species

Designation	Presented in Matrices as:	Effects Described
		cited under Ramsar Criterion 6 using functionally linked habitat
	Damage to habitats (within Ramsar site)	Damage to habitats within designated area used by species cited under Ramsar Criterion 2 or 6 from changes to water and/or sediment quality (either from surface or groundwater discharges from Project Site including construction / operational waste and pollutants ; or from disruption of contaminated Thames sediments), with potential associated knock-on risk of bioaccumulation.
		Damage to habitats used by species cited under Ramsar Criterion 6 within designated area from changes in air quality including from dust, construction waste and pollutants, and exhaust emissions .
		Damage to habitats used by species cited under Ramsar Criterion 6 within designated area from introduction or proliferation of invasive non-native species (INNS)

Designation	Presented in Matrices as:	Effects Described
	Disturbance (outside of Ramsar site)	<p>Disturbance (noise and lighting) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat.</p>
		<p>Disturbance (from shipping/ferry movements) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat.</p>
		<p>Disturbance (human movement or activity) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat.</p>
		<p>Disturbance (noise and lighting) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat.</p>
		<p>Disturbance (from shipping/ferry movements) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat.</p>

Designation	Presented in Matrices as:	Effects Described
Thames Estuary and Marshes SPA	Disturbance (within SPA)	<p>Disturbance (noise and lighting) associated with increased shipping traffic, giving rise to displacement, behavioural changes or physiological stress to cited species within designated area.</p>
		<p>Disturbance (from shipping/ferry movements) giving rise to displacement, behavioural changes or physiological stress to cited species within designated area.</p>
	Disturbance (outside of SPA)	<p>Disturbance (noise and lighting) giving rise to displacement, behavioural changes or physiological stress to cited species using functionally linked habitat.</p>
		<p>Disturbance (from shipping/ferry movements) giving rise to displacement, behavioural changes or physiological stress to cited species using functionally linked habitat.</p>
		<p>Disturbance (human movement or activity) giving rise to displacement, behavioural changes or physiological stress to cited species using functionally linked habitat.</p>
	Damage to habitats (within SPA)	<p>Damage to habitats within designated area used by cited species from changes to water and / or sediment quality (either from</p>

Designation	Presented in Matrices as:	Effects Described
		<p>surface or groundwater discharges from Project Site including construction / operational waste and pollutants; or from disruption of contaminated Thames sediments), with potential associated knock-on risk of bioaccumulation.</p>
		<p>Damage to habitats used by cited species within designated area from changes in air quality including from dust, construction waste and pollutants, and exhaust emissions.</p>
		<p>Damage to habitats used by cited species within designated area from introduction or proliferation of invasive non-native species (INNS).</p>
	Damage to habitats (outside of SPA)	<p>Direct loss of/damage to functionally linked habitats, i.e. those used outside of designated site which are used by cited species.</p>
		<p>Damage to habitats used by cited species caused by changes to sediment circulation or deposition within functionally linked habitat.</p>
		<p>Damage to functionally linked habitats used by cited species from changes to water</p>

Designation	Presented in Matrices as:	Effects Described
		<p>and/or sediment quality (either from surface or groundwater discharges from Project Site including construction/operational waste and pollutants; or from disruption of contaminated Thames sediments), with potential associated knock-on risk of bioaccumulation.</p> <p>Damage to functionally linked habitats used by cited species from changes in air quality including from dust, construction waste and pollutants, and exhaust emissions</p> <p>Damage to functionally linked habitats used by cited species from introduction or proliferation of invasive non-native species (INNS).</p>
Medway Estuary and Marshes Ramsar	Disturbance (outside of Ramsar site)	<p>Disturbance (noise and lighting) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat.</p> <p>Disturbance (from shipping/ferry movements) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat</p>

Designation	Presented in Matrices as:	Effects Described
		<p>Disturbance (human movement or activity) giving rise to displacement, behavioural changes or physiological stress to species cited under Ramsar Criterion 6 using functionally linked habitat.</p>
	<p>Damage to habitats (outside of Ramsar)</p>	<p>Direct loss of/damage to functionally linked habitats, i.e. those used outside of designated site which are used by cited species.</p>
		<p>Damage to habitats used by cited species caused by changes to sediment circulation or deposition within functionally linked habitat.</p>
		<p>Damage to functionally linked habitats used by cited species from changes to water and / or sediment quality (either from surface or groundwater discharges from Project Site including construction / operational waste and pollutants; or from disruption of contaminated Thames sediments), with potential associated knock-on risk of bioaccumulation.</p>

Designation	Presented in Matrices as:	Effects Described
Medway Estuary and Marshes SPA	Disturbance (outside of SPA)	<p>Disturbance (noise and lighting) giving rise to displacement, behavioural changes or physiological stress to cited species using functionally linked habitat.</p>
		<p>Disturbance (from shipping/ferry movements) giving rise to displacement, behavioural changes or physiological stress to cited species using functionally linked habitat.</p>
		<p>Disturbance (human movement or activity) giving rise to displacement, behavioural changes or physiological stress to cited species using functionally linked habitat.</p>
	Damage to habitats (outside of SPA)	<p>Direct loss of/damage to functionally linked habitats, i.e. those used outside of designated site which are used by cited species.</p>
		<p>Damage to habitats used by cited species caused by changes to sediment circulation or deposition within functionally linked habitat.</p>
		<p>Damage to functionally linked habitats used by cited species from changes to water and/or sediment quality (either from surface or groundwater discharges from Project Site</p>

Designation	Presented in Matrices as:	Effects Described
		including construction/operational waste and pollutants ; or from disruption of contaminated Thames sediments), with potential associated knock-on risk of bioaccumulation.
		Damage to functionally linked habitats used by cited species from changes in air quality including from dust, construction waste and pollutants, and exhaust emissions .
		Damage to functionally linked habitats used by cited species from introduction or proliferation of invasive non-native species (INNS) .

Designation	Presented in Matrices as:	Effects Described
Peter's Pit SAC	Habitat damage (within SAC)	Damage to habitats within designated area used by Annex II species from changes to water quality (either from surface or groundwater discharges from Project Site including construction / operational waste and pollutants)
		Damage to habitats used by Annex II species within designated area from changes in air quality including from dust, construction waste and pollutants, and exhaust emissions.
		Damage to habitats used by Annex II species within designated area from recreational disturbance
North Downs Woodland SAC	Habitat damage (within SAC)	Damage to habitats within designated area used by Annex II species from changes to water quality (either from surface or groundwater discharges from Project Site including construction / operational waste and pollutants) Damage to habitats used by Annex II species within designated area from changes in air quality including from dust, construction waste and pollutants, and exhaust emissions.

Designation	Presented in Matrices as:	Effects Described
		Damage to habitats used by Annex II species within designated area from recreational disturbance

Table A2.2: Screening Matrix 1 – Thames Estuary and Marshes SPA. Evidence for, or against, likely significant effects (LSE) on European site(s) or their feature(s) is detailed within footnotes (a, b, c, etc.). Where LSE cannot be excluded, that potential impact source is carried forward to Stage 2 assessment. ✓ = LSE cannot be excluded, X = LSE can be excluded, C = construction, O = operation, D = decommissioning

Name of European Site and Designation: Thames Estuary and Marshes SPA															
Site Code: UK9012021															
Distance to DCO Order Limits: 3.3KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.1 feature: avocet (winter)	X _a	X _b		X _d	X _e		✓ _f	X _f		✓ _g	X _d		✓ _l	✓ _l	
Article 4.1 feature: hen harrier (winter)	X _a	X _b		X _d	X _e		✓ _f	X _f		X _d	X _d		✓ _l	✓ _l	
Article 4.2 feature:	X _a	X _b		X _d	X _e		✓ _f	X _f		X _d	X _d		✓ _l	✓ _l	

Name of European Site and Designation: Thames Estuary and Marshes SPA															
Site Code: UK9012021															
Distance to DCO Order Limits: 3.3KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
ringed plover (passage)															
Article 4.2 feature: knot (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Article 4.2 feature: grey plover (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Article 4.2 feature: dunlin (winter)	Xa	Xb		Xd	Xe		√f	Xf		√g	Xd		√l	√l	

Name of European Site and Designation: Thames Estuary and Marshes SPA															
Site Code: UK9012021															
Distance to DCO Order Limits: 3.3KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: black-tailed godwit (winter)	Xa	Xb		√c	√e		√f	Xf		√g	Xd		√l	√l	
Article 4.2 feature: redshank (winter)	Xa	Xb		√c	√e		√f	Xf		√g	Xd		√l	√l	
Article 4.2 feature: waterfowl assemblage (winter)	Xa	Xb		√c	√e		√f	Xf		√g	Xd		√l	√l	

Table A2.3: Screening Matrix 2 – Thames Estuary and Marshes Ramsar. Evidence for, or against, likely significant effects (LSE) on European site(s) or their feature(s) is detailed within footnotes (a, b, c, etc.). Where LSE cannot be excluded, that potential impact source is carried forward to Stage 2 assessment. ✓ = LSE cannot be excluded, ✗ = LSE can be excluded, C = construction, O = operation, D = decommissioning

Name of European Site and Designation: Thames Estuary and Marshes Ramsar															
Site Code: 7UK141															
Distance to DCO Order Limits: 2.8KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 2 qualifying feature (nationally rare and scarce plant/invertebrate species)	✗h	✗h		✗h	✗h		✗i	✗i		✓i	✓i		✓l	✓l	
Criterion 5 qualifying feature: Total waterfowl (winter)	✗a	✗b		✓c	✓e		✓f	✗f		✓g	✗d		✓l	✓l	

Name of European Site and Designation: Thames Estuary and Marshes Ramsar															
Site Code: 7UK141															
Distance to DCO Order Limits: 2.8KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 6 qualifying feature: ringed plover (passage)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Criterion 6 qualifying feature: black-tailed godwit (winter)	Xa	Xb		√c	√e		√f	Xf		√g	Xd		√l	√l	
Criterion 6 qualifying feature: grey plover (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Criterion 6 qualifying feature: knot (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	

Name of European Site and Designation: Thames Estuary and Marshes Ramsar															
Site Code: 7UK141															
Distance to DCO Order Limits: 2.8KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 6 qualifying feature: dunlin (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Criterion 6 qualifying feature: redshank (winter)	Xa	Xb		√c	√e		√f	Xf		√g	Xd		√l	√l	

Table A2.4: Screening Matrix 3 – Medway Estuary and Marshes SPA. Evidence for, or against, likely significant effects (LSE) on European site(s) or their feature(s) is detailed within footnotes (a, b, c, etc.). Where LSE cannot be excluded, that potential impact source is carried forward to Stage 2 assessment. ✓ = LSE cannot be excluded, X = LSE can be excluded, C = construction, O = operation, D = decommissioning

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.1 feature: avocet (winter)	Xa	Xb		Xd	Xe		✓f	Xf		Xd	Xd		✓l	✓l	
Article 4.1 feature: Bewick's swan (winter)	Xa	Xb		Xd	Xe		✓f	Xf		Xd	Xd		✓l	✓l	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: black-tailed godwit (winter)	Xa	Xb		√c	√e		√f	Xf		√g	Xd		√l	√l	
Article 4.2 feature: redshank (winter)	Xa	Xb		√c	√e		√f	Xf		√g	Xd		√l	√l	
Article 4.2 feature: curlew (winter)	Xa	Xb		Xd	Xe		√f	Xf		√g	Xd		√l	√l	
Article 4.2 feature: dark-bellied brent goose (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: dunlin (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Article 4.2 feature: greenshank (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Article 4.2 feature: grey plover (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Article 4.2 feature: knot (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Article 4.2 feature:	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
oystercatcher (winter)															
Article 4.2 feature: pintail (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Article 4.2 feature: ringed plover (winter)	Xa	Xb		Xd	Xe		√f	Xf		√g	Xd		√l	√l	
Article 4.2 feature: shelduck (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xk	Xd		√l	√l	
Article 4.2 feature: shoveler (winter)	Xa	Xb		√j	√e		√f	Xf		Xk	Xd		√l	√l	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: teal (winter)	Xa	Xb		√j	√e		√f	Xf		Xk	Xd		√l	√l	
Article 4.2 feature: turnstone (winter)	Xa	Xb		√c	√e		√f	Xf		Xd	Xd		√l	√l	
Article 4.2 feature: wigeon (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Article 4.2 feature: waterfowl assemblage (winter)	Xa	Xb		√cj	√e		√f	Xf		√g	Xd		√l	√l	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.1 feature: avocet (breeding)	Xa	Xb		Xm	Xm		√f	Xf		Xm	Xm		√l	√l	
Article 4.1 feature: little tern (breeding)	Xa	Xb		Xm	Xm		√f	Xf		Xm	Xm		√l	√l	
Article 4.2 feature: Breeding assemblage	Xa	Xb		Xn	Xo		√f	Xf		√p	Xm		√l	√l	

Table A2.5: Screening Matrix 4 – Medway Estuary and Marshes Ramsar. Evidence for, or against, likely significant effects (LSE) on European site(s) or their feature(s) is detailed within footnotes (a, b, c, etc.). Where LSE cannot be excluded, that potential impact source is carried forward to Stage 2 assessment. ✓ = LSE cannot be excluded, X = LSE can be excluded, C = construction, O = operation, D = decommissioning

Name of European Site and Designation: Medway Estuary and Marshes Ramsar															
Site Code: 7UK068															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 2 qualifying feature (nationally rare and scarce plant/invertebrate species)	Xh	Xh		Xh	Xh		Xi	Xi		Xi	Xi		✓l	✓l	
Criterion 5 qualifying feature: Total waterfowl (winter)	Xa	Xb		✓c, j	✓e		✓f	Xf		✓g	Xd		✓l	✓l	

Name of European Site and Designation: Medway Estuary and Marshes Ramsar															
Site Code: 7UK068															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 6 qualifying feature: dark-bellied brent goose (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√I	√I	
Criterion 6 qualifying feature: dunlin (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√I	√I	
Criterion 6 qualifying feature: grey plover (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√I	√I	
Criterion 6 qualifying feature: knot (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√I	√I	

Name of European Site and Designation: Medway Estuary and Marshes Ramsar															
Site Code: 7UK068															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 6 qualifying feature: pintail (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Criterion 6 qualifying feature: redshank (winter)	Xa	Xb		√c	√e		√f	Xf		√g	Xd		√l	√l	
Criterion 6 qualifying feature: ringed plover (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xd	Xd		√l	√l	
Criterion 6 qualifying feature: shelduck (winter)	Xa	Xb		Xd	Xe		√f	Xf		Xk	Xd		√l	√l	

Name of European Site and Designation: Medway Estuary and Marshes Ramsar															
Site Code: 7UK068															
Distance to DCO Order Limits: 13.1KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 6 qualifying feature: black-tailed godwit (winter)	Xa	Xb		√c	√e		√f	Xf		√g	Xd		√l	√l	

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

Disturbance Impacts upon SPA/Ramsar Sites during Construction

a The distance between the Project Site and the nearest part of the Thames Estuary and Marshes (TE and M) SPA (foreshore adjoining Eastcourt/Shorne Marshes) is approximately 3.3km and the nearest part of the Ramsar approximately 2.8km. These areas are, furthermore, the westernmost extremity of both the SPA and Ramsar Site, which cover 4,838.94 and 5,588.59 ha respectively, extending eastward from the Project Site up to 25.8km from the DCO Order Limits at their eastern extent. The entirety of the SPA and the vast majority of the Ramsar Site is therefore >3km removed from the Project Site. The distance from the nearest point of the Medway Estuary and Marshes (ME and M) SPA/Ramsar is even more distant. Such distances alone mitigate against any LSE on qualifying bird species using the SPA/Ramsar Site from visual and aural disturbance as a result of construction, and lighting.

The potential magnitude of change in noise generation as compared to the baseline position has been assessed in the Noise and vibration ES chapter (Document Reference Part 6.1, Chapter 15) and the outputs of that assessment are considered in terms of implications for ecological receptors in the terrestrial and freshwater ecology chapter (Document Reference Part 6.1, Chapter 12). It is worth noting that baseline noise levels at sampling locations around the Project Site were 41db-69db LA90 (i.e. constant background noise) and 50-73db LA10 (i.e. noise events experience for 10% of the sampling time), and long term monitoring at location 22 (Swanscombe Marshes) recorded a noise level of between 35 and 40 LA90, with maximum noise levels of between 65db and 88db, including at night and an average noise level (LAeq) of between 44db and 48db. Therefore, it can be said that the Project Site pre-development experiences significant noise pollution, particularly at its peripheries, with regular disturbance events peaking well above significant levels for most species right into the centre of the Kent Project Site.

Peak or mean (i.e. 24hr) noise in excess of 55dB is not predicted to be experienced outside of the DCO Order Limits for most construction or operational activities, with the exception of construction-phase jetty piling and dredging and pavement construction, for which values are not yet known. However, based on the information provided for more extensive works in

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

association with Tilbury2, the foremost of these could see noise levels of 63dB at 300m from source with the latter having the potential to slightly exceed the 55dB level at 300m (Tilbury2 ES Chapter 17 Table 17.30 [APP-031]). These data indicate that noise levels during construction would not be sufficient to elicit any behavioural responses in birds at over 2.8km (the nearest point of the TE and M SPA/Ramsar Site).

It is anticipated that no additional shipping movements would occur along the Thames past either site during construction or operation. Whilst construction phase movements will include additional barge movements between the Kent and Essex Project Sites, this is not anticipated to increase shipping traffic within or nearby to either the TE and M or ME and M SPA/Ramsar Sites. These additional barge movements will be accommodated within the normal and ongoing delivery pattern and will not represent an uplift on disturbance due to the combined and absolute limitations of berthing capacity and tidal restrictions at that site.

Thus there is assessed to be no likely significant effect on either SPA or Ramsar Site from the limited shipping activity associated with the construction phase. In consequence, there is no likely significant effect on cited SPA or Ramsar bird species using the designated areas and no need to progress this part of the assessment to Stage 2.

Disturbance Impacts upon SPA/Ramsar Sites during Operation

b In the operational phase, the mitigating effect of distance similarly rules out a LSE on qualifying bird species within either SPA/Ramsar Site from visual disturbance emanating from the Project Site and from lighting.

Noise disturbance

Noise levels generated within the site during operation by traffic and visitors/rides are not anticipated to exceed 49dB at any off-shore location. Peaks associated with the resort's operation can therefore be ruled out as having the potential to give rise to a

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

LSE on either SPA/Ramsar Site.

Disturbance by increased shipping traffic

Shipping traffic during the operational phase will be limited to waste removal and ferry/Thames clipper services between Tilbury, the Kent Project Site and Westminster Pier in central London, i.e. away from both European Sites. No increase in potential for LSE from disturbance during operation is therefore associated with the predicted uplift in shipping traffic as the shipping lanes utilised lie over 2.8km from the closest Ramsar boundary. In the unlikely and unpredicted event of increased shipping traffic from the lower Thames, the navigable channel is typically >200m from the TE and M SPA/Ramsar Site boundary and from the mouth of the ME and M SPA/Ramsar, and shipping will be experienced by avian receptors against a backdrop of existing regular traffic of large, distant vessels. The additional shipping movements from the Proposed Development are therefore assessed to represent a negligible increase in disturbance in the context of existing levels of habituation, if any.

Recreational disturbance

The North Kent visitor survey¹ results suggest that, on average, visitors travel from around 6.5km from visited sites in North Kent. Although the TE&M Ramsar is situated 4.8km from the Kent Project Site, by road the distance is c.9km or c.5km by foot. Furthermore, no public parking is available at this location. It is highly unlikely that new residents will regularly walk 5km through Gravesend to get to the edge of the Ramsar. The results of the visitor survey showed that 90% of visitors by foot live within 2.7km of the site to which they are visiting. The nearest public parking to the Kent Project Site is at Cliffe, which is

¹ Fearnley, H. & Liley, D. (2011). North Kent Visitor Survey Results. Footprint Ecology.

Footnotes relating to above Screening Matrices	
General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.	
	<p>situated around 22km from the Kent Project Site by road. It is possible that a small number of residents will occasionally make this journey, but the predicted increase in visitors at this distance is not considered to be significant.</p> <p>In consequence, there is assessed to be no likely significant effect on cited SPA or Ramsar bird species using the designated areas and no need to progress to Stage 2 appropriate assessment in respect of this potential impact source. In-combination effects are considered under 'l' below.</p>
Disturbance Impacts upon Functionally Linked Land during Construction	
c	<p>Avocet, ringed plover, curlew, shelduck, teal, turnstone, wigeon, shoveler, knot, black-tailed godwit, oystercatcher and redshank (Birds Directive Article 4.1 and 4.2 qualifying species; and Ramsar Criteria 5 and 6 species) have all been recorded making use of intertidal habitats around the peninsula in either 2012/13 or 2019/20. The individual birds involved will in most cases be part of the local wintering or passage population that forms the qualifying feature of either the TE and M (avocet, black-tailed godwit, dunlin, knot, redshank and ringed plover) or ME and M SPA/Ramsar (as previous, plus curlew, oystercatcher, shelduck, shoveler, teal, turnstone and wigeon).</p> <p>Quantitative data on the numbers using intertidal habitats within and in proximity to the proposed DCO limits is provided by the baseline information reported on in ES Chapter 12 (Document Reference Part 6.1, Chapter 12) (expanded upon within the breeding and passage bird and wintering bird annexes of the Ecology Baseline (Document Reference Part 6.2, Chapter 12.1), which details breeding, passage and winter bird surveys undertaken at the Project Site, alongside the wider ecological baseline). The data indicate that peak numbers using intertidal habitat within the proposed DCO Order Limits at any one time remains in most cases less than 1% of the SPA/Ramsar Site population as stated within the SPA citation or Ramsar Information Sheet (RIS) (Annex 4 to this report). Effects upon these species are considered under 'd' below. However, peak counts representing 2.00% (TE and M)/3.45% (ME and M), 2.09 (TE and M)/1.84% (ME and M), 8.22%, 6% and 2.85%, for black-tailed godwit, redshank, teal and turnstone respectively, were recorded during surveys of the foreshore.</p>

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

Baseline noise

The potential magnitude of change in noise generation as compared to the baseline position has been assessed in the Noise and vibration ES chapter (Document Reference Part 6.1, Chapter 15) and the outputs of that assessment are considered in terms of implications for ecological receptors in the terrestrial and freshwater ecology chapter (Document Reference Part 6.1, Chapter 12). It is worth noting that baseline noise levels at sampling locations around the Project Site were 50db-71db LAeq (average ambient noise), 50db-71db LAeq (average ambient noise), 41db-69db LA90 (i.e. constant background noise) and 50-73db LA10 (i.e. noise events experience for 10% of the sampling time), and long term monitoring at location 22 (Swanscombe Marshes) recorded a noise level of between 35 and 40 LA90, with maximum noise levels of between 65db and 88db, including at night and an average noise level (LAeq) of between 44db and 48db. Noise levels at Stonely Crescent (at the south-western extremity of Black Duck Marsh), the closest sampling location to both the estuary frontage and the large, open waterbody within the marsh, were measured at 53db LAeq, 48db LA90 and 55db LA10, and sampling at Manor Way, closest to the south-eastern corner of Black Duck Marsh, were measured at 69db LAeq, 51db LA90 and 72db LA10. Therefore, it can be said that the Project Site, pre-development and in close proximity to Functionally Linked habitat, experiences significant noise pollution, with regular disturbance events peaking well above significant levels for most species right into the centre of the Kent Project Site.

Noise disturbance at Black Duck Marsh

Data on predicted noise levels during construction were taken from Chapter 15 of the ES (Document Reference Part 6.1, Chapter 15) and the Construction Noise and Vibration Assessment (Document Reference Part 6.2, Chapter 15.3). At the locations referenced above (Stonely Crescent and Manor Way), during construction of Gate 1 and hotels, ambient noise level increases are expected to be of negligible significance (61db, 0-1db increase). However, ambient noise increases at the manor way

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

sampling point are expected to increase by 8db to 69db due to the proximity of construction works. Ambient daytime noise levels in the very north-east of Black Duck Marsh are expected to increase to around 60-64db. Although this isn't an increase in the baseline noise levels experience at the closest sampling location (22), baseline noise events at this level were sporadic (10% of the sampling time). These levels represent a change in ambient noise levels of up to 16-20db during the daytime. Because the main area of use by qualifying species is the open water in the south-west of the marsh, where expected noise levels are expected to be between 50db and 54db, and the main period of use by qualifying species was between dusk and dawn, construction noise disturbance effects on qualifying species are considered to be unlikely to cause a LSE during Gate 1 and hotel construction. However, the proximity of Gate 2 and an 8db increase in ambient noise levels in proximity to this waterbody mean that a LSE due to disturbance cannot be ruled out during construction.

Noise Disturbance within the Wider Estuary

Gate 1 construction is considered most likely to cause disturbance effects on other functionally linked land, namely that along the estuary front, due to its position within the centre and north-west of the peninsula. Diagram 15.3.2 within the Construction Noise and Vibration Assessment, reproduced below shows that expected noise levels will rise to between 69db and 80db adjacent to the existing jetty, which has been identified as an important high tide roost for ducks. The proximity of this noise source is considered to be likely to result in significant disturbance effects upon that resource. Other important roost areas include the mouth of the creek and around the Broadness weather recording jetty. Noise levels in this area are expected to reach between 50db and 54db, which is just below the level advised for caution for the most sensitive species present, redshank, according to the TIDE toolkit². Noise levels further from the source into the Thames Estuary and across to Thurrock

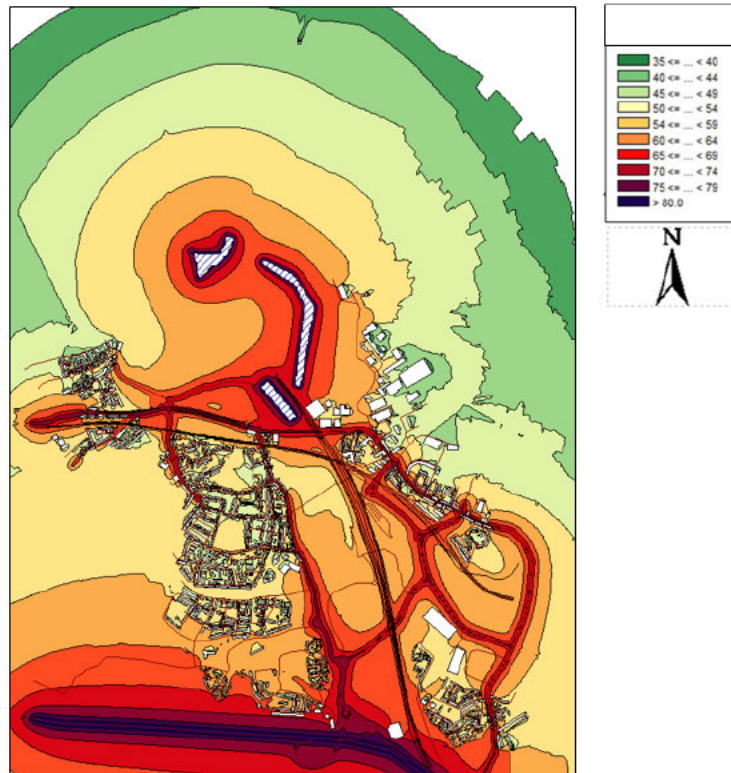
² Cutts, N., Hemingway, K. and Spencer, J. (2013) *Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects*. Institute of Estuarine and Coastal Studies (IECS)

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

Lagoon and Marshes SSSI will attenuate further and are expected to be as low as 35-40db on the north bank of the Thames, or 45db worst case.

Diagram 15.3.2: L_{eq,t} noise map showing Gate 1 General Construction



Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

Disturbance by Construction Shipping

Furthermore, a worst-case increase of shipping movements by 26/day between the Essex and Kent Project Sites, or 2000 a year, is anticipated during construction, an increase of approximately 10% over existing levels according to the Navigation Risk Assessment (Document Reference Part 6.2, Chapter 10.1). These extra disturbance events, although minor and relatively acute, have the potential to significantly reduce the suitability of functionally linked habitat around the Swanscombe Peninsula and Tilbury for cited species through their frequency.

Construction traffic passing between the Kent and Essex Project Sites will necessarily pass within 600m of both shores, with the Thames reaching 1.2km width at its widest between Bell's Wharf and Tilbury. The "Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance" report³ states that the distance at which visual disturbance from boats has been shown to be reduced to below 10% is 600m. However, these figures apply to all birds, including seabirds far out to sea. In reality, the daily presence of ships through the Thames Gateway will have to some extent habituated the local bird assemblage to visual and noise disturbance. A study in the Lagoon of Venice⁴ found that the response distance to boats was significantly lower, at between 55 and 102m for redshank and avocet. It can be reasonably assumed that habituation will limit bird response at the Project Site, and disturbance impacts will only be significant on departure or arrival from the dock at the Kent Project Site. The floating pontoon at Tilbury is situated approximately 100m from the shore and activity associated with it is considered to be unlikely to cause LSE upon functionally linked habitat directly to the north.

³ Cutts, N., Phelps, A. & Burdon, D. (2009). Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Institute of Estuarine and Coastal Studies, University of Hull

⁴ Scarton, F. (2018) Flight initiation distances in relation to pedestrian and boat disturbance in five species of waders breeding in a Mediterranean lagoon. *Revue d'Ecologie* 73(3)

Footnotes relating to above Screening Matrices	
General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.	
	<p><u>Visual Human Disturbance</u></p> <p>Although work alongside the estuary is predicted to be limited to Bell's Wharf, there is some risk of visual disturbance by construction staff passing within view of roost sites.</p> <p>Therefore, LSE upon these cited species cannot be ruled out at this stage, and disturbance to black-tailed godwit, redshank, teal, turnstone and to the overall assemblage of wildfowl using functionally linked habitats is progressed to Stage 2 appropriate assessment.</p>
Disturbance and Damage/Loss Impacts Considered Sub-significant during Construction and Operation	
d	<p>Due to the sub-significant, pre-development levels of use of intertidal habitats within 300m of the development footprint by the remainder of cited species recorded (i.e. avocet, curlew, dunlin, knot, shelduck, oystercatcher and wigeon), even if significant temporary disturbance or degradation effects occur during construction on receptors within habitats that are functionally linked to the SPA/Ramsar Site, the result (up to and including temporary displacement) is assessed as not likely to give rise to a significant effect on the qualifying features. The remainder of cited species have not previously been recorded within the Project Site or functionally linked habitat surrounding it.</p> <p>No LSE are anticipated upon SPA/Ramsar cited species during construction, other than those listed under 'c' above, and therefore LSE are not anticipated upon either the TE and M or ME and M SPA/Ramsar sites as a result of the Proposed Development.</p>
Disturbance Impacts upon Functionally Linked Land during Operation	
e	<p>As discussed above, LSE of any kind are not anticipated upon sub-significant populations of cited birds using functionally linked intertidal and wetland habitat (i.e. avocet, curlew, dunlin, knot, shelduck, oystercatcher and wigeon), even when significant disturbance events occur by virtue of representing <1% of the cited population. However, the scope for significant disturbance effects on populations of SPA and Ramsar Site qualifying bird species representing >1% of the cited population totals (black-tailed</p>

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

godwit, redshank, shoveler, teal and turnstone) using areas outside the respective designation boundaries is greater during the operational phase by virtue of the predicted increase in recreational pressure as a result of ancillary housing.

Recreational disturbance

As stated in the project description (Document Reference Part 6.1, Chapter 3), up to 500 dwellings of 4-6 bedrooms will be provided for staff of the resort. Therefore, in a scenario based on 1 occupant per bedroom, the local population will increase by 3000. Although this would not, in reality, translate to an increase of 3000 daily visitors along the estuary frontage, in the absence of reliable data to form an estimate of the actual increase in recreational use, there is potential for significant recreational effects as a result of additional visitors and LSE cannot be ruled out at this point. This is particularly true when the sensitivity of each bird species to disturbance by reference to the TIDE toolkit (for which, refer to Table 5-1 of this HRA report) is considered.

Visual and aural disturbance by shipping (Thames Clipper)

Furthermore, the likelihood of potentially significant disturbance effects during the operational phase by river transport is likely greater than in the construction phase due to their regularity and frequency. The additional movements anticipated as part of the Thames Clipper service between the Essex Project Site, Kent Project Site and Westminster Pier, alongside the additional movements of service vessels, will result in an increase of up to 53,000 movements, or almost 140% over the baseline. This, in effect, will introduce an additional disturbance event along the foreshore of the Swanscombe Peninsula every c.7.5 minutes for 18 hours a day, plus once every 12 minutes at Tilbury and once every 20 minutes along the Thames towards London. The “Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance” report⁵ states that the distance at which visual disturbance from boats has been shown to be reduced to below 10% is 600m. This 600m buffer takes in all intertidal habitat between the Kent and

⁵ Cutts, N., Phelps, A. & Burdon, D. (2009). Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Institute of Estuarine and Coastal Studies, University of Hull

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

Essex Project Sites and the West Thurrock Lagoon and Marshes SSSI, even if the Clipper service travels down the central channel of the Thames.

The Thames Clipper service, as noted above, will result in a significant number of movements across the Thames. However, the noise modelling in Appendix 1 of Chapter 15 (Document Reference Part 6.2, Chapter 15.1) of the ES demonstrate that there should be no change in noise level at the Kent and Essex Project Sites or existing noise sensitive receptors. This is due to distance attenuation and other, higher, level noise sources at the Kent and Essex Project Sites effectively “masking” the noise from the boats at the pier. Overall, the noise climate is primarily associated with industrial noise and road traffic e.g. on Dartford Crossing.

As noted under ‘c’ above birds are expected to present a degree of habituation due to the presence of existing industrial and shipping activity, particularly at the outer limits of this range, and effects are only considered to be significant at under 100m from noise source. This excludes all but the area directly around the new jetty, which will inevitably be regularly disturbed on arrival and departure of the Clipper service.

Other aural disturbance

Operational noise is not anticipated to increase significantly due to traffic. The noise assessment in Chapter 15 of the ES (Document Reference Part 6.1, Chapter 15) predicts a rise of up to 1db across the Swanscombe Peninsula and between 1 and 3db at Tilbury. This level of increase is not considered to be significant, and noise due to road traffic is therefore not considered to be capable of causing LSE.

The operational noise created by the attractions within the Resort are predicted to result in noise levels of around 40 and 49db across most of Black Duck Marsh, which is roughly equivalent to the baseline in the surrounding area, as described in the baseline

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

appendix to Chapter 15 of the ES (Document Reference Part 6.2, Chapter 15.1). Noise levels across the Thames, i.e. at Thurrock Lagoon and Marshes SSSI, are expected to have dropped to around 35db or lower. Figure 15.20 (Document Reference Part 6.3, Figure 15.20) demonstrates that noise levels from attractions will have dropped below significance levels well before reaching the borders of any designated site, including those considered to be functionally linked to either SPA/Ramsar site.

The most significant noise source during operation will be loudspeaker announcements, which are expected to produce up to 80db at the estuary front, dropping to c.55-59db around the existing jetty, which is considered an important roost area.

Therefore, at this point LSE cannot be ruled out as a result of disturbance effects caused by increased river transport, recreational disturbance and noise from loudspeaker announcements. Potential effects arising from these sources will therefore be progressed to Stage 2 appropriate assessment.

Damage/Loss Impacts upon SPA/Ramsar/SAC Sites during Construction and Operation

f Direct Damage and Water Quality Impacts [SPA/Ramsar sites](#)

By virtue of the distance between the Project Site and either SPA/Ramsar site, no LSE are anticipated to the SPA/Ramsar sites themselves as a result of the Proposed Development. Given that distance, no direct damage will occur during either construction or operation and changes to sediment circulation patterns are likely to be minor given the open structure of the proposed new jetty at the Kent Project Site and of the extension of facilities in Tilbury. At this point no dredging is anticipated. Standard avoidance and management measures will reduce the likelihood of pollution events, and it is considered that any minor incidents that occur will be sufficiently dilute by the time they reach the TE and M SPA/Ramsar 2.8km downstream that they will not have the potential to cause LSE on the SPA/Ramsar.

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

Although no data is currently available in respect of water quality, localised elevated concentrations of PAHs including perylene, pyrene and fluoranthene and of metals including Arsenic, Chromium and Nickel were found in samples of sediment around the Tilbury2, which is not unusual for the Thames. There is potential for these contaminants to be mobilised by the sub-marine construction works. The contaminants of concern in this case generally have low solubility and where mobilised will mostly remain adsorbed onto sediment particles. This reduces the potential for contamination of the water column but could pose a risk to sediment dwelling organisms were these substances to be re-deposited at high concentrations. The risk to marine and estuarine biota is generally assessed in the Marine ecology and biodiversity ES Chapter (Document Reference Part 6.1, Chapter 13). Risk to higher trophic orders, including SPA and Ramsar Site cited species is mainly possible through these substances becoming directly bio-available in re-distributed sediments and or from biomagnification through the food chain, although the risks from biomagnification in the case of PAHs are ameliorated due to the greater capacity of higher organisms to metabolise PAHs. An assessment of the risks of significantly contaminated sediments around Tilbury2 being redistributed onto intertidal habitats indicated that perylene mobilised during dredging operations has a very low risk of becoming available to SPA/Ramsar cited species, with in particular a very low risk of significant deposition onto functionally linked intertidal areas and within the SPA/Ramsar Site further afield. Other contaminants adsorbed to sediments will follow a similar dispersion pathway and therefore the risk of significant effects from mobilisation of other PAHs and metals observed at elevated levels in the samples is assumed to be equivalent or less than for perylene. Given the distance between the Project Site and the mouth of the Medway estuary (c.30km from DCO Order Limits) (i.e. the receptor pathway for pollutants), LSE are unlikely on the ME and M SPA/Ramsar. However, because LSE cannot be excluded upon the either the TE and M SPA/Ramsar or ME and M SPA/Ramsar this potential impact source will be progressed to Stage 2 appropriate assessment.

Direct Damage and Water Quality Impacts SAC sites

By virtue of the distance between the Project Site and either SAC site, no LSE are anticipated to the SAC sites themselves as a result of the Proposed Development. Given that distance, no direct habitat damage will occur during either construction or operation. In regard to the potential for increased recreational pressure to damage habitats used by qualifying species of Peter's Pit SAC, namely the Annex II species great crested newt (*Triturus cristatus*), due to the distance between the Project Site and the SAC likely significant effects can be ruled out. Furthermore, the qualifying features of the SAC are not considered to be particularly vulnerable to recreational pressure. The North Downs Woodland SAC is located 8km south-east of the Kent Project Site and 9.7km for the Essex Project Site, at these distances it is considered that increases in recreational disturbance from staff using on-site accommodation (in the unlikely event that all residents wished to visit the SAC) will be insignificant.

In relation to the potential for changes in water quality to affect habitats used by the qualifying species of the Peter's Pit SAC, due to the distance between the Project Site and the SAC this potential effect is screened out. Furthermore, the ponds within the SAC are rain fed⁶, and as such there are no impact pathways that could link the Proposed Development to this SAC. In regards to potential water quality effects to North Downs Woodland SAC, the SAC is located 8km south-east of the Kent Project Site and 9.7km for the Essex Project Site, at these distances, and in the absence of any effect-receptor pathways likely significant effects arising from water quality changes can be screened out. Furthermore, the majority of the SAC comprises free-draining chalk escarpments which are not particularly sensitive to hydrological changes.

Air Quality

Effects upon air quality have been assessed within the Air quality ES chapter (Document 6.1, Chapter 16). Adverse air quality impact during construction have been screened due to being situated >500m from the DCO Order Limits. Adverse air quality impacts due to operational traffic on habitats within the SPA/Ramsar/SAC Site boundary have been screened out due to the distance (>200m) from a road with anticipated 1000AADT increase. Adverse impacts linked to the energy centre have been screened out due to a predicted increase of <1% of critical load for all features within 10km.

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

The Port of London Authority Air Quality Strategy[1] includes details of a dispersion modelling study quantifying the impact of emissions from Tier II engine vessels at sensitive receptor locations adjacent to the River Thames. This study makes the assumption that receptors are located 90m from the vessel, due to the width of the river along a typical vessel journey. The modelling study predicted an annual mean NO_x contribution at the point of exposure of 0.08µg/m³. Assuming a 100% conversion to NO₂, this represents approximately 0.2% of the Air quality objective for NO₂.

In line with the NRA, there is predicted to be an increase in vessel movements of up to 10% resulting from the Proposed Development during construction. It is therefore anticipated that the increase in vessel emissions resulting from the proposed development would lead to an increase in concentrations of approximately 0.008µg/m³, which represents a negligible impact. It should be noted that this is on the basis of receptors being located 90m from the emission source, however owing to the width of the river in the vicinity of the proposed development, this is likely to be a worst-case assumption. On this basis, it is therefore concluded that emissions from vessel movements generated by the proposed development will not be significant.

INNS

In respect of invasive non-native species (INNS), the main risk is generally due to an increase in shipping traffic being likely to elevate the risk of introducing foreign marine or estuarine organisms. However, construction and operational river traffic will be limited to that coming from Tilbury and from central London, and therefore the risk of INNS introductions in ballast water discharged by vessels is unlikely. There is also a potential risk through the introduction of invasive plants through the deposition of contaminated soil into the river. However, the risk of this is extremely low given the relative scarcity of INNS within the Project Site, the limited groundworks adjacent to the Thames and the extremely small chance that seeds are deposited within

⁶ See Peter's Pit SAC designation Citation (2005), enclosed within Annex 5.0 of Appendix 12.4: Shadow Habitats Regulations Assessment

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

European Sites. Furthermore, the distance form regular shipping lanes to the SPA/Ramsar sites is considered a limiting factor in the potential for INNS introductions.

Damage/Loss Impacts of Functionally Linked Land during Construction and Operation

g Direct Damage/Loss

A significant amount of functionally linked land will be lost within the DCO Order Limits to facilitate the construction of the Resort and associated infrastructure. This includes the loss of 14.55ha of Floodplain Wetland Mosaic (mostly Coastal/floodplain Grazing Marsh), a small amount of saltmarsh to facilitate the construction of the new jetty and 0.94ha of reedbed around the peripheries of Black Duck Marsh. This effect is therefore progressed to Stage 2: Appropriate Assessment.

Air Quality

As noted within the main body of this HRA, construction and operational traffic and dust created as a result of construction, increased ferry traffic and emissions associated with energy production have the potential to negatively affect functionally linked habitats within and surrounding the Project Site through deposition.

However, no retained functionally linked habitats lie within 200m of a proposed or existing road and off-road traffic will be well below the 1000 AADT threshold. Effects due to increased construction traffic have therefore been screened out of this assessment. In terms of operation, as the site is >200m from the roadside of roads predicted to experience an increase of >1000 AADT, the impact of increased traffic can be ruled insignificant. With regards to contribution to air quality impacts from the energy centre, following dispersion modelling the predicted impact at both these sites is <1% of minimum critical load and critical level for all retained habitats and can therefore be ruled insignificant.

The Port of London Authority Air Quality Strategy[1] includes details of a dispersion modelling study quantifying the impact of emissions from Tier II engine vessels at sensitive receptor locations adjacent to the River Thames. This study makes the

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

assumption that receptors are located 90m from the vessel, due to the width of the river along a typical vessel journey. The modelling study predicted an annual mean NO_x contribution at the point of exposure of 0.08µg/m³. Assuming a 100% conversion to NO₂, this represents approximately 0.2% of the Air quality objective for NO₂.

In line with the NRA, there is predicted to be an increase in vessel movements of up to 10% resulting from the Proposed Development. It is therefore anticipated that the increase in vessel emissions resulting from the proposed development would lead to an increase in concentrations of approximately 0.008µg/m³, which represents a negligible impact. It should be noted that this is on the basis of receptors being located 90m from the emission source, however owing to the width of the river in the vicinity of the proposed development, this is likely to be a worst-case assumption. On this basis, it is therefore concluded that emissions from vessel movements generated by the proposed development will not be significant.

Therefore, the air quality impacts on functionally linked land are only taken forward for dust created as a result of construction. Given the proximity of construction work to retained functionally linked habitats (<50m in some cases, especially around Black Duck Marsh and along the estuary front), significant dust deposition is anticipated.

Water Quality Impacts

Although no data is currently available in respect of water quality, localised elevated concentrations of PAHs including perylene, pyrene and fluoranthene and of metals including Arsenic, Chromium and Nickel were found in samples of sediment around the Tilbury2, which is not unusual for the Thames. There is potential for these contaminants to be mobilised by the sub-marine construction works. The contaminants of concern in this case generally have low solubility and where mobilised will mostly remain adsorbed onto sediment particles. This reduces the potential for contamination of the water column but could pose a risk to sediment dwelling organisms were these substances to be re-deposited at high concentrations. The risk to marine and

Footnotes relating to above Screening Matrices	
General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.	
	<p>estuarine biota is generally assessed in the Marine ecology and biodiversity ES Chapter (Document Reference Part 6.1, Chapter 13). Risk to higher trophic orders, including SPA and Ramsar Site cited species is mainly possible through these substances becoming directly bio-available in re-distributed sediments and or from biomagnification through the food chain, although the risks from biomagnification in the case of PAHs are ameliorated due to the greater capacity of higher organisms to metabolise PAHs. An assessment of the risks of significantly contaminated sediments around Tilbury2 being redistributed onto intertidal habitats indicated that perylene mobilised during dredging operations has a very low risk of becoming available to SPA/Ramsar cited species, with in particular a very low risk of significant deposition onto functionally linked intertidal areas and within the SPA/Ramsar Site further afield. Other contaminants adsorbed to sediments will follow a similar dispersion pathway and therefore the risk of significant effects from mobilisation of other PAHs and metals observed at elevated levels in the samples is assumed to be equivalent or less than for perylene. The risk of significant effects to habitat functionally linked to TE and M SPA/Ramsar due to damage cannot be excluded and therefore for precautionary reasons this potential impact source is progressed to Stage 2 appropriate assessment.</p>
Impacts upon Non-avian Ramsar Features during Construction and Operation	
h	Not applicable.
i	<p>In both the construction and operational phases, the effect of distance rules out a likely significant effect on Criterion 2 invertebrate and plant species within either Ramsar Site from lighting and from dust deposition impacts. Impacts to such species (within or outside the Ramsar boundary) could however occur in both the construction and operational phases by habitat changes triggered by exceedance of critical loads for atmospheric pollutants or (in respect of cited plant and invertebrate species associated with intertidal habitats) from changes in sediment circulation systems and deposition patterns or from localised or wider water quality or sediment quality changes within the Thames system (see under 'f' above). This effect is considered to be unlikely in consideration of ME and M given the distance of over 33km to the estuary mouth and a direct distance of 13.4km.</p>

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

Of the fifteen nationally rare or scarce plant species cited in the TE and M RIS and 7 cited within the ME and M RIS, only two and x have been recorded respectively within the Project Site – Borrer’s saltmarsh-grass (*Puccinellia fasciculata*) and divided sedge (*Carex divisa*). For these species, direct habitat loss outside the Ramsar Site and within the DCO Order Limits may result in losses of small numbers of individuals. However, these losses will be minor, and opportunities for colonisation will be created through habitat enhancement, particularly through the recreation of saltmarsh around the northern edge of the peninsula, with any potential for effects at the population-level being limited by virtue of the small number of plants involved and the continued presence of these species in other nearby habitat outside of the Ramsar Site. Furthermore, cross pollination or colonisation between the TE and M Ramsar and the Project Site is considered very unlikely given the distance involved between the two.

Of the twenty-seven Ramsar-cited invertebrate species, just one has been recorded within the Project Site so far, *Baryphyma duffeyi*. Given the fact that this species is a saltmarsh specialist, that minimal saltmarsh habitat is anticipated to be lost (1.01ha) and that habitat enhancements within the Project Site will involve the restoration of former saltmarsh across a much larger area (3.03ha), there will be a net positive effect in terms of functionally linked habitat for this species. Within functionally linked intertidal and saltmarsh habitats close to Bell’s Wharf, lighting impacts could affect functionally linked populations of Criterion 2 species, potentially initiating physiological responses that could affect species lifecycles, life strategies and the long-term viability of populations. However only a very small, degraded area of intertidal habitat is potentially at risk of lighting effects.

Ramsar-cited invertebrate species are therefore not assessed to be at risk of significant impacts from lighting, noise, dust and other emissions given their existence within a heavily disturbed site up until now.

Disturbance Impacts upon Medway Estuary and Marshes SPA/Ramsar Qualifying Species using Functionally Linked Habitat

j Shelduck, shoveler, teal and wigeon (Birds Directive Article 4.1 and 4.2 qualifying species; and Ramsar Criteria 5 and 6 species) have all been recorded making use of Black Duck Marsh in 2019/20. The individual birds involved will in most cases be part of the local wintering or passage population that forms the qualifying feature the ME and M SPA/Ramsar. Quantitative data on the numbers

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

using intertidal habitats within and in proximity to the proposed DCO limits is provided by the baseline information reported on in the baseline appendix of the Terrestrial and freshwater ecology and biodiversity ES chapter (Document Reference Part 6.2, Chapter 12.1), which includes details on breeding, winter and passage bird surveys undertaken at the Project Site).

The data indicate that peak numbers using intertidal habitat within the proposed DCO Order Limits at any one time remains in most cases less than 1% of the SPA/Ramsar Site population as stated within the SPA citation or Ramsar Information Sheet (RIS) (**Annex 4** to this report). Effects upon these species are considered under 'd' above. However, peak counts representing 8% and 3.1%, for shoveler and teal respectively, were recorded during surveys of the marsh. Although no data for on response distances for either species was available, from the modelling data presented within the Noise and Vibration chapter of the ES (Document Reference Part 6.1, Chapter 15), it can be shown that noise levels will exceed those deemed to be significant for other species along the southern edge of Black Duck Marsh.

Baseline Noise

The potential magnitude of change in noise generation as compared to the baseline position has been assessed in the Noise and vibration ES chapter (Document Reference Part 6.1, Chapter 15) and the outputs of that assessment are considered in terms of implications for ecological receptors in the terrestrial and freshwater ecology chapter (Document Reference Part 6.1, Chapter 12). It is worth noting that baseline noise levels at sampling locations around the Project Site were 50db-71db LAeq (average ambient noise), 41db-69db LA90 (i.e. constant background noise) and 50-73db LA10 (i.e. noise events experience for 10% of the sampling time), and long term monitoring at location 22 (Swanscombe Marshes) recorded a noise level of between 35 and 40 LA90, with maximum noise levels of between 65db and 88db, including at night and an average noise level (LAeq) of between 44db and 48db. Noise levels at Stonely Crescent (at the south-western extremity of Black Duck Marsh), the closest sampling location to both the estuary frontage and the large, open waterbody within the marsh, were measured at 53db LAeq, 48db LA90

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

and 55db LA10, and sampling at Manor Way, closest to the south-eastern corner of Black Duck Marsh, were measured at 69db LAeq, 51db LA90 and 72db LA10. Therefore, it can be said that the Project Site, pre-development and in close proximity to Functionally Linked habitat, experiences significant noise pollution, with regular disturbance events peaking well above significant levels for most species right into the centre of the Kent Project Site.

Noise Disturbance at Black Duck Marsh

Data on predicted noise levels during construction were taken from Chapter 15 of the ES (Document Reference Part 6.1, Chapter 15) and the Construction Noise and Vibration Assessment (Document Reference Part 6.2, Chapter 15.3). At the locations referenced above (Stonely Crescent and Manor Way), during construction of Gate 1 and hotels, ambient noise level increases are expected to be of negligible significance (61db, 0-1db increase). However, ambient noise increases at the manor way sampling point are expected to increase by 8db to 69db due to the proximity of construction works. Ambient daytime noise levels in the very north-east of Black Duck Marsh are expected to increase to around 60-64db. Although this isn't an increase in the baseline noise levels experience at the closest sampling location (22), baseline noise events at this level were sporadic (10% of the sampling time). These levels represent a change in ambient noise levels of up to 16-20db during the daytime. Because the main area of use by qualifying species is the open water in the south-west of the marsh, where expected noise levels are expected to be between 50db and 54db, and the main period of use by qualifying species was between dusk and dawn, construction noise disturbance effects on qualifying species are considered to be unlikely to cause a LSE during Gate 1 and hotel construction. However, the proximity of Gate 2 and an 8db increase in ambient noise levels in proximity to this waterbody mean that a LSE due to disturbance cannot be ruled out during construction.

Noise Disturbance within the Wider Estuary

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

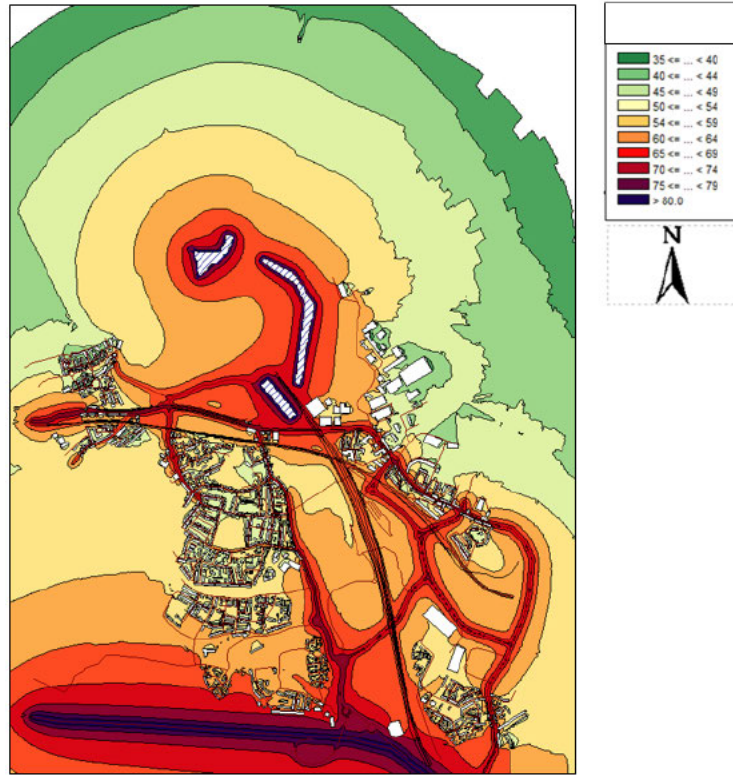
Gate 1 construction is considered most likely to cause disturbance effects on other functionally linked land, namely that along the estuary front, due to its position within the centre and north-west of the peninsula. Diagram 15.3.2 within the Construction Noise and Vibration Assessment, reproduced below shows that expected noise levels will rise to between 69db and 80db adjacent to the existing jetty, which has been identified as an important high tide roost for ducks. The proximity of this noise source is considered to be likely to result in significant disturbance effects upon that resource. Other important roost areas include the mouth of the creek and around the Broadness weather recording jetty. Noise levels in this area are expected to reach between 50db and 54db, which is just below the level advised for caution for the most sensitive species present, redshank, according to the TIDE toolkit⁷. Noise levels further from the source into the Thames Estuary and across to Thurrock Lagoon and Marshes SSSI will attenuate further and are expected to be as low as 35-40db on the north bank of the Thames, or 45db worst case

⁷ Cutts, N., Hemingway, K. and Spencer, J. (2013) *Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects*. Institute of Estuarine and Coastal Studies (IECS)

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

Diagram 15.3.2: $L_{Aeq,T}$ noise map showing Gate 1 General Construction



Footnotes relating to above Screening Matrices	
General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.	
	Therefore, disturbance to shoveler, teal and to the overall assemblage of wildfowl using functionally linked habitats is progressed to Stage 2 appropriate assessment.
Damage/Loss Impacts upon Medway Estuary and Marshes SPA/Ramsar Qualifying Species using Functionally Linked Habitat	
k	Shelduck, shoveler and teal were all recorded using wetland features on Botany Marsh West during winter. This functionally linked habitat will be directly lost as a result of the Proposed Development. However, the peak count of each of these species within the marsh was sub-significant (<1% of the total citation population) and no LSE upon ME and M SPA/Ramsar are therefore considered to occur.
Cumulative Impacts	
l	Cumulative (additive or synergistic) effects are possible for most of the potential impact sources arising from The Project when considered in-combination with other projects. The extent to which these have the potential to give rise to significant effects on the SPA and Ramsar Site, directly or via functionally linked features, varies, but significant effects cannot be excluded in particular for disturbance (from shipping), disturbance to functionally linked habitat used by cited bird species, cumulative effects on air quality, cumulative effects on sediment circulation processes and water quality and additive risks from invasive non-native species. Consequently, in-combination effects are progressed to Stage 2 appropriate assessment.
Impacts upon SPA Qualifying Species during Summer (Breeding)	
m	No breeding activity was recorded within or nearby the Project Site by little tern or avocet.
n	As species populations are not given for the SPA within the citation for qualifying assemblages and WeBS data does not cover the breeding season, significance of breeding populations was based upon estimates of the UK population within the latest Rare Breeding Birds Report (RBBR) ⁸ , or Musgrove et al. (2013) ⁹ where not included in the former. On-site breeding populations of

⁸ Holling, M. & the Rare Breeding Birds Panel. 2019. Rare Breeding Birds in the UK in 2017. *British Birds* 112:706-758

⁹ Musgrove, A., Aebischer, N., Eaton, M., Hearn, S., Newson, S., Noble, D., Parsons, M., Risely, K. & Stroud, D. 2013. Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 106:64-100.

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

waterfowl and waders were recorded within Black Duck Marsh and Botany Marsh West, including mute swan, greylag, shelduck, pochard, gadwall, mallard, teal, shoveler, tufted duck, lapwing, little ringed plover and oystercatcher.

An estimate of breeding pairs for each species is included within Annex 4 of the Ecology Baseline report (Document Reference Part 6.2, Chapter 12.1). Maximum breeding pairs has been compared against the UK total given in RBBR or Musgrove et al. and those representing >0.1% of the UK total, or >1% of the Kent total where data is available, are considered to be significant. Within Musgrove et al. (2013), dabbling ducks are given a population estimate due to the difficulties in accurately recording populations, so a worst case is given here based on the upper limit of that range. Breeding populations recorded within the Project Site of greylag, mute swan, shelduck, mallard, teal, tufted duck, little ringed plover, oystercatcher and lapwing represented <0.1% of the UK total. However, breeding shoveler represent 0.36% of the UK total and 7.84% of the Kent population according to RBBR, and gadwall 0.87% of the UK total according to Musgrove et al. However, pochard apparently breeding within the Project Site represent c.1.4% of the UK total or 13.33% of the Kent population according to RBBR.

There is therefore a risk of disturbance to these three species resulting in a LSE upon the breeding assemblage qualifying feature of the ME and M SPA.

Baseline Noise

The potential magnitude of change in noise generation as compared to the baseline position has been assessed in the Noise and vibration ES chapter (Document Reference Part 6.1, Chapter 15) and the outputs of that assessment are considered in terms of implications for ecological receptors in the terrestrial and freshwater ecology chapter (Document Reference Part 6.1, Chapter 12). It is worth noting that baseline noise levels at sampling locations around the Project Site were 50db-71db LAeq (average ambient noise), 41db-69db LA90 (i.e. constant background noise) and 50-73db LA10 (i.e. noise events experience for 10% of the

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

sampling time), and long term monitoring at location 22 (Swanscombe Marshes) recorded a noise level of between 35 and 40 LA90, with maximum noise levels of between 65db and 88db, including at night and an average noise level (LAeq) of between 44db and 48db. Noise levels at Stonely Crescent (at the south-western extremity of Black Duck Marsh), the closest sampling location to both the estuary frontage and the large, open waterbody within the marsh, were measured at 53db LAeq, 48db LA90 and 55db LA10, and sampling at Manor Way, closest to the south-eastern corner of Black Duck Marsh, were measured at 69db LAeq, 51db LA90 and 72db LA10. Therefore, it can be said that the Project Site, pre-development and in close proximity to Functionally Linked habitat, experiences significant noise pollution, with regular disturbance events peaking well above significant levels for most species right into the centre of the Kent Project Site.

Noise Disturbance at Black Duck Marsh

Data on predicted noise levels during construction were taken from Chapter 15 of the ES (Document Reference Part 6.1, Chapter 15) and the Construction Noise and Vibration Assessment (Document Reference Part 6.2, Chapter 15.3). At the locations referenced above (Stonely Crescent and Manor Way), during construction of Gate 1 and hotels, ambient noise level increases are expected to be of negligible significance (61db, 0-1db increase). However, ambient noise increases at the manor way sampling point are expected to increase by 8db to 69db due to the proximity of construction works. Ambient daytime noise levels in the very north-east of Black Duck Marsh are expected to increase to around 60-64db. Although this isn't an increase in the baseline noise levels experience at the closest sampling location (22), baseline noise events at this level were sporadic (10% of the sampling time). These levels represent a change in ambient noise levels of up to 16-20db during the daytime. Because the main area of use by qualifying species is the open water in the south-west of the marsh, where expected noise levels are expected to be between 50db and 54db, and the main period of use by qualifying species was between dusk and dawn, construction noise disturbance effects on qualifying species are considered to be unlikely to cause a LSE during Gate 1 and hotel

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

construction. However, the proximity of Gate 2 and an 8db increase in ambient noise levels in proximity to this waterbody mean that a LSE due to disturbance cannot be ruled out during construction.

Visual Human Disturbance

Although work alongside Black Duck Marsh will be screened by existing vegetation and site hoarding, there is some risk of visual disturbance by construction staff passing within view of roost sites.

Therefore, LSE upon these cited species cannot be ruled out at this stage, and disturbance to black-tailed godwit, redshank, teal, turnstone and to the overall assemblage of wildfowl using functionally linked habitats is progressed to Stage 2 appropriate assessment.

o As noted above in 'n', Black Duck Marsh and Botany Marsh West are known to support significant breeding waterfowl populations representing part of the breeding assemblage which forms a qualifying feature for the ME and M SPA.

Recreational Disturbance

As stated in the project description (Document Reference Part 6.1, Chapter 3), up to 500 dwellings of 4-6 bedrooms will be provided for staff of the resort. Therefore, in a scenario based on 1 occupant per bedroom, the local population will increase by 3000. Although this would not, in reality, translate to an increase of 3000 daily visitors along the estuary frontage, in the absence of reliable data to form an estimate of the actual increase in recreational use, there is potential for significant recreational effects as a result of additional visitors and LSE cannot be ruled out at this point. This is particularly true when the sensitivity of each bird species to disturbance by reference to the TIDE toolkit (for which, refer to Table 5-1 of this HRA report) is considered.

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

Visual and Aural Disturbance by Shipping (Thames Clipper)

Although breeding ducks were not recorded outside of Black Duck or Botany Marshes, there remains a risk of disturbance due to the increased frequency of river traffic. As noted above in relation to disturbance of winter assemblages, the additional movements anticipated as part of the Thames Clipper service between the Essex Project Site, Kent Project Site and Westminster Pier, alongside the additional movements of service vessels, will result in an increase of up to 53,000 movements, or almost 140% over the baseline. This, in effect, will introduce an additional disturbance event along the foreshore of the Swanscombe Peninsula every c.7.5 minutes for 18 hours a day, plus once every 12 minutes at Tilbury and once every 20 minutes along the Thames towards London. The “Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance” report¹⁰ states that the distance at which visual disturbance from boats has been shown to be reduced to below 10% is 600m. Although this buffer includes Black Duck Marsh, the presence of the sea wall, scrub and reedbed, plus the presence of buildings constructed as part of the Proposed Development, between this disturbance source and the qualifying features will reduce its potential impact beyond significance.

Furthermore, the Thames Clipper service, as noted above, noise modelling in Appendix 1 of Chapter 15 (Document Reference Part 6.2, Chapter 15.1) of the ES demonstrate that there should be no change in noise level at the Kent and Essex Project Sites or existing noise sensitive receptors due to the Thames Clipper service. This is due to distance attenuation and other, higher, level noise sources at the Kent and Essex Project Sites effectively “masking” the noise from the boats at the pier. Overall, the noise climate is primarily associated with industrial noise and road traffic e.g. on Dartford Crossing.

As noted under ‘c’ above birds are expected to present a degree of habituation due to the presence of existing industrial and shipping activity, particularly at the outer limits of this range, and effects are only considered to be significant at under 100m from

¹⁰ Cutts, N., Phelps, A. & Burdon, D. (2009). Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Institute of Estuarine and Coastal Studies, University of Hull

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

noise source. This excludes all but the area directly around the new jetty, which will inevitably be regularly disturbed on arrival and departure of the Clipper service.

Other Aural Disturbance

Operational noise is not anticipated to increase significantly due to traffic. The noise assessment in Chapter 15 of the ES (Document Reference Part 6.1, Chapter 15) predicts a rise of up to 1db across the Swanscombe Peninsula and between 1 and 3db at Tilbury. This level of increase is not considered to be significant, and noise due to road traffic is therefore not considered to be capable of causing LSE.

The operational noise created by the attractions within the Resort are predicted to result in noise levels of around 40 and 49db across most of Black Duck Marsh, which is roughly equivalent to the baseline in the surrounding area, as described in the baseline appendix to Chapter 15 of the ES (Document Reference Part 6.2, Chapter 15.1). Noise levels across the Thames, i.e. at Thurrock Lagoon and Marshes SSSI, are expected to have dropped to around 35db or lower. Figure 15.20 (Document Reference Part 6.3, Figure 15.20) demonstrates that noise levels from attractions will have dropped below significance levels well before reaching the borders of any designated site, including those considered to be functionally linked to either SPA/Ramsar site.

The most significant noise source during operation will be loudspeaker announcements, which are expected to produce up to 80db at the estuary front, dropping to c.50-59db throughout Black Duck Marsh.

Therefore, at this point LSE cannot be ruled out as a result of disturbance effects caused by recreational disturbance or noise from loudspeaker announcements. Potential effects arising from these sources will therefore be progressed to Stage 2 appropriate assessment.

Footnotes relating to above Screening Matrices

General note: Effects within functionally linked habitat within or adjacent to the Project Site are considered significant for species where peak count during WeBS or targeted surveys of the Project Site were more than 1% of the SPA/Ramsar population.

p

As noted above in 'n', Black Duck Marsh and Botany Marsh West are known to support significant breeding waterfowl populations representing part of the breeding assemblage which forms a qualifying feature for the ME and M SPA.

The loss of small parts of Black Duck Marsh and the entirety of Botany Marsh West therefore represents a loss of breeding habitat for these species, which form part of the qualifying SPA assemblage, and LSE cannot be ruled out. Consequently, damage or loss of functionally linked habitat for this SPA feature is progressed to Stage 2: Appropriate Assessment.

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Annex 3.0 STAGE 2 INTEGRITY MATRICES

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Table A3.1: Integrity Matrix 1 – Thames Estuary and Marshes SPA. Those effects that have been brought forward from the screening stage exercise are tested against the potential effects of the integrity of the designating feature following the implementation of mitigation measures as part of the project. Evidence for, or against, likely significant effects (LSE) on the integrity of the European site(s) or their feature(s) is detailed within footnotes (a, b, c, etc.). ✓ = LSE cannot be excluded, X = LSE can be excluded, C = construction, O = operation, D = decommissioning

Name of European Site and Designation: Thames Estuary and Marshes SPA															
Site Code: UK9012021															
Distance to DCO Order Limits: 3.3KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.1 feature: avocet (winter)							X _c						X _e	X _e	
Article 4.1 feature: hen harrier (winter)							X _c						X _e	X _e	
Article 4.2 feature: ringed plover (passage)							X _c						X _e	X _e	

Name of European Site and Designation: Thames Estuary and Marshes SPA															
Site Code: UK9012021															
Distance to DCO Order Limits: 3.3KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: knot (winter)							X _c						X _e	X _e	
Article 4.2 feature: grey plover (winter)							X _c						X _e	X _e	
Article 4.2 feature: dunlin (winter)							X _c						X _e	X _e	
Article 4.2 feature: black-tailed godwit (winter)				X _a	X _b		X _c			X _d			X _e	X _e	

Name of European Site and Designation: Thames Estuary and Marshes SPA															
Site Code: UK9012021															
Distance to DCO Order Limits: 3.3KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: redshank (winter)				Xa	Xb		Xc			Xd			Xe	Xe	
Article 4.2 feature: waterfowl assemblage (winter)				Xa	Xb		Xc			Xd			Xe	Xe	

Table A3.2: Integrity Matrix 2 – Thames Estuary and Marshes Ramsar. Those effects that have been brought forward from the screening stage exercise are tested against the potential effects of the integrity of the designating feature following the implementation of mitigation measures as part of the project. Evidence for, or against, likely significant effects (LSE) on the integrity of the European site(s) or their feature(s) is detailed within footnotes (a, b, c, etc.). ✓ = LSE cannot be excluded, X = LSE can be excluded, C = construction, O = operation, D = decommissioning

Name of European Site and Designation: Thames Estuary and Marshes Ramsar															
Site Code: 7UK141															
Distance to DCO Order Limits: 2.7KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 2 qualifying feature (nationally rare and scarce plant/invertebrate species)										Xd	Xd		Xe	Xe	
Criterion 5 qualifying feature: Total waterfowl (winter)				Xa	Xb		Xc			Xd			Xe	Xe	
Criterion 6 qualifying feature:							Xc						Xe	Xe	

Name of European Site and Designation: Thames Estuary and Marshes Ramsar															
Site Code: 7UK141															
Distance to DCO Order Limits: 2.7KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
ringed plover (passage)															
Criterion 6 qualifying feature: black-tailed godwit (winter)				Xa	Xb		Xc			Xd			Xe	Xe	
Criterion 6 qualifying feature: grey plover (winter)							Xc						Xe	Xe	
Criterion 6 qualifying feature: knot (winter)							Xc						Xe	Xe	
Criterion 6 qualifying feature: dunlin (winter)							Xc						Xe	Xe	
Criterion 6 qualifying feature: redshank (winter)				Xa	Xb		Xc			Xd	Xd		Xe	Xe	

Table A3.3: Integrity Matrix 3 – Medway Estuary and Marshes SPA. Those effects that have been brought forward from the screening stage exercise are tested against the potential effects of the integrity of the designating feature following the implementation of mitigation measures as part of the project. Evidence for, or against, likely significant effects (LSE) on the integrity of the European site(s) or their feature(s) is detailed within footnotes (a, b, c, etc.). ✓ = LSE cannot be excluded, ✗ = LSE can be excluded, C = construction, O = operation, D = decommissioning

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.4KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.1 feature: avocet (winter)							✗ _c						✗ _e	✗ _e	
Article 4.1 feature: Bewick's swan (winter)							✗ _c						✗ _e	✗ _e	
Article 4.2 feature: black-tailed godwit (winter)				✗ _a	✗ _b		✗ _c			✗ _d			✗ _e	✗ _e	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.4KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: redshank (winter)				Xa	Xb		Xc			Xd			Xe	Xe	
Article 4.2 feature: curlew (winter)							Xc			Xd			Xe	Xe	
Article 4.2 feature: dark-bellied brent goose (winter)							Xc			Xd			Xe	Xe	
Article 4.2 feature: dunlin (winter)							Xc						Xe	Xe	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.4KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: greenshank (winter)							X _c						X _e	X _e	
Article 4.2 feature: grey plover (winter)							X _c						X _e	X _e	
Article 4.2 feature: knot (winter)							X _c						X _e	X _e	
Article 4.2 feature: oystercatcher (winter)							X _c						X _e	X _e	
Article 4.2 feature: pintail (winter)							X _c						X _e	X _e	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.4KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: ringed plover (winter)							X _c						X _e	X _e	
Article 4.2 feature: shelduck (winter)							X _c						X _e	X _e	
Article 4.2 feature: shoveler (winter)				X _a	X _b		X _c						X _e	X _e	
Article 4.2 feature: teal (winter)				X _a	X _b		X _c						X _e	X _e	
Article 4.2 feature: turnstone (winter)				X _a	X _b		X _c						X _e	X _e	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.4KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: wigeon (winter)				Xa	Xb		Xc						Xe	Xe	
Article 4.2 feature: waterfowl assemblage (winter)				Xa	Xb		Xc			Xd			Xe	Xe	
Article 4.1 feature: avocet (breeding)							Xc						Xe	Xe	
Article 4.1 feature: little tern (breeding)							Xc						Xe	Xe	

Name of European Site and Designation: Medway Estuary and Marshes SPA															
Site Code: UK9012031															
Distance to DCO Order Limits: 13.4KM															
Effect	Likely Significant Effect														
	Disturbance (within SPA)			Disturbance (functionally linked habitat)			Habitat Damage (within SPA)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Article 4.2 feature: Breeding assemblage				Xa	Xb		Xc			Xd			Xe	Xe	

Table A3.4: Integrity Matrix 4 – Medway Estuary and Marshes Ramsar. Those effects that have been brought forward from the screening stage exercise are tested against the potential effects of the integrity of the designating feature following the implementation of mitigation measures as part of the project. Evidence for, or against, likely significant effects (LSE) on the integrity of the European site(s) or their feature(s) is detailed within footnotes (a, b, c, etc.). ✓ = LSE cannot be excluded, X = LSE can be excluded, C = construction, O = operation, D = decommissioning

Name of European Site and Designation: Thames Estuary and Marshes Ramsar															
Site Code: 7UK068															
Distance to DCO Order Limits: 13.4KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 2 qualifying feature (nationally rare and scarce plant/invertebrate species)													Xe	Xe	
Criterion 5 qualifying feature: Total waterfowl (winter)				Xa	Xb		Xc			Xd			Xe	Xe	

Name of European Site and Designation: Thames Estuary and Marshes Ramsar															
Site Code: 7UK068															
Distance to DCO Order Limits: 13.4KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 6 qualifying feature: dark-bellied brent goose (winter)							X _c						X _e	X _e	
Criterion 6 qualifying feature: dunlin (winter)							X _c						X _e	X _e	
Criterion 6 qualifying feature: grey plover (winter)							X _c						X _e	X _e	
Criterion 6 qualifying feature: knot (winter)							X _c						X _e	X _e	
Criterion 6 qualifying feature: pintail (winter)							X _c						X _e	X _e	

Name of European Site and Designation: Thames Estuary and Marshes Ramsar															
Site Code: 7UK068															
Distance to DCO Order Limits: 13.4KM															
Effect	Likely Significant Effect														
	Disturbance (within Ramsar)			Disturbance (functionally linked habitat)			Habitat Damage (within Ramsar)			Habitat Loss or Damage (functionally linked habitat)			In combination effects		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Designated Feature															
Criterion 6 qualifying feature: redshank (winter)				Xa	Xb		Xc			Xd			Xe	Xe	
Criterion 6 qualifying feature: ringed plover (winter)							Xc						Xe	Xe	
Criterion 6 qualifying feature: shelduck (winter)							Xc						Xe	Xe	
Criterion 6 qualifying feature: black-tailed godwit (winter)				Xa	Xb		Xc			Xd			Xe	Xe	

Footnotes for the Integrity Matrices for the Above Tables

Disturbance Effects on the Qualifying Features using Functionally Linked Land during Construction.

a. Avocet, ringed plover, curlew, shelduck, teal, turnstone, wigeon, shoveler, knot, black-tailed godwit, oystercatcher and redshank (Birds Directive Article 4.1 and 4.2 qualifying species; and Ramsar Criteria 5 and 6 species) have all been recorded making use of intertidal habitats around the peninsula in either 2012/13 or 2019/20. The individual birds involved will in most cases be part of the local wintering or passage population that forms the qualifying feature of either the TE and M (avocet, black-tailed godwit, dunlin, knot, redshank and ringed plover) or ME and M SPA/Ramsar (as previous, plus curlew, oystercatcher, shelduck, shoveler, teal, turnstone and wigeon). Quantitative data on the numbers using intertidal habitats within and in proximity to the DCO Order limits is provided by the baseline information reported on in the baseline appendix of the Terrestrial and freshwater ecology and biodiversity ES chapter (Document Reference Part 6.2.12.1), which includes details on breeding, winter and passage bird surveys undertaken at the Project Site).

The data indicate that peak numbers using intertidal habitat within the DCO Order Limits at any one time remains in most cases less than 1% of the SPA/Ramsar Site population as stated within the SPA citation or Ramsar Information Sheet (RIS) (**Annex 2** to this report). Effects upon these species have been screened out as non-significant. However, peak counts representing 2.00% (TE and M)/3.45% (ME and M), 2.09 (TE and M)/1.84% (ME and M), 8.22%, 6% and 2.85%, for black-tailed godwit, redshank, teal and turnstone respectively, were recorded during surveys of the foreshore. Three-hundred metres is taken as a rational outer extent of impact envelope for significant construction-phase disturbance taking into account literature on response distances amongst the bird species concerned (see **Table 2.1** within the main body of this HRA report) and outputs from the impact studies reported in the ES (in particular Noise and vibration, Document Reference 6.1.15).

From the modelling data presented within the Noise and vibration chapter of the ES (Document Reference Part 6.1.15), it can be shown that, during construction, noise levels will only exceed those deemed to be significant for any of the cited species on the western foreshore of the peninsula around Bell's Wharf, within Black Duck Marsh and adjacent to the Cemex plant east of the Kent Project Site. In considering the scope for adverse effects on integrity, key considerations are the likely extremely temporary duration of any displacement effect (the principal risk being piling and paving, which will be time-limited both within the 24 hour

Footnotes for the Integrity Matrices for the Above Tables

Disturbance Effects on the Qualifying Features using Functionally Linked Land during Construction.

period and in terms of overall duration), the extent of functionally linked habitat available to temporarily displaced birds and the worst-case approach that has been taken to the assessment (i.e. assuming that all birds could be displaced from the 300m zone of significant noise impacts).

Taking these factors into account, it is extremely unlikely that displacement due to disturbance emanating from the Project Site could have consequences for the SPA or Ramsar Site populations to the extent that its integrity is compromised, or indeed significant physiological consequences for any individual birds or collective assemblages of individuals or mixed species agglomerations. It is also proposed that the Applicant will undertake a monitoring of bird use on the intertidal habitats and other functionally linked land within proximity of the Project Site during the construction phase. Noise reduction measures outlined in the main body of the HRA and detailed within the Noise and Vibration Chapter and CEMP (Document References 6.1.15 and 6.2.3.2 respectively) will further limit the magnitude of effects. The monitoring will ensure that if numbers of birds within the monitored area fall below a certain threshold in response to obvious construction activities then those disturbance activities will be temporally ceased. These measures will be outlined within a Bird Monitoring Response Strategy (BMRS).

The disturbance of birds using the intertidal zone within 100m of the new jetty at the Kent Project Site by increased shipping movements during both construction and operation is likely to be a recurring problem. However, boats will be limited in speed until away from the dock, which has been shown to reduce the likelihood of disturbance events. Construction work at Bell's Wharf is predicted to cause significant noise disturbance within the immediate environs, and it is likely that this area will be functionally lost as a daytime, high tide roost during this period.

Visual disturbance by construction workers will be limited through limitation of access to sensitive areas through the use of Ecological Protection Zones (EPZs) where possible. Hoardings around construction areas will further reduce visual disturbance effects. With these measures in place, visual disturbance is considered unlikely to increase significantly over baseline levels.

Footnotes for the Integrity Matrices for the Above Tables

Disturbance Effects on the Qualifying Features using Functionally Linked Land during Construction.

It is considered that any residual effects upon functionally linked land around the Project Site will be more than offset by the provision of off-site habitat creation in closer proximity to both SPA/Ramsar sites, as detailed in the EMMF and Principles for Off-Site Mitigation Land reports (Document References 6.2.12.3 and 6.2.12.10 respectively).

Footnotes for the Integrity Matrices for the Above Tables

Disturbance Effects on the Qualifying Features using Functionally Linked Land during Operation.

- b.** Avocet, ringed plover, curlew, shelduck, teal, turnstone, wigeon, shoveler, knot, black-tailed godwit, oystercatcher and redshank (Birds Directive Article 4.1 and 4.2 qualifying species; and Ramsar Criteria 5 and 6 species) have all been recorded making use of intertidal habitats around the peninsula in either 2012/13 or 2019/20. The individual birds involved will in most cases be part of the local wintering or passage population that forms the qualifying feature of either the TE and M (avocet, black-tailed godwit, dunlin, knot, redshank and ringed plover) or ME and M SPA/Ramsar (as previous, plus curlew, oystercatcher, shelduck, shoveler, teal, turnstone and wigeon). Quantitative data on the numbers using intertidal habitats within and in proximity to the DCO Order limits is provided by the baseline information reported on in the Terrestrial and freshwater ecology and biodiversity ES chapter (Document Reference 6.2.12.1).
- The data indicate that peak numbers using intertidal habitat within the DCO Order Limits at any one time remains in most cases less than 1% of the SPA/Ramsar Site population as stated within the SPA citation or Ramsar Information Sheet (RIS) (**Annex 2** to this report). Effects upon these species have been screened out as non-significant. However, peak counts representing 2.00% (TE and M)/3.45% (ME and M), 2.09 (TE and M)/1.84% (ME and M), 8.22%, 6% and 2.85%, for black-tailed godwit, redshank, teal and turnstone respectively, were recorded during surveys of the foreshore. Five-hundred metres is taken as a rational outer extent of impact envelope for significant operation-phase disturbance taking into account literature on response distances amongst the bird species concerned (see **Table 2.1** within the main body of this HRA report) and outputs from the impact studies reported in the ES (in particular Noise and vibration – Document Reference 6.1.15).

Footnotes for the Integrity Matrices for the Above Tables

Disturbance Effects on the Qualifying Features using Functionally Linked Land during Operation.

From the modelling data presented within the Noise and vibration chapter of the ES (Document Reference 6.1.15), it can be shown that, during operation, noise levels will only exceed those deemed to be significant for any of the cited species around Bell's Wharf, due loudspeaker announcements and the movement of boats. Owing to the extent of functionally linked habitat available to temporarily displaced birds it is extremely unlikely that displacement due to disturbance emanating from the Project Site could have consequences for the SPA or Ramsar Site populations, or indeed significant physiological consequences for any individual birds or collective assemblages of individuals or mixed species agglomerations.

As discussed above, LSE of any kind are not anticipated upon sub-significant populations of cited birds using functionally linked intertidal and wetland habitat (i.e. avocet, curlew, dunlin, knot, shelduck, oystercatcher and wigeon), even when significant disturbance events occur by virtue of representing <1% of the cited population. However, the scope for significant disturbance effects on populations of SPA and Ramsar Site qualifying bird species representing >1% of the cited population totals (black-tailed godwit, redshank, shoveler, teal and turnstone) using areas outside the respective designation boundaries is greater during the operational phase by virtue of the predicted increase in recreational pressure as a result of ancillary housing. As stated in the project description (Document Reference Part 6.1, Chapter 3), up to 500 dwellings of 4-6 bedrooms will be provided for staff of the resort. Therefore, in a scenario based on 1 occupant per bedroom, the local population will increase by 3000. Although this would not, in reality, translate to an increase of 3000 daily visitors along the estuary frontage, in the absence of reliable data to form an estimate of the actual increase in recreational use, there is potential for significant recreational effects as a result of additional visitors. Furthermore, the likelihood of potentially significant disturbance effects during the operational phase by river transport is likely greater than in the construction phase due to their regularity and frequency.

However, when taking account of the mitigation measures put in place through the provision of the Ecological Mitigation and Management Framework (EMMF, Document Reference 6.2.12.3) and the Landscape Strategy (Document Reference 6.2.11.7) these potential impacts are greatly reduced as the areas are protected through managed access or additional provision for the species is provided where recreational impacts are limited. In addition, a Strategic Access Management and Monitoring Strategy

Footnotes for the Integrity Matrices for the Above Tables

Disturbance Effects on the Qualifying Features using Functionally Linked Land during Operation.

(SAMMS) (included as **Annex 6**) has been implemented across the Thames, Medway and Swale estuaries. This strategy ensures that recreational pressures on the three SPA/Ramsar sites relating to those estuaries is managed sufficiently, through a combination of education, access restrictions, enhancement and ranger presence. This is implemented through financial contributions from developers. A formal decision was made by Gravesham Borough Council in 2015 which set the contribution at £223.58 per dwelling within 6km of the SPA/Ramsar sites or for “larger sites” within 10km, which has since been raised to £250.39 per dwelling. Dartford Borough Council have adopted this approach, defining a “larger” development as above 100 units. The proposed residential development within the Project Site is situated within the 6km buffer, and therefore a contribution of £250.39 per unit will be made in order to offset the recreational impact of the increased residential population upon both SPA/Ramsar sites.

An Artificial Lighting Environmental Impact Assessment has been prepared for the Proposed Development by Buro Hapold. This sets out a lighting strategy and design principles which will ensure that the retained intertidal and marsh habitats within the Project Site which are important for the SPA/Ramsar bird populations remain in the following Environmental Lighting Zones:

- River Thames and Intertidal Zone – Environmental Zone E1 (Typical of relatively uninhabited rural areas. No artificial lighting. Maintain the river in its current condition)
- Black Duck, Botany and Broadness Marshes - Environmental Zone E2 (Typical of sparsely uninhabited rural areas. No lighting sources visible from animal habitats. Protect the natural areas that are to be conserved and enhanced)

The disturbance of birds using the intertidal zone within 100m of the new jetty at the Kent Project Site by increased shipping movements during both construction and operation is likely to be a recurring problem. However, boats will be limited in speed until away from the dock, which has been shown to reduce the likelihood of disturbance events. It is considered that any residual effects upon functionally linked land around the Project Site will be more than offset by the provision of off-site habitat creation

Footnotes for the Integrity Matrices for the Above Tables	
Disturbance Effects on the Qualifying Features using Functionally Linked Land during Operation.	
	in closer proximity to both SPA/Ramsar sites, as detailed in the EMMF and Principles for Off-Site Mitigation Land reports (Document References 6.2.12.3 and 6.2.12.10 respectively).
Damage to Habitats Inside Designated Sites	
c.	Taking account of construction and operational restrictions that will be contained within the Construction Environmental Management Plan (CEMP, Document Reference 6.2.3.2) and/or volunteered through the Deemed Marine Licence/Development Consent Order, there is assessed to be no scope for significant changes to baseline sediment circulation (erosion and deposition) regimes within the SPA/Ramsar Site boundary arising as a consequence of marine works and dredging, during either the construction or operational phase. Furthermore, the CEMP (Document Reference 6.2.3.2) will limit the risk of pollution of watercourses running into the Thames through the use of EPZs and standard pollution prevention measures. Consequently, no risk to the quality and availability of intertidal habitats for cited SPA or Ramsar Site species is predicted within either SPA/Ramsar.

Footnotes for the Integrity Matrices for the Above Tables	
Damage to Habitats within Functionally Linked Land	
d.	<p>Taking account of mitigation measures to limit the spatial influence of impacts during the construction-phase through the use of EPZs, hoarding and restrictions to limit activity in winter, particularly with regards to the new ferry terminal, impacts upon retained and adjacent functionally linked habitats will be minimised.</p> <p>Reinstatement and restoration measures will also render such impacts at least partly temporary, further reducing the potential for a significant effect. The scope for adverse effects on integrity is therefore vanishingly small even without regard to the mitigation provision of offsite habitat that is proposed to ensure no net loss of priority habitat. Taking that mitigation provision into account within the HRA Integrity Matrices, there is assessed to be greater likelihood of net beneficial consequences for Criterion 2 species than net negative, and in all scenarios, no scope for adverse effects on integrity.</p>

Footnotes for the Integrity Matrices for the Above Tables

Damage to Habitats within Functionally Linked Land

Taking account of construction and operational restrictions that will be contained within the Construction Environmental Management Plan (CEMP, Document Reference 6.2.3.2) and/or volunteered through the Deemed Marine Licence/Development Consent Order, there is assessed to be no scope for significant changes to baseline sediment circulation (erosion and deposition) regimes arising as a consequence of marine works and dredging, during either the construction or operational phase. Furthermore, the CEMP (Document Reference 6.2.3.2) will limit the risk of pollution of watercourses running into the Thames through the use of EPZs and standard pollution prevention measures. Consequently, no risk to the quality and availability of intertidal habitats for cited SPA or Ramsar Site species is predicted within retained functionally linked habitat.

Similarly, provisions made within the CEMP for dust suppression, no significant residual effects are anticipated.

The provision of off-site mitigation habitat, as set out within the EMMF and Principles for Off-Site Mitigation reports (Document References 6.2.12.3 and 6.2.12.10 respectively) will provide habitat that is greater in size and quality to those habitats lost within the site that are utilised by significant populations of the SPA/Ramsar site. Therefore, when considering the integrity of the affected SPA/Ramsar sites, it can be assumed that this provision will not only mitigate the area of functionally linked habitat lost but will also provide some net benefits for the species of birds that are both affected at a significant level and those within the wider assemblage.

In-combination Effects

- e. Cumulative (additive or synergistic) low magnitude effects on estuarine processes (including sediment circulation) that support intertidal habitats and related designations, and on water and sediment quality within designated areas or associated with functionally linked habitats, are also possible from refurbishment of marine structures and/or capital and maintenance dredging associated with other projects. However, the potential influence on estuarine processes of the Project has been shown to be negligible and therefore significant in-combination effects are not likely regardless of the magnitude of effects arising elsewhere. Similarly, the adoption of measures to prevent significant mobilisation of polluted sediments, and the controls imposed by dredging regulators as a matter of standard practice, and the ability of Port of London Authority (PLA) to control other dredging in the estuary through marine licensing, leaves a negligible potential contribution to any cumulative water quality effects arising from

Footnotes for the Integrity Matrices for the Above Tables

Damage to Habitats within Functionally Linked Land

other marine works projects and dredging activities, such that adverse in-combination effects are unlikely. By virtue of the distance between the Project Site and either SPA/Ramsar site, no LSE are anticipated to the SPA/Ramsar sites.

Given the potential beneficial effects on the qualifying species as a result of the mitigation both within the site and the off-site mitigation land habitats as set out within the EMMF (Document Reference 6.2.12.3) it is considered that there can be no additional negative effects from the proposals and therefore only beneficial in combination effects on these species. There are thus concluded to be no credible risks of significant in-combination effects having adverse consequences for the integrity of the European/Ramsar Site.

Annex 4.0 WATERBIRD DISTURBANCE MITIGATION
TOOLKIT (INSTITUTE OF ESTUARINE AND COASTAL
STUDIES (IECS) UNIVERSITY OF HULL, 2013) (TIDE
TOOLKIT)

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Waterbird Disturbance Mitigation Toolkit

Informing Estuarine Planning & Construction Projects



Click on the Photograph to Enter



Produced by the Institute of Estuarine & Coastal Studies (IECS) University of Hull, 2013



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Version 3.2, March 2013
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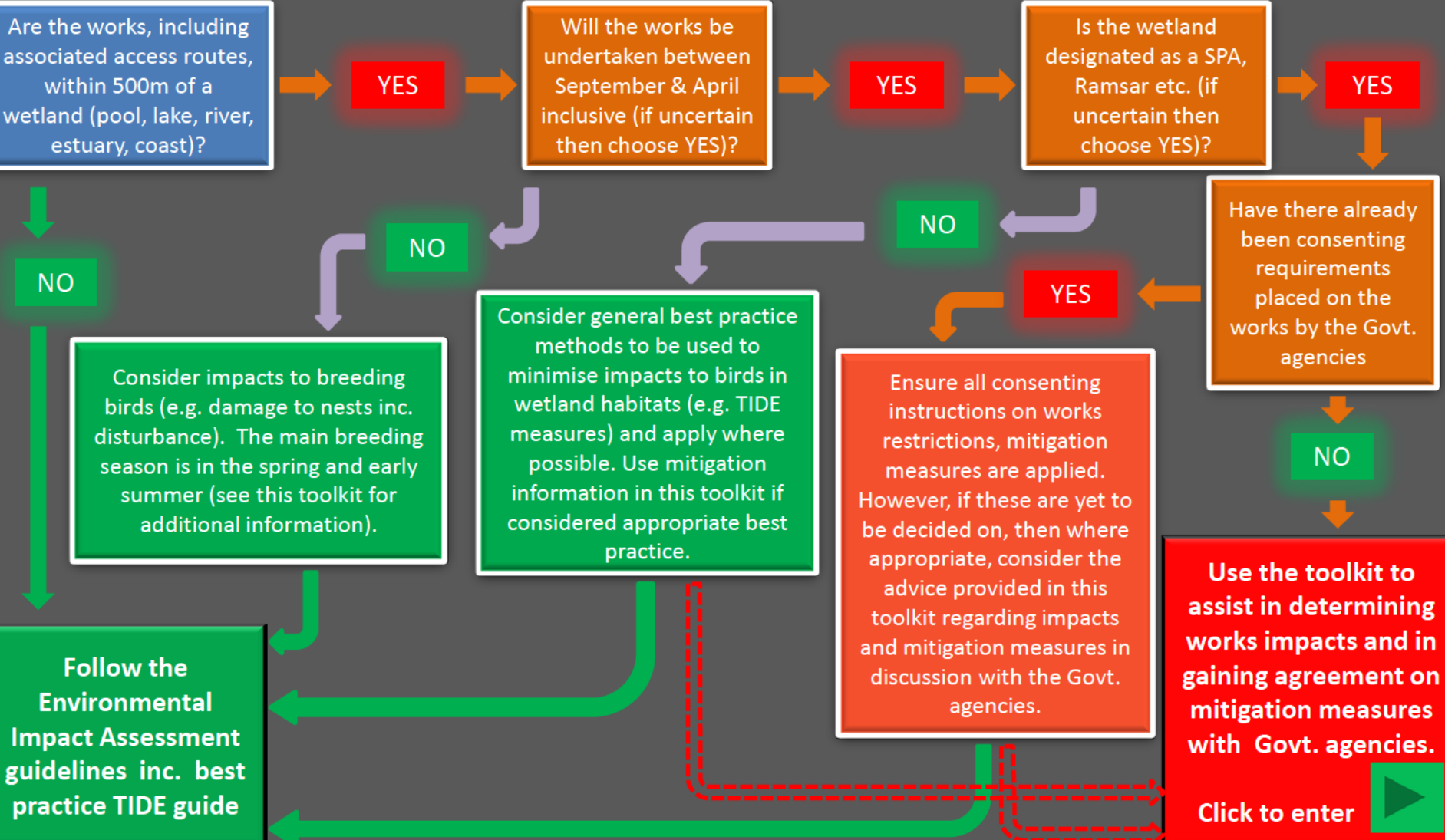


The authors are solely responsible for the content of this toolkit. Material included herein does not represent the opinion of the European Community, and the European Community is not responsible for any use that might be made of it.

In what situation would the Waterbird Disturbance Mitigation Toolkit be of value to me?

Click Here to Enter 

This flow chart describes the basic context for situations where the Waterbird Disturbance Mitigation Toolkit will be of value. It is designed for use by works planners & site managers to initially assess whether impacts to migrating and wintering waterbirds are likely to arise from a proposed project, and to identify additional information requirements to meet consenting needs. It can also be of value during operations to gauge the level of impact from works operations.



Toolkit Contents & Navigation



Click on the 'buttons' on the left to go to individual pages or use the arrows at the bottom of page to navigate sequentially (top right to get back to the first page).

Species Account colour on the 'buttons' to the left indicates the sensitivity of individual species to works disturbance (**green** less sensitive, **red** more sensitive).



- Toolkit Description & Context
- Background - Birds
- Background - Disturbance
- Noise Disturbance
- Visual Disturbance
- Disturbance Summary
- Seasonality
- References
- Species Accounts
- Brent Goose *Branta bernicla*
- Shelduck *Tadorna tadorna*
- Mallard *Anas platyrhynchos*
- Oystercatcher *Haematopus ostralegus*
- Ringed Plover *Charadrius hiaticula*
- Golden Plover *Pluvialis apricaria*
- Grey Plover *Pluvialis squatarola*
- Lapwing *Vanellus vanellus*
- Knot *Calidris canutus*
- Sanderling *Calidris alba*
- Dunlin *Calidris alpina*
- Black-tailed Godwit *Limosa limosa*
- Bar-tailed Godwit *Limosa lapponica*
- Curlew *Numenius arquata*
- Redshank *Tringa totanus*
- Turnstone *Arenaria interpres*



What is the Waterbird Disturbance Mitigation Toolkit?



This toolkit has been developed to assist flood protection managers and ports developers in relation to waterfowl disturbance impacts arising from construction works within or adjacent to Natura 2000 sites (e.g. Special Protection Areas and Ramsar Sites). In addition, it is hoped that the toolkit can be used by planners when considering development plans in estuaries and coasts with a high conservation value for waterbirds. Importantly, this tool is not designed to replace traditional methods of environmental assessment and monitoring, but to provide an initial high level guidance in the identification of possible construction:waterfowl disturbance issues and assist in the development of appropriate mitigation methods where practicable. The toolkit can be used in conjunction with the Bird Disturbance Mitigation Android App which is available from Google Play.

Disturbance can occur from both visual and aural stimuli, and whilst there is a paucity of avifaunal response data for both sources of disturbance, it is our experience that in particular, data relating to noise stimuli responses are extremely poor. Probably as a result of this poor evidence base, consenting of construction activity adjacent to wetland sites of waterbird importance appears to be particularly precautionary, and this necessarily can constrain operations in some situations (e.g. works timings).

It is therefore the aim of this toolkit to better characterise construction sourced disturbance effects to waterbirds on estuaries, and in particular, the effects of generated noise, in order to provide both works management with a clear route to determine high level disturbance issues, and consenting bodies with sufficient information to reduce the level of 'precaution' applied to the planning process. It is also hoped that the toolkit will provide information on a suite of actions for universal management and mitigation methods to be employed regardless of such work's location.



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Considerations Within the Toolkit



From disturbance response monitoring at a number of flood defence improvement sites on estuaries, as well as other construction projects and potentially 'disturbing' operations, it is our observation that noise stimuli rarely cause waterbird disturbance before associated visual stimuli have an effect. Visual disturbance, although complex at a detailed level, has however been studied (and reported) more extensively, so that response thresholds for this form of stimuli are available for a number of species and disturbing activities. Noise in its own right can, of course, have a direct impact in some situations, although as a disturbance stimuli, *noise (or sound pressure level)* is a complex parameter to characterise.

Different species of bird have different tolerance thresholds to noise disturbance (and visual disturbance) and therefore construction works and other operations impact upon different species in differing ways. Furthermore, birds are liable to habituation (e.g. they usually become more tolerant with increased exposure time to regular activities) to both aural and visual disturbance stimuli. This is of importance, as different types of noise have different likely effects, and at its most simplistic, ongoing background or regular noise is likely to be more readily assimilated by waterfowl than sudden irregular noise events at a similar decibel level. As such, 'loud' works in a generally 'loud' environment may cause little actual ongoing disturbance (as birds are already tolerant or *habituated*), whilst quieter works in a quiet environment may potentially have a greater disturbance effect in some instances.

It is therefore important to emphasise that the development context is an important consideration in assessing disturbance potential, reflecting both the existing environmental considerations, as well as the sensitivity & importance of the waterbirds in the area and the likely construction activities.



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Context of the Toolkit



This toolkit has been developed using a combination of literature review information and field observation, tailored specifically for the purpose of defining disturbance impacts to avifauna from construction-type operations on or adjacent to intertidal areas.

However, paucity of published data on the subject means that large amounts of information used within the toolkit are from direct observation of flood protection works in the UK, and as such information may require updating as further research is carried out.

The toolkit is presented as a number of pages each providing information on aspects of bird disturbance, the basic ecology and tolerances common waterbirds found in estuarine and coastal habitats and mitigation measures.

Noise tolerances for each species are presented as thresholds which should not be exceeded when measured **at the bird (receptor)**. Also included for ease of use is a chart for key bird species, providing response levels at set distances and noise thresholds, allowing an assessment to be made by managers of the likely disturbance effect based on the known location of plant in relation to main bird areas.

This is a live document and thus open to revision when more evidence becomes available through further research or externally published papers.



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Background - Birds



The toolkit provides information on disturbance effects from a range of construction works to commonly encountered waterbirds on estuaries and other wetlands (for which we have observed behavioural responses). The term *waterbird* includes species of geese, ducks and waders, with detailed information provided within this tool for 1 species of goose, 2 species of duck, and 13 species of wader. These birds make up common elements of estuarine and coastal avifauna, although there are many other species that may be encountered. On this page we will deal with basic ecology and identification of these birds. Hover over the button to get basic text on the species. Later in the tool the individual Species Account sheets have a photograph of a typical individual as well as sensitivity information and mitigation measures. Colour-coding of the buttons reflects species sensitivity.



[Bar-tailed Godwit](#)



[Dunlin](#)



[Lapwing](#)



[Ringed Plover](#)



[Black-tailed Godwit](#)



[Golden Plover](#)



[Mallard](#)



[Sanderling](#)



[Brent Goose](#)



[Grey Plover](#)



[Oystercatcher](#)



[Shelduck](#)



[Curlew](#)



[Knot](#)



[Redshank](#)



[Turnstone](#)



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Types of Waterbird Disturbance Stimuli



Different types of disturbance stimuli are characterised by different avifaunal reactions. Furthermore, the level of reaction is not uniform to certain types of activity and is not always intuitive. Generic guidelines at present are precautionary for consenting requirements and employ an approach distance to 300m and a low noise threshold figure of **55dB** (possibly based on research by Wintermans in 1991 which recorded no effect of shooting on roosting waders where noise levels did not exceed 55dB e.g. a level where no effect occurred rather than a threshold where effect commenced).

A 70dB noise threshold has however been developed over a period of years, based on published data as well as findings from primary observations (e.g. Cutts & Allen, 1999; Cutts, Phelps & Burdon, 2008 and Cutts & Hemingway 2010). It is considered that the threshold works as a general rule but is relatively simplistic as it does not take into account the type of stimuli or the species of bird involved. Whilst 'rules of thumb' can be applied, development specific details required to improve predictions.

Although in many instances, the larger the visual stimuli the greater the disturbance response, counter-intuitively this is not always the case and a large plant undertaking vigorous work may cause less disturbance than a single worker walking along the floodbank, particularly if walking onto the intertidal zone. A single sudden sound will generally cause more disturbance than a constant or regular noise regardless of noise level, e.g. a dropped piece of scaffold at 65dB will cause a greater disturbance reaction than ongoing vibration piling at 80dB. Habituation to a stimuli will also usually entail a reduction in the level of reaction - this applies to both visual and noise related disturbance. An exception to this is if multiple stimuli occur at the same time e.g. walkers, works and planes. In this case an effect called facilitation may occur, where a greater reaction than expected is observed.



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General Waterbird Disturbance Levels Stimuli



Generic waterbird responses to disturbance from a range of activities including construction work have been collated and summarised by IECS over time (e.g. Cutts, Phelps & Burdon, 2008), based on a range of research papers, but in particular, those included in Davidson & Rothwell 1993. The table below is based on the collation of these data together with author observations of construction studies on the Humber Estuary and produced in Cutts & Allen, 1999.

Personnel and plant on mudflat:	High (and should be restricted at all times)
Third party on mudflat:	High (but difficult to restrict)
Personnel and plant on seaward toe and face:	High to Moderate
Intermittent plant and personnel on crest:	High to Moderate
Third party on bank:	High to Moderate
Irregular piling noise (above 70db):	High to Moderate
Long-term plant and personnel on crest:	Moderate
Regular piling noise (above 70db):	Moderate
Irregular noise (50db - 70db):	Moderate
Regular noise (50db - 70db):	Moderate to Low
Occasional movement of crane:	Moderate to Low
Noise below 50db:	Low
Long-term plant only on crest:	Low
Activity behind flood bank (inland):	Low



Noise Disturbance Effect on Waterbirds



Noise (sound pressure level; SPL) is a complex parameter usually measured in decibels (dB), but with a range of other metrics associated with this. Points to consider in monitoring and assessing noise are:

Noise levels are described on a logarithmic rather than linear scale, so that a doubling of the decibel figure does not entail a doubling of loudness; two or more noise sources are not directly additive in loudness effect; without a distance from source figure, a noise level is not of great value, except as an indicator of response threshold (e.g. a noise of 70dB at the receptor can either originate from a source of c. 90dB around 10m away, or a noise source of 120dB if 300m distant). Threshold response figures quoted in this report are for SPL at the **receptor** (bird) unless otherwise stated.

High Noise Level Effects

Noise disturbance is typified by regular responses to stimuli with birds moving away from the works to areas which are less disturbed (within noise tolerances). Most birds will show a degree of response to noise stimuli. Birds that remain in the affected area may not forage efficiently and if there are additional pressures on the birds (cold weather, extreme heat etc.) then this may impact upon the survival of individual birds or their ability to breed. For auditory disturbance to qualify as a high level, it must constitute a sudden noise event of over 60dB (at the bird, not at source) or a more prolonged noise of over 72dB. Included at the bottom of this worksheet is a graphic, showing how noise at source relates to noise at the receptor (using standard decay formulae) and categorising this as high, moderate or low impact.

Moderate and Low Noise Level Effects are described on the next page



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Noise Disturbance Effects on Waterbirds

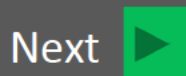
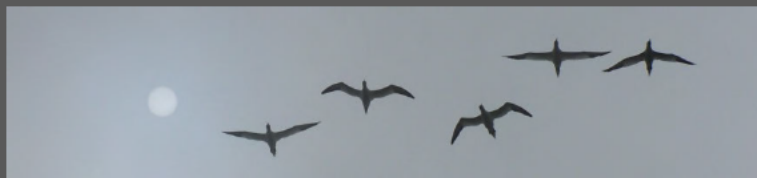


Moderate Noise Level Effects

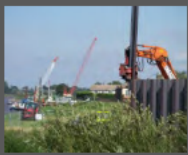
Moderate noise disturbance is typified as high level noise which has occurred over long periods so that birds become habituated to it or lower level noise which causes some disturbance to birds. This encompasses occasional noise events above 55dB, regular noise 60-72dB and long-term regular noise above 72dB, where birds have become habituated. There is cross-over in moderate and high level noise thresholds although the lower band can be assumed unless the species is particularly sensitive. Those species that are particularly sensitive are Brent Goose, Curlew & Redshank. Birds that may be more sensitive than average include Shelduck & Bar-tailed Godwit (Smit & Visser, 1993).

Low Noise Level Effects

Low level noise is classed as that which is unlikely to cause response in birds using a fronting intertidal area. As such noises of less than 55dB at the bird are included in this category. These effects are likely to be masked by background inputs in all but the least disturbed areas and thus would not disturb the birds close by. Noise between 55-72dB in some highly disturbed areas e.g. industrial or urban areas and adjacent to roads, may feature a low level of disturbance provided the noise level was regular as birds will to often habituate to a constant noise level.



Noise Disturbance effects on Waterbirds



Based on the observed responses of waterbirds (primarily Mallard and Redshank) to various noise stimuli, it has been possible to derive an overview table utilising the standard distance decay rates for noise. As such, it is possible to calculate the likely disturbance effect for a noise level and distance of receptor from source. E.g. plant generating 100dB(A) at around source will provide a likely 'acceptable' receptor dose of 70dB(A) at c. 20m distance, and a source of 90dB(A) would be below the impact threshold at c. 10m.

Metres from Source	dB(A)										
0.67	120	110	100	95	90	85	80	75	70	65	60
1.33	114	104	94	89	84	79	74	69	64	59	54
2.67	108	98	88	83	78	73	68	63	58	53	48
5.33	102	92	82	77	72	67	62	57	52	47	42
10.67	96	86	76	71	66	61	56	51	46	41	36
20.67	90	80	70	65	60	55	50	45	40	35	30
42.67	84	74	64	59	54	49	44	39	34	29	24
85.33	78	68	58	53	48	43	38	33	28	23	
170.67	72	62	52	47	42	37	32	27	22		
341.33	66	56	46	41	36	31	26	21			
682.66	60	50	40	35	30	25	20				
1365.32	54	44	34	29	24						

Acceptable 'dose' levels (e.g. to 70dB(A) are shaded green with dark green unlikely to have any affect whilst the pale green might occasionally induce a low level behavioural response such as a heads-up; yellow to orange shading is where a response is likely but mitigation may be effective in reducing the disturbance risk; pale red where mitigation is necessary and might be of value, but with a remaining risk of effect; dark red where a flight response is almost certain to occur and would be increasingly difficult to mitigate through

Simple screening etc and may require the cessation of works during high sensitivity periods. However, the level of effect will change slightly on a site per site basis due to differing ambient noise levels at a location. A useful noise calculator resource can be found at:



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Visual Disturbance Effects on Waterbirds



As noted earlier in this tool, whilst visual disturbance effects on waterbirds have been more frequently studied, empirical information on threshold variability remains poor. However, In most instances a visual stimuli will create a disturbance effect before any associated noise starts to have an effect e.g. a flight response might be expected by many species if approached to within c. 100-150m across a mudflat, whereas for such an affect to occur through noise alone, then this would require a SPL of c. 120-130dB to be generated at source (around the threshold of pain).

High Level Visual Disturbance

This is typified by regular reactions to visual stimuli with birds moving away from the works (source) to areas which are less disturbed. Most birds will show a degree of response to stimuli. Birds that remain in the affected area may not forage efficiently and if there are additional pressures on the birds (cold weather, extreme heat etc.) then this may impact upon the survival of individual birds or their ability to breed. Visual stimuli reaches high levels of disturbance extremely easily with workers operating outside of equipment, fast movement, large plant and close proximity to the birds (especially encroachment on mudflats) contributing to this level of disturbance.

Moderate Level Visual Disturbance

Typified as either high level disturbance which has occurred over long periods so that birds become habituated to it or less intrusive works which still cause a degree of disturbance. This describes visual stimuli such as works or third parties on the flood bank. Habituation occurs less with workers on the flood bank or foreshore working outside machinery. If a worker leaves plant it usually increases the disturbance level to high. There is a cross-over in the moderate and high level thresholds, although unless a species is particularly sensitive or it is a new activity then the lower band can be assumed.



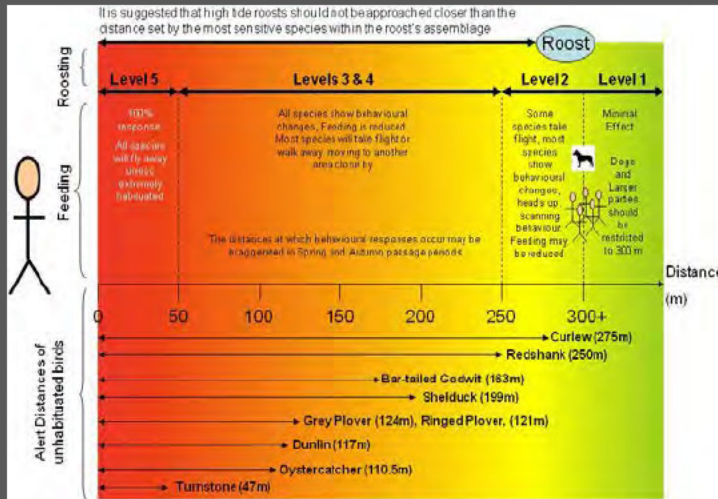
Visual Disturbance Effects on Waterbirds



Low level Visual Disturbance

This is stimuli that is unlikely to cause a response in birds using an adjacent wetland. Most works would not qualify as low-level impact unless they were out of sight of the birds and any disturbance then would be considered noise-related disturbance (there remain overflight issues for some species whereby flights to and from inland feeding and roost sites can mean that behind bank works have an effect). Long-term works inc. plant on a floodbank are also considered to be low impact. This type of work would initially qualify as moderate disturbance but with the absence of workers on the floodbank, birds would quickly become habituated. If workers were to appear alongside plant this would immediately increase the disturbance to moderate.

Click on the image below to enlarge
Taken from Cutts *et al*, 2009



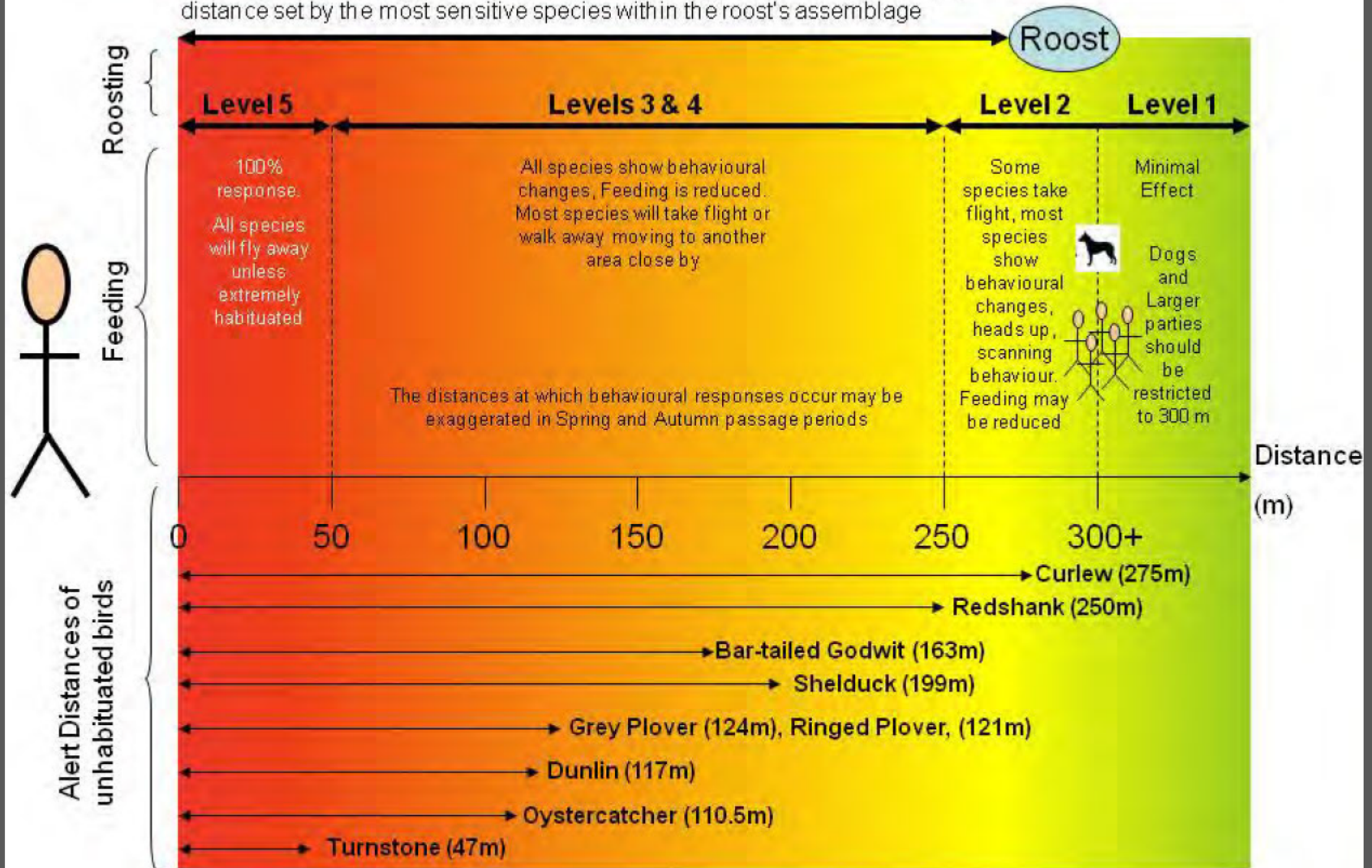
To the left is a schematic summarising basic visual disturbance thresholds for general activities, key species and function. It indicates that for some species, behavioural responses during feeding may commence at around 300m distance (e.g. Curlew), whilst for others, a range of 150m to 100m is the response threshold (e.g. Dunlin). For roost sites, a generic response threshold radius of c. 300m has been derived, based around the approach distance for the most sensitive species. This because when disturbance occurs at a roost site, there is often a mass flight response or 'spook', where all species vacate an area at the first movement of an individual bird, regardless of respective species sensitivity thresholds).



Visual Disturbance on Waterbirds: Summary Effects



It is suggested that high tide roosts should not be approached closer than the distance set by the most sensitive species within the roost's assemblage





High Level Disturbance Stimuli

- Sudden single noise of over 60dB (at the bird) e.g. single or initial pile impact, dropping of piles on hard surface in undisturbed environment.
- Continuous/repetitive noise over 72dB (at the bird) e.g. ongoing percussive or Movax vibro-piling (depending on receptor distance).
- Close proximity of activities to birds e.g. works or works access undertaken less than 100m from bird activity
- Works on foreshore. Potentially substantially greater level of impact compared to similar works on bank crest. Some habituation possible.
- Workers operating outside of plant e.g. single operative working on the bank may have a greater impact than an operational excavator or other plant.
- Workers vacating plant e.g. when an operator vacates an excavator or other plant, then disturbance levels can increase.
- Works access e.g. access by operators along bank crest to and from plant can have a greater disturbance effect than the plant operation.
- Large/fast moving machinery e.g. slow moving vehicles can have a lower impact than fast. However vehicles stopping can cause a flight response.
- 3rd parties accessing along the foreshore. Often difficult to account for and manage, but restriction to public access can be effective mitigation.

Moderate Disturbance Stimuli

- Sudden noises of 55-60dB (at the bird) e.g. as above (55-60dB can be moderate or high depending on context).
- Continuous/repetitive noises 60-72dB (at the bird) e.g. as above.
- High level disturbance activities that have reduced impact due to habituation. As above, but if ongoing, habituation can occur reducing impact.
- Slow moving/small plant. Plant movement can cause disturbance at any speed. However vehicles coming to a halt can on occasion increase response.

Low Level Disturbance Stimuli

- Noise of less than 55dB (at bird). This is often below background levels in estuaries.
- Noise of 55-72dB in a highly disturbed environment e.g. with background ambient noise levels of >60dB.
- Moderate level disturbances that have reduced impact due to habituation. As above but with regular occurrence increasing habituation.
- Works that are out of sight of birds and create a low level noise e.g. behind bank - but overflying birds may respond and locate away from works.
- High level works where the birds are always over 500m away (before start up). This may be reduced to a 300m radius with habituation.
- Moderate level works where the birds are over 300m away (before start up). Potential for further slight range reduction with habituation (c. 250m)

It is emphasised that the above are only 'rules of thumb' and will often require additional detailed assessment on a site per site basis, reflecting a range of modifying parameters such as species assemblage detail, time of year, intertidal morphology, flood protection bank details, adjacent habitat, background activity etc. This information is designed for initial high level planning not detailed impact assessment.



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Seasonality of Disturbance Sensitivity



Timing of works has the potential to reduce impact levels substantially, including the reduction in disturbance effects. However, the efficacy of timing in achieving this will depend on the species (and associated habitats) in proximity to the planned works. This toolkit primarily considers the effects of disturbance to waterbirds on estuaries, and these birds are most numerous during the autumn, winter and spring.

However, although most waterbirds will vacate estuaries during the summer, this absence is relatively short, as some species migrate through estuaries to northern breeding grounds during the late spring, with northern European estuaries generally cleared latest, whilst failed and non-breeders can move back through estuaries on return migration during late summer, with arrivals at northern sites being earliest. As such, the 'summer period' of 'no waterfowl' is effectively only very short, although in terms of numbers, September through to April inclusive features the greatest sensitivity.

Seasonal Waterbird Sensitivity Summary by Functional Group

Broad monthly sensitivity of waterbird groups in relation to construction works

Broad Functional Group	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Feeding Wildfowl	H	H	H	M	M	L	L	L	M	M	H	H
Roosting Wildfowl	H	M	M	M	L	L	L	M	H	M	H	H
Small Feeding Waders	H	M	H	H	M	0	0	M	M	H	H	H
Large Feeding Waders	H	M	H	M	L	0	0	M	H	H	H	H
Roosting Waders	H	M	L	L	L	0	0	M	H	H	H	H
General Sensitivity	H	H	H	H	M	L	L	M	H	H	H	H



Seasonality of Disturbance Sensitivity



This disturbance toolkit concentrates on impacts to non-breeding birds. However, these too require some consideration. The breeding season can be considered to run from March to July for most species and during this time many of the species mentioned in the toolkit are absent from estuaries as they breed in the high Arctic (e.g. Turnstone & Sanderling), on upland moors (e.g. Dunlin & Golden Plover) or on wet meadows away from estuaries (e.g. Black-tailed Godwit, Curlew & Redshank). Only Oystercatcher, Shelduck and Ringed Plover breed on the foreshore and its surrounds although Curlew, Lapwing and Redshank may breed in relative proximity to estuaries.

In the UK, birds which are showing signs of breeding MUST be considered under the WCA, 1981.

In addition, differing habitats will vary in their main sensitivity periods, based around function e.g. mudflats are most important during the winter for wintering waterbirds, but reedbed and wet grassland are generally more important during the spring and summer for breeding birds (inc. passerine species). A broad characterisation of monthly sensitivities of key aquatic habitats based on all birds (including non SPA species) are given below. However, this is a high level approach and individual sites may have variations on these sensitivity weightings that should be taken into e.g. assemblage, habitat & location.

Wetland Habitat Seasonal Sensitivity Summary

Broad monthly sensitivity of wetland habitats (for birds) in relation to disturbance and damage/loss

Broad Habitat	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mudflat	H	H	H	H	M	L	L	M	H	H	H	H
Saltmarsh	H	H	L	M	M	M	M	L	M	H	H	H
Reedbed	M	L	M	H	H	H	H	M	M	L	M	M
Open Water	H	M	M	H	H	H	L	L	L	M	H	H
Wet Grassland	M	L	M	H	H	M	L	L	M	M	M	M
Scrub	L	L	M	H	H	M	L	L	L	L	M	M



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Selected References



A summary of findings from research papers is provided in Cutts & Hemingway 2012. A selection of the most useful texts of the subject are provided below:

Cayford, J., 1993. Wader disturbance: a theoretical overview. *Wader Study Bulletin*, 68, pp. 3-5.

Cutts, N.D., Phelps, A., & Burdon, D., 2009. Construction and waterfowl: Defining sensitivity, response, impacts and guidance. Report to Humber INCA. Institute of Estuarine & Coastal Studies, University of Hull.

Cutts, N.D., & Hemingway K.L.H., 2012. Bird disturbance from flood and coastal risk management construction activities. Report to Cascade Consulting. Institute of Estuarine & Coastal Studies, University of Hull.

Gill, J.A., Norris, K., & Sutherland, W.J., 2001. The effects of disturbance on habitat use by Black-tailed Godwits *Limosa limosa*. *Journal of Applied Ecology*, 38, pp. 846-856.

Goss-Custard, J.D., Triplet, P., Sueur, F., & West, A.D., 2006. Critical thresholds of disturbance by people and raptors in wading birds. *Biological Conservation*, 127, pp. 88-97.

Hirvonen, H., 2001. Impacts of highway construction and traffic on a wetland bird community. *Proceedings of the 2001 international conference of ecology & transportation*. pp.369-372.

IECS, 2007. Avifaunal disturbance assessment: flood defence works, Saltend. Report to the Environment Agency. Institute of Estuarine & Coastal Studies (IECS), University of Hull, UK.

Koolhaas, A., Dekinga, A., & Piersma, T., 1993. Disturbance of foraging Knots by aircraft in the Dutch Wadden Sea in August-October 1992. *Wader Study Group Bulletin*, 68, pp. 20-22.

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

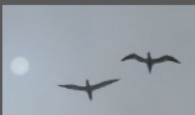
Wright, M.D., Goodman, P., & Cameron, T.C., 2010. Exploring behavioural responses of wading birds to impulsive noise. *Wildfowl*, 60, pp. 150-167.



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Species Accounts – Disturbance



The identification, ecology and sensitivity of the following species are addressed in detail on the following **Species Accounts** pages in taxonomic order. These species are considered to be some of those most commonly encountered on estuaries and for which disturbance sensitivity can be addressed. Navigation to each **Species Account** can be made by clicking on the links below (given in taxonomic order & coloured for individual disturbance sensitivity). International name is in brackets.

[\(Branta\) Brent Goose](#)
[*Branta bernicla*](#)

[\(Common\) Shelduck](#)
[*Tadorna tadorna*](#)

[Mallard](#)
[*Anas platyrhynchos*](#)

[\(Eurasian\) Oystercatcher](#)
[*Haematopus ostralegus*](#)

[\(Common\) Ringed Plover](#)
[*Charadrius hiaticula*](#)

[\(Eurasian\) Golden Plover](#)
[*Pluvialis apricaria*](#)

[Grey Plover](#)
[*Pluvialis squatarola*](#)

[\(Northern\) Lapwing](#)
[*Vanellus vanellus*](#)

[\(Red\) Knot](#)
[*Calidris canutus*](#)

[Sanderling](#)
[*Calidris alba*](#)

[Dunlin](#)
[*Calidris alpina*](#)

[Black-tailed Godwit](#)
[*Limosa limosa*](#)

[Bar-tailed Godwit](#)
[*Limosa lapponica*](#)

[\(Eurasian\) Curlew](#)
[*Numenius arquata*](#)

[\(Common\) Redshank](#)
[*Tringa totanus*](#)

[\(Ruddy\) Turnstone](#)
[*Arenaria interpres*](#)



Brent (Brant) Goose (*Branta bernicla*)



Disturbance Potential: High Sensitivity



Brent Geese are a species highly sensitive to noise disturbance and they react in a variable manner to visual disturbance (Smit & Visser, 1993). From this study they were found to react to up to 92% of aircraft passes although this declined to 64% with habituation. Although there is an element of visual disturbance with aircraft, often the noise is the greater stimuli, especially when the aircraft fly high. The sensitivity of Brent Geese also varies depending on their activity, especially to visual disturbance. When foraging they tolerate disturbance relatively nearby with an average proximity to disturbance threshold of 105m for first reaction. When roosting or loafing the birds are far more sensitive, with the range for first reaction increasing to 205m, nearly doubling in distance the effective range. This is likely to be due to increased vigilance at roost. Further to this it has been shown that during wildfowling seasons, in areas where Brent Geese are a quarry species, the range at which they will react to potential disturbance stimuli increases further to 350m indicating a dynamic response to potential disturbance activities based around a number of parameters.

Advice & Mitigation:

Brent Geese are extremely sensitive to moderate and high level visual disturbance. If geese are within 400m of works then consideration should be given to mitigation including the commencement of works and efforts should be made to avoid high level disturbance at such time if possible.

Brent Geese are very sensitive to noise stimuli but due to their wary nature and liability to flush, the minimum approach distance can be expected to be no less than 100m. At this distance using the noise response works noise required to create high level disturbance would be 110-115dB at source and thus not particularly prohibitive. This increases to 120-125dB at 300m.

Due to their sensitivity to disturbance Brent Geese are unlikely to be found in areas with high levels of general disturbance (not works disturbance). If there are geese in a moderately or highly disturbed area expect them to be more sensitive than in an area of low level normal disturbance and try to adjust accordingly.



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Shelduck (*Tadorna tadorna*)



Disturbance Potential: **High Sensitivity**



Shelduck are generally a wary species and are highly sensitive to visual disturbance. Typically they approach construction works no closer than 300m and are affected by visual disturbance up to 500m away from source. Aural disturbance occurs from 72dB upward. However, the species is subject to a high degree of habituation and further exposure to sounds of the same or greater level can lead to no response to stimuli. No response has been recorded for noise levels as high as 88dB but this is likely to be an extreme 'no response' level and caution should be exercised at receptor levels over 70dB. Observation of disturbance responses from flood protection works has suggested that Shelduck react to noise in approximately 30% of exposure events to sudden noise above 60dB or any noise above 70dB.

Advice & Mitigation:

Shelduck are extremely sensitive to moderate and high level visual disturbance. Ducks that are closer than 500m to activity should be given consideration when commencing works and efforts should be made to avoid activities with a potential high level of disturbance at such time if possible.

Shelduck are quite sensitive to noise stimuli but due to their wary nature and liability to flush, the minimum approach distance can be expected to be no less than 150m. At this distance using the noise effects table, works noise required to create a high level of disturbance at this range would be 115-120dB at source and thus not particularly prohibitive unless undertaking pilling. This would increase to 125-130dB at 500m.

Due to their sensitivity to disturbance Shelduck are unlikely to be found in areas with high levels of general disturbance (not works disturbance). If there are ducks in a moderately or highly disturbed areas, then expect them to be more sensitive to disturbance events than in an area of low level normal disturbance and attempt to adjust works accordingly.



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Mallard (*Anas platyrhynchos*)



Disturbance Potential: **Moderate Sensitivity**



Mallard are a relatively tolerant species and will habituate rapidly to activity. In undisturbed areas Mallard will flush at moderate range (up to 500m) but in more disturbed habitats (and where they often come into human contact), such as a typical estuary, this figure is reduced to between 25-300m dependent upon the stimuli (with people causing the most extreme reaction). Stationary objects can be assumed to make lesser impacts than those that move as it has been shown that slow moving and stationary boats cause a lesser displacement of Mallard than fast moving boats. However tolerances may vary seasonally and be reduced during the wildfowling season. There is very little information on the effects of noise disturbance on Mallard but direct disturbance observation of piling recorded 2 incidents of Mallards reacting to noise (heads-up response) at levels of 69dB and 71dB although higher noise generation instances c. 80dB had no observed response to loafing and foraging birds in a moderately 'noisy' tidal freshwater site on a busy navigation. Some individual Mallard were also observed foraging around equipment pontoons whilst works were ongoing, indicating habituation.

Advice & Mitigation:

Mallard are relatively tolerant of moderate and high level visual disturbance. However, birds that are closer than 200m should be considered at the commencement of 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.

Mallard are not thought to be particularly sensitive to noise stimuli but there is little evidence for this other than through our direct observation and as such a standard approach should be employed with noise up to 72dB acceptable at the bird, but with caution above 55dB (60dB in a highly disturbed area). As Mallard will forage up to within 50m of plant, this means that a source noise threshold of 105-110dB would be applicable but with caution above 87-92dB. They are quite resilient to works but will be displaced by walkers/workers on the mudflat and possibly on the floodbank. Mallard are likely to be present in lower densities in highly disturbed areas, and those that are present are likely to be highly stressed, so if birds are closer than 200m to works, then high level disturbance should be avoided if possible, especially workers operating away from plant.



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Oystercatcher (*Haematopus ostralegus*)



Disturbance Potential: **Moderate Sensitivity**



Oystercatchers are relatively tolerant of disturbance stimuli and will habituate rapidly to ongoing activity. In undisturbed areas they will flush at great range (up to 500m) but in more disturbed locations such as a typical estuary, this figure reduces to between 25-200m dependent upon the stimuli (with people causing the most extreme reaction). Agricultural vehicles average a 60m threshold before they are seen to react (and a fair assumption would be that the figure for construction plant would be similar). Stationary people and plant can be assumed to create a lesser impact than those that are mobile, as it has been shown that bait diggers cause a lesser displacement of Oystercatchers than walkers (although again habituation may be a factor in this). There is very little information on the effects of noise disturbance on Oystercatchers, but direct observation at a highly disturbed site (ambient noise level of 60dB) saw a reaction to only 9% of events with a degree of habituation assumed. Prior to the commencement of the works, Oystercatcher were observed foraging close to the works, but once activity commenced, birds foraged at 200m+ range with occasional birds venturing to within a radius of 100m from the activity.

Advice & Mitigation:

Oystercatcher are relatively tolerant of moderate and high level visual disturbance. Birds that are closer than 200m to a potential disturbance source should be considered when commencing works and efforts should be made to avoid high level disturbance events at such a time if possible, especially if it includes workers on the mudflat/fronting intertidal zone.

Oystercatcher are not thought to be particularly sensitive to noise stimuli but there is little evidence for this, so as such a standard approach should be applied, with noise up to 72dB acceptable at the bird but with caution used at levels of above 55dB (60dB in a highly disturbed area). As Oystercatcher will forage up to within 50m of plant, this means that a source noise threshold of 105-110dB may be possible but applied with caution at levels above 87-92dB. They are quite resilient to works but will be displaced by walkers/workers on the mudflat and possibly on the floodbank. Oystercatchers are likely to be present in lower densities in highly disturbed areas and those that are present are likely to be highly stressed, so if birds are closer than 200m to works, then high level disturbance activities should be avoided if possible, especially by workers operating on the frontage, away from plant.



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Ringed Plover (*Charadrius hiaticula*)



Disturbance Potential: **Low Sensitivity; extremely tolerant with habituation**



Ringed Plover are thought to be an extremely tolerant species that habituates to anthropogenic activities rapidly. They are also tolerant of people, allowing approach as close as 30-50m before flushing when confronted with a lone walker on the mudflat. There is no published evidence with regard the Ringed Plover's reaction to noise or construction works but it is likely that again they have a high threshold to such activities given their general high tolerance. Observation of disturbance impacts suggest response to construction activity is consistent with wider disturbance tolerances reported from earlier research, with birds approaching works to within 20m on occasion. However, at distances within 50m from a disturbance source they would readily flush, only to land nearby and continue foraging almost immediately. At distances of over 100m from activity birds rarely showed any sign of disturbance and appeared often unperturbed when other species in their vicinity were reacting. Ringed Plovers were observed to not react to any noise stimuli, despite exposure to noise levels up to 88dB from aircraft flying overhead.

Advice & Mitigation:

Ringed Plover are very tolerant of moderate and high level visual disturbance. Birds that are closer than 50m to works should however, be given consideration 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.

Ringed Plover would appear not to be very sensitive to noise stimuli and to habituate rapidly, especially in conjunction with visual stimuli. A noise level of up to 75dB is considered acceptable at the bird, but with caution given above 60dB levels (65dB in a highly disturbed area). They will forage extremely close to plant (<50m), and a source noise threshold of 107-112dB can be tolerated but with caution at levels above 93-98dB. If birds are primarily using an area closer than 50m to works, then it is likely that additional mitigation will be necessary. They are resilient to works activities and unlikely to be readily displaced by walkers/workers unless on close approach. Only potentially highly disturbing activities should be avoided when birds are using an area within 50m of works.



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Golden Plover (*Pluvialis apricaria*)



Disturbance Potential: **Moderate Sensitivity**; Annex 1 of the EU Birds Directive



Typically they are birds of upland in summer and agricultural land in winter. They can be present on intertidal mudflats in very large numbers during the autumn and winter, where they primarily roost (often in association with Lapwing (*Vanellus vanellus*), and can similarly use inland fields, often adjacent to estuaries as additional roost areas when mudflats are covered by the tide. As with the Lapwing, there has been very little research undertaken on the reaction and tolerance of Golden Plover to disturbance in their wintering areas, either from noise or visual stimuli, and unfortunately the species was not present during field studies at works sites during the IECS data collection process. A precautionary 'standard' approach is therefore required.

Advice & Mitigation:

Reasonably tolerant of moderate level visual disturbance, but birds that are closer than 200m to potential activities 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. Of particular note is the potential for inland roosts, often in arable fields adjacent to estuarine/riverine locations. A similar disturbance distance threshold should be considered therefore in terms of inland usage works, although flocks will use fields adjacent to industrial plant where visual and aural stimuli can be readily habituated to.

Golden Plover are moderately sensitive to noise stimuli but with little direct evidence, a precautionary approach assumes tolerance of noise up to 72dB being acceptable at the bird but with caution at levels above 55 dB (60dB in a highly disturbed area). As Golden Plover will roost to within 300m of plant this means that a source noise threshold of 120-125dB may be acceptable, but with caution above 107-112dB. If birds approach closer than 300m additional mitigation should be put in place. As the species often flies between the intertidal and adjacent terrestrial habitat to roost and feed, the presence of activity behind (landward) of flood defences can also have an influence on behaviour (even when out of sight to birds using the intertidal zone), with limited data suggesting that differential site take up occurs where works are present with flocks moving to adjacent (possibly sub-optimal) areas to roost.



Grey Plover (*Pluvialis squatarola*)



Disturbance Potential: **Moderate Sensitivity**



Limited data suggest that Grey Plover are a relatively disturbance tolerant species, although the ability of Grey Plover to habituate to works is unknown. They are surprisingly tolerant of people, allowing approach as close as 50-100m before flushing when confronted with a lone walker on the mudflat, even when roosting. However, despite this 'tolerance', Grey Plover may abandon highly disturbed areas in favour of quieter areas to forage and roost and the threshold linkages for this or undetermined. It is also largely unclear how tolerant the Grey Plover is to noise disturbance, and unfortunately there were no Grey Plover observed near the various disturbance monitoring sites. As such, the limited evidence require a precautionary approach in setting likely response thresholds for the species to works.

Advice & Mitigation:

Grey Plover are tolerant of moderate and high level visual disturbance, however, birds that are closer than 200m to works should be considered prior to commencement of the activity, 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.

Grey Plover are probably moderately sensitive to noise stimuli but due to their wary nature, the minimum approach distance can be expected to be no less than 150m. At this distance using the noise:distance table, the sound level required to create a high level disturbance impact would be 115-120dB at source and thus not particularly prohibitive and this would increase to 125-130dB at 500m from source.

Grey Plover are resilient to flushing by works but may be displaced by walkers/workers on the mudflat and possibly on the floodbank. Grey Plover are likely to be absent in highly disturbed areas and those that are present are likely to be highly stressed, so if birds are closer than 200m to works, then high level disturbance activity should be avoided if possible.



Lapwing (*Vanellus vanellus*)



Disturbance Potential: **Moderate Sensitivity**



Typically the Lapwing is a bird of the uplands in summer and agricultural land in winter. However they do use the intertidal zone to roost (often with Golden Plover, *Pluvialis apricaria*) and can be encountered in large numbers at such sites, which are often habitually utilised. There is very little research on the reactions of Lapwing to disturbance in their wintering areas, either in response to noise or visual stimuli. Due to this paucity of information, a standard approach is considered appropriate, with additional information used, where possible, from the disturbance effects work being carried out by IECS. Unfortunately Lapwing were not encountered from the study, but a small number of records were collected from earlier work suggesting no response to visual disturbance at c. 300-400m. Previous *ad hoc* observations suggest that Lapwing do not react particularly strongly to disturbance when at roost, but information is limited and can only support a relatively conservative position on disturbance potential.

Advice & Mitigation:

Lapwing are reasonably tolerant of moderate level visual disturbance stimuli. However, birds that are closer than 300m to planned activities 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 a mudflat. Of particular note however, is their potential for inland roosting, often in arable fields adjacent to estuarine/riverine locations. A similar disturbance distance threshold should be considered therefore in terms of inland usage and the location of works should be considered in the context of potential field usage by the species.

Lapwings are thought to be only moderately sensitive to noise stimuli but there is little evidence to support this, and so a standard 'precautionary' approach should be applied, with noise of up to 72dB acceptable at the bird but with caution given for noise levels in excess of 55dB (60dB in a highly disturbed area). As Lapwing will roost to within 200m of plant, this means that a source noise threshold of 115-120dB can be applied, but with caution above 87-92dB. If birds approach closer than 200m, then appropriate mitigation should be put in place.



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Knot (*Calidris canuta*)



Disturbance Potential: **High Sensitivity to Noise Disturbance**; **Tolerant of Visual Disturbance**



Despite a paucity of published disturbance response research data, Knot appear to be a relatively tolerant species that habituates to works rapidly. They are also surprisingly tolerant of people but despite this tolerance of visual disturbance, they are highly disturbed by overflying aircraft which combine visual stimuli with noise and a resemblance to raptors (predators). This sort of reaction may be a result of facilitation - a number of different stimuli occurring simultaneously causing a greater reaction than expected. Knot would also seem to be highly sensitive to noise disturbance, moving away from stimuli readily, and from a study on the Dee estuary it would appear that such displacement can have significant impacts on Knot at a population level. Direct observation of disturbance responses from flood works saw Knot responding in a similar way to that described from the limited existing research, with birds reacting to walkers at <75m when roosting. Birds were occasionally flushed or showed disturbed behaviour to truck movements which encompass a number of differing stimuli - noise, large size - although reactions were restricted to within 100m. Knot were seen to react to aircraft overhead at a noise level of 88dB (heads-up).

Advice & Mitigation:

Knot are tolerant of moderate and high level visual disturbance events. Birds that are closer than 100m 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.

Knot are conversely quite sensitive to noise stimuli, especially in conjunction with visual stimuli, and as such a noise of up to 70dB is acceptable at the bird but with caution required at levels above 55 dB (60dB in a highly disturbed area). As Knot will forage close to plant (<50m) and to workers (>75m), this means that a source noise threshold of 100-105dB can be applied with caution required above 87-92dB. Knot are resilient to works activity in general, but may be displaced by walkers/workers on the mudflat and possibly on the floodbank. Knot are likely to be present in lower densities in highly disturbed areas and those that are present are likely to be stressed, so if birds are closer than 75m to potential works, then disturbance should be avoided, especially by workers operating away from plant.



Sanderling (*Calidris alba*)



Disturbance Potential: **Low Sensitivity; extremely tolerant with habituation**



Sanderling are thought to be an extremely tolerant species that rapidly habituates to anthropogenic activity. They are also tolerant of people, allowing approach as close as 6-50m before flushing when confronted with a lone walker on the mudflat. There is no published information regarding their reaction to noise or construction works, but it is likely that as with other 'tolerant' species, they have a relatively high threshold to construction work activity and associated noise. Observation of disturbance responses identified Sanderling response behaviour to be consistent with that described from existing research, with birds tolerating an approach distance of less than 20m before reacting. This was observed in a highly disturbed area, with much public use of the foreshore and thus some degree of existing habituation would be expected. Of the 88 potential disturbance events observed from the study, only 6 caused reaction, of which none were seen to be caused by the works and with walkers (and dog walkers in particular) causing the greatest reactions. There was no evidence of reactions to noise measured to 90dB from piling operations.

Advice & Mitigation:

Sanderling are tolerant of moderate and high level visual disturbance. However, birds that are closer than 50m to the 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.

Sanderling are not very sensitive to noise stimuli and habituate rapidly, especially in conjunction with visual stimuli. A noise of up to 75dB is considered acceptable at the bird but with caution at levels above 60dB (65dB in a highly disturbed area). As Sanderling will forage close to plant (<100m) this means that a source noise threshold of 112-117dB could be applied for close feeding individuals, but with caution above 97-102dB. If birds are closer than 100m then mitigation should be applied, but for birds present at some distance from the works, then a tolerance to c. 120db works might be expected. Sanderling are resilient to works and are unlikely to be displaced by walkers/workers. As such, highly disturbing activities should be avoided only where birds are within 75m if possible.



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Dunlin (*Calidris alpina*)



Disturbance Potential: **Low Sensitivity**; subspecies *schinzii* Annex 1 of the EU Birds Directive



Dunlin are a relatively tolerant species that habituates to various works. They are also surprisingly tolerant of people, allowing approach as close as 50-90m before flushing when confronted with a lone walker on the mudflat. When foraging, they are often initially disturbed by activity start-up, with a flight response, but will then forage back towards the works, approaching to within 25m on occasion, before sometimes 'spooking' and moving away again, to repeat the process. Despite this general tolerance of visual disturbance they can be disturbed by overflying aircraft which combine visual stimuli with noise and have a resemblance to raptor predators. This sort of reaction may be a result of facilitation - a number of different stimuli occurring simultaneously causing a greater reaction than expected. Dunlin are moderately sensitive to noise disturbance, moving away from highly disturbing stimuli. Direct observation of disturbance events found that Dunlin exhibited a similar pattern to that identified from previous research, with birds occasionally reacting to works. Birds were occasionally flushed or showed disturbed behaviour to truck movements however, in some instances birds would forage within 20m of the works with habituation. Despite this Dunlin can be displaced from up to a 300m range by regular high level stimuli and were seen to react to aircraft overhead at a noise level at receptor of 88dB (heads-up).

Advice & Mitigation:

Dunlin are very tolerant of moderate and high level visual disturbance. Birds that are closer than 75m 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.

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. Dunlin will forage extremely closely to plant (<50m) and >75m from worker. This means that a source noise threshold of 102-107dB can be applied but with caution above 92dB. Dunlin are resilient to works but may be displaced by walkers/workers on the mudflat and possibly on the floodbank. Dunlin are likely to be present in lower densities in highly disturbed areas and those that are present are likely to be highly stressed, so if birds are regularly present closer than 75m to the potential works, then high level disturbance events should be avoided if possible, especially for workers away from plant.



Black-tailed Godwit (*Limosa limosa*)



Disturbance Potential: **Moderate Sensitivity**



Black-tailed Godwit are an under-studied species with regard disturbance impacts, both from noise and visual sources. Gill *et al.* (2001) suggest that the species is tolerant of disturbance but little detail on how this affects birds below the population level is described. Given that it is suggested that the Black-tailed Godwit is a robust species with regard disturbance, it is suggested that a standard approach should be used until further evidence is available. No Black-tailed Godwit were observed during the recent disturbance data collection work by IECS, but from previous work on the Humber, they were observed to be tolerant of general works including Movax pilling at a range of c. 150m, and on one occasion were observed moving towards a noise source whilst tideline foraging, with a noise level at receptor (pilling) of 70dB. A flight response by a small flock was also noted at a range of c. 250m relating to crane jib operation moving a load above the skyline over the flood defences.

Advice & Mitigation:

Given the paucity of information, Black-tailed Godwit are considered tolerant of moderate visual disturbance. However, birds that are closer than 250m to activity should be considered when commencing works and efforts should be made to avoid high level disturbance at such a time if possible, especially if it includes workers on the mudflat/fronting intertidal zone.

They are considered moderately sensitive to noise stimuli and can be expected to approach works to within 100m. At this distance using noise response data, the source level required to create high level disturbance would be 110-115dB and possibly greater (based on limited observed response information) thus not particularly prohibitive. Moderate disturbance at this distance would be caused by source noise of 92dB plus, but this is considered precautionary given data deficiencies. Due to these issues, information on how close Black-tailed Godwit will forage in relation to works is uncertain, and as such, if they approach closer than 100m then caution should be exercised. They are resilient to flushing by works but may be displaced by walkers/workers on the mudflat and possibly on the floodbank. They may be absent in highly disturbed areas and those that are present are more likely to be stressed, so if birds are closer than 100m to works, then high level disturbance should be avoided if possible.



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Bar-tailed Godwit (*Limosa lapponica*)



Disturbance Potential: **Moderate Sensitivity**; Annex 1 of the EU Birds Directive



Bar-tailed Godwit are a relatively disturbance tolerant species that habituates to works rapidly. They are also surprisingly tolerant of people, allowing an approach range of as close as 40-100m before flushing when confronted with a lone walker on the mudflat. However, despite this tolerance, Bar-tailed Godwits rapidly abandon highly disturbed areas in favour of quieter areas to forage and roost. research has indicated that Bar-tailed Godwit are moderately affected by auditory stimuli, reacting to 38% of overflying planes in one study. Direct observation of disturbance responses by the species to flood defence works supported the evidence with regard reactions to visual stimuli. Only a single negative reaction, caused by a third party, was noted at a moderately disturbed site, whilst during the same study, 140 potential disturbance events were tolerated by the birds, including several aircraft passes recorded at between 69-72dB. However, despite seemingly being unaffected by the works, the species did not forage within 200m of the activity, despite foraging activity being actively pursued beyond this range, suggesting that they had actively vacated the area close to the works, this being consistent with previous research findings.

Advice & Mitigation:

Bar-tailed Godwit are tolerant of moderate and high level visual disturbance stimuli. However, birds that are closer than 200m should be considered when commencing works and efforts should be made to avoid high level disturbance events at such time if possible especially if it includes workers on the mudflat/fronting intertidal zone.

Bar-tailed Godwit are moderately sensitive to noise stimuli, but due to their wary nature the minimum approach distance can be expected to be no less than 150m. At this distance, using works noise response levels, sound levels required to create a high level disturbance would be 115-120dB at source and thus not particularly prohibitive. This increases to a 125-130dB source tolerance at a range of 500m.

Bar-tailed Godwit are resilient to flushing by works but may be displaced by walkers/workers on the mudflat and possibly on the floodbank. Bar-tailed Godwits are likely to be absent in highly disturbed areas and those that are present are likely to be highly stressed, so if birds are closer than 200m, high level disturbance stimuli should be avoided if possible.



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Curlew (*Numenius arquata*)



Disturbance Potential: **Moderate Sensitivity**



Research evidence indicates that Curlew are an extremely wary species that does not habituate to works rapidly and are also particularly intolerant of people, allowing approach to a range of 120-300m before flushing when confronted with a lone walker on the mudflat. This figure may rise to 550m in a disturbed environment when facilitation effects occur and Curlew are also highly reactive to aircraft, research showing disturbed behaviour for 42-86% of aircraft over-flights. However, from the recent programme assessing disturbance responses from flood defence works, this intolerance was not evidenced to the same degree. Observation of two moderately disturbed sites, one with highly disturbing works and one with moderately disturbing works both had Curlew foraging regularly within 100m. No reactions were observed to machinery operation or aircraft passing overhead. Earlier monitoring of impacts identified a general intolerance of the species to the presence of people on flood banks (in vehicle was OK).

Advice & Mitigation:

Curlew are considered to be wary of moderate and high level visual disturbance. Birds that are closer than 300m should be considered when commencing works and efforts should be made to avoid high level disturbance at such a time if possible, especially if it includes workers on the mudflat/fronting intertidal zone. Similarly, whilst they may tolerate vehicle movements, once a person gets out of a vehicle then flight can occur.

Curlew are moderately sensitive to noise stimuli but due to their wary nature the minimum approach distance can be expected to be no less than 100m. At this distance using the noise response table, noise required to create high level disturbance would be 107-112dB at source and thus not particularly prohibitive, and increasing to 117-122dB at 300m. If birds should approach closer than 100m, then highly disturbing activities should be avoided if possible.

If the works are in a highly disturbed area with aircraft and disturbance from the public then expect Curlew to be particularly wary and adjust accordingly. Curlew may well be displaced by the works in these areas so extra care should be shown.



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Redshank (*Tringa totanus*)



Disturbance Potential: **High Sensitivity to Noise Disturbance**; **Tolerant of Visual Disturbance**



Redshank are a relatively tolerant species that habituates to works rapidly. They are also surprisingly tolerant of people, allowing approach as close as 70-115m before flushing when confronted with a lone walker on the mudflat. Despite this tolerance of visual disturbance, they are highly disturbed by overflying aircraft which have a resemblance to raptors. They are also highly sensitive to noise disturbance, moving away from stimuli readily. Observation of works impacts on Redshank identified a broadly similar tolerance range to that of existing research, with birds reacting to workman at <75m. Redshank were seen to react to aircraft overhead at noise levels of 72dB (heads-up) and 88dB (flushed) but it is unlikely that there was a visual component to this response, as the flight altitude was high.

Advice & Mitigation:

Redshank are very tolerant of moderate and even high level visual disturbance stimuli. However, birds that are closer than 100m 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 conversely 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). As Redshank will forage extremely close to plant (<50m) and >75m to workers, this means that a source noise threshold of 100-105dB should be applied, with caution above 87-92dB.

Redshank are resilient to works but may be displaced by walkers/workers on the mudflat and possibly on the floodbank. They are likely to be present in lower densities in highly disturbed areas and those that are present are likely to be highly stressed, so if birds are closer than 75m from a works source, high level disturbance should be avoided if possible, especially by workers operating away from plant.



Turnstone (*Arenaria interpres*)



Disturbance Potential: **Low Sensitivity; extremely tolerant with habituation**



Turnstone are thought to be an extremely tolerant species that habituates rapidly. They are tolerant of people, allowing approach as close as 30-50m before flushing when confronted with a lone walker on the mudflat (and will feed closely around people on harbours etc). There is no published evidence with regard their reaction to noise or works, but it is likely that again they have a high threshold to noise and works. Direct observation of disturbance effects from works found Turnstone responses to be consistent with the expected high tolerance, with birds allowing approach to works to within 10m before reacting. This was in a highly disturbed area with much public use of the foreshore and of 127 potential disturbance events observed, only 19 caused reaction of which only 3 were caused by the works with trucks flushing Turnstones at between 15-100m. Walkers (and dog walkers in particular) caused the greatest reactions. There was no evidence of reactions to noise, which reached levels above 90dB due to piling.

Advice & Mitigation:

Turnstone are very tolerant of moderate and high level visual disturbance, although birds that are closer than 50m proximity 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.

They are not very sensitive to noise stimuli and habituate rapidly, especially in conjunction with visual stimuli. A noise of up to 75dB appears acceptable at the bird, but with caution suggested for levels above 60dB (65dB in a highly disturbed area). They will forage extremely close to plant (<50m and often within 10m), which means that a source noise threshold of 107-112dB can be applied with caution possible above 93-98dB. However, high noise levels at source (c. 120db) are probably acceptable for birds foraging at distance, but if birds are regularly foraging closer than 50m, then this should be mitigated for. They are resilient to works and are unlikely to be displaced by walkers/workers. As such highly disturbing activities should be avoided if birds are within 50m if possible.

Annex 5.0 EUROPEAN SITE CITATIONS AND CONSERVATION OBJECTIVES

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

Citation for Special Area of Conservation (SAC)

Name: North Downs Woodlands
Unitary Authority/County: Medway, Kent
SAC status: Designated on 1 April 2005
Grid reference: TQ674629
SAC EU code: UK0030225
Area (ha): 287.58
Component SSSI: Halling to Trottiscliffe Escarpment SSSI, Wouldham to Detling Escarpment SSSI

Site description:

This site consists of mature beech *Fagus sylvatica* forests and yew *Taxus baccata* woods on steep slopes. The stands lie within a mosaic of scrub, other woodland types and areas of unimproved grassland on thin chalk soils.

The beech and yew woodland is on thin chalk soils and where the ground flora is not shaded dog's mercury *Mercurialis perennis* predominates. Associated with it is stinking iris *Iris foetidissima* and several very scarce species such as lady orchid *Orchis purpurea* and stinking hellebore *Helleborus foetidus*.

The chalk grassland, on warm south-facing slopes, is dominated by upright brome *Bromopsis erecta* and sheep's-fescue *Festuca ovina* but supports many other plants which are characteristic of unimproved downland, including the nationally rare ground pine *Ajuga chamaepitys*.

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

- *Taxus baccata* woods of the British Isles. (Yew-dominated woodland)*
- *Asperulo-Fagetum* beech forests. (Beech forests on neutral to rich soils)
- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*). (Dry grasslands and scrublands on chalk or limestone)

Annex I priority habitats are denoted by an asterisk (*).

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0030225
Date of registration: 14 June 2005

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

European Site Conservation Objectives for North Downs Woodlands Special Area of Conservation

Site code: UK0030225



With regard to the SAC and the natural habitats and/or species for which the site has been designated (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 Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

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:

H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*); Dry grasslands and scrublands on chalk or limestone

H9130. *Asperulo-Fagetum* beech forests; Beech forests on neutral to rich soils

H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland*

* denotes a priority natural habitat or species (supporting explanatory text on following page)

* Priority natural habitats or species

Some of the natural habitats and species for which UK SACs have been selected are considered to be particular priorities for conservation at a European scale and are subject to special provisions in the Habitats Regulations. These priority natural habitats and species are denoted by an asterisk (*) in Annex I and II of the Habitats Directive. The term 'priority' is also used in other contexts, for example with reference to particular habitats or species that are prioritised in UK Biodiversity Action Plans. It is important to note however that these are not necessarily the priority natural habitats or species within the meaning of the Habitats Regulations.

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the "Habitats Regulations"). 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 available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term 'favourable conservation status' is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

**North Downs Woodlands Special Area of Conservation (SAC)
Site Code: UK0030225**



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Date of Publication: 11 February 2019

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to North Downs Woodlands SAC. This advice should therefore be read together with the SAC Conservation Objectives available [here](#).

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	North Downs Woodlands Special Area of Conservation (SAC)
Location	Kent
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	April 2005
Qualifying Features	See below
Designation Area	288.58 Hectares
Designation Changes	None
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Halling to Trottiscliffe Escarpment SSSI Wouldham to Detling Escarpment SSSI
Relationship with other European or International Site designations	None

Site background and geography

North Downs Woodlands SAC is situated in south-east England within the [North Downs National Character Area](#), which forms a chain of chalk hills extending from the Hog's Back in Surrey and ending dramatically at the internationally renowned White Cliffs of Dover.

The North Downs Woodlands SAC consists of mature Beech forests and Yew woods on steep slopes. The stands lie within a mosaic of scrub and other woodland types and are the most easterly of the Beech woodland sites selected. Parts of the woods were affected by the storm of 1987. Small areas of unimproved chalk grassland are also present.

The area is considered one of the best areas in the United Kingdom for *Asperulo-Fagetum* beech forests and one of the best areas in the British Isles for *Taxus baccata* woods.

The geological interest within the site occurs in the Upper and Lower Culand Pits. The sequence of Chalk in these pits has yielded rich and diverse collections of fossil fishes which complement those from Lewes in Sussex. The material is superbly preserved, frequently without significant crushing or distortion, and the fish are usually articulated, and thus have been the subject of much scientific research.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying habitats:

- **H9130 *Asperulo-Fagetum* beech forests**

This site consists of mature *Asperulo-Fagetum* beech forests and also yew H91J0 Yew *Taxus baccata* woods on steep slopes. The stands lie within a mosaic of scrub and other woodland types and are the most easterly of the beech woodland sites selected. Parts of the woods were affected by the Great Storm of 1987.

- **H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)(*important orchid sites)**

These grasslands are typically found on thin, well-drained, lime-rich soils associated with chalk and limestone. They occur predominantly at low to moderate altitudes in England and Wales, extending locally into upland areas in northern England, Scotland and Northern Ireland. Most of these calcareous grasslands are maintained by grazing.

The chalk grassland is primarily in the north-west section of the SAC and is dominated by upright brome *Bromus erectus* and sheep's fescue *Festuca ovina* but supports many other plants which are characteristic of unimproved downland. Among these are dwarf thistle *Cirsium acaule*, chalk milkwort *Polygala calcarea*, clustered bellflower *Campanula glomerata*, horseshoe vetch *Hippocrepis comosa*, and several species of orchid including the scarce musk orchid *Herminium monorchis* and man orchid *Aceras anthropophorum*. This range of food-plants and the warm conditions are ideal for insects and the area is of great entomological importance. It is the only known location in Britain for the moth *Hypercallia citrinalis* and several other very scarce moths, beetles and grasshoppers also occur.

- **H91J0 *Taxus baccata* woods of the British Isles * Priority feature**

Yew *Taxus baccata* woodland at this site is associated with H9130 *Asperulo-Fagetum* beech forests, scrub and small areas of unimproved grassland on thin chalk soils. Where the shade is not too dense dog's mercury *Mercurialis perennis* predominates in the ground flora. The site is the most easterly of those selected.

Table 1: Supplementary Advice for Qualifying Features: H6210. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*); Dry grasslands and scrublands on chalk or limestone

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the feature to 40.4 hectares	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information.</p> <p>The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations.</p> <p>Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.</p>	<p>JNCC. (2015). Natura 2000 – Standard Data Form; North Downs Woodlands.</p> <p>NATURAL ENGLAND. (2014). Definitions of Favourable Condition for Designated Features of Interest; Wouldham to Detling Escarpment SSSI (Final).</p> <p>NATURAL ENGLAND. (2014). Definitions of Favourable Condition for Designated Features of Interest; Halling to Trottiscliffe Escarpment SSSI (Final).</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes.</p> <p>This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>composition of the Annex I habitat.</p> <p>Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction.</p> <p>These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.</p>	
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type (s)</p> <p>CG2 <i>Festuca ovina</i> – <i>Avenula pratensis</i> grassland (all forms)</p> <p>CG3 <i>Bromus erectus</i> grassland (all forms)</p> <p>CG4 <i>Brachypodium pinnatum</i> grassland (all forms)</p> <p>CG5 <i>Bromus erectus</i> – <i>Brachypodium pinnatum</i> grassland (all forms)</p>	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).</p> <p>Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).</p>	<p>JNCC. (2015). <i>Natura 2000 – Standard Data Form; North Downs Woodlands</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Wouldham to Detling Escarpment SSSI (Final)</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Halling to Trottscliffe Escarpment SSSI (Final)</i>.</p>
Structure and function (including its	Vegetation: proportion of herbs	Restore the proportion of herbaceous species within the range 40%-90%	A high cover of characteristic herbs, including sedges (<i>Carex</i> species) is typical of the structure of this habitat type.	This attribute will be periodically monitored as part of Natural England's SSSI condition

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
typical species)	(including <i>Carex</i> spp)			assessments
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	<p>Restore the abundance of the typical species listed below to enable each of them to be a viable component of the H6210 habitat;</p> <p>The constant and preferential plants of the CG2, CG3, CG4 and CG5 grassland NVC community types which forms a key component of the H6210 feature</p> <p>Vascular plant assemblage including: Ground Pine <i>Ajuga chamaepitys</i>; Man Orchid <i>Aceras anthropophorum</i>; Lady Orchid – <i>Orchis purpurea</i>; Cut-leaved germander <i>Teucrium botrys</i>; Musk orchid <i>Herminium monorchis</i></p>	<p>Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include;</p> <ul style="list-style-type: none"> • Structural species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • Influential species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • Site-distinctive species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. <p>There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.</p>	
Structure and function (including its typical species)	Vegetation: undesirable species	Restore the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or	There will be a range of undesirable or uncharacteristic species which, if allowed to colonise and spread, are likely to have an adverse effect on the feature's structure and function, including its more desirable typical species. These may include invasive non-natives such as <i>Cotoneaster</i> spp, or coarse and	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		hydrology which may encourage their spread.	aggressive native species which may uncharacteristically dominate the composition of the feature.	
Structure and function (including its typical species)	Vegetation community transitions	Maintain the pattern of natural vegetation zonations/transitions	Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna.	
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Functional connectivity with wider landscape	Restore the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	<p>This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site.</p> <p>These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will</p>	NATURAL ENGLAND, Priority habitat inventory (available on interactive mapping system MAGIC: http://www.magic.gov.uk/)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.</p> <p>Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p>	
Supporting processes (on which the feature relies)	Air quality	<p>Maintain as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System</p> <p>██████████</p>	<p>This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis.</p> <p>Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p> <p>There are concerns about the risk of atmospheric nitrogen</p>	<p>More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System</p> <p>██████████</p> <p>NATURAL ENGLAND (2014). Site Improvement Plan: North Downs Woodlands SAC.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>deposition which have been flagged as needing further investigation but currently the critical load for the site is within acceptable limits.</p> <p>Nitrogen Deposition (kg N/ha/yr): 15.3 which is between Critical Loads (kg N/ha/yr): 15-25</p>	
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the feature	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p> <p>Significant scrub clearance has been carried out and grazing regimes, including those with native hebridean sheep have been established. These management practices should be maintained to keep scrub at a manageable level. These management practices should be applied across this habitat feature.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Version Control				
Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 2: Supplementary Advice for Qualifying Features: H91J0. *Taxus baccata* woods of the British Isles; Yew-dominated woodland *

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the feature to 66.08 hectares	<p>See the explanatory notes for this attribute above in Table 1</p> <p>For this feature, this attribute includes the extent of semi-natural wood-pasture mosaic area; tree'd area; the number of veteran trees (except through natural causes), including dead and living trees. Tree roots (particularly of veteran trees) may extend a considerable distance beyond the boundary of the site. A reduction of woodland/wood-pasture area - whether at the edge or in the middle of a site will reduce the core area where wood-pasture conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example).</p> <p>Loss of any woodland area which fragments a site into different parts may interrupt the movement of species between the remaining parts of the woodland, especially those with limited powers of dispersal.</p>	<p>JNCC. (2015). <i>Natura 2000 – Standard Data Form; North Downs Woodlands</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Wouldham to Detling Escarpment SSSI (Final)</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Halling to Trottscliffe Escarpment SSSI (Final)</i>.</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes.</p> <p>This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type</p> <p>W13 <i>Taxus baccata</i> woodland</p>	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).</p> <p>Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).</p>	<p>JNCC. (2015). <i>Natura 2000 – Standard Data Form; North Downs Woodlands</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Wouldham to Detling Escarpment SSSI (Final)</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Halling to Trottscliffe Escarpment SSSI (Final)</i>.</p>
Structure and function (including its typical species)	Vegetation structure - canopy cover	Maintain an appropriate tree canopy cover across the feature, which will typically be between 40-90% of the site	<p>Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages. Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litterfall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil.</p> <p>Open canopies with just scattered trees will have less of a</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well.	
Structure and function (including its typical species)	Vegetation structure - open space	Maintain areas of permanent/temporary open space within the woodland feature, typically to cover approximately 10%of area	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.</p> <p>Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/ snow damage.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 50% of the feature at any one time) and the assemblages of veteran and ancient trees (typically >10 trees per hectare).	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. For this habitat type, old or over-mature elements of the woodland are particularly	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			characteristic and important features, and their continuity should be a priority.	
Structure and function (including its typical species)	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m ³ per hectare of standing or fallen timber or 3-5 fallen trees >30cm per hectare	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.</p> <p>Dead and actively decaying wood, either as part of a standing tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - age class distribution	Maintain at least 2 age classes (e.g. pole stage, mature, veteran) spread across the average life expectancy of the trees - which can be hundreds of years.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - shrub layer	Maintain an understorey of shrubs that is sparse under the yew canopy, with occasionally present (e.g. holly, hawthorn, elder, box) (this will vary with light levels and site objectives)	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - Woodland edge	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. Woodland edge is defined as being the transitional	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
species)	(graduated edge; buffered; mosaics with other habitats)	scrub.	zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations.	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the resilience of the feature by ensuring a diversity of site-native tree species; although yew dominates, this can be provided by a scattering of one or more of whitebeam, ash, beech, sycamore and oak.	See the explanatory notes for this attribute above in Table 1	NATURAL ENGLAND. (2015). Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England (Available at [REDACTED] [REDACTED] [REDACTED])
Structure and function (including its typical species)	Regeneration potential	Maintain the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate ;	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from pollarding of veteran trees should be included where this is happening.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Tree and shrub species composition	Maintain a canopy and understorey of which 95% is composed of site native trees and shrubs	Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species).	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	<p>Maintain species listed below to enable each of them to be a viable component of the H91J0 habitat;</p> <p>The constant and preferential plants of the W13 woodland NVC community types which forms a key component of the H91J0 feature</p> <p>Vascular plant assemblage including White mullein <i>Verbascum lychnitis</i>; Stinking hellebore <i>Helleborus foetidus</i>; Lady orchid <i>Orchis purpurea</i></p>	See the explanatory notes for this attribute above in Table 1	<p>JNCC. (2015). <i>Natura 2000 – Standard Data Form; North Downs Woodlands</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Wouldham to Detling Escarpment SSSI (Final)</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Halling to Trottscliffe Escarpment SSSI (Final)</i>.</p>
Structure and function (including its typical species)	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature	<p>Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species.</p> <p>Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides). Such species can include Rhododendrons, snowberry, Japanese knotweed, giant hogweed and Himalayan balsam, for example. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species.</p>	NATURAL ENGLAND (2014). Site Improvement Plan; North Downs Woodlands SAC.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Invasive Sycamore has the potential to regenerate in woodland gaps reducing overall extent of SAC feature. This is more of an issue in Beech stands than in Yew woodland where Yew tends to eventually succeed in dominating the canopy.	
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Supporting processes (on which the feature relies)	Functional connectivity with wider landscape	Restore the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	<p>This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site.</p> <p>These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.</p> <p>There are additional areas of lowland calcareous grassland, good quality semi-improved grassland, and areas of deciduous</p>	NATURAL ENGLAND, Priority habitat inventory. Available on interactive mapping system MAGIC: http://www.magic.gov.uk/

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			woodland that connect to the SAC. Some of this priority habitat falls within non SAC units of Halling to Trottiscliffe Escarpment SSSI and Wouldham to Delting Escarpment SSSI. Peters Pit SAC and SSI, Holborough to Burham Marshes SSSI and Houlder and Monarch Hill Pits Upper Halling SSSI are situated between the two portions of North Downs Woodlands SAC. These designated sites support habitats including coastal and floodplain grazing marsh, good quality semi-improved grassland, coastal saltmarsh, deciduous woodland and reedbeds.	
Supporting processes (on which the feature relies)	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System ██████████	See the explanatory notes for this attribute above in Table 1 Nitrogen Deposition (kg N/ha/yr): 25.9 which is above Critical Loads (kg N/ha/yr): 5-15	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System ██████████ NATURAL ENGLAND (2014). Site Improvement Plan; North Downs Woodlands SAC.
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level (as necessary, maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. This attribute and target are included because disruption/ damage to hydrological processes could be caused by activities at some distance from the site boundary. Eg through extraction of ground or surface waters; diverting or damming river channels; pollution of water source;	NATURAL ENGLAND (2014). Site Improvement Plan; North Downs Woodlands SAC.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			channel alignment that disrupts natural geomorphological processes; tunnelling etc.	
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is maintained to a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.	
Version Control				
Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 3: Supplementary Advice for Qualifying Features: H9130. *Asperulo-Fagetum* beech forests; Beech forests on neutral to rich soils

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the feature at 66.08 hectares.	<p>See the explanatory notes for this attribute above in Table 1</p> <p>For this feature, this attribute includes the extent of semi-natural wood-pasture mosaic area; tree'd area; the number of veteran trees (except through natural causes), including dead and living trees. Tree roots (particularly of veteran trees) may extend a considerable distance beyond the boundary of the site. A reduction of woodland/wood-pasture area - whether at the edge or in the middle of a site will reduce the core area where wood-pasture conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example).</p> <p>Loss of any woodland area which fragments a site into different parts may interrupt the movement of species between the remaining parts of the woodland, especially those with limited powers of dispersal.</p>	<p>JNCC. (2015). <i>Natura 2000 – Standard Data Form; North Downs Woodlands</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Wouldham to Detling Escarpment SSSI (Final)</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Halling to Trottscliffe Escarpment SSSI (Final)</i>.</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat.</p> <p>Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the feature are referable to and characterised by the following National Vegetation Classification type</p> <p><i>W12 Fagus sylvatica – Mercurialis perennis</i> woodland</p>	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).</p> <p>Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature.</p>	<p>JNCC. (2007). Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: http://jncc.defra.gov.uk/pdf/Article17/FCS2007-H9130-audit-Final.pdf</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Wouldham to Detling Escarpment SSSI (Final)</i>.</p> <p>NATURAL ENGLAND. (2014). <i>Definitions of Favourable Condition for Designated Features of Interest; Halling to Trottiscliffe Escarpment SSSI (Final)</i>.</p>
Structure and function (including its typical species)	Vegetation structure - canopy cover	<p>Maintain an appropriate tree canopy cover across the feature, which will typically be between 40-90% of the site</p>	<p>Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages. Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litterfall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil. Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture).</p> <p>Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			should provide a core of woodland interior conditions with some open and edge habitat as well.	
Structure and function (including its typical species)	Vegetation structure - open space	Maintain areas of permanent/temporary open space within the woodland feature, typically to cover approximately 10% of area	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.</p> <p>Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 20% of the feature at any one time) and the assemblages of veteran and ancient trees (typically >10 trees per hectare).	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context. For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity should be a priority.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically between 30 - 50 m ³ per hectare of standing or fallen timber or 3-5 fallen trees >30cm per hectare, and >10 standing dead trees per hectare	<p>Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. The targets set within this attribute should reflect the most appropriate structure for the woodland feature on a particular site, taking account of its known interest, history, past management and the landscape context.</p> <p>Dead and actively decaying wood, either as part of a standing</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature.	
Structure and function (including its typical species)	Vegetation structure - age class distribution	Maintain at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Vegetation structure - Woodland edge (graduated edge; buffered; mosaics with other habitats)	Maintain a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations.	
Structure and function (including its typical species)	Vegetation structure - age class distribution	Maintain a diversity (at least 3 species on more base rich sites) of site-native trees (e.g. beech, ash, whitebeam, yew, sycamore, holly) across the site.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Browsing and grazing by herbivores	Maintain browsing/grazing (e.g. by livestock) to sufficient levels to allow tree seedlings and saplings the opportunity to exceed browse height, and which maintain the characteristic structure of the woodland feature	Herbivores, especially deer, are an integral part of woodland ecosystems. They are important in influencing woodland regeneration, composition and structure and therefore in shaping woodland wildlife communities. In general, both light grazing and browsing is desirable to promote both a diverse woodland structure and continuous seedling establishment. Short periods with no grazing at all can allow fresh natural regeneration of trees, but a long-term absence of herbivores can result in excessively dense thickets of young trees which shade out ground flora and lower plant species. However,	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			heavy grazing by deer or sheep prevents woodland regeneration, and can cause excessive trampling and/or poaching damage, canopy fragmentation, heavy browsing, barkstripping and a heavily grazed sward.	
Structure and function (including its typical species)	Regeneration potential	Restore the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate ;	<p>The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from pollarding of veteran trees should be included where this is happening.</p> <p>A restore target has been set as beech regeneration is insufficient to retain canopy cover in the long term. In addition, Beech saplings are susceptible to squirrel damage.</p>	NATURAL ENGLAND (2014). Site Improvement Plan: North Downs Woodlands SAC.
Structure and function (including its typical species)	Tree and shrub species composition	Maintain a canopy and understorey of which 95% is composed of site native trees and shrubs	Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species).	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	<p>Maintain species listed below to enable each of them to be a viable component of the H9130 habitat;</p> <p>The constant and preferential plants of the W12 woodland NVC community types which forms a key component of the H9130 feature</p>	See the explanatory notes for this attribute above in Table 1	<p>Hall, J.E., Kirby, K.J and Whitbread, A.M. (2004). <i>National Vegetation Classification: Field guide to woodland</i>. Peterborough: JNCC.</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Vascular plant assemblage including White mullein <i>Verbascum lychnitis</i> ; Stinking hellebore <i>Helleborus foetidus</i> ; Lady orchid <i>Orchis purpurea</i>		
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal: bacterial ratio, to within typical values for the habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Structure and function (including its typical species)	Root zones of ancient trees	Restore the soil structure within and around the root zones of the mature and ancient tree cohort to an un-compacted condition	<p>The management of land within and around forest habitats which are characterised by ancient trees can be crucial to their individual welfare and long-term continuity, and the landscape they are part of can be just as or even more important. The condition of the soil surrounding such trees will affect their roots, associated mycorrhizal fungi and growth. Plants have difficulty in compacted soil because the mineral grains are pressed together, leaving little space for air and water which are essential for root growth.</p> <p>Unless carefully managed, activities such as construction, forestry management and trampling by grazing livestock, recreational vehicle use and human feet during recreational activity may all contribute to excessive soil compaction around ancient trees.</p> <p>A restore target has been set as off-road vehicles as well as all-terrain bikes are having an impact on parts of the woodland. Vehicle damage is associated with vehicles coming off the Public Rights of Way (PRoW) into the woodland.</p>	NATURAL ENGLAND (2014). Site Improvement Plan; North Downs Woodlands SAC.
Supporting processes (on which the feature relies)	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this	<p>See the explanatory notes for this attribute above in Table 1</p> <p>Nitrogen Deposition (kg N/ha/yr): 25.9 which is above Critical Loads (kg N/ha/yr): 10-20</p>	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		feature of the site on the Air Pollution Information System ██████████		██████████ NATURAL ENGLAND (2014). Site Improvement Plan; North Downs Woodlands SAC.
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level (as necessary, maintain natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.	NATURAL ENGLAND (2014). Site Improvement Plan; North Downs Woodlands SAC.
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is maintained to a level which is unlikely to affect natural phenological cycles and processes to the detriment of the feature and its typical species at this site.	Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.	
Version Control				
Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

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

Citation for Special Area of Conservation (SAC)

Name: Peter's Pit
Unitary Authority/County: Kent
SAC status: Designated on 1 April 2005
Grid reference: TQ717628
SAC EU code: UK0030237
Area (ha): 28.30
Component SSSI: Peter's Pit SSSI

Site description:

Peter's Pit is an old chalk quarry with adjoining soil-stripped fields on the North Downs, with scattered ponds situated amongst grassland, scrub and woodland. The ponds have widely fluctuating water levels and support large breeding populations of great crested newt *Triturus cristatus*.

The site has an undulating terrain in which many rain fed ponds, of various sizes, have developed. Those which dry up early in the season are of less interest, but five ponds are sufficiently large to support very substantial populations of amphibians, particularly the great crested newt. The value of the site for newts is enhanced by the presence, around the edges and between the ponds, of areas of scrub with loose rock which serve as day and winter refuges. Aquatic vegetation provides shelter in the pond environment.

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

- Great crested newt *Triturus cristatus*

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0030237
Date of registration: 14 June 2005

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

European Site Conservation Objectives for Peter's Pit Special Area of Conservation Site Code: UK0030237



With regard to the natural habitats and/or species for which the site has been designated (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 Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- **The extent and distribution of the habitats of qualifying species**
- **The structure and function of the habitats of qualifying species**
- **The supporting processes on which the habitats of qualifying species rely**
- **The populations of qualifying species, and,**
- **The distribution of qualifying species 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:

S1166. *Triturus cristatus*; Great crested newt

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 as amended from time to time (the “Habitats Regulations”). 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 available) will also provide a framework to inform the measures needed to conserve or restore the European Site and the prevention of deterioration or significant disturbance of its qualifying features.

These Conservation Objectives are set for each habitat or species of a [Special Area of Conservation \(SAC\)](#). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving Favourable Conservation Status for that species or habitat type at a UK level. The term ‘favourable conservation status’ is defined in regulation 3 of the Habitats Regulations.

Publication date: 27 November 2018 (version 3). This document updates and replaces an earlier version dated 31 March 2014 to reflect the consolidation of the Habitats Regulations in 2017.



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

**Peter's Pit Special Area of Conservation (SAC)
(UK0030237)**



Photo courtesy of Kent Wildlife Trust

Date of Publication: 20 May 2015

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Peter's Pit SAC.

This advice should therefore be read together with the SAC Conservation Objectives available [here](#).

This supplementary advice to the Conservation Objectives describes in more detail the range of ecological attributes which are most likely to contribute to a site's overall integrity and the minimum targets each qualifying feature needs to achieve in order to meet the site's objectives.

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site. Any proposals or operations which may affect the site or its qualifying features should be designed so they do not adversely affect any of the attributes listed in the objectives and supplementary advice.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectives@naturalengland.org.uk

About this site

European Site information

Name of European Site	Peter's Pit Special Area of Conservation
Location	Kent
	The designated boundary of this site can be viewed here on the MAGIC website.
Designation Date	May 2001
Qualifying Features	See below
Designation Area	28.3 hectares
Designation Changes	Not applicable
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Peter's Pit SSSI
Relationship with other European or International Site designations	Not applicable.

Site background and geography

Covering a total area of 28.91 hectares, 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. The ponds have widely fluctuating water levels and large great crested newt *Triturus cristatus* populations have been recorded breeding here.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying species:

- **S1166 Great Crested Newt *Triturus cristatus***

The great crested newt *Triturus cristatus* is the largest native British newt, reaching up to around 17cms in length. It has a granular skin texture (caused by glands which contain toxins making it unpalatable to predators), and in the terrestrial phase is dark grey, brown or black over most of the body, with a bright yellow/orange and black belly pattern.

Adult males have distinctive jagged crests running along the body and tail. Newts require aquatic habitats for breeding. Eggs are laid singly on pond vegetation in spring, and larvae develop over summer to emerge in August – October, normally taking 2–4 years to reach maturity. Juveniles

spend most time on land, and all terrestrial phases may range a considerable distance from breeding sites.

Breeding sites are mainly medium-sized ponds, though ditches and other water body types may also be used less frequently. Ponds with ample aquatic vegetation (which is used for egg-laying) seem to be preferred. Great crested newts can be found in rural, urban and post-industrial settings, with populations less able to thrive where there are high degrees of fragmentation. The connectivity of the landscape is important, since great crested newts often occur in meta-populations that encompass a cluster of several or many ponds. This helps ensure the survival of populations even if sub-populations are affected by, for example, the temporary drying-out of breeding ponds.

The great crested newt is also fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2010 (as amended), making it a European Protected Species. A Licence may therefore be required for any activities likely to harm or disturb great crested newts.



Great Crested Newt (female)

Table 1: Supplementary Advice for Qualifying Features: S1166 Great Crested Newt *Triturus cristatus*

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: structure/function	Overall Habitat Suitability Index score	Maintain an overall Great Crested Newt Habitat Suitability Index score of no less than 0.8	The Habitat Suitability Index provides an overall measure of evaluating habitat quality and quantity for Great Crested Newts. The Index score lies between 0 and 1, with 1 representing optimal Great Crested Newt habitat. In general, the higher the index score the more likely the site is to support great crested newts. The HSI methodology is documented in ARG-UK Advice Note 5 (May 2010). The HSI should <u>not</u> be used as a substitute for more detailed surveys and consideration of other attributes where necessary.	
	Presence of ponds	Maintain the number and surface area of ponds present within the site. Number = 12 ponds Surface area = 1.06 ha	Ponds include breeding and non-breeding ponds, since the latter may be used for foraging or sustaining prey populations. The surface area of a pond is taken from when water reaches its highest level (excluding flooding events), which will usually be in the spring.	Habitat features extent from Natural England 2006 GIS dataset. 4 original ponds (2000) supplemented by 8 new ponds created by Kent Wildlife Trust (2012). This attribute will be periodically monitored as part of Natural England's site condition assessments .
	Permanence of ponds	Maintain the permanence of water within ponds present within the site	Ponds include breeding ponds as well as non-breeding ponds, since the latter may be used for foraging or sustaining prey populations. Ponds should have a high degree of permanence (i.e. they never or rarely dry out other than through natural drought) and this may be adversely affected by changes in the supply or flow of water (from either surface water and/or groundwater sources] to the ponds. At this SAC, The quarry ponds are located on bare chalk and depend on the water table in the chalk aquifer. The site has maintained a high newt population despite all the ponds being dry by early spring in some years.	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			Although not ideal in such years it does have the benefit of restricting colonisation by fish. The more permanent ponds in the soil-stripped fields are a safeguard against prolonged droughts.	
Supporting habitat: structure/function	Cover of macrophytes	Maintain a high cover of macrophytes, typically between 50-80%, within ponds	<p>Marginal and emergent vegetation are important components of a great crested newt pond as they provide excellent egg-laying sites. Good plants for this purpose include water forget-me-not <i>Myosotis scorpioides</i>, flote/sweet grass <i>Glyceria fluitans</i> and great hairy willowherb <i>Epilobium hirsutum</i>. They are, however, an integral part of the natural successional change of a waterbody and whilst it is preferable to have a good range and area of marginal plants, they should not extend across the entire water surface.</p> <p>In most circumstances it will be desirable to retain a fringe of marginal and emergent vegetation around at least half of a pond's edge. Where the marginal vegetation is particularly invasive, and provides no specific benefit to crested newts, it may be decided that its complete removal is necessary.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
	Invasive, non-native and/or introduced species	Ensure invasive non-native species are either rare or absent components of open water habitat supporting the great crested newt.	Submerged vegetation is an important component of the pond ecosystem, making it habitable to a wide range of animals, but too many plants can occasionally be undesirable for newts, if the water column becomes completely shaded and choked. Introduced or 'alien' submerged plants can grow very vigorously and dominate more beneficial native species. New Zealand stonecrop <i>Crassula helmsii</i> and Canadian pondweed <i>Elodea canadensis</i> are two examples to be avoided. In most instances, any introductions should be avoided and if present the complete removal of such species is usually recommended.	
	Supporting terrestrial habitat quality	Maintain the quality of terrestrial habitat likely to be utilised by Great Crested Newts, with no fragmentation of habitat by significant barriers to newt dispersal.	<p>Great crested newts need both aquatic and terrestrial habitat. Good quality terrestrial habitat, particularly within 500m of the breeding ponds, provides important sheltering, dispersing and foraging conditions and can include all semi-natural habitat along with meadows, rough tussocky grassland, scrub, woodland, as well as 'brownfield' land or low-intensity farmland.</p> <p>Good quality terrestrial habitat for Great Crested Newts has structural diversity which can be provided by features such as hedges, ditches, stone walls, old farm buildings, loose stone/rocks, rabbit burrows and small mammal holes. Good habitat provides a range of invertebrates, such as earthworms, insects, spiders and slugs, on which Great Crested Newts are known to feed.</p> <p>Fragmentation refers to significant barriers to Great Crested Newt</p>	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			<p>movement such as walls and buildings, but not footpaths or tracks. Newts disperse over land to forage for food, and move between ponds. The distances moved during dispersal vary widely according to habitat quality and availability.</p> <p>At most sites, the majority of adults probably stay within 250m of the breeding pond but may well travel further if there are areas of high quality foraging and refuge habitat extending beyond this range.</p>	
Supporting habitat: structure/function	Shading of ponds	Maintain pond perimeters generally free of shade (typically affecting less than 60% of the shoreline)	Shading from trees and/or buildings (not including emergent pond vegetation) can negatively affect the abundance of marginal vegetation in ponds, water temperature and the rate of hatching and development of great crested newt eggs and larvae.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
	Presence of fish and wildfowl	Ensure fish and wildfowl are either absent or rare in all ponds.	<p>At high densities, waterfowl (i.e. most water birds such as ducks, geese and swans but excluding moorhen) can remove all aquatic vegetation, adversely affect water quality and create turbid pondwater conditions. Some may also actively hunt adult Great Crested Newts and their larvae.</p> <p>Similarly fish can be significant predators of Great Crested Newt larvae. The presence of waterfowl and fish can therefore reduce habitat suitability. These should be wholly absent from sites which support fewer than 5 ponds.</p>	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Supporting processes (on which the feature or its supporting habitat relies)	Water quality	Maintain the quality of pondwaters within the site as indicated by the presence of an abundant and diverse invertebrate community.	As the clarity and chemical status of water bodies supporting Great Crested Newts can be subjective, the presence of an abundant and diverse community of freshwater invertebrates can be indicative of suitable water quality standards. Invertebrate groups present should include groups such as mayfly larvae and water shrimps. This will ensure ponds support a healthy (mainly invertebrate) fauna to provide food for developing great crested newt larvae and adults.	
Population (of the feature)	Population size	Maintain the abundance of the great crested newt population at a level which is above a peak mean of 332 adults, whilst avoiding deterioration from its current level as indicated by the	"This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's	The peak mean count is based on the three consecutive years (2002 – 2004) after the SSSI boundary was modified and

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		latest mean peak count or equivalent	<p>size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise that the figures stated are the best available.</p> <p>Estimating the average size of the GCN population will normally be based on the peak count of adults undertaken in the known peak season for the area, and in-year weather conditions; likely to be Mid-April to mid-May in central areas. The peak count is derived by summing the counts across the site on 'best' night for each season. Considerable natural between-year variation in population counts is frequent."</p>	<p>the SAC designated (2001), because prior to this counting was irregular. (The figure at al SSSI notification was 311 in 1985)</p> <p>This attribute will be periodically monitored as part of Natural England's site condition assessments.</p>
Population (of the feature)	Population viability	Maintain the presence of Great Crested Newt eggs in breeding ponds at a level which is likely to maintain the abundance of the great crested newt population at or above its target level.	A "breeding pond" is defined as a pond in which egg-laying and successful metamorphosis (e.g. the pond doesn't dry up too soon) is likely to occur at least once every three years. The optimum time to survey for eggs is mid-March to mid-May. Presence of eggs can be recorded by day or night visits and surveys should be combined with visits for the adult component.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
	Supporting	Maintain the connectivity of	Great Crested Newts often exist in metapopulations. A metapopulation is a	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
	metapopulation	the SAC population with other closely-associated populations (either within or outside of the site boundary)	<p>group of associated populations made up of newts which breed in, and live around, a cluster of ponds. There will be some interchange of newts between these populations, even though most adults consistently return to the same pond to breed, and so it will be important to avoid the isolation of these populations from each other.</p> <p>A metapopulation associated with a SAC may occur and extend outside of the designated site boundary. The connectivity of the wider local landscape to the SAC may therefore be important as this may help the safe movement of animals and ensure the survival of the overall population even if sub-populations are temporarily affected by, for example, pond desiccation or fish introductions.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Maintain management or other measures (within and/or outside the site boundary as appropriate) necessary to maintain or restore the feature and/or its supporting habitat	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England.</p> <p>This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p>	Natural England's Views about the Management of the SSSI which underpin this SAC are available from [REDACTED] [REDACTED] [REDACTED]
Supporting habitat: extent and distribution	Extent of supporting habitat	<p>Maintain the extent of habitat which supports the feature at:</p> <p>Broadleaved, Mixed and Yew Woodlands: 13.89 ha Lowland calcareous grassland/inland rock/scrub mosaic: 13.94 ha</p>	<p>In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.</p> <p>The broad habitats known or likely to support the feature at this SAC are: standing water, lowland calcareous grassland/inland rock/scrub mosaic.</p>	Habitat extent taken from NE GIS 2006 dataset
	Distribution of supporting habitat	Maintain the distribution and continuity of the feature's supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the	<p>A contraction in the range, or geographic spread, of the supporting habitat (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine the resilience of the Great Crested Newt feature to adapt to future environmental changes.</p> <p>Contraction may also reduce and break up the continuity of a habitat within</p>	Habitat extent taken from NE GIS 2006 dataset

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		site	a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.	
Supporting processes (on which the feature and/or its supporting habitat relies)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	<p>This recognises the increasing likelihood of supporting habitat features needing to absorb or adapt to wider environmental changes.</p> <p>Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site.</p> <p>The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p>	
Supporting habitat: structure/function	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, within typical values for the supporting habitat	<p>Soil and substrate supports basic ecosystem function and is a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter.</p> <p>Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with the supporting habitat of this Annex I feature.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Air quality	Maintain or restore as necessary the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System [REDACTED]	<p>The supporting habitat type is considered sensitive to changes in air quality. Exceedance of critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and reducing supporting habitat quality and population viability of this feature.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide</p>	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			<p>(SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development.</p> <p>It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p>	
<p>Version Control Advice last updated: 20 May 2015 – previous version has been incorporated into a revised 2015 document template; minor edits to generic text made.</p>				
<p>Variations from national feature-framework of integrity-guidance: None</p>				

Document control information		
Status of this Version	V2	
Prepared by	Phil Williams	Date 21 Jan 2014
Other notes	This advice supercedes previous supplementary advice published on 31 March 2014.	
Quality assurance information		
Checked by:	Rosemary Godfrey	Date 23 Jan 2014
Reviewed by:	Steve Clifton & Richard Leishman	Date 03 March 2014
Finalised for publication on:	V2 - 20 May 2015	

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.

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 Conservation Advice document for the EMS. Natural England's formal Conservation Advice for European Marine Sites can be found via [GOV.UK](https://www.gov.uk).

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations'). 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 and the prevention of deterioration of habitats and significant disturbance of its qualifying features

These Conservation Objectives are set for each bird feature for a [Special Protection Area \(SPA\)](#).

Where these objectives are being 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: 21 February 2019 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

Information Sheet on Ramsar Wetlands (RIS)

1. Name and address of the compiler of this form:**Joint Nature Conservation Committee**

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

Designated: 05 May 2000 / Updated: May 2005

3. Country:

UK (England)

4. Name of the Ramsar site:

Thames Estuary and Marshes

5. Map of site included:**a) hard copy** (required for inclusion of site in the Ramsar List): *yes* ✓ -or- *no***b) digital (electronic) format** (optional): Yes

6. Geographical coordinates (latitude/longitude):

51° 29' 08'' N

00° 35' 47'' E

7. General location:

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

8. Elevation (average and/or max. & min.) (metres): **9. Area** (hectares): 5589

Min. -5

Max. 5

Mean No information available

10. Overview:

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.

11. Ramsar Criteria:

2, 5, 6

12. Justification for the application of each Criterion listed in 11. above:

Ramsar criterion 2

The site supports more than 20 British Red Data Book invertebrates and populations of the GB Red Book endangered least lettuce (*Lactuca saligna*), as well as the vulnerable slender hare's-ear (*Bupleurum tenuissimum*), divided sedge (*Carex divisa*), sea barley (*Hordeum marinum*), Borrer's saltmarsh-grass (*Puccinellia fasciculata*), and dwarf eelgrass (*Zostera noltei*).

Ramsar criterion 5

Assemblages of international importance:

Species with peak counts in winter:

45,118 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:

Black-tailed godwit , *Limosa limosa islandica*, 1,640 individuals, representing an average of 4.5% of the population (5 year peak mean 1998/9-2002/3)
Iceland/W Europe

Species with peak counts in winter:

Dunlin , *Calidris alpina alpina*, W Siberia/W 15,171 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9-2002/3)
Europe

Red knot , *Calidris canutus islandica*, W & 7,279 individuals, representing an average of 1.6% of the population (5 year peak mean 1998/9-2002/3)
Southern Africa
(wintering)

More 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 Alerts report, which is updated annually. [REDACTED]

13. Biogeography:

a) biogeographic region:

Atlantic

b) biogeographic regionalisation scheme (include reference citation):

Council Directive 92/43/EEC

14. Physical features of the site:

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

20. Noteworthy fauna:**Birds****Species currently occurring at levels of national importance:****Species with peak counts in spring/autumn:**

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)
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)
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)
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)

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)
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)
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)

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*.

21. Social and cultural values:

Aesthetic
 Archaeological/historical site
 Conservation education
 Current scientific research
 Fisheries production
 Livestock grazing
 Non-consumptive recreation
 Sport fishing
 Sport hunting
 Tourism
 Transportation/navigation

22. Land tenure/ownership:

Ownership category	On-site	Off-site
Non-governmental organisation	+	+
Local authority, municipality etc.	+	+
Private	+	+
Public/communal	+	

23. Current land (including water) use:

Activity	On-site	Off-site
Nature conservation	+	+
Tourism	+	+
Recreation	+	+
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	+	

24. Factors 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

25. Conservation measures taken:

Conservation measure	On-site	Off-site
SSSI / ASSI	+	
SPA	+	
Land owned by a NGO for nature conservation	+	+
Management agreement	+	

Site management statement/plan implemented	+	
ESA	+	+

26. Conservation measures proposed but not yet implemented:

No information available

27. Current scientific research and facilities:

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

28. Current conservation education:

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.

29. Current recreation and tourism:

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.

30. Jurisdiction:

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

31. Management authority:

Site Designations Manager, English Nature, Sites and Surveillance Team, Northminster House, Northminster Road, Peterborough, PE1 1UA, UK

32. Bibliographical references:**Site-relevant references**

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

Medway Estuary and Marshes (Kent)

The Medway Estuary and Marshes proposed Special Protection Area is a wetland of international importance comprising grazing marshes, inter-tidal flats and saltmarshes. The site provides breeding and wintering habitats for important assemblages of wetland bird species, particularly wildfowl and waders.

The boundaries of the proposed Special Protection Area are coincident with those of the Medway Estuary and Marshes Site of Special Scientific Interest (SSSI), apart from the exclusion of a section of inter-tidal mudflats in the west of the SSSI and other small areas of land in the north of the site at Abbey Court, Middle Stoke, and Grain. The proposed designation applies only to land above the Mean Low Water mark. The proposed Special Protection Area is an integral part of the larger Thames estuary and contributes to its overall regional significance for bird species, in a European context.

The Medway Estuary and Marshes qualifies under Article 4.1 of the EC Birds Directive by supporting, in summer, nationally important breeding populations of avocet *Recurvirostra avosetta* (28 pairs, 7% British breeding population) and little tern *Sterna albifrons* (24 pairs, 1% British breeding population) both Annex 1 species.

The site also qualifies under Article 4.1 by regularly supporting a nationally important wintering population of avocet. During the five year period 1986/87 to 1990/91, the average peak count was 70 birds, representing 7% of the British population.

The site also qualifies under Article 4.2 as a wetland of international importance by virtue of regularly supporting over 20,000 waterfowl, with an average peak count of 53,900 birds recorded in the five winter period 1986/87 to 1990/91. This total includes internationally or nationally important wintering populations of the following migratory waterfowl (figures given are average peak counts for the five winter period 1986/87 to 1990/91): 4,130 dark-bellied brent geese *Branta bernicla bernicla* (2.4% of the world population, 4.6% of the British wintering population), 5,900 shelduck *Tadorna tadorna* (2.3% of the North West European population, 7.9% of British), 980 pintail *Anas acuta* (1.4% of the North West European wintering, 3.9% British), 740 ringed plover *Charadrius hiaticula* (1.4% of the East Atlantic Flyway population, 3.2% of British), 4,810 grey plover *Pluvialis squatarola* (3.2% of EAF, 22.9% of British), 3,690 knot *Calidris canutus* (1.0% of EAF, 1.6% of British), 22,900 dunlin *Calidris alpina* (1.6% of the EAF, 5.3% of British), 4,180 redshank *Tringa totanus* (2.7% of the EAF, 5.5% of British), 250 great crested grebe *Podiceps cristatus* (2.5% of British), 5,200 wigeon *Anas penelope* (2.0% of British), 2,400 teal *Anas crecca* (2.4% of British), 150 shoveler *Anas clypeata* (1.7% of British), 3300 oystercatcher *Haematopus ostralegus* (1.1% of British), 390 black-tailed godwit *Limosa limosa* (7.9% of British), 1,900 curlew *Numenius arquata* (2.1% of British), 17 spotted redshank *Tringa*

erythropus (8.5% of British), 12 greenshank *Tringa nebularia* (3.0% of British) and 630 turnstone *Arenaria interpres* (1.4% of British).

The site also qualifies under Article 4.2 by virtue of regularly supporting, in summer, a diverse assemblage of breeding migratory waterfowl including oystercatcher *Haematopus ostralegus*, lapwing *Vanellus vanellus*, ringed plover *Charadrius hiaticula*, redshank *Tringa totanus*, shelduck *Tadorna tadorna*, mallard *Anas platyrhynchos*, teal *Anas penelope*, shoveler *Anas clypeata*, pochard *Aythya ferina* and common tern *Sterna hirundo*, the last an Annex 1 species. The site thus has an important role in maintaining the ranges of several species which have been affected by changes in their habitat elsewhere in Britain.

The site also qualifies under Article 4.2 by virtue of regularly supporting, in winter, a diverse assemblage of wintering species including red-throated diver, *Gavia stellata* great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo*, shelduck *Tadorna tadorna*, mallard *Anas platyrhynchos*, teal *Anas crecca*, shoveler *Anas clypeata*, pochard *Aythya ferina*, oystercatcher *Haematopus ostralegus*, ringed plover *Charadrius hiaticula*, dunlin *Calidris alpina*, and redshank *Tringa totanus*; and also the following Annex 1 species: Bewick's swan *Cygnus columbianus bewickii*, hen harrier *Circus cyaneus*, merlin *Falco columbarius*, golden plover *Pluvialis apricaria*, short-eared owl *Asio flammeus* and kingfisher *Alcedo atthis*.

During severe winter weather elsewhere, the Medway Estuary and Marshes can assume even greater national and international importance as wildfowl and waders from many other areas arrive, attracted by the relatively mild climate, compared with continental European areas, and the abundant food resources available.

SPA Citation
March 1993
SJP

This citation / map relates to a site entered in
the Register of European sites for Great Britain.
Register UK001203
Date of 25 AUG 1993
Signed [Signature]
on behalf [Redacted] for the Environment

European Site Conservation Objectives for Medway Estuary and Marshes Special Protection Area Site Code: UK9012031



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:

A046a *Branta bernicla bernicla*; Dark-bellied brent goose (Non-breeding)

A048 *Tadorna tadorna*; Common shelduck (Non-breeding)

A054 *Anas acuta*; Northern pintail (Non-breeding)

A132 *Recurvirostra avosetta*; Pied avocet (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)

A162 *Tringa totanus*; Common redshank (Non-breeding)

A195 *Sterna albifrons*; Little tern (Breeding)

Waterbird assemblage

Breeding bird assemblage

This is a European Marine Site

This SPA is a part of the Swale & Medway European Marine Site (EMS). These Conservation Objectives should be used in conjunction with the Conservation Advice document for the EMS. Natural England's formal Conservation Advice for European Marine Sites can be found via [GOV.UK](https://www.gov.uk).

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations'). 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 and the prevention of deterioration of habitats and significant disturbance of its qualifying features

These Conservation Objectives are set for each bird feature for a [Special Protection Area \(SPA\)](#).

Where these objectives are being 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: 21 February 2019 (version 3). This document updates and replaces an earlier version dated 30 June 2014 to reflect the consolidation of the Habitats Regulations in 2017.

RAMSAR INFORMATION SHEET

FOR WETLANDS OF INTERNATIONAL IMPORTANCE

Date of designation 15/12/93

Site reference number 7UK068
1 Compilation date Feb 1999
2 Country UK (England)
3 Name of wetland Medway Estuary and Marshes
4 Site centre location: Latitude: 51 24 02 N Longitude: 00 40 38 E
5 Altitude Not being submitted
6 Area (ha) 4696.74

7 Overview

A complex of rain fed, brackish, floodplain grazing marsh with ditches, and intertidal saltmarsh and mudflat. These habitats together support internationally important numbers of wintering waterfowl. Rare wetland birds breed in important numbers. The saltmarsh and grazing marsh are of international importance for their diverse assemblages of wetland plants and invertebrates.

8 Wetland type Marine/coastal wetland

Code	Name	% Area
E	Sand / shingle shores (including dune systems)	0
G	Tidal flats	61.3
H	Salt marshes	13.6
M	Rivers / streams / creeks: permanent	1.2
TP	Freshwater marshes / pools: permanent	0.4
4	Seasonally flooded agricultural land	14
Other	Other	9.5

9 Ramsar Criteria 2a, 3a, 3c
10 Map of the site ✓
11 Compiler Joint Nature Conservation Committee
Monkstone House
City Road
Peterborough
Cambridgeshire PE1 1JY
UK
Telephone/Fax : +44(0) 1733 562626 / +44(0) 1733 555948

12 Justification of criteria

Ramsar criterion 2a

The site supports a number of species of rare plants and animals. The site holds several nationally scarce plants, including sea barley *Hordeum marinum*, curved hard-grass *Parapholis incurva*, annual beard-grass *Polypogon monspeliensis*, Borrer's saltmarsh-grass *Puccinellia fasciculata*, slender hare's-ear *Bupleurum tenuissimum*, sea clover *Trifolium squamosum*, small goose foot *Chenopodium chenopodioides*, golden samphire *Inula crithmoides*, perennial glasswort *Salicornia perennis* and the one flowered glasswort *Salicornia pusilla*. A total of at least twelve British Red Data Book species of wetland invertebrates have been recorded on the site. These include a ground beetle *Polistichus connexus*, a fly *Cephalops perspicuus*, a dancefly *Poecilobothrus ducalis*, a fly *Anagnota collini*, a weevil *Baris scolopacea*, a water beetle *Berosus spinosus*, a beetle *Malachius vulneratus*, a rove beetle *Philonthus punctus*, the ground lackey moth *Malucosoma castrensis*, a horsefly *Atylotu latistriatus*, a fly *Campsicnemus magius*, a soldier beetle, *Cantharis fusca*, and a crane fly *Limonia danica*. A significant number of non-wetland British Red Data Book species also occur.

Ramsar criterion 3a

Internationally important waterfowl assemblage (greater than 20,000 birds)

Ramsar criterion 3c

Over winter the site regularly supports internationally important populations of: Dark-bellied Brent Goose *Branta bernicla bernicla*, Dunlin *Calidris alpina alpina*, Grey Plover *Pluvialis squatarola*, Knot *Calidris canutus*, Pintail *Anas acuta*, Redshank *Tringa totanus*, Ringed Plover *Charadrius hiaticula*, Shelduck *Tadorna tadorna*

13 General location

Nearest town/city: Canterbury

On the north coast of Kent, within the Greater Thames Estuary.

Administrative Region: Kent, Essex

14 Physical Features

Soil & Geology	alluvium, mud, shingle
Geomorphology and Landscape	coastal, estuary, floodplain, intertidal sediments (including sandflat/mudflat)
Nutrient status	eutrophic
pH	circumneutral
Salinity	brackish / mixosaline, fresh, saline / euhaline
Soil	no information
Water permanence	usually permanent, usually seasonal / intermittent
Summary of main climatic features	Rainy, temperate climate with a mild winter and periodic frost. Mean minimum temperature approximately 11.6°C. Mean maximum temperature approximately 18.3°C. Mean annual precipitation approximately 382.4mm, with a winter maximum.

15 Hydrological values

Shoreline stabilisation and dissipation of erosive forces. Sediment trapping, Flood water storage / desynchronisation of flood peaks, Maintenance of water quality (removal of nutrients)

16 Ecological features

The intertidal flats are of fine, silty sediment. The saltmarsh shows a transition from pioneer communities containing *Zostera* to high saltmarsh dominated by *Atriplex portaculoides*. 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 australis* and *Bolboschoenus maritimus*.

17 Noteworthy flora

Nationally important species occurring on the site.

Higher Plants.

Hordeum marinum, *Parapholis incurva*, *Polypogon monspeliensis*, *Puccinellia fasciculata*, *Bupleurum tenuissimum*, *Trifolium squamosum*, *Chenopodium chenopodioides*, *Inula cithrimoides*, *Salicornia perennis*, *Salicornia pusilla*.

18 Noteworthy fauna

Birds

Species occurring at levels of international importance (as identified at designation):

Over winter the area regularly supports:

Dark-bellied Brent Goose, <i>Branta bernicla bernicla</i> (Western Siberia/Western Europe)	3205 individuals, representing an average of 1.1% of the population (5 year peak mean 1991/92-1995/96)
Dunlin, <i>Calidris alpina alpina</i> (Northern Siberia/Europe/Western Africa)	25936 individuals, representing an average of 1.9% of the population (5 year peak mean 1991/92-1995/96)
Grey Plover, <i>Pluvialis squatarola</i> (Eastern Atlantic (wintering))	3406 individuals, representing an average of 2% of the population (5 year peak mean 1991/92-1995/96)
Knot, <i>Calidris canutus</i> (Northeastern Canada/Greenland/Iceland/Northwestern Europe)	541 individuals, representing an average of 0.2% of the population (5 year peak mean 1991/92-1995/96)
Pintail, <i>Anas acuta</i> (Northwestern Europe)	697 individuals, representing an average of 1.2% of the population (5 year peak mean 1991/92-1995/96)
Redshank, <i>Tringa totanus</i> (Eastern Atlantic (wintering))	3690 individuals, representing an average of 2.1% of the population (5 year peak mean 1991/92-1995/96)
Ringed Plover, <i>Charadrius hiaticula</i> (Europe/Northern Africa (wintering))	768 individuals, representing an average of 1.6% of the population (5 year peak mean 1991/92-1995/96)
Shelduck, <i>Tadorna tadorna</i> (Northwestern Europe)	4465 individuals, representing an average of 1.5% of the population (5 year peak mean 1991/92-1995/96)

Species occurring at levels of international importance (as identified post-designation):

Over winter the area regularly supports:

Black-tailed Godwit, <i>Limosa limosa islandica</i> (Iceland (breeding))	957 individuals, representing an average of 1.5% of the population (5 year peak mean 1991/92-1995/96)
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Species currently occurring at levels of national importance:

During the breeding season the area regularly supports:

Avocet, <i>Recurvirostra avosetta</i> (Western Europe/Western Mediterranean (breeding))	28 pairs, representing an average of 6.2% of the GB population (5 year mean 1988-1992)
Common Tern, <i>Sterna hirundo</i> (Northern/Eastern Europe (breeding))	77 pairs, representing an average of 0.6% of the GB population (Estimate from count of birds 1994)
Little Tern, <i>Sterna albifrons</i>	28 pairs, representing an average of 1.2% of the

(Eastern Atlantic (breeding))

GB population (5 year mean 1991-1995)

Over winter the area regularly supports:

Avocet, *Recurvirostra avosetta*

(Western Europe/Western Mediterranean (breeding))

314 individuals, representing an average of 24.7% of the GB population (5 year peak mean 1991/92-1995/96)

Cormorant, *Phalacrocorax carbo*

(Northwestern Europe)

231 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1991/92-1995/96)

Curlew, *Numenius arquata*

(Europe (breeding))

1900 individuals, representing an average of 1.7% of the GB population (5 year peak mean 1991/92-1995/96)

Greenshank, *Tringa nebularia*

(Europe/Western Africa)

10 individuals, representing an average of 2.6% of the GB population (5 year peak mean 1991/92-1995/96)

Little Grebe, *Tachybaptus ruficollis*

(Western Palearctic)

53 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1991/92-1995/96)

Oystercatcher, *Haematopus ostralegus*

(Europe & Northern/Western Africa)

3672 individuals, representing an average of 1% of the GB population (5 year peak mean 1991/92-1995/96)

Spotted Redshank, *Tringa erythropus*

(Europe/Western Africa)

up to 19 individuals, representing an average of 15.8% of the GB population (5 year peak mean 1991/92-1995/96)

Teal, *Anas crecca*

(Northwestern Europe)

1824 individuals, representing an average of 1.3% of the GB population (5 year peak mean 1991/92-1995/96)

Wigeon, *Anas penelope*

(Western Siberia/Northwestern/Northeastern Europe)

4346 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1991/92-1995/96)

Assemblages of international importance:

Over winter the area regularly supports:

65496 waterfowl (5 year peak mean 1991/92-1995/96)

Nationally important species occurring on the site.

Invertebrates.

Polystichus connexus, *Cephalops perspicus*, *Peocilobothrus ducalis*, *Anagnota collini*, *Baris scolopoea*, *Berosus spinosus*, *Malachius vulneratus*, *Philonthus punctus*, *Malacostoma castrensis*, *Atylotus latistriatus*, *Campsicnemus magius*, *Cantharis fusca*, *Limonia danica*.

19 Social and Cultural Values

Aesthetic

Archaeological/historical site

Conservation education

Current scientific research

Fisheries production
 Livestock grazing
 Non-consumptive recreation
 Sport fishing
 Sport hunting

20 Land tenure/ownership

Ownership category	On-Site	Off-Site
Non-governmental organisation	+	
Local authority, municipality etc.	+	
National/Crown estate	+	
Private	+	
Other	+	

21 Current land use

Activity	On-Site	Off-Site	Scale
Nature conservation	+		Large-Scale
Tourism	+		Small-Scale
Recreation	+		Large-Scale
Research	+		Small-Scale
Fishing: commercial	+		Small-Scale
Fishing: recreational/sport	+		Small-Scale
Gathering of shellfish	+		Small-Scale
Bait collection	+		Large-Scale
Permanent arable agriculture		+	Large-Scale
Livestock watering hole/pond	+		Large-Scale
Grazing (unspecified)	+		Large-Scale
Hay meadows	+		Small-Scale
Hunting: commercial	+		Small-Scale
Hunting: recreational/sport	+		Large-Scale
Industrial water supply	+		Large-Scale
Industry		+	Large-Scale
Sewage treatment/disposal	+		Large-Scale
Harbour/port	+		Large-Scale
Flood control	+		Large-Scale
Transport route	+		Large-Scale
Urban development		+	Large-Scale
Military activities		+	Large-Scale

22 Adverse factors affecting the ecological character of the site

Activity	On-Site	Off-Site	Scale
Drainage/reclamation for industry	+		Large-Scale
Dredging	+		Large-Scale
Erosion	+		Large-Scale
Recreational/tourism disturbance (unspecified)	+		Large-Scale
Transport infrastructure development	+		Large-Scale

23 Conservation measures taken

Conservation measure	On-site	Off-site
SSSI	+	
SPA	+	

Land owned by a NGO for nature conservation	+	
Management agreement	+	
Site management statement/plan implemented	+	

24 Conservation measures proposed but not yet implemented
see below

Site vulnerability and management statement

There is evidence of rapid erosion of intertidal habitat within the site due to natural processes and the effects of sea defences and clay extraction. Research on mudflat recharge using dredging spoil is being investigated as a means of countering the erosion.

The intertidal area is also vulnerable to disturbance from water borne recreation. This is being addressed as part of an estuary management plan.

The terrestrial part of the site depends on appropriate grazing and management of water. The availability of livestock may be affected by policy on BSE and there will be a need to investigate how this may be addressed through management agreements. The effects of abstraction on the availability of water through abstraction for other land uses and drainage for arable cultivation will be addressed through the consent review process under the Habitats Regulations. Pressures from proposed transport and industrial developments are being addressed through the planning system and under the provisions of the Habitat Regulations.

25 Current scientific research/survey/monitoring and facilities

Fauna.

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

Habitat.

ENSIS monitoring.

Experimental mudflat recharge using dredging spoil.

MNCR littoral and sublittoral survey.

26 Current conservation education

Gillingham Riverside Country Park. Power Gen Oakham Marsh Nature Reserve.

27 Current recreation and tourism

Activities, Facilities provided and Seasonality.

Yachting, angling, wildfowling, jet skiing, waterskiing, birdwatching. Disturbance from these activities is a current issue but is addressed through negotiation relating to activities consented within the SSSI and information dissemination.

28 Functional jurisdiction

Department of the Environment, Transport and the Regions

29 Management authority

English Nature

30 Bibliography

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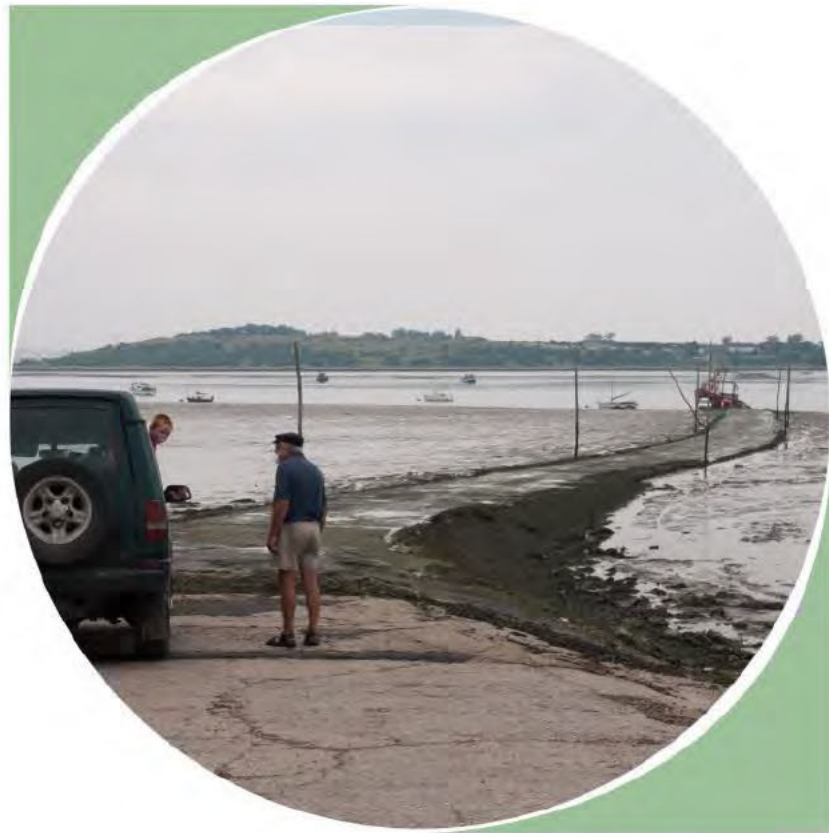
Reference should also be made to Country Agencies Management Plans for sites that are within National Nature Reserves.

Annex 6.0 THAMES, MEDWAY & SWALE ESTUARIES –
STRATEGIC ACCESS MANAGEMENT AND
MONITORING STRATEGY (FOOTPRINT ECOLOGY)

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Thames, Medway & Swale Estuaries - Strategic Access Management and Monitoring Strategy



Durwyn Liley and John Underhill-Day

Thames, Medway and Swale Estuaries – Strategic Access Management
and Monitoring Strategy



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Summary

This report sets out a strategy to resolve disturbance issues to wintering birds on the North Kent Marshes. The report focuses on the European Protected Sites (Thames Estuary and Marshes SPA/Ramsar Site, Medway Estuary and Marshes SPA/Ramsar Site, and The Swale SPA/Ramsar Site) and their internationally important bird interest features.

Previous studies show marked declines of key bird species, particularly on the Medway Estuary. There is currently insufficient evidence to adequately assess the cause of these declines. Disturbance is one potential factor, and studies have shown recreational activities to cause disturbance impacts to birds. The declines in birds have been detected at the SPA level. Within the Medway, the areas that have seen the most marked declines are the area north of Gillingham, including the area around Riverside Country Park. This is one of the busiest areas in terms of recreational pressure.

New development will further exacerbate the pressures. New development (in the region of 68,000 dwellings are set out in the relevant local plans) brings more people to the local area and access levels have been predicted to increase on the coastal sites by around 15%. Such an increase will be gradual and long-term, across a wide stretch of coast; robust solutions are required to ensure that this level of development, considered in-combination, does not have an adverse effect on the integrity of the European sites.

This strategy addresses disturbance impacts and provides a strategic, cross-boundary solution to issues relating to disturbance, there are two aims.

- To support sustainable growth whilst protecting the integrity of European wildlife sites from impacts relating to recreational disturbance
- To reduce the existing recorded recreation impact on birds on the European wildlife sites in order to meet duties relating to the maintenance and restoration of European sites, as required by Article 4(4) of the Birds Directive.

Elements within the strategy are:

- A North Kent Coast Dog Project
- Wardening/Visitor Engagement
- New Access Infrastructure
- Parking (Strategic Review and Changes to Parking)
- Codes of Conduct
- Interpretation/signage
- Work with local club/group
- Refuge
- Enhancement of existing sites to create hub
- Enhancement to existing GI away from SPA
- Enforcement
- Monitoring

The **dog project** and **wardening/visitor engagement** elements are generic and can be established quickly. The **dog project** focuses on the activity that is most associated with disturbance and will engage with local dog walkers. It will be able to promote particular sites to dog walkers and raise

Thames, Medway and Swale Estuaries – Strategic Access Management and Monitoring Strategy

awareness of disturbance issues. **Wardens/rangers** with a visitor engagement role can be mobile and deployed across a range of locations, targeting areas with particular issues or close to new development. **New access infrastructure** will involve a range of discrete, focussed projects that could be phased with new development. **A review of parking locations** will provide the necessary information to underpin long-term changes in parking capacity, charging and provision. Such changes can be phased over time and linked to available funding and locations where new development comes forward. **Codes of conduct** will provide guidance for a range of activities. In-line with these, **interpretation/signage** and **work with local clubs/groups** is envisaged. These three elements dovetail and should be undertaken simultaneously. They also link with the long term aim of creating **refuges** – ‘quiet’ areas within the Medway where recreation and other activities are discouraged. We also set out **enhancement to existing sites**: both those **within the SPA** and **outside**. In the long term access is best focussed away from the SPAs or in particular honeypots around the shore where it can be managed and engagement with visitors targeted. We therefore highlight sites outside the SPA that are close enough to potentially draw some visitors. Sites within the SPA, such as Riverside Country Park, already draw high numbers of visitors and are likely to always draw people. Measures are possible at such locations to reduce disturbance. **Monitoring** across the SPA sites will provide a check on success of measures and inform where further measures, such as enforcement (for example dog control orders) might be necessary.

The strategy therefore contains elements that can be initiated quickly and other elements that can be phased over time and are flexible. Based on the results of a workshop and some site visits we have set out some suggestions for specific locations and we identify the overall cost for the strategy. The costs are set out below (Table 1). While only indicative the costings should provide the opportunity to budget and source funding, but in the long term different elements of the strategy may change in emphasis and costs may need to be distributed differently. Elements of the strategy that relate to new development (and can be classed as mitigation) should potentially be funded through some means of developer contribution. Other elements within the strategy relate to existing impacts or are more aspirational. We therefore categorise elements within the strategy as:

- A. Clearly mitigation for new development as related to particular housing allocations/areas of notable growth or necessary to be confident of no adverse effect on integrity as a result of cumulative impacts of new development over a broad area.
- B. Clearly linked to a current issue or required to rectify current problem
- C. More aspirational or less defined at this stage. This may be a potential opportunity to avoid or mitigate for impacts but could be implemented in a number of ways, with a variety of partners providing input, or may be such that it is best refined over time, informed by new information. At this stage therefore difficult to categorise and possibly elements that could be developed as an external funding bid.

Using the above criteria, elements that are categorised as A are those that could form part of a tight, clearly defined mitigation plan. Implementation of such a plan should ensure that a significant effect on the relevant European sites as a result of impacts from increased recreational disturbance (linked to new development) on wintering/passage waterfowl is avoided. The total capital cost for these elements is £185,300, plus an annual figure of £95,500.

Thames, Medway and Swale Estuaries – Strategic Access Management and Monitoring Strategy

Table 1: Summary of all elements of the strategy. Costs are indicative and approximate, drawn where possible from examples elsewhere, but not based on actual quotes. Total costs are given at the end of the table. These costs are also summarised as a per dwelling figure. This is calculated assuming 35,000 dwellings within 6km of the SPA boundaries and annual costs scaled to apply annually for 80 years (included the three ranger posts). No discounting or contingency is applied.

Recommendation	Set-up/Capital Cost	Annual Cost	Notes	Category
Dog Project	£15,000	£2,000	Staff time not included in cost as assumed undertaken by warden/rangers. Set up cost to cover web design, production of membership packs, launch event. Running costs for web hosting, updates to website, further events.	A
Senior ranger post		£45,000	Long-term post. Includes office and vehicle costs.	A (but some of warden time may end up focussed on existing impacts)
Two seasonal rangers		£40,000	Potentially short-term (c.10 years). Includes office and vehicle costs.	A (but some of warden time may end up focussed on existing impacts)
Path links	£5,000		Cost would depend on surfacing, route etc.	A
Structures to inhibit vehicles.	£3,500	£750	Range of different gate styles or designs possible. Costs need to cover installation. Annual maintenance/checking required	B (could possibly be argued that further development would increase pressure)
Additional planting at various locations	£1,800		Planting relatively low cost, but will need regular checks to ensure gaps are not developing and further planting may be required	A
Horrid Hill path management and screening	£5,000		Will need regular maintenance and checks to ensure new paths are not developing and further work (planting/screens) may be required	A
Dog training area	£3,000		Cost depends on area fenced.	A
Fencing at Motney Hill	£3,000	£500	Cost depends on type of fencing. Will need checking and maintenance	A
Fencing and signs around Shellness	£2,000	£500	Cost dependent on scale of fencing. New fencing may be required each year depending on flooding/changes in bird use etc.	A
Review of Parking	£0		No cost allocated as assumed review conducted by warden/ranger team	A
Changes to Parking	£20,000		Depends entirely on outcome of the review. £20000 would allow one or two small projects to probably be achieved.	A
Interpretation boards	£25,000	£2,500	Estimate based on 10 outdoor panel	A

Thames, Medway and Swale Estuaries – Strategic Access Management and Monitoring Strategy

Recommendation	Set-up/Capital Cost	Annual Cost	Notes	Category
			interpretation boards (A0 size); £2500 per board. Annual fee allows for replacement of boards over 10 year period	
Signs	£20,000	£1,000	10 signs. £2000 per sign, plus £1000 per year for replacement/maintenance	A
Codes of Conduct developed	£10,500		8 codes produced as a pack for printing and as interactive document; cost estimated at £8,000. £2,500 additional cost for revision and further print runs	A
New Visitor Centre and other facilities at Cliffe Pools RSPB	£4,000,000		Very approximate cost. Aspirational rather than an essential element of the strategy. Range of funding sources may be possible.	C
Enhancements at Northward Hill RSPB	£20,000		Improved parking and other infrastructure	A
Enhancements to Riverside Country Park	£25,000		Enhancements to areas away from shoreline such that access can increase here without further disturbance	A
Enhancements to existing GI away from the SPA	£420,000		Cost assumes around five projects at an average cost of £84,000	C
Speed monitoring equipment including digital camera and speed gun	£10,000		Approximate cost	A
Setting up dog control orders	£10,000		Estimate of costs required for legal advice, administration etc	A
Monitoring visitor numbers at set locations	£10,000	£1,500	Most of the counts every five years, undertaken by warden staff. Budget for automated counters and casual staff/consultancy support as required and included as an annual figure	A
Monitoring visitor activities, motivation, profile and		£1,000	Questionnaire work undertaken every 5 years (i.e. annual budget of £1000 equates to £5000 every 5 years).	A
Continued monitoring of wintering waterfowl		£500	Undertaken already as part of WeBS. Small annual fee to ensure data collated by local co-ordinators	A
Disturbance monitoring		£1,000	Could be undertaken at set intervals - e.g. every 10 years or on an annual basis	A
TOTAL (all categories)	£4,608,800	£96,250	Equates to £351 per dwelling	
A	£185,300	£95,500	Equates to £223.58 per dwelling	
B	£3,500	£750	Equates to £1.81 per dwelling	
C	£4,420,000	£0	Equates to £126.29 per dwelling	

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A wide range of people participated in a workshop in September 2013, and our thanks to all those who attended and shared ideas about the management of recreation and disturbance impacts to birds.

1. Introduction

- 1.1 In this section we set out the background to this report, summarising why a strategy is required and providing the necessary context for the rest of the document.

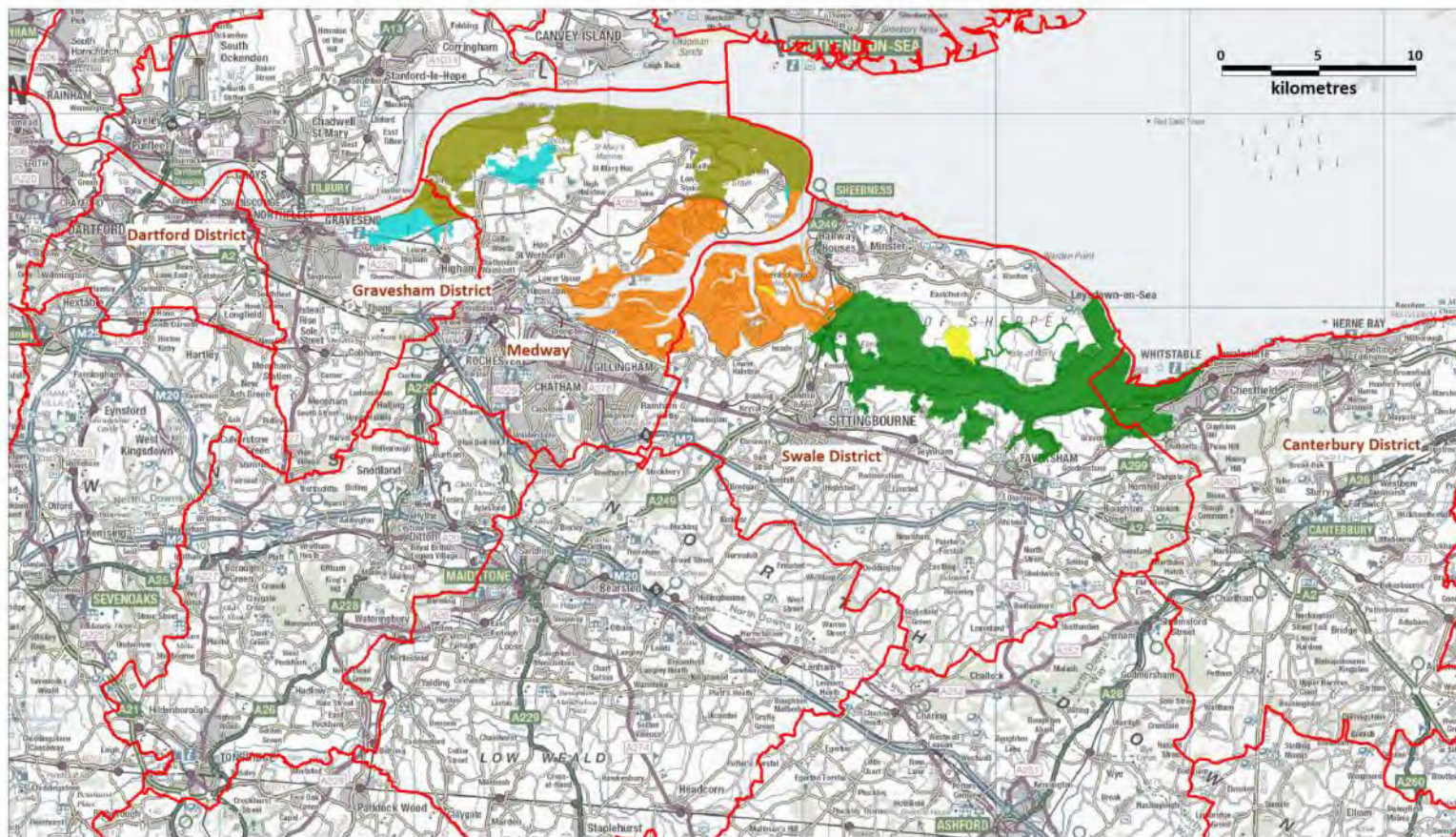
North Kent's international wildlife designations

- 1.2 This stretch of shoreline encompasses three Special Protection Areas (SPAs): the Thames Estuary and Marshes SPA, the Medway Estuary and Marshes SPA and the Swale SPA (Map 1). All three sites are also listed as Ramsar¹ sites, for their wetlands of international importance. The Ramsar site boundary does not quite match the SPA boundary, notably near Gravesham where the Ramsar boundary extends beyond the western boundary of the SPA (see Map 1).
- 1.3 The three sites are classified as SPAs in accordance with the European Birds Directive (Council Directive 79/409/EEC on the conservation of wild birds, updated by Council Directive 2009/147/EC in 2009). This European legislation requires Member States to classify sites that are important for bird species listed on Annex 1 of the European Directive, which are rare and/or vulnerable in a European context, and also sites that form a critically important network for birds on migration.
- 1.4 All three of the north Kent sites are classified for their waders and waterfowl, both Annex 1 and migratory species. The bird interest features for which each site has been classified varies slightly across the three sites, but all three sites provide on passage, overwintering, and breeding habitat to an array of species of European Importance. The sites therefore provide habitat for European wildlife throughout the year, with particular interest varying at different times of the year, and it is clear that the three European sites together provide a vast and linked expanse of critically important habitat to the SPA network around the British coast. Details of the interest features of each of the sites are summarised in [Appendix 1](#).
- 1.5 The additional Ramsar site listing for all three sites arises from the recognition of the international wetland importance of each, under the Ramsar Convention. It is common for SPAs to also be listed as Ramsar sites, and the Ramsar designations do include interest features that are not birds.
- 1.6 Also of relevance are areas of land identified as compensatory measures for adverse effects on European sites. These sites are given the same protection as SPAs/Ramsar sites². There are two areas in N Kent that meet this criteria and they are also shown in Map 1.

¹ Convention on wetlands of international importance especially as waterfowl habitat, Ramsar, Iran, 2/2/71 as amended by the Paris protocol of 3/12/92 and the Regina amendments adopted at the extraordinary conference of contracting parties at Regina, Saskatchewan, Canada 28/5 – 3/6/87, most commonly referred to as the 'Ramsar Convention.'

² See paragraph 118 of the National Planning Policy Framework

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**Map 1: Relevant European Sites
(South side of Thames only)**

Contains Ordnance Survey data © Crown database and database right 2013

- Medway Estuary & Marshes SPA & Ramsar
- Ramsar outside of SPA
- Thames Estuary & Marshes SPA & Ramsar
- Compensation sites
- District Boundaries

Previous studies

- 1.7 Previous studies (Banks *et al.* 2005) show marked declines of key bird species, particularly on the Medway Estuary (these previous studies are listed and summarised in [Appendix 2](#)). There is insufficient evidence to adequately assess the cause of these declines (some of which are long-term, going back 25 years), they may relate to a range of factors. However previous studies (see summary in [Appendix 2](#)) do show disturbance impacts to birds and disturbance may be a component factor.

Growth in North Kent

- 1.8 This strategy focuses on the administrative areas of Canterbury, Dartford, Gravesham, Medway and Swale local authorities. A review of the progression of local plans across the administrative areas of Canterbury, Dartford, Gravesham, Medway and Swale local authorities has identified that plans have progressed across the area since work on the European site mitigation requirements began. The following bullets provide a brief summary of the current progression of the relevant planning documents and indicate that around 68,000 new homes are likely to come forward in the next few decades³:
- **Canterbury** – The preparation of the Canterbury Local Plan by Canterbury City Council is underway, with a recent consultation on the draft plan being undertaken in the summer of 2013. The plan period of 2011 to 2031 is allocated a total of 15,600 dwellings. Land to the south of Canterbury takes up an allocation of 4,000 dwellings, with other large strategic sites at Hillborough and Sturry/Broad Oak.
 - **Dartford** – Dartford Borough Council adopted its Core Strategy in September 2011, with a plan period up to 2026. The plan supports new housing provision up to 17,300 dwellings over the plan period. Key development sites are identified in the plan, with Ebbsfleet to Stone accommodating 7,850 new homes, Dartford 3,070 and the Thames waterfront allocated 3,750.
 - **Gravesham** – The Council is planning for 6,170 houses over its plan period (to 2028), with the Core Strategy for the Borough currently at examination stage. Most of the new housing will be accommodated within the urban area of Gravesend.
 - **Medway** – Medway Council withdrew its draft Core Strategy from Examination in November 2013, following designation of an extended SSSI at Lodge Hill, Chattenden. The Council is in the early stages of preparing a new Local Plan, working to a programme of adoption in 2017. The Council is required to carry out a comprehensive objective assessment of development needs to inform the growth allocations in the new plan that will cover the period up to 2035. Currently, it is premature to indicate the level of the housing provision that will be made in the new plan.
 - **Swale** – the draft Local Plan for Swale proposes a housing target of 10,800 new homes over the plan period, primarily as extensions to the larger towns such as Sittingbourne.

³ The plans for the area have different plan periods with end dates which range from 2026 to 2035.

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- 1.9 Given this level of growth there is a clear need for a strategic strategy for mitigation measures relating to new growth.

Other projects of relevance

- 1.10 There are a number of other projects or initiatives that provide some cross-over or links to the SARMP, which include:
- Thames Estuary 2100 (TE2100)⁴, which sets out the strategic direction for managing flood risk in the Thames estuary.
 - The Greater Thames Marshes Nature Improvement Area (NIA)⁵ which is one of twelve landscape scale NIA projects in England. Elements within the NIA include habitat management and creation; work with local businesses, community engagement and securing long-term funding.
 - Shoreline Management Plans⁶.
 - Marine and Coastal Access Act: enhanced coastal access will provide a right of access (with ‘spreading room’) around England Work is planned to start on the stretch of coast between Ramsgate and London in 2014/15.

Structure of the Report

- 1.11 Background to the methods we have used to produce this strategy are set out in [Appendix 3](#). Subsequent sections of this strategy are structured with separate sections that describe:
- An overview of possible measures: the long list, with a review of each of the options within the list
 - Locations that are the focus for the strategy
 - The short-list of measures
 - The detailed strategy.

⁴ <http://www.environment-agency.gov.uk/homeandleisure/floods/125045.aspx>

⁶ <http://www.environment-agency.gov.uk/research/planning/105014.aspx>

2. A framework for the Plan

2.1 In this section we define the aims of the strategy, how those aims are distinguished within the strategy and we set out the guiding principles that provide a framework for the strategy.

Aims of the Plan

2.2 The strategy has two broad aims:

- It will support sustainable growth whilst protecting the integrity of European wildlife sites from impacts relating to recreational disturbance
- It will reduce the existing recorded recreation impact on birds on the European wildlife sites in order to meet duties relating to the maintenance and restoration of European sites, as required by Article 4(4) of the Birds Directive.

Legal and policy requirements

2.3 The National Planning Policy Framework (NPPF) provides the Government's policy framework within which sustainable growth should come forward. It is fundamental to the success of any strategic mitigation strategy for European sites that such a strategy is founded on sound planning principles. This strengthens the strategy and ensures its deliverability in the planning system.

2.4 The first aim of this strategy relates to new development and the need for competent authorities to ensure that new growth will not adversely affect the integrity of the North Kent European sites. This is in accordance with Article 6(3) of the Habitats Directive, transposed into Regulation 61 of the Habitats Regulations, whereby competent authorities are required to ensure that any plan or project for which they are authorising, or undertaking themselves, will not adversely affect the integrity of a European site. This is met by a competent authority in one of two ways. Firstly, the Habitats Regulations allow for a competent authority to be able to screen out the proposed plan or project from any further detailed assessment if it can be determined that it will not be likely to have a significant effect on any European site due to the nature of the proposal or any measures built into the proposal to avoid the likelihood of significant effects.

2.5 Where proposals cannot be initially screened out, the competent authority will proceed to a more detailed level of assessment, known as the 'appropriate assessment,' gathering the best scientific information to determine whether an adverse effect on the integrity of the European site can be ruled out. Measures that can adequately mitigate for any identified effects are considered during this detailed assessment, and added to the proposal where necessary, usually through the use of planning conditions or legal agreements.

2.6 Local planning authorities are increasingly seeking strategic approaches to securing mitigation for new growth, where the potential impact on European sites is similar for each individual development. Such an approach includes detailed appropriate

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assessment work undertaken upfront, followed by an agreed approach to mitigation that can be consistently applied to development coming forward. This is normally supported by local plan policy, and often with a partnership across administrative boundaries and drawing on input from Natural England and both national and local nature conservation bodies or established partnerships.

- 2.7 Defining potential impacts and making sound decisions relating to when a plan or project is likely to have a significant effect, whether there will be an adverse effect on site integrity and the need to take a precautionary approach whilst not being unjustifiably over precautionary, is a challenging and sometimes very difficult task. These decisions are important not only because they relate to the highest level of wildlife protection, but also because the conclusions may ultimately determine whether a plan or project should proceed or not.

Geographical area

- 2.8 The strategy will relate to the interest features of the following European Sites: the **Medway Estuary and Marshes SPA/Ramsar; the Swale SPA/Ramsar; Thames Estuary and Marshes SPA/Ramsar**. The strategy will not necessarily be limited to measures implemented within these sites, as the interest features may well occur outside the site boundaries at certain times, and in addition, measures relating to access may well be relevant well-outside the site boundaries (for example the provision of new routes or new green infrastructure).

Activities

- 2.9 The strategy will address the impacts of **recreational activities**, and not to impacts relating to other activities (for example there may additional impacts from industrial development, shipping, etc.). New housing may also have other impacts that are outside the scope of the strategy – for example effects on water quality. Impacts that relate solely to other (i.e. non-avian) interest features of the European Sites are also beyond the scope of the strategy.

Timescale

- 2.10 The interest features of the above sites include breeding birds, as well as passage and wintering birds. The declines in birds particularly relate to wintering (though note that the number of little terns has declined, see Liley *et al.* 2011). Following the recommendation of Natural England the strategy will relate only to the winter.
- 2.11 Mitigation measures will need to be secured in perpetuity, and therefore there is a need for the strategy to last and look to the **long-term**. The strategy should be robust enough to give certainty that European site interest will be protected, but at the same time **flexible** enough to be reviewed and modified over time, in line with results indicated by monitoring. It is difficult to be confident of how the coastline, the distribution of birds, the distribution of prey and access patterns may change over long time periods. Different weather conditions may result in people using the coast differently and result in seasonal shifts in bird numbers and access levels. As such the strategy needs to be able to respond to circumstances and carefully monitor changes.

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General Principles

- 2.12 The following principles underpin how the strategy has been prepared. The strategy should be **cost effective** in terms of management, collection, fund-holding, distribution and accounting. It should seek to put in place measures that are required, but not those that are over and above that which is necessary to give certainty that the European sites will be adequately protected, and not those that deliver other objectives for the local area. Requirements of new development should be fairly and reasonably related in scale and kind to the development, as required by paragraphs 204 and 206 of the NPPF.
- 2.13 The strategy should be **fair** in that it is applied fairly to development, proportionate to the potential impact that will be generated. Measures should not target particular types of development and leave other types free to proceed without adequately contributing to the mitigation for their impacts. Equally, the measures should be fair in respect to the types of recreation and the impacts associated with those activities. It is important to note that the local planning authorities, as competent authorities are responsible for securing the necessary mitigation and funding for some measures may need to be raised from other sources (this accords with the solutions focussed approach advocated in paragraph 187 of the NPPF).
- 2.14 The measures within the strategy should be included on the basis of **evidence** to justify their need and their appropriateness and likely effectiveness, and therefore in accordance with the requirements of paragraph 158 of the NPPF. The strategy should not include measures that may be considered desirable to achieve other objectives.
- 2.15 The strategy should be **implementable** with a good degree of certainty that the required measures can be delivered in a timescale that is related to the commencement of the development and the avoidance of potential impacts, taking account of the gradual change in recreational use over time. This will require considerable forward planning for the strategy to be implemented in a timely manner. Some measures will need to be secured in-perpetuity to ensure that impacts are avoided into the long term.

Drawing a distinction between current impacts and the effects of new development

- 2.16 The two broad aims for the SARMP are interlinked aims and very difficult to separate. However, it is important to clarify how they should be addressed as two different requirements of the legislation, as described above in Section 1, and where responsibility lies for securing the achievement of each.

Maintaining and restoring the European site network by resolving existing impacts

- 2.17 The overriding principles of the European legislation in terms of the European site network is the establishment, maintenance, restoration and protection of a coherent network that secures the favourable conservation status of the habitats and species of European importance, listed in the Directives. Article 6(2) of the Habitats Directive particularly requires each Member State to avoid the deterioration of habitats and disturbance of species for which European sites have been designated. It is this requirement that is the reason for the second aim of the strategy, which is to reduce the impact of existing levels of recreation on the North Kent European sites. There

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have been marked declines in the bird interest on some of the sites for a number of years, and disturbance levels may be a factor in these declines.

2.18 Meeting the requirements of Article 6(2) of the Habitats Directive is a Member State responsibility, and it is therefore a government wide responsibility, which logically extends to all public bodies and individuals holding public office whether their statutory remit includes duties that are relevant to the Article 6(2) requirement. It is worth noting that similar duties in national legislation exist for public bodies with regard to furthering the conservation and enhancement of Sites of Special Scientific Interest (SSSIs).

2.19 Whilst the first aim of the SARMP is specifically met by measures provided by new development, the second aim of the strategy is to contribute to the achievement of Article 6(2) objectives, and this can be achieved by the collective input of a range of authorities, bodies and partnerships. There may therefore be a number of options and opportunities for funding and resourcing measures contributing to this requirement.

Suggested approach to identifying responsibility for measures relating to new and existing impacts

2.20 The intention is to set out a single strategy that addresses the issue of recreational disturbance across the board, from both new development as well as existing development. The strategy aims to provide the right balance between the two aims, apportioning measures to each with logical and justified distinctions, whilst also seeking a realistic and implementable way forward that does not separate out the two aims to the extent that implementation becomes overly complicated and burdensome. Responsibility for existing deterioration should not be borne by new development, and at the same time, where new development will lead to additional impacts, fair and proportionate responsibility should be taken.

2.21 Our approach to seeking to identify responsibility will be to produce a single strategy that addresses disturbance impacts. Within the strategy we will – as far as possible – identify and split measures that relate to the two different aims. These splits will be identified as follows:

- Some measures within the strategy will be applicable to both aims, but it may be possible to subdivide or apportion them. **As far as possible some elements within the strategy may therefore be split according to whether they address new impacts from new development or solely relate to existing access.**
- Some of the measures will be those that are clearly and urgently required and those will therefore highlight existing issues requiring rectification. Such measures are likely to be location specific, and need to be very clearly defined. **This will need to relate back to ecological information to focus on locations in most need of urgent action.**
- Housing allocations may identify where particular measures will be required to prevent any new impacts from occurring. **A check of allocations should identify any such hotspots.** However windfall development and high levels of growth a few

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kilometres from the coast will mean that changes in access will also occur across a wide area.

- Some measures within the strategy may be less structured at this stage, being opportunities to mitigate for impacts but ones that may be implemented in a number of ways, with a variety of partners providing input, or may be those that can be refined over time. Some of these measures may even be more aspirational in nature. **These types of measures do not offer the necessary certainty to enable new development to meet the requirements of the legislation, but may provide positive opportunities to contribute towards rectifying existing issues.**
- Some measures will not necessarily have a clear allocation to either existing or new development impacts, but there may be logical reasons why their implementation is with one or the other. There will be activities that are best implemented by local planning authorities or other partners, and others that would be very difficult without developer led funding. Additionally, some projects may be of a type that meet external funding bid criteria, and therefore best pursued for existing impacts, leaving developer contributions to fund other important and necessary mitigation. **The most appropriate implementation path should be followed to maximise outcomes, and this will be a consideration in highlighting where responsibility may lie.**
- In checking that the burden on new development is fair and proportionate, consideration should be given to the expected increases in housing, and how that relates to the existing level of impact. **Checks should also be made across to other established strategic mitigation schemes, to assess whether impact, mitigation requirements and costs, and the levy placed on developers is in line with other approaches.**

3. An overview of possible mitigation measures: the long-list

3.1 In this section we provide an overview of the different measures to reduce disturbance impacts at coastal sites: measures that could form part of a strategy. We then review each in terms of cost, deliverability, effectiveness and timescale to implement to provide context to later stages of the report.

A 'long list'

3.2 We set out a summary 'long' list of possible options in [Appendix 4](#). These options range from soft measures and proactive work with local residents, to enforcement. The table simply sets out all the possible ways in which disturbance might be reduced. Some measures can be described as either off-site or on-site measures. Others, such as the promotion of visitor awareness of issues, or habitat creation, may fall into both categories. Therefore this distinction is only made where useful in organising the measures presented in the table. The measures listed are not necessarily compliant with the habitat regulations in terms of mitigation.

Assessment of the long list

3.3 In [Appendix 5](#) we provide a table assessing each of the measures in the long list ([Appendix 4](#)) in terms of effectiveness, deliverability, time frame to implement and cost. The colours facilitate comparison – rows that are mostly green indicate more positive assessment while those rows with dark brown cells indicate approaches with less merit.

3.4 From this assessment we can draw the following broad conclusions.

Habitat Management

3.5 Habitat management measures could include creation of artificial, undisturbed roost sites, creation of additional feeding areas (e.g. managed retreat or new lagoons) or enhancement of habitats to provide better feeding sites (for example changes of management of wet grassland). Problems with these measures include:

- Some are large infrastructure projects which are complex and expensive to deliver,
- There are existing roost sites on islands that are largely free from disturbance,
- Wet grassland habitats (the obvious focus for changing management) are not used during the winter by many of the waders that have been declining (such as knot, grey plover, dunlin and ringed plover)
- They may be dependent on opportunities and other plans (managed retreat),
- Some should be taking place anyway (management of the European sites to achieve favourable condition),
- They are not necessarily compliant with the Habitat Regulations if new habitat is being created outside the SPA to compensate for deterioration of the SPA.

3.6 We therefore suggest that opportunities may arise, such as managed retreat. Such opportunities will depend on other plans and circumstance, and whenever possible maximum potential should be made to enhance habitats and minimise disturbance for the bird interest. As such, habitat management measures are not a main element of this strategy, but should be recognised as important in their own right.

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Planning and off-site measures

- 3.7 Ensuring development does not take place around sensitive sites effectively avoids issues relating to the impacts of new development. There are now precedents around the UK where SPA and SAC sites have a development exclusion zone clearly set out within overarching plans. For example local authorities around the Dorset Heaths, Thames Basin Heaths, Breckland, Ashdown Forest and Wealden Heaths have all included 400m zones around their heathland sites. Establishing such a zone with respect to disturbance issues and coastal sites is much more difficult, as recreational users travel from a wide area to visit and use coastal sites (previous work has suggested a 6km zone from which the majority of recreational use originates). There are also practical considerations as each local authority is at different stages in their relevant plans. A ‘sterile’ zone of no development around the three North Kent SPAs would encompass ports, town centres, very built up residential areas and contaminated brownfield sites. Development would potentially be halted or pushed to greenfield sites whilst also preventing regeneration of urban centres. We therefore suggest this approach does not merit further consideration with any large buffer. While not included as a main mitigation element within the strategy, local authorities may wish to consider small exclusion zones (say 400m) around main access points.
- 3.8 The provision of Suitable Alternative Natural Greenspace ‘SANGs’ and other additional green infrastructure is a potentially appealing solution to resolving disturbance impacts. By providing additional space for visitors, it would seem intuitive that an area can support more visitors. In terms of visitors to the coast, alternative sites are most likely to work for types of access that are not dependent on particular coastal features – for example visitors who are simply drawn to sites because it is the nearest open space to their home, or because it is a convenient place to walk the dog and let the dog off a lead. The options to create alternative sites that provide coastal scenery, locations to kite surf or beautiful beaches are likely to be limited. Given the high cost of purchasing land and securing management in perpetuity, SANGs are not ‘quick wins’ and should be carefully selected, targeted and planned. Taking a long view, SANGs may have a longer term and more strategic role in mitigation compared to other measures, and must clearly be carefully considered on a site-by-site basis.
- 3.9 Opportunities for SANGs delivery may come forward through existing sites (potentially already in local authority or county council ownership) which could be enhanced to provide access or when directly linked to individual, large developments. Sites that are linked to development will be likely to be close to new housing (in some ways ideal – but likely to mean a particularly ‘urban’ feel) and need to be considered very carefully on their merit (an area of grassland on the edge of a large development is unlikely to provide a good alternative to the SPA sites). We therefore suggest that provision of new green space sites does have a role in mitigation, but that it is a long-term one and one that needs to be carefully planned. Given the high cost of such measures, they are dependent on local opportunities.

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- 3.10 Other off-site measures relate to more local approaches, enhancing sites outside the European sites, managing visitor flows on adjacent sites, essentially drawing visitors away from European sites. These approaches have merit, but are small in scale and local.

On-site Access Management

- 3.11 The matrix in [Appendix 5](#) indicates that most on-site measures are relatively easy to implement, effective and relatively low cost. The one measure with concern regarding effectiveness is fenced exercise areas for dogs.
- 3.12 There are a range of management measures that relate to shore based access which would be relatively easy to implement and potentially low-cost, but they are mostly quite local and site specific. As such they could work to resolve issues in particular locations, enhance access in particular places and be carefully targeted. They all require some work 'on the ground', working with local landowners, rights of way officers and other relevant stakeholders, and as such could be considered as a series of individual small, discrete projects:
- Management of visitor flows on adjacent land
 - Paths rerouted inland/below seawall
 - Screening
 - Path management
 - Restricting access at particular locations (such as temporary fencing near wader roosts)
- 3.13 These kind of approaches have merit, but require careful planning and design. Many can be targeted to resolve particular issues at sites or be tailored to particular access types. For example low screening or low fencing at particular locations may provide opportunities to keep dogs away from key areas for birds. These kinds of measures can be phased/targeted as resources allow and as issues arise.
- 3.14 Management of parking (reducing/redistributing spaces/closing parking locations/review of charging) is a means of managing access over a wide area, and applies to a wide range of different access types. Changes to car-parks can take place both on and off-site. In order to ensure success, careful work is needed initially to review existing parking, map parking and identify changes. An important element is the need to ensure a consistent approach across local authorities and others responsible for parking. Changes to parking may also be unpopular with some users, so would need to be undertaken carefully and considerately. It would be necessary to predict and monitor likely displacement to ensure that the pressure did not merely move from one sensitive area to another. Conducting a review, producing a car-parking 'plan' and liaising with users would all necessitate a degree of staff resources.
- 3.15 Zoning is particularly relevant to watersports and there are numerous examples around the country where watersport zones have been established. Zoning works where users spread over a wide area and there are issues with disturbance at particular points. Zoning is positive in that it creates a dedicated space for users, but zones require some careful

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consideration and consultation in order to get right. As such the approach is not a ‘quick win’.

Education and Communication/Awareness Raising

- 3.16 Education initiatives, such as interpretation, guided walks, wardening, school visits, community events etc., are widely undertaken at many countryside sites and enhance people’s visits to sites and their understanding of the local area. Such approaches are proactive, rather than reactive, but unlikely to solve problems in the short term and depend largely on the audience and style of communication. In general, therefore, education and awareness raising measures are likely to have wider conservation benefits, but there is relatively little evidence that such measures on their own will bring about rapid changes in people’s behaviour and reduce disturbance. Good communication is however likely to be important when linked to other measures, to ensure visitors understand issues and to ensure clear guidance for people on where to go, how to behave etc.
- 3.17 Voluntary codes of conduct provide a means of clearly conveying messages about where to undertake different activities and how to behave, and provide a foundation to other measures such as enforcement.
- 3.18 Wardens appear twice in the matrix, as people out ‘on-site’ can have an engagement role (talking to visitors, showing people wildlife, explaining issues etc.) and/or an enforcement role. Establishing a warden presence is relatively easy to implement, but employment costs over a long-period (in perpetuity) are high. If wardens have an enforcement role, then there is a need for clear guidance to users and legislative support to provide the scope for enforcement.
- 3.19 The presence of a warden on-site, asking people to behave differently, and the wardens on-site to show people wildlife are relatively ‘quick wins’ in that a wardening team can be established quickly. There is published evidence of their effectiveness, for example in resolving impacts from access for breeding terns (Medeiros *et al.* 2007). Given that warden/rangers could undertake monitoring and also work closely with stakeholders on other projects, an on-site presence, at least in an early part of the strategy, would seem a sensible use of resources. It will be important to ensure that the warden/rangers have powers to enforce byelaws etc. as required over time.

Enforcement

- 3.20 A range of legal mechanisms are relevant. Byelaws can be applied to enforce zones, limit speeds and dog control orders provide a range of options for fines to be levied to dog owners (for example requiring dogs to be on leads; requiring dog owners to put their dogs on leads when asked etc.). In general these measures require a little time to set up – involving consultation, evidence gathering etc. – and (not surprisingly) can be unpopular. Users need to be made aware of any changes and some way of monitoring, checking and enforcing (such as wardens, see above) is required. Measures relating to enforcement are therefore ones which have a high likelihood of success, but require some time to set up and establish. We therefore suggest legal mechanisms such as dog control orders and byelaws are elements that potentially feature later in any strategy, after other (more positive) measures have been implemented.

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- 3.21 Capping visitor numbers is problematical. Permits or similar systems are used in other countries (see Newsome, Moore & Dowling 2002 for details and a review), and occasionally within the UK. In general, however, the approach is applicable to wilderness areas or sensitive nature reserves and has largely lost favour within the UK. At most locations around the SPA there are existing rights of access and controlling access in such a way along the coastline is probably not worth further consideration.
- 3.22 Covenants relating to pets in new development is also not worth further consideration. It is difficult to have confidence that covenants can be applied and be effective in the long term. The checks, monitoring and legal costs of ensuring residents do not keep pets are complicated.

4. Locations that are a focus for the strategy

4.1 In this section we summarise spatial data relevant to the strategy. [Appendix 6](#) includes a series of maps and summarises background information relating to spatial context. It contains the following maps:

- Map 11: Areas important for particular bird species: WeBS sectors holding more than 10% of the count of interest features of the SPAs
- Map 12: Areas that are potentially vulnerable to disturbance/sensitive to disturbance (high tide roosts)
- Map 13: Priority habitats within the SPAs, highlighting habitats relevant to the SPA interest features
- Map 14: Areas where access may increase in particular
- Map 15: Current access
- Map 16: Areas where particular activities are focussed

4.2 The key areas for birds – based on WeBS core count data – are the northern parts of the Swale and the inner part of the Medway (islands). These are some of the quietest areas in terms of access and development pressure. These areas also hold a high proportion of wader roosts. The largest areas of intertidal habitat (the richest feeding for many of the birds) are in the Medway and the outer Thames. The area with the most new housing likely to come forward (within a 6km radius) is the South-west corner of the Medway, between Lower Upnor and Gillingham. Areas near Gravesend and the upper reaches of the Swale are also likely to see a marked increase in housing within 6km. Current access levels are highest near Whitstable (mouth of the Swale) and the upper parts of the Medway.

5. Elements of the Plan

5.1 The following elements form the basis of the strategy. Each are discussed in detail within this section.

- A North Kent Coast Dog Project
- Wardening/Visitor Engagement
- New Access Infrastructure
- Parking: Strategic Review and Changes to Parking
- Codes of Conduct
- Interpretation/signage
- Work with local club/group
- Refuge
- Enhancement of existing sites to create hub
- Enhancement to existing GI away from SPA
- Enforcement
- Monitoring

5.2 The **dog project** and **wardening/visitor engagement** elements are generic and can be established quickly. The **dog project** focuses on the activity that is most associated with disturbance and will engage with local dog walkers. It will be able to promote particular sites to dog walkers and raise awareness of disturbance issues. **Wardens/rangers** with a visitor engagement role can be mobile and deployed across a range of locations, targeting areas with particular issues or close to new development. The level of wardening can be flexible over time and the posts can supplement existing visitor engagement and range posts.

5.3 **New access infrastructure** will involve a range of discrete, focussed projects that could be phased with new development. **A review of parking locations** will provide the necessary information to underpin long-term changes in parking capacity, charging and provision. Such changes can be phased over time and linked to available funding and locations where new development comes forward. **Codes of conduct** will provide guidance for a range of activities, in particular making it clear how users should behave and where to undertake particular activities (important ground work should legal enforcement be required in later years). In-line with these, **interpretation/signage** and **work with local clubs/groups** is envisaged. These three elements should be undertaken in tandem and it is important they interlink, for example the maps on the codes of conduct could also be used on the interpretation. Also linked is the long term aim of creating **refuges** – ‘quiet’ areas within the Medway where recreation and other activities are discouraged. We also set out **enhancement to existing sites**: both those **within the SPA** and **outside**. In the long term access is best focussed away from the SPAs, and the more that existing green infrastructure away from the SPA can absorb access pressure and people’s access requirements the better. Particular honeypots within the SPA will be likely to continue to draw access and coastal sites will always have a particular draw. These sites therefore need to be made more robust, with

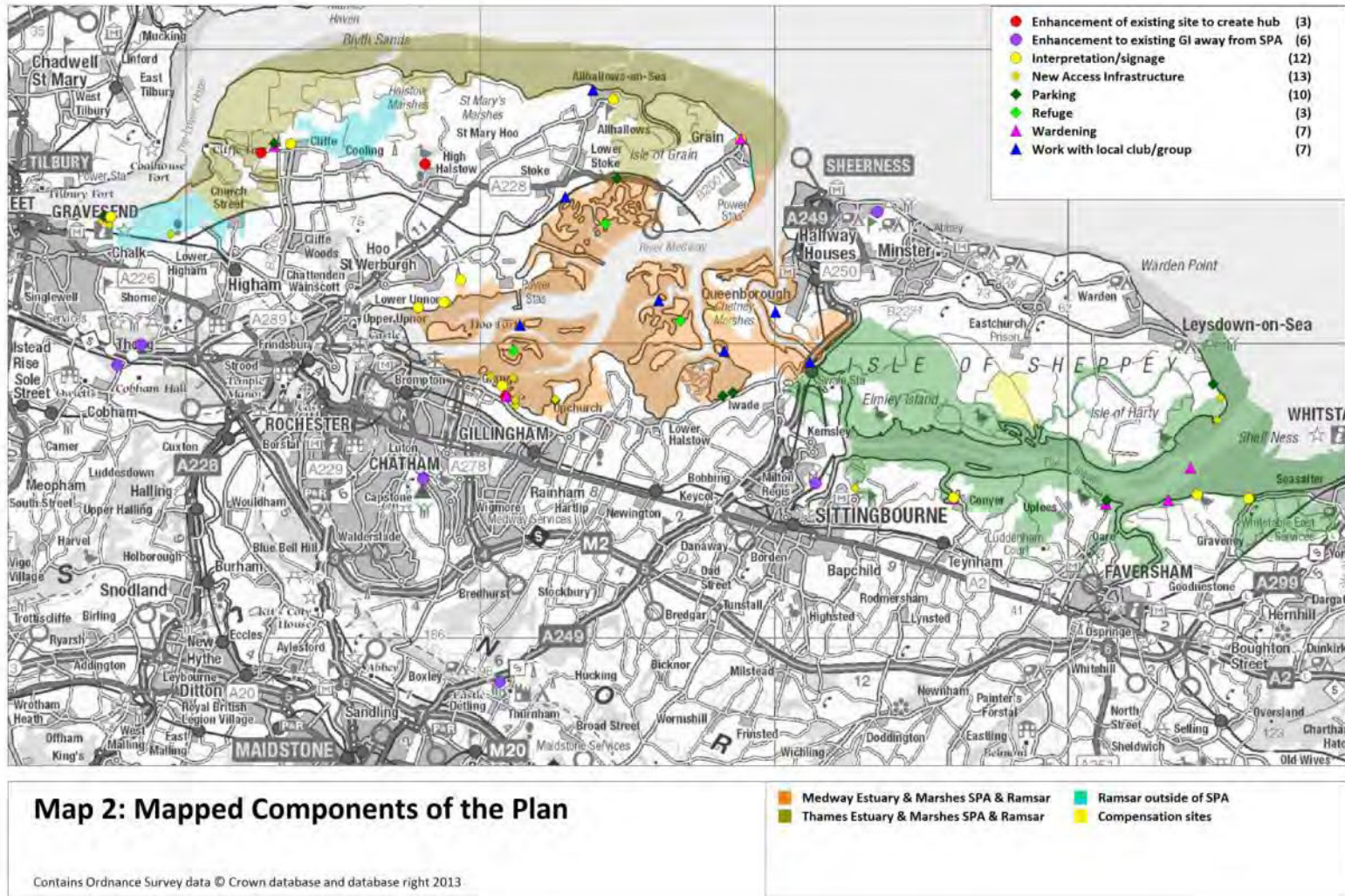
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additional resources made available and management measures targeted to reduce disturbance impacts. Measures are possible at such locations to reduce disturbance.

Monitoring across the SPA sites will provide a check on success of measures and inform where further measures, such as enforcement (for example dog control orders) might be necessary

- 5.4 Elements which can be mapped are shown in Map 2, which provides an overview of the different elements. Note that some parts of the strategy cannot be specifically plotted and for some elements (such as wardening) some suggested locations are indicated on the map but there may be additional locations over time. We also summarise the strategy spatially in [Appendix 7](#). In this Appendix we set out a summary map (Map 17) showing all components of the strategy and an accompanying table that summarises the spatial elements of the strategy.

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A North Kent Coast Dog Project

Overview

5.5 A dog project would provide the opportunity to actively engage with local dog walkers and establish a means for dog walkers and conservation/countryside staff to communicate with each other. The approach has been successfully used in other parts of the country where there are concerns about the impacts of dogs on European sites.

Justification

5.6 Dog walking was the most common activity people were undertaking at the survey points included in the disturbance study (Liley & Fearnley 2011). Dog walking accounted for 55% of the major flight events recorded during the disturbance study and the study showed that it was dogs off-lead that were a particular issue. A dog project aimed at establishing communication with dog walkers, providing a means to engage with users, raising concerns, highlighting sites to visit (and sites where dogs are not so welcome) etc. is a positive, proactive and cost effective approach.

Detailed Recommendations

5.7 We recommend that a project is established that has its own identity/branding and is something that is free. The project would be a strategic, over-arching element of the strategy – in that it is not location specific. The main element to the project would be a website that is aimed at those interested in dogs. As such the website could provide:

- social networking opportunities for dog walkers,
- a forum for users to share information on places to walk and local issues,
- help for people with lost dogs
- a list of vets, pet food suppliers, kennels etc.
- a live gazetteer of countryside sites, potentially with opportunities for users to add comments about sites, recommend sites etc. The gazetteer should indicate (potentially with a colour scheme) sites where dogs are welcome and sites where dogs should be on a lead or are not welcome
- a register for professional dog walkers (allowing professional dog walkers to sign up to a particular code of conduct)
- a code of conduct for dog walkers in the countryside

5.8 Besides the website, there is the potential for the project to include events (guided walks, meet-the-ranger type events, events at particular sites where there are dog walking issues, indoors events with stands etc.). Promotion of the project could involve face-face contact on-sites, and also active work with local vets, suppliers etc.

5.9 By holding people's contact details (and potentially details of their dogs, where they live/walk etc.) there is the potential for users to be contacted directly if there are issues on local sites, for consultation etc.

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- 5.10 ‘Dorset Dogs’⁷ provides a useful precedent – the project has won awards from the Kennel Club and has been developed over a number of years, using funding from developers to off-set impacts related to the Dorset Heaths SAC/Dorset Heathlands SPA.

Indicative Costs and Implementation

- 5.11 The website and the approach of the project will need to be designed with the involvement of local dog walkers and be tailored to the specific area of North Kent. This will ensure it will appeal to local dog walkers and be useful.
- 5.12 The project will need to have its own identity and initial costs will need to cover the design of the website, production of membership packs, display material, equipment for events etc. Staff time will be required to develop the project and organise any start-up events etc.
- 5.13 Costs are summarised in Table 2.

Table 2: Indicative costs for dog project

Recommendation	Set-up/Capital Cost	Annual Cost	Notes
Dog Project	£15,000	£2,000	Staff time not included in cost as assumed undertaken by warden/rangers. Set up cost to cover web design, production of membership packs, launch event. Running costs for web hosting, updates to website, further events.

⁷ [REDACTED]

Wardening/Visitor Engagement

Overview

5.14 A small team of mobile warden/rangers is needed to patrol the SPA, engaging with visitors and providing the staffing needed to implement some of the other measures within the strategy.

Justification

5.15 There are lengths of coastline with currently little or no ranger presence and there are issues of disturbance from both legal and illegal activities. There are also a number of local settlements where there is little liaison with the communities and a lack of understanding of the importance of the SPA featured species and their sensitivity to human activities. Where mitigation measures are needed, there will be a need to liaise with local land managers and owners and to either carry out works or appoint and supervise contractors. A number of places are popular with tourists and enthusiasts at all times of year and engagement with these transient visitors is also important to inculcate an understanding of the importance of the SPA and the vulnerability of the featured species to human impacts. This all requires a presence on the ground of knowledgeable rangers. We therefore envisage a small mobile ranger team that would supplement and fit with existing warden/rangers. The team would have a dedicated role along the lines of a ‘bobby on the beat’, and the team would be flexible over time in that staffing levels and deployment would vary as required.

5.16 There are published studies that show that wardening is effective in reducing disturbance impacts (e.g. Medeiros *et al.* 2007).

Detailed Recommendations

5.17 The warden/ranger’s would function as a mobile team, covering multiple sites (under different ownership and management) and their duties would involve working with the existing site managers (where present) and include:

- Actively patrolling sensitive areas, engaging with visitors.
- Putting up seasonal signs, fences etc.
- Familiarisation with the area and identification of disturbance issues
- Putting in place mitigation measures to remove sources of disturbance (such as illegal motor biking) or reducing disturbance from legitimate users (education, signs, screening etc.
- Liaison with local communities, landowners and land managers and other organisations
- Education initiatives with local schools etc.
- Monitoring impacts from human activities and the effectiveness of mitigation measures

5.18 While we envisage that the main work of the warden/rangers would involve active engagement with visitors, we also envisage that the duties would include work on some of the other areas recommended in this report – the parking review and the dog project for example.

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- 5.19 The wardens would need to have a strong presence and be clearly identifiable. There are a range of options for how the warden/rangers could be hosted or established. For example it may be possible to add to existing staff teams in the area (e.g. wildlife trust/RSPB/local authority) alternatively the warden/rangers could form their own team with a separate brand and identification.
- 5.20 It would be possible for the core team to work with volunteers, which could provide a means of increasing local support and face-face contact. ‘Walking Wardens’ have been employed by some wildlife trusts⁸ on their reserves to report anti-social behaviour and (for those who have dogs) ‘best practice’ dog walking.
- 5.21 Wardening effort and patrolling would involve all areas, and be flexible. Different locations and issues may become a focus at different times. Map 3 shows suggested locations for the wardening effort to be focused. These are also summarised in Table 3. The list is not exhaustive, but provides an overview of some of the locations where the wardening effort could be directed.

Table 3: Suggested areas for wardening effort to be focussed.

Map ID (See Map 3)	Details
11	Mobile warden/ranger focus: issues with local dog walkers/motor bikes
22	Roaming warden along Medway estuary shore - boost to existing warden staff
41	Mobile warden/ranger focus dog walkers
48	warden presence
51	Existing wardening presence at Oare Marshes, but necessary to ensure continuity and coverage
53	Mobile warden/ranger focus: issues with local dog walkers, roosts wardened at high tides
55	enforce speed limits - jet skis and catamarans in this area

- 5.22 In general the areas that should be a focus for wardening effort should be:
- Wader roost sites at high tides
 - Sites with particular issues, such as a focus for particular activities (off-roading; dogs off-leads etc.)
 - Areas where access is likely to change, for example close to areas where development takes place

Indicative Costs and Implementation

- 5.23 It is anticipated that two rangers will be required during the winter, and in addition one senior ranger throughout the year. Additional short-term posts could be created to supplement the core team as required (monitoring results will provide indication as to whether this is necessary). The senior ranger would supervise the seasonal rangers and would be funded in perpetuity. The senior ranger would cover the sites where wader

⁸ For example in Northamptonshire: [Irthlingborough Lakes and Meadows Walking Wardens leaflet](#)

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numbers start to build in July and in the quieter summer months (April – July) would be working on the other elements, such as data entry (monitoring data), the dog project, the parking review etc.). The two seasonal ranger posts would be employed for the autumn/winter only (August-March) and may not be required in perpetuity. This is because once access patterns have become established in particular ways that reduce disturbance (such as dogs on leads at particular sites) then there may no longer be a need for the staffing to continue at such a level. Volunteer wardens may prove effective support in the long term too. It may therefore be that – after eight to ten years and following careful review - it would be possible to reduce the staffing levels to two or one.

5.24 Costs would depend on how the team is set up and functioning. We recommend that the team does have its own identity, with an office base, vehicles, branding etc. With three staff in place, one staff member could have a focus on a particular estuary (Thames, Medway and Swale), with the potential for the three to also work together on particular aspects/projects/events.

5.25 Approximate costs are summarised in Table 4.

Table 4: Indicative costs for warden/ranger team

Recommendation	Set-up/Capital Cost	Annual Cost	Notes
Senior ranger post		£45,000	Long-term post. Includes office and vehicle costs.
Two seasonal rangers		£40,000	Potentially short-term. Includes office and vehicle costs.
Total		£85,000	

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Map 3: Wardening/Rangers

(NB these would have a wide remit, points are examples and indicative)

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- Medway Estuary & Marshes SPA & Ramsar
- Thames Estuary & Marshes SPA & Ramsar
- Ramsar outside of SPA
- Compensation sites

New Access Infrastructure

Overview

5.26 This section is intended to cover small projects to reduce or modify visitor impacts on a site specific basis, for example changes to paths, gateways or other access infrastructure. Generic measures across sites and larger projects such as strategic signage or visitor centres are considered elsewhere.

Justification

5.27 Small, site specific measures may work well to resolve issues at a local scale. For example there are examples of where resurfacing paths has changed where people walk and as a consequence reduced disturbance (Pearce-Higgins & Yalden 1997). Vegetation structure appears to have the potential to affect how disturbance may affect birds (Murison *et al.* 2007), with thicker, scrubbier vegetation potentially screening visitors and reducing access off-paths.

5.28 The visitor survey results (Fearnley & Liley 2011) indicate that certain features draw users to particular locations and include better path surfacing/path network (7% respondents) and more dog-friendly (6%). For dog walkers in general evidence suggests that favourite sites are those where dogs are perceived as most happy; where they are permitted to run off lead, can socialise with other dogs, and where there is little danger of road traffic (Edwards & Knight 2006).

5.29 Re-routing paths, providing screening, providing fenced areas for dogs to be off lead and restricting access at certain (vulnerable) locations are commonly used approaches to simultaneously enhance access and reduce impacts. Many measures will be cost-effective to implement.

Detailed Recommendations

5.30 The following site specific measures have merit and could be focussed to particular locations:

- Allow vegetation to grow to set access back from sea-wall and screen users
- Provision of physical screening, such as reeds or fencing, to keep people away from particular areas and hide them. It may be possible to provide viewing facilities through the screen
- Enhancement of existing paths, for example through resurfacing, to draw users along particular routes
- Enhanced gateway/access furniture to prevent particular types of activity (such as off-road vehicles or motorbikes)
- Linking paths to provide choice of routes and potentially divert access away from seawall/shoreline
- Re-routing paths, for example below seawalls
- Fencing to direct people away from wader roosts

5.31 Opportunities for some of these measures may occur over time or be linked to other projects. It may be necessary to consider particular approaches as access levels change.

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Through the workshop and site visits, we have identified a number of particular locations and projects. These are summarised in Table 5 and Map 4.

Table 5: Locations where there is potential for new access infrastructure which will reduce potential disturbance

Map ID (See Map 4)	Details
1	Linking of the shoreline path (Saxon Shore Way) with the Thames and Medway Canal towpath to give a choice of circular walks from housing and industrial area to east of Gravesend
3, 4 & 8	Infrastructure to inhibit motorbikes and other vehicles accessing marshes along the Saxon Shore Way, the Thames and Medway Canal towpath or existing or proposed new paths across Eastcourt or Shorne marshes.
19	Continue to manage existing shoreline vegetation of bramble etc. and reinforce with additional planting to provide partial screening - along seaward side of seawall in country park
23	Management of paths at Horrid Hill –making subtle changes including modification of path surfaces, provision of low vegetation screening and measures to discourage visitors straying onto foreshore instead staying on paths. Gated entrance to main access path onto Horrid Hill Peninsula with dogs on leads restriction on peninsula.
24	Continue to manage existing shoreline vegetation of bramble etc. and reinforce with additional planting to provide partial screening - along seaward side of seawall in country park
26	Promotion of fenced dogs run free areas away from shoreline, including particular dog training area
28	Fencing to restrict access from Saxon Shore Way on west side of Motney Hill onto adjoining beach.
46	Infrastructure to inhibit motorbikes and other vehicles accessing marshes on paths either side of Milton Creek
50	Screening enhanced at Oare Marshes with additional planting
58	Fencing around roost
59	Potential to restrict access at Shellness (privately owned area owned by hamlet) during tern breeding season (fencing and signs) and negotiate for access to very specific locations during winter to prevent disturbance to roosts.

5.32 Many of the recommendations in Table 5 relate to screening and allowing vegetation to develop further at particular locations. Low bramble exists in many locations, particularly around the Medway in the vicinity of the Riverside Country Park, and allowing the vegetation to build on the seaward side of the path to still provide views to people walking, but acting as a screen (particularly for dogs) would be relatively simple to achieve. Such approaches are particularly relevant in areas such as Horrid Hill where the spit allows people to be close to large areas of intertidal habitat important for birds. Provision and promotion of dog fenced areas in this area would also help divert use away from the shoreline, particularly if there is a stronger push for dogs to be kept on leads along the shoreline. Guidance on design and size of dog-fenced areas are provided by Jenkinson (2013). There is scope to provide agility areas (for both owners and their dogs: Jenkinson 2009).

5.33 These relatively small infrastructure projects need to be considered on a case-by-case basis, and could be developed by the wardening team once in place. It may be that the best approach – at least initially – is for projects to come forward over time as funds allow. These projects could be phased with development.

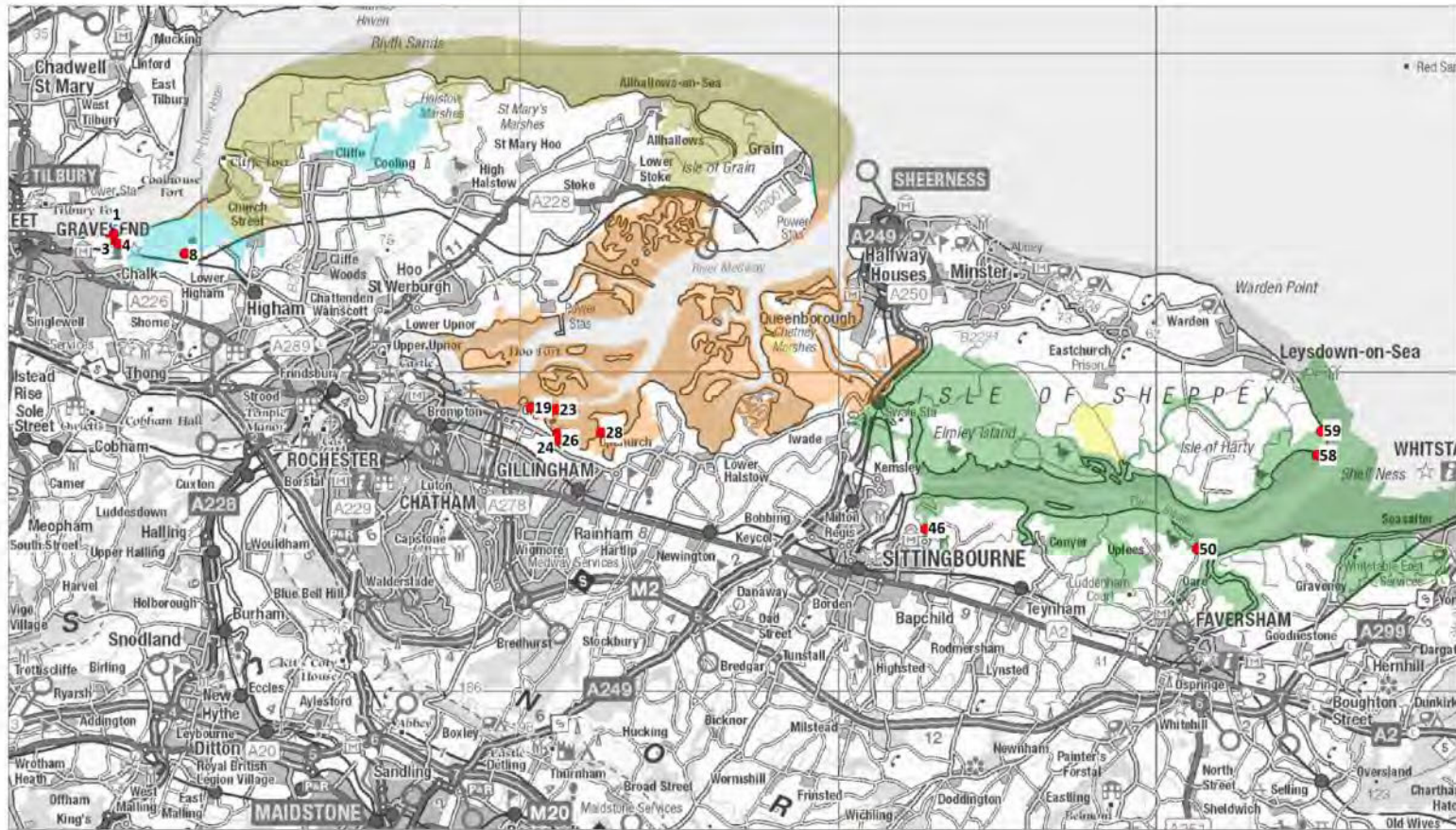
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5.34 Indicative costs for the measures above are summarised in Table 6.

Table 6: Indicative costs for site specific infrastructure


	Recommendation	Set-up/Capital Cost	Annual Cost	Notes
1	Path links	£5,000		Cost would depend on surfacing, route etc.
3, 4, 8 & 46	Structures to inhibit vehicles.	£3,500	£750	Range of different gate styles or designs possible. Costs need to cover installation. Annual cost covers maintenance/checking
19, 24 and 50	Additional planting at various locations	£1,800		Planting relatively low cost, but will need regular checks to ensure gaps are not developing and further planting may be required
23	Horrid Hill path management and screening	£5,000		Will need regular maintenance and checks to ensure new paths are not developing and further work (planting/screens) may be required
26	Dog training area	£3,000		Cost depends on area fenced.
28	Fencing at Motney Hill	£3,000	£500	Cost depends on type of fencing. Will need checking and maintenance
58&59	Fencing and signs around Shellness	£2,000	£500	Cost dependent on scale of fencing. New fencing may be required each year depending on flooding/changes in bird use etc.
	Total	£17,500		

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Map 4: New Access Infrastructure

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	Medway Estuary & Marshes SPA & Ramsar		Ramsar outside of SPA
	Thames Estuary & Marshes SPA & Ramsar		Compensation sites

Parking: Strategic Review and Changes to Parking

Overview

5.35 We recommend a review of parking across the three estuaries and adjacent sites. The review should encompass lay-bys, formal car parks and roadside parking. It should consider the number of parking spaces available, any charges for parking and whether there are additional facilities (such as access to the water with a boat). While sites that have access to the SPAs should be the focus, sites that may also attract similar visitors and are away from the coast should be included. Following from the review a series of carefully considered changes should be possible.

Justification

5.36 Of the people interviewed in the visitor survey, 63% had arrived by car (Fearnley & Liley 2011). For locations well away from nearby housing the majority of people will travel by car. Modifying the distribution, cost and ease of parking is therefore a means of managing visitor flows. There are examples of sites where the careful review, assessment and management of parking provision has led to a marked change in how people use sites. For example at Burnham Beeches, an SAC near Slough, the Corporation of London have created a car-free zone in the northern part of the site and then closed part of Lord Mayor's Drive (which allowed vehicular access through the middle of the site). In total three car parks have been closed and roadside parking has been restricted on roads around the site through signage, ditches, banks and dragon's teeth. In parallel with these changes, the Corporation of London relocated the main visitor facilities to provide a central focus of activity slightly away from sensitive SAC features and adjacent to open grassland which was not particularly sensitive to recreation pressure. Car park charges have been introduced at weekends only, a system intended to encourage people not to visit at busier times.

5.37 The Burnham Beeches example illustrates how managing parking has the potential to influence access and redistribute visitor pressure. Closing car parks can however be contentious; for example proposals to close car-parks in the New Forest National Park have been strongly opposed by local dog walkers⁹. Closures should only be undertaken after careful consultation and survey work to ascertain people's reactions and where access might be deflected to. Evidence from Cannock Chase in Staffordshire suggests that results can be unpredictable (Burton & Muir 1974), for example people may still choose to visit favoured areas, but are prepared to park further away and walk further. In general, preventing parking in lay-bys, on verges and other informal parking locations may be easier to achieve than closing formal car-parks

Detailed Recommendations

5.38 A review of parking across the area would involve a short visit to each parking location and assessment of each in a standard fashion – recording charges, capacity, surfacing, signposting etc. Sites can initially be identified from aerial imagery. The review would

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identify changes that could be made to the car-parks, including enhancing some locations (by providing additional spaces, reducing parking fees etc.) and reducing parking and introducing charges/increasing charges at other locations. Suggestions for some locations that could be included in the review are set out in Table 7.

Table 7: Some locations to include in the parking review and where measures relating to parking could be adopted in the future

Map ID (See Map 5)	Details
2	Parking: creation of a small parking area linked to paths to provide circular walk on edge of SPA, i.e. focusing access where signs, visitor engagement etc. can take place.
10	Include in parking review. Track with parking
29	Could restrict roadside parking and close lay-by
34	Potential to close lay
37	Potential to formalise this layby, provide interpretation; low fence/dragons teeth to ensure parking and access contained
39	Potential to formalise this layby, provide interpretation; low fence/dragons teeth to ensure parking and access contained
42	Potential to enhance car-park to create more welcoming feel but also restricting overall number of spaces - potentially removing back half of car-park (already difficult to access and use anyway)
52	Oare Marshes. Include in review with consideration as to limit roadside parking in some locations and enhance car-park
57	Potential to move car-park entirely away from end of road, placing it part way down track and providing access to NNR well away from beach
61	Possibility for measures to restrict roadside parking around Sportsman Pub with aim of ensuring this location does not become too busy in future

Indicative Costs and Implementation

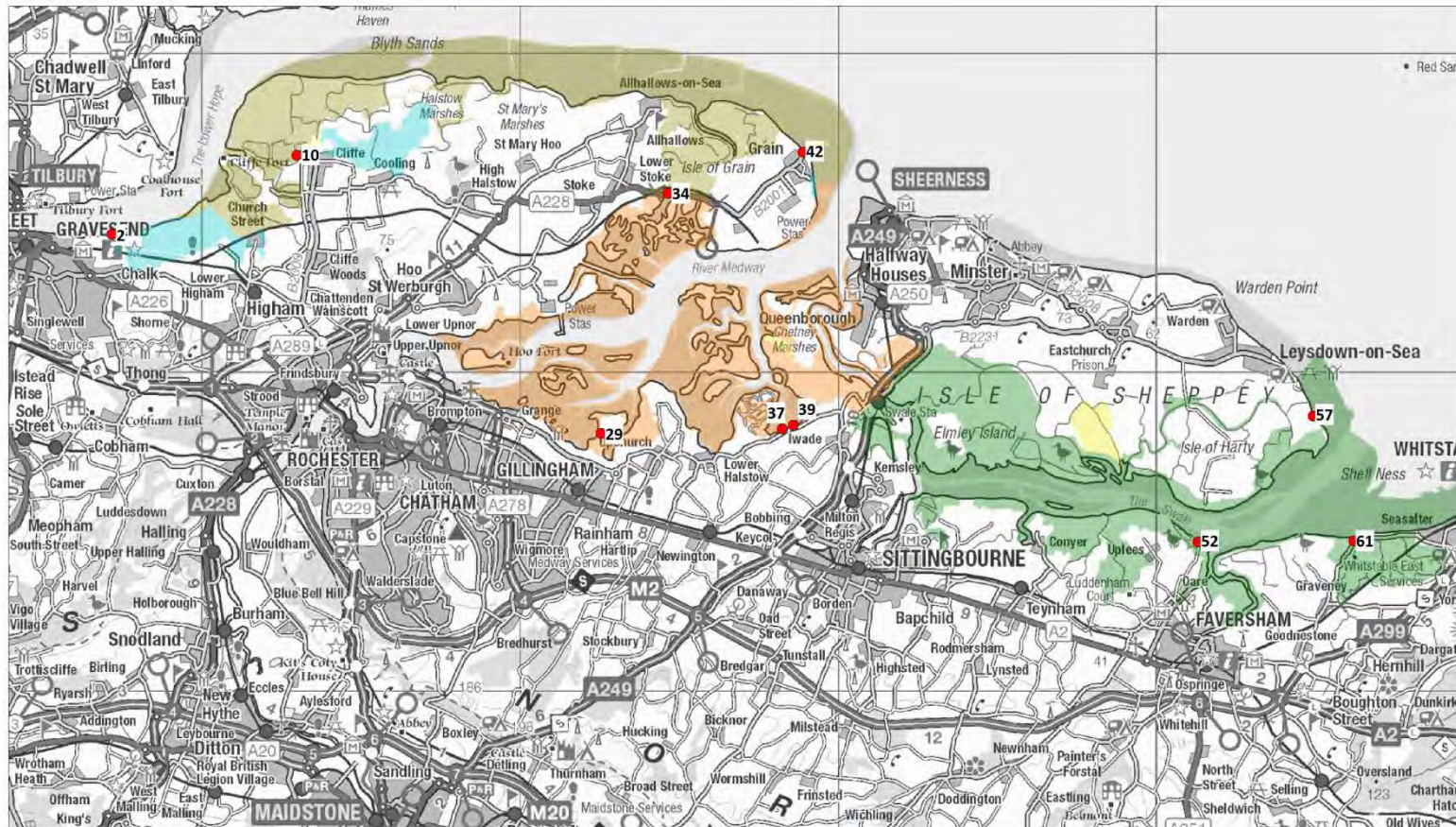
5.39 It would be possible to include this as part of other projects – such as green infrastructure audits or checks. The review itself would not be a large or complicated piece of work, and could be achieved at little or no cost by wardening staff. Recommendations would need a set budget, but would depend on the outcomes of the review.

5.40 Costs are summarised in Table 8

Table 8: Indicative costs for parking: review and changes to parking

Recommendation	Set-up/Capital Cost	Annual Cost	Notes
Review of Parking	£0		No cost allocated as assumed review conducted by warden/ranger team
Changes to Parking	£20,000		Depends entirely on outcome of the review. £20000 would allow one or two small projects to probably be achieved.

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Map 5: Some Locations to Include in Parking Review

- Medway Estuary & Marshes SPA & Ramsar
- Thames Estuary & Marshes SPA & Ramsar
- Ramsar outside of SPA
- Compensation sites

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Interpretation/signage

Overview

5.41 Interpretation will ensure visitors recognise that the sites they are visiting are important for nature conservation and will potentially increase awareness of nature conservation issues (and possibly behaviour in the long-term). Signage will convey particular messages, such as asking dogs to be on leads or asking people not to stray from the path. We recommend that interpretation with consistent styling and branding is installed at a range of carefully selected locations. Standard signs are also warranted at a range of locations.

Justification

5.42 Interpretation boards and signs are widely used around the UK at nature reserve sites. Tests of the effectiveness of education and interpretation in reducing visitor impacts are limited (Newsome, Moore & Dowling 2002), but studies would seem to indicate that they can be effective if targeted and well designed (Littlefair 2003). Interpretation has a role only in mitigation only as part of a package of measures – while it may help change people’s awareness, new interpretation boards on their own will certainly not be guaranteed to resolve any disturbance issues.

5.43 Signs are an important means of conveying information to visitors. Considerable guidance is available, for example describing design principles, wording, etc. for signs and interpretation (Mcleavy 1998; Kuo 2002; Hall, Roberts & Mitchell 2003; Littlefair 2003; Bell 2008; Kim, Airey & Szivas 2010). Provision of signage and wardening has been shown to result in enhanced breeding success for little terns in Portugal (Medeiros *et al.* 2007), and there is therefore some evidence of their merit.

5.44 Signs can ask visitors to behave in different ways. Interpretation provides information for visitors, enhancing their understanding of the site and its importance. Signs are also important to give the information to users that would be necessary to enable a conviction to be taken in relation to visitors knowingly causing harm to any of the features for which the site is notified.

Detailed Recommendations

5.45 We recommend a series of new interpretation boards should be designed and placed at strategic locations around the three sites. These signs should highlight the importance of the sites and the wildlife present in an inspiring way, and also provide information on what (in general) people can do to help protect the site, for example through keeping dogs on leads.

5.46 It would seem appropriate to establish up-dated signs at strategic points around the estuary, in line with the revised codes of conduct. The signs should clearly set out how users should behave, and a series of designs may be necessary – for example one for dogs on leads.

5.47 The locations for new signs and interpretation should be established by the warden/ranger team and new locations may become evident over time, as access

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patterns change or as levels of access change at some places. Some suggestions for possible locations are given in Table 9 and Map 6.

Table 9: Potential locations for new interpretation and/or signage.

Map ID (See Map 6)	Details
60	Potential for interpretation: targeted to users at caravan park
56	Potential for signage re dogs on leads
49	Potential for interpretation aimed at dog walkers
20	Potential for signage re dogs on leads
13	Potential for interpretation at car-park
16	Potential location for interpretation, edge of marshes
17	Potential location for interpretation
7	Potential location for interpretation
40	Potential location for interpretation
12	Potential location for interpretation : at start of track.
33	Potential location for interpretation at start of footpath across marshes

Indicative Costs and Implementation

5.48 Costs are summarised in Table 10, we estimate that around ten interpretation panels and ten signs would be required. The exact locations would be chosen by the wardens/rangers.

Table 10: Indicative costs for new interpretation and or signage

Recommendation	Set-up/Capital Cost	Annual Cost	Notes
Interpretation boards	£25,000	£2,500	Estimate based on 10 outdoor panel interpretation boards (A0 size); £2500 per board. Annual fee allows for replacement of boards over 10 year period
Signs	£20,000	£1,000	10 signs. £2000 per sign, plus £1000 per year for replacement/maintenance

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Map 6: Some Locations for Interpretation/Signage

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■ Medway Estuary & Marshes SPA & Ramsar	■ Ramsar outside of SPA
■ Thames Estuary & Marshes SPA & Ramsar	■ Compensation sites

Codes of Conduct

Overview

5.49 Codes of conduct set out how users should behave and provide guidance on a range of issues, including safety. A standard set of codes of conduct should be developed for the main activities and covering all three estuaries. Developing the codes provides a means to engage with local users and once established, a foundation is in place for enforcement if required. Codes of conduct should be widely promoted to users through paper copies, websites, user groups and local clubs. The warden/ranger team should be able to refer to them and give them out as required.

Justification

5.50 Codes of conduct set out clearly how users undertaking a particular activity should behave. Where there is plenty of space, relatively few users and few conflicts, there is unlikely to be a need for any agreed code of conduct. They are however relevant where there are a wide range of different users, potentially not linked to particular clubs, and a range of complicated issues, or where multiple activities overlap. Developing good, clear codes with user groups ensures that safety issues, insurance, consideration of other users and nature conservation issues can be accommodated, ensuring users can enjoy their chosen activities while minimising any impacts. The codes are also useful for casual visitors, who perhaps visit a location sporadically, and are unlikely to be fully informed of all local issues. A code of conduct provides the user with all the information they need to undertake their chosen activity safely, within the law and without creating conflict with others.

5.51 Codes of conduct can be established by directly working with local users, even by the users themselves. Codes developed in this way are likely to be the most effective. Involvement with users directly also makes sure that the codes of conduct reach the right audiences, as one of the key issues can be ensuring that they are read and circulated widely and that visitors are aware of them. Getting people to 'sign up' to voluntary codes of conduct is potentially tricky and may be difficult to achieve where many users are ad hoc, casual visitors and where there are multiple access points (i.e. no central location at which users can be intercepted).

5.52 A good example of voluntary codes of conduct is those for the Thanet area of Kent, where a series of codes of conduct have been brought together in a single document for a stretch of coast¹⁰. The document sets out the bird roosts and European Marine sites, and provides an easily accessible overview for users. The individual codes of conduct include dog walking, horse riding, bait collection, wind-powered activities and powercraft.

¹⁰ [REDACTED]

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Detailed Recommendations

- 5.53 Using the Thanet example, we recommend that a similar set of Codes of Conduct are developed for the North Kent sites. These codes should be similar in design and wording, and should work as a pack.
- 5.54 We suggest codes are developed for the following activities (with a single code of conduct for each activity covering the three estuaries).
- Dog walking
 - Powercraft activities
 - Wind-powered craft
 - Bait digging and collecting
 - Wildlife Watching
 - Shore angling
 - Canoeing
 - A general shore code covering other activities
- 5.55 They should address safety issues, consideration for other users and conservation issues and be developed with users. Monitoring of behaviour should take place after the codes are established.

Indicative Costs and Implementation

- 5.56 The development of the codes could potentially be implemented by the wardening team. Consultancy support and graphic design would be required, and additional input may be required from local authorities/partners.
- 5.57 Costs are summarised in Table 11.

Table 11: Indicative costs for developing generic codes of conduct

Recommendation	Set-up/Capital Cost	Annual Cost	Notes
Codes of Conduct developed	£8,000	£200	8 codes produced as a pack for printing and as interactive document; cost estimated at £8,000. Annual cost allows for revision and further print runs

Work with local club/group

Overview

- 5.58 There is scope to resolve very specific local issues by directly talking to local users that have a local club/group and this contact has relevance for some of the other recommendations in this report (such as input into the codes of conduct).

Detailed Recommendations

- 5.59 An estuary users survey was undertaken in 2012 and this provides a useful overview of local clubs and groups. The survey identified 57 local clubs/groups and provides information on which have codes of conduct for members, how each group is set up and provides contact details. Direct contact with some of these groups to discuss

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disturbance issues and resolve specific issues is recommended. These are listed below in Table 12 and shown in Map 7.

Table 12: Specific locations where there are specific issues relating to a club/group or where there is potential to reduce disturbance through direct contact and discussion

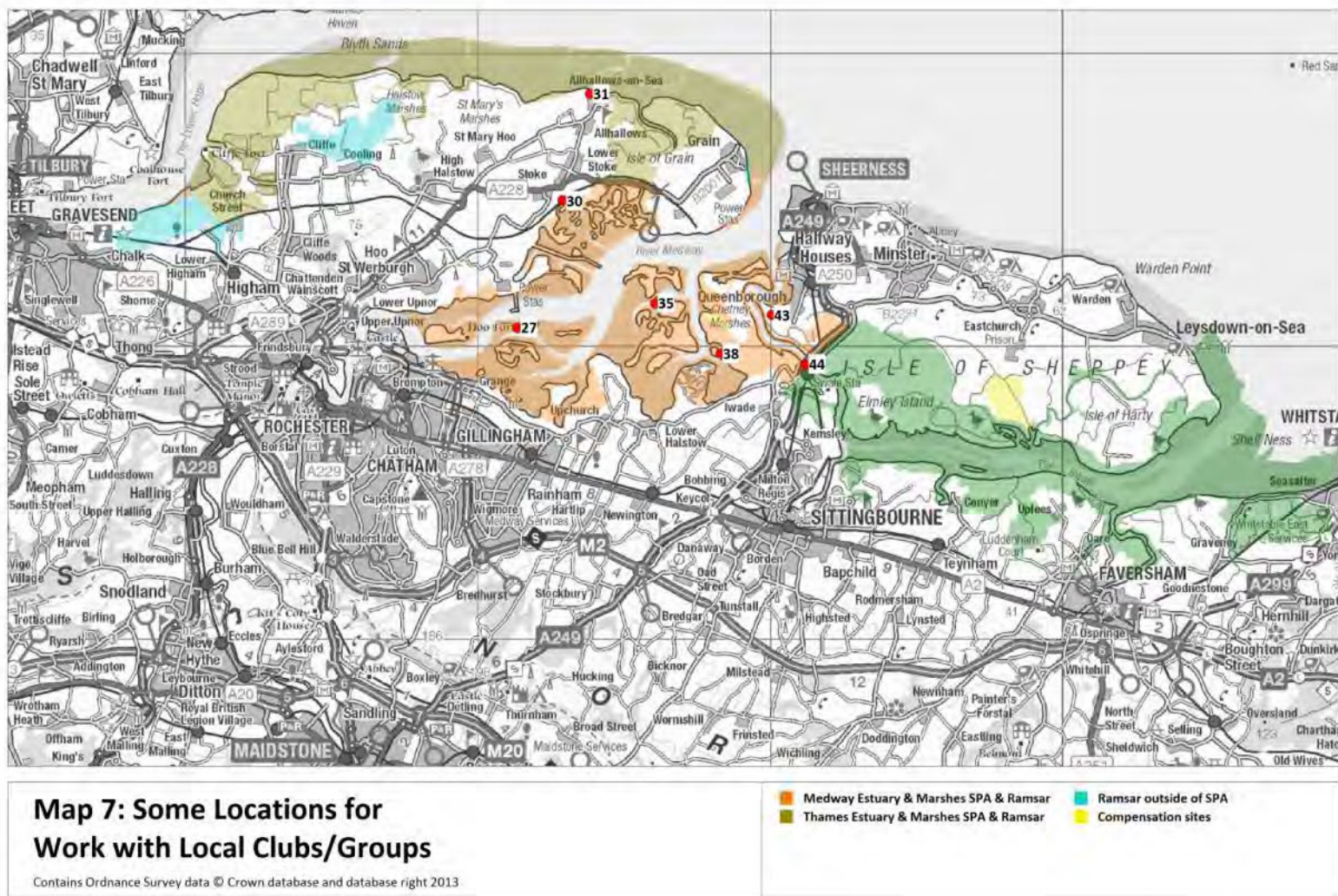
Map ID (See Map 7)	Details
27	Proactive work with canoe clubs, links to codes of conduct.
30	Liaison with the micro light Club (Medway Airsports Club) to attempt to resolve disturbance issues. Club website has no-fly zones but these do not seem to overlap with the SPA.
31	Work with caravan site
35	Work with canoe clubs to minimise disturbance from canoes here
38	Work with wildfowling to minimise disturbance
43	Work with local landowner to reduce disturbance from corporate shoot
44	Liaison with long reach jet ski club. Seems an awkward location given speed restrictions and alternative locations may be better.

5.60 Besides the specific examples given in Table 12 more general contact with local clubs and groups is recommended. The development of the codes of conduct may be a good way to facilitate contact and engage with local groups. Such contact should raise the profile of the nature conservation importance of the sites, ensure that users are aware that it may be illegal for them to disturb wildlife and discuss ways in which users could ensure they are not causing problems.

Indicative Costs and Implementation

5.61 Implementation of this element of the work could be done by the local warden/ranger team and no additional costs are likely to be incurred.

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Refuges

Overview

5.62 The Medway is the estuary with the most pressure from new development and the most marked declines in waterfowl. At the workshop it was suggested that creating one or more areas as refuges could be effective. These refuges would essentially be areas where human activity was minimised and users actively discouraged or prevented from undertaking activities in these areas.

Justification

5.63 There are some existing areas in the Medway that are relatively quiet and inaccessible and include a range of habitats. Establishing one or more of these as refuges would provide a means of ensuring a disturbance free area was always available to the birds. Such areas should provide roost and feeding areas.

Detailed Recommendations

5.64 Three potential areas could be established as 'refuges', these currently have relatively low levels of access and are relatively remote compared to some other parts of the estuary. The three areas are shown in Map 8 and Table 13. We recommend that at least one and potentially all three are promoted as areas for users to avoid. While access is fairly limited in these areas at present, they are used, for example Hoo Ness and Darnet are visited by canoeists who wild camp on the islands¹¹. Canoeists visiting these islands park at the Riverside Country Park and launch from Horrid Hill. Establishing these areas as voluntary no-go areas could be done through direct contact with the local groups, through maps in the codes of conduct and through other ways, such as restricting canoe launching from certain locations (for example by making it awkward to access the water). Creating these areas as refuges could also be extended to commercial activities and specific planning schemes. Mapping and promoting these areas as 'quiet zones to protect bird interest' (or similar) wherever possible would help ensure their effectiveness.

Table 13: Potential locations for 'refuges'

Map ID (See Map 8)	Details
25	Potential for 'refuge' - area with minimal access and disturbance. Overlap with 36 and 32
36	Potential for 'refuge' - area with minimal access and disturbance. Overlap with 25 and 32
32	Potential for 'refuge' - area with minimal access and disturbance. Overlap with 25 and 36

Indicative Costs and Implementation

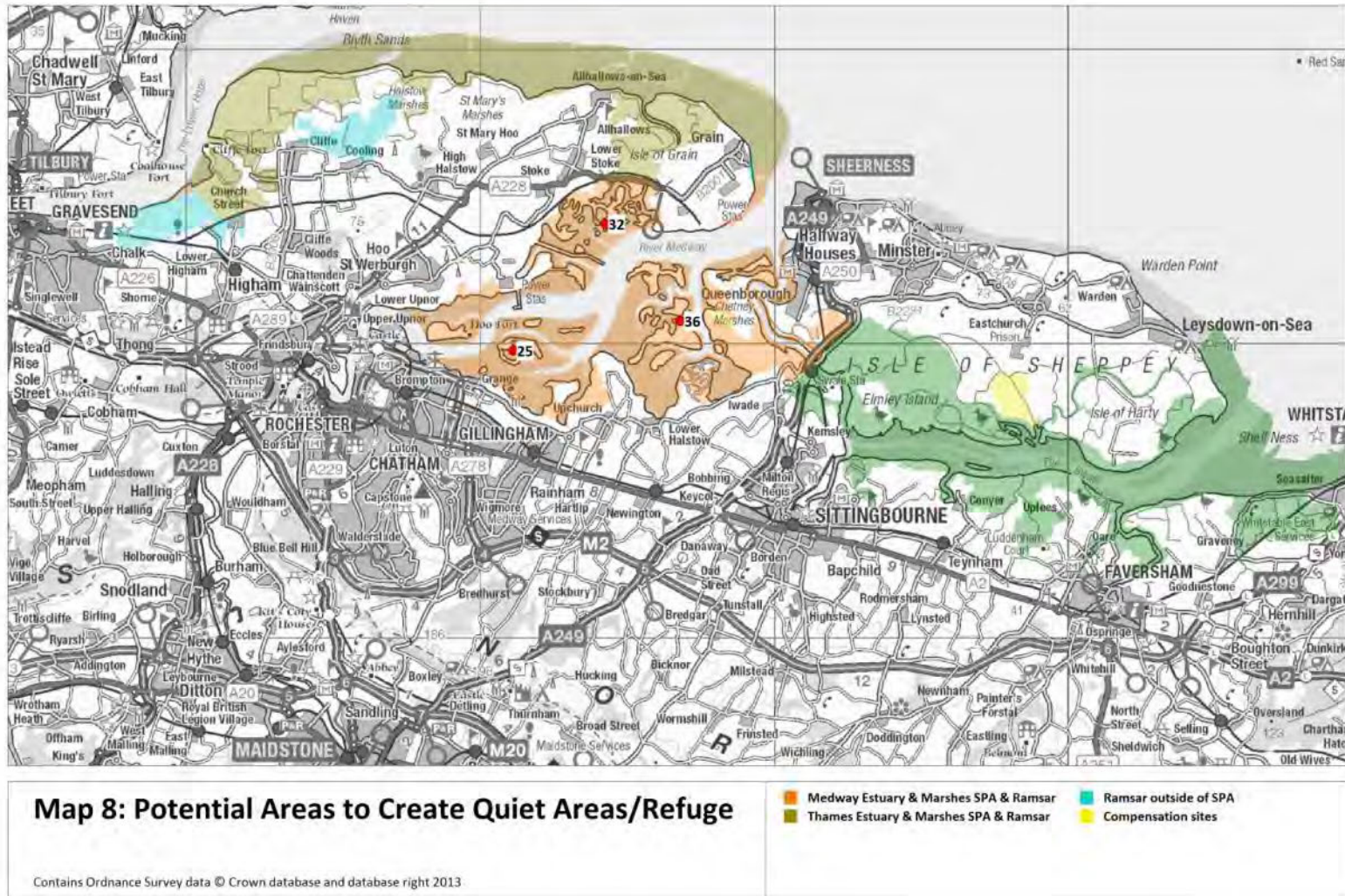
5.65 Establishing the refuge areas would be a longer term goal than some of the other measures in this strategy, and would dovetail with many of the other recommendations such as the direct contact with clubs and the codes of conduct. We would envisage that

¹¹ For example: [REDACTED]

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the refuges would be established and promoted through these means and therefore the cost of this work would be minimal.

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Enhancement of existing site to create hub

Overview

5.66 Directing users to particular locations where there is good access infrastructure and management in place should reduce disturbance. Where the users are deflected from visiting other more sensitive locations and instead spend their time at locations where disturbance is managed this approach is effective and the approach is positive as it enhances access for visitors.

Justification

5.67 At sites with high disturbance pressures it is usually best to aggregate visitors in as small an area as possible, whereas in areas with lower disturbance pressure, an even distribution of visitors may be better (Beale & Monaghan 2005; Beale 2007). A long term aim should therefore be to focus activity at particular locations, drawing users to areas where disturbance impacts can be effectively managed. Such an approach should reduce access in the wider area by drawing visitors who use other sites, rather than attracting new visitors to the area.

5.68 This approach is not a quick win, but would dovetail with the creation of the refuges in the Medway and be a long term goal of drawing access to particular locations.

Detailed Recommendations

5.69 We can identify three sites where existing visitor infrastructure is in place but where enhancements could be made to make more of a focus and draw for users. These three locations are:

- RSPB Cliffe Pools Reserve (Location 9 on Map 9)
- RSPB Northward Hill Reserve (Location 14 on Map 9)
- Riverside Country Park (Location 21 on Map 9)

5.70 At Cliffe Pools there is a secure car-park, nature trails and viewing platforms for seeing wildlife. There is potential in the long term to enhance the facilities here, for example with a dedicated visitor centre, toilets, education facilities and a wider range of walks.

5.71 At Northward Hill the RSPB Reserve has a car-park and toilets. This site could be promoted more for local access/users and access infrastructure enhanced to raise the profile of the site and its ability to absorb more visitors – for example through increasing the amount of parking provision. The existing public rights of way network, including the Saxon Shore Way and bridleways provide routes where dogs can be welcomed. These measures would be much more low-key than at Cliffe Pools. The aim would be to draw local visitors from nearby villages (Cooling, High Halstow, All Hallows) rather than these directly accessing the shoreline at other locations around the Thames/Medway.

5.72 Riverside Country Park covers a long stretch of the Medway shoreline and already draws a wide range of users, including many dog walkers. The site has a large car-park, visitor centre, café and children's playground. A number of measures could be

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established here to reduce disturbance (see para 5.30) and the site could absorb further visitors. Additional infrastructure at the site could include fenced areas for dogs (again see para 5.30) and promotion of areas within the park away from the shoreline, for example creating more circular walks – drawing more access inland at the park.

Indicative Costs and Implementation

5.73 The enhancement of visitor facilities at Cliffe would be expensive and long-term. Options at both Cliffe Pools and Northward Hill would depend on the RSPB, their assessment of the impact of existing visitor pressure and their long-term aspirations at the sites. At the Riverside Country Park the measures suggested are relatively low key and could be developed relatively easily, potentially incorporated into the site management plan. Any potential changes at the site would be dependent on Medway Council and their aspirations for the site.

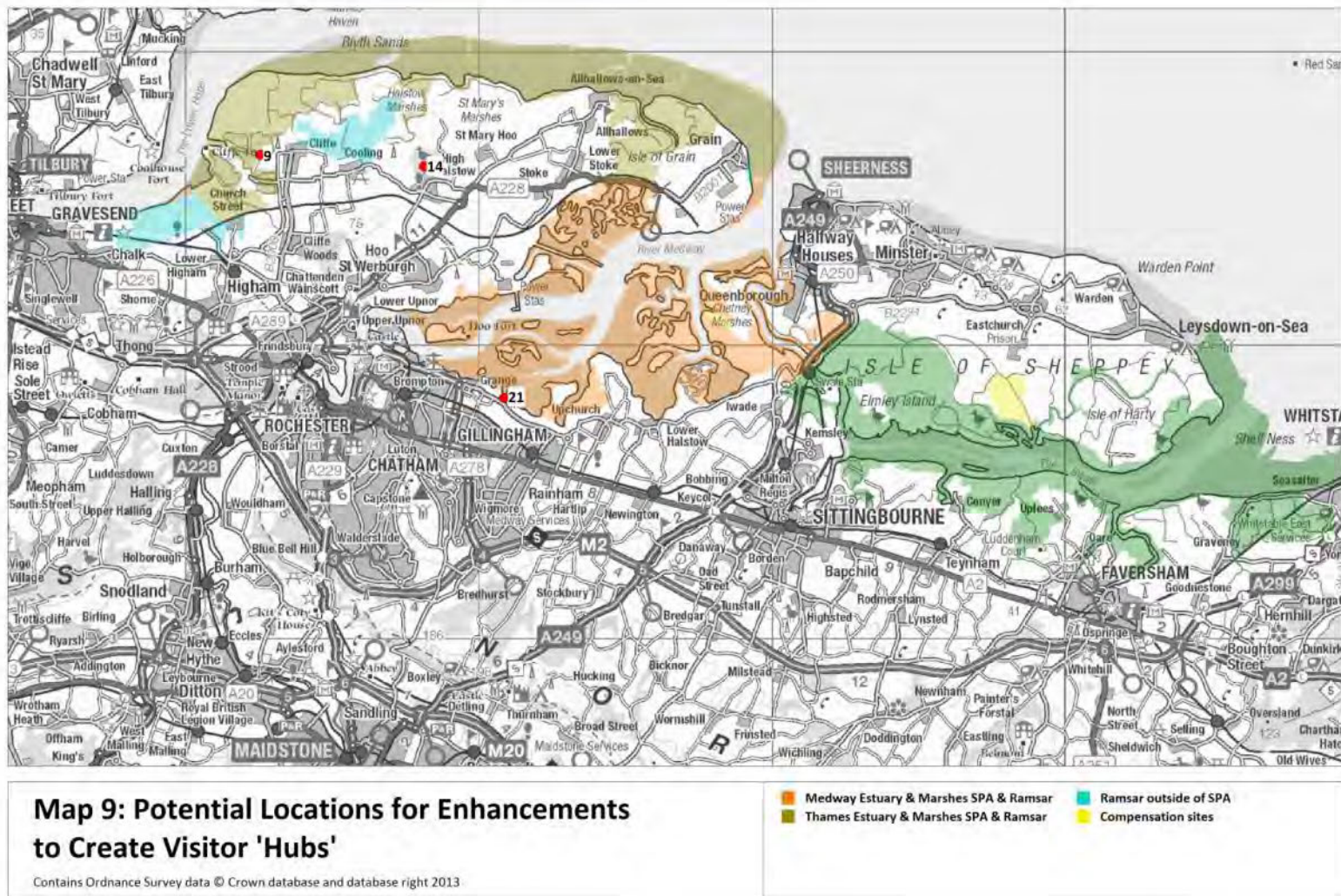
5.74 Costs are summarised in Table 14. These costs are difficult to estimate and are approximate costs intended as a guide only. The potential to implement measures at these sites will depend on opportunities

Table 14: Indicative costs for enhancements to additional sites around the SPA

Map ID (See Map 9)	Recommendation	Set-up/Capital Cost	Annual Cost	Notes
9	New Visitor Centre and other facilities at Cliffe Pools RSPB	£4,000,000		Very approximate cost, roughly equivalent to cost of centre at Saltholme ¹² . Aspirational rather than an essential element of the strategy. Range of funding sources may be possible.
14	Enhancements at Northward Hill RSPB	£20,000		Improved parking and other infrastructure
21	Enhancements to Riverside Country Park	£25,000		Enhancements to areas away from shoreline such that access can increase here without further disturbance

¹² [REDACTED]

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Enhancement to existing green infrastructure sites away from SPAs

Overview

5.75 There are some existing sites, well away from the SPAs, which could function as alternative destinations, drawing visitors away from the coast. Enhancements to these to draw visitors that otherwise would visit the SPA coast should help to reduce disturbance.

Justification

5.76 SANGs are a cornerstone of a number of European site mitigation strategies. We do not recommend creation of new sites for access, as whilst the evidence gathered for other strategic mitigation schemes and their particular circumstances indicate a clear need for alternative open space as a primary mechanism to protect the European sites, it is apparent that for North Kent there is a need for a more comprehensive mix of measures because alternative green infrastructure is unlikely to be as successful in drawing all types of visitors away in the absence of a wider suite of measures. It is important to appropriately apply mitigation to meet the individual circumstances of any strategic mitigation scheme, and where alternative greenspace will be successful it plays an important role. However, over reliance on new alternative greenspace that is expensive and potentially complex to achieve in circumstances where the benefits would be notably less will not benefit the European sites or those trying to achieve sustainable development. A strategic mitigation scheme should be evidence led, and it is however apparent that it should be possible to draw some of the very local and regular use of the European sites by improving the greenspace resource in the area. There are some existing nearby greenspace sites which would appear to have the potential to draw visitors and therefore we identify as potential alternative destinations.

5.77 In the on-site visitor work conducted on the North Kent Marshes (Fearnley & Liley 2011), one of the questions addressed whether changes could be made to alternative local sites in order to attract the interviewee to those sites. Of the responses given, 63% indicated that they thought no changes would work. This suggests enhancing alternative sites is likely to be effective for a relatively small proportion (37%) of visitors.

5.78 Modifications (to other local sites) that would appear from the visitor data to have the most merit are improvements to path surfacing and paths; making sites more dog friendly; measures to control other users and attractive scenery.

Detailed Recommendations

5.79 Five locations were mentioned in the workshop and are potentially good locations to draw visitors away from the SPAs. These sites are under existing management as recreational greenspace. It may be possible at each site to change the management slightly in such a way as to attract users that might otherwise visit the SPA. The sites are listed in Table 15 and shown in Map 10. In addition we would expect there to be other greenspace sites in the wider area which may suitable or may come forward over time.

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5.80 We recommend that these sites are included in the review of parking (see para 5.35) and that consideration is given to measures at these sites that would attract those people who might otherwise visit the SPA. Measures would be changes to the path network, provision of dedicated areas for dogs, provision of attractive and relatively wild dog walking routes. Measures would need to be carefully considered and developed with the relevant organisations running the site.

Table 15: Existing green infrastructure sites away from the SPA

Map ID (See Map 10)	Details
18	White Horse Wood Country Park: potential to enhance and function as alternative destination for dog walking etc, though possibly too distant from main urban areas
45	Sittingbourne Church Marshes: potential to enhance and function as alternative destination for dog walking etc
5	Jeskyns Community Woodland: liaison with FC to ensure function as alternative greenspace and links to Shorne
6	Shorne Woods Country Park: liaison with KCC to ensure function as alternative greenspace and links to Jeskyns
47	Bartons Point Coastal Park: potential to enhance to draw canoeists and other users away from estuary
54	Capstone Country Park: potential to enhance and function as alternative destination for dog walking etc

Indicative Costs and Implementation

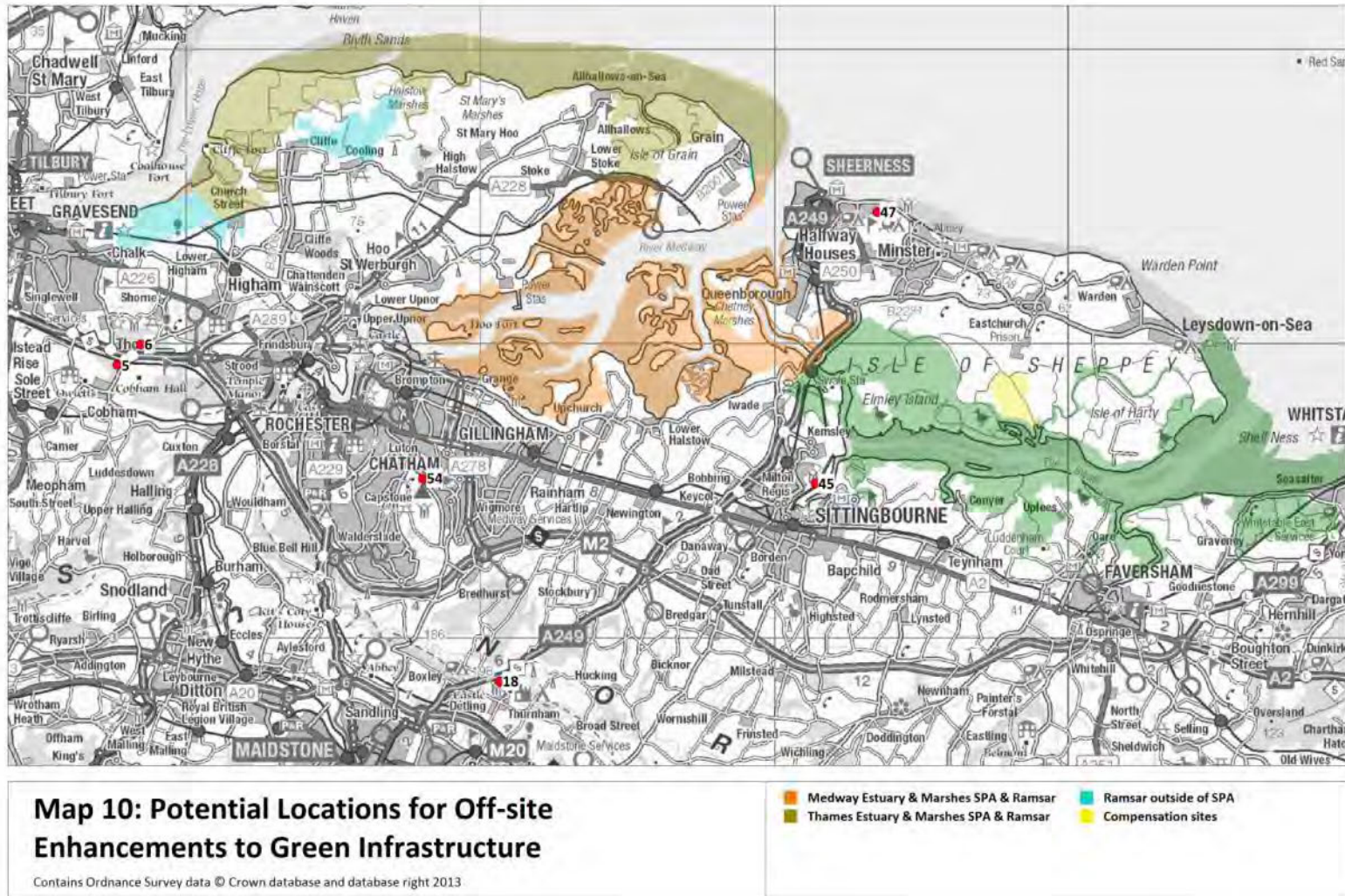
5.81 Implementation of management measures at the above sites would be undertaken by the organisations responsible for the sites. Costs are difficult to estimate as they are dependent on opportunities at the sites themselves.

5.82 As a means of calculating an indicative cost for a project to enhance access at an alternative site we have reviewed measures proposed in Dorset as mitigation (funded through developer contributions) to resolve access impacts on the Dorset Heaths. In the Dorset Heaths Planning Framework 2012-2014¹³ a series of projects are proposed which relate to enhancing existing greenspace sites¹⁴ – these range in cost (the cost sought from the fund) from £4,800 (for a dog gym/agility area) to £200,000 (for a new route and crossing to provide access to an existing open space) and the average cost is £84,000. A total budget of £420,000 would therefore be likely to fund around five projects.

¹³ See [REDACTED]

¹⁴ Projects 1,4,6,8,10,11,14 and 15 in Appendix A of the above report

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Enforcement

Overview

5.83 Legal enforcement provides a means of ensuring some particularly disturbing activities do not take place. We suggest enforcement of speed limits on the water and the establishment of dog control orders as two mechanisms that would reduce disturbance. These should be targeted in response to monitoring data and phased such that they are utilised should other measures not be working.

Justification

5.84 A six knot speed limit operates west of Folly Point on the Medway and an eight knot limit is in place on the Swale. Active enforcement of these for small craft such as RIBs and Personal Watercraft would potentially curb speeding and could encourage users to seek alternative locations for their activity.

5.85 Dog control orders provide a mechanism through which dog walkers can be required to keep their dogs on a leads. Dog walkers whose dogs are not on leads can be fined. This would provide 'clout' to the on-site wardens.

5.86 The enforcement of speed limits and dog control orders would both require active policing and are likely to alienate users. Both are not without practical difficulties. They are therefore justified where other approaches have failed to work and applied to specific locations where disturbance issues are in place. As such their application will be linked to the monitoring results.

Detailed Recommendations

5.87 The enforcement of speed limits would primarily fall under the Medway Port authority. Some funding may be required to ensure effective targeting to the locations and times of year when birds are disturbed. Targeting would be informed by the monitoring. We feel that a dedicated patrol boat may be unnecessary, but additional equipment to record speed and capture images may need to be purchased.

5.88 Dog control orders need to be based on evidence, and will therefore need to be established in line with monitoring results. Costs will include legal fees and administration and in order to be effective active policing will be required. This will necessitate warden/ranger time. Dog control orders could therefore be carefully phased –as required – such that wardens can target their time efficiently.

Indicative Costs and Implementation

5.89 Indicative costs are set out in Table 16. The costs of these elements would depend on scale and may not even be required at all.

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Table 16: Indicative costs for enforcement

Recommendation	Set-up/Capital Cost	Annual Cost	Notes
Speed monitoring equipment including digital camera and speed gun	£10,000		Approximate cost
Setting up dog control orders	£10,000		Estimate of costs required for legal advice, administration etc

Monitoring

- 5.90 Monitoring is essential to ensure the successful delivery of the mitigation work. Monitoring is necessary to ensure approaches are working as anticipated and to tell whether further refinements or adjustments are necessary. As the individual projects take off, monitoring will inform where resources can best be allocated, for example it may be that once codes of conduct are in place and working efficiently, wardening presence can be reduced or scaled back. In addition it is difficult to be confident of how access patterns may change over time, for example in response to new activities, changes in climate, and changes on the sites themselves. The monitoring is therefore aimed at ensuring mitigation effort is focused and responsive to changes in access, and that money is well-spent and correctly allocated. The monitoring is integral to the mitigation ‘package’.
- 5.91 Specific monitoring requirements are set out in Table 17. Many of these are already undertaken (at least in part) or there are existing protocols in place (for example the WeBS counts for birds).

Table 17: Monitoring elements required as part of the mitigation strategy

Monitoring	Justification	Approach
Visitor numbers at set locations	Repeat monitoring will inform how use is changing over time	Car-park counts, spot counts of people, mapping of people on the site (from vantage points); automated counters. Undertaken at a sample of locations and repeated annually
Visitor activities, motivation, profile and	Provides information on what people do, why they visit and how they behave	Questionnaires at a sample of access points repeated every 5 years. Questionnaires including home postcode, route on site, etc
Continued monitoring of wintering waterfowl	Ensures any changes in bird use of the site are picked up	WeBS
Disturbance monitoring	Checks to monitor response of birds and levels of disturbance	Repeat of approach in Disturbance Study, potentially at 10 year intervals.

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5.92 Indicative costs for the monitoring (as set out in Table 17) are summarised in Table 18.

Table 18: Indicative costs of monitoring

Recommendation	Set-up/Capital Cost	Annual Cost	Notes
Visitor numbers at set locations	£10,000	£1500	Most annual, undertaken by warden staff. Budget for automated counters and casual staff/consultancy support as required and included as an annual figure
Visitor activities, motivation, profile and		£1000	Questionnaire work undertaken every 5 years (i.e. annual budget of £1000 equates to £5000 every 5 years).
Continued monitoring of wintering waterfowl		£500	Undertaken already as part of WeBS. Small annual fee to ensure data collated by local co-ordinators
Disturbance monitoring		£1000	Could be undertaken at set intervals - e.g. every 10 years or on an annual basis

6. Implementation

6.1 In this section we consider the implementation of the strategy, including delivery, phasing, governance, options for developer contributions and how to ensure the strategy can be flexible.

Delivery

6.2 The challenge with the strategy is that it needs to provide for the mitigation measures necessary to address the in-combination impacts of a range of development (including many small developments) spread over a wide area and coming forward over an extended time period. It also needs to ensure that the impacts are resolved in perpetuity, which could be 80-125 years into the future¹⁵.

6.3 A strategic approach that is plan led should enable impacts to be avoided where possible, and adequately mitigated for where the pressure cannot be diverted. A strategic approach for new growth should provide timely measures so that they are in place and functioning in line with growth coming forward, and therefore prevent harm from occurring. Such measures are often particularly difficult to secure where there are numerous, small developments likely to come forward. There therefore needs to be certainty that a package of measures to avoid and mitigate for the potential impact is planned, is fit for purpose, capable of implementation and fully committed to by those competent authorities taking forward the local plans and authorising the development projects.

6.4 However, within this there needs to be an inbuilt level of flexibility to adapt, particularly in light of monitoring findings, in recognition of the fact that further information and opportunities will emerge. Access patterns may change over time, and new recreational activities may become more prevalent. Whilst declines in SPA interest features are known, there are some aspects that are not fully understood, and as the way in which the sites are used changes over time, threats and potential impacts on the birds may also change.

6.5 A partnership of local planning authorities, Natural England and those best placed to contribute to mitigation through their land ownership or remit could be responsible for the continued evolution of the strategy over time. A partnership/board/panel would be responsible for overseeing the whole project and reacting to any changes necessary as monitoring or other new information emerges. Some mitigation measures (e.g. enhancement of alternative sites) will depend on the response of private landowners).

6.6 Within the strategy there is potential for measures to be interchanged, or developed in detail at a later stage, or modified in reaction to new information. Initially, there needs to be momentum behind the implementation of measures that are urgent and/or those that are easily implemented, in order to have confidence that initial development

¹⁵ The Perpetuities and Accumulations Act 1964 defined in-perpetuity as 80 years. The new Perpetuities and Accumulations Act 2009 extended the in-perpetuity definition to 125 years.

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coming forward is being mitigated for by measures that are in progress, thus preventing any significant time lag between development and mitigation. It is suggested that measures to be implemented in the immediate term should include the dog project and the wardening (see phasing section above).

- 6.7 The concept of a flexible list of mitigation is already well established for the Dorset Heathlands strategic mitigation scheme, where for some time the approach has been based on an initial costed list of measures which is used to set a tariff that goes into a central funding pot. Proposals and bids are then put forward to use this money. For North Kent, a similar approach could be implemented, but it is also suggested that the additional element of maximising opportunities through external funding and combining the objective of European site protection with other initiatives should also be a focus, particularly given the twin objectives of this Plan and the need to rectify existing impacts. Changes in land management or ownership, wider green infrastructure or visitor management initiatives, remediation and regeneration projects, European funding, lottery funding, industry led funding schemes or changes in focus within partner organisations could provide additional opportunities.
- 6.8 An approach to implementing the strategy is therefore to develop a tariff based on the overall quantum cost of measures required for the level of new development coming forward, and this tariff calculated on a per house contribution. The partnership/board/panel would then collect and allocate funds according to proposals that come forward. Alongside the initial commencement of the scheme, there is continued work to improve the detail of the Plan, get the monitoring established and continually review opportunities for refined or additional measures. This approach would allow projects to be developed locally, collectively, and carefully planned to ensure success, encouraging proactive development of measures by all partners, and maintaining a best value approach, whilst continuing to ensure that the funding was being allocated to measures that were appropriate.

Phasing

- 6.9 The elements of the strategy, as set out in Section 6, are in an order that represents the order in which the main elements should be implemented and should facilitate phasing. Further notes on phasing are summarised in Table 19.
- 6.10 Establishing the wardening team will provide a core team and staff resources to get the other projects off the ground. Crucially the warden/ranger team could be deployed where most required, i.e. at locations where there is a direct link with new development or where particular issues are in place. The Dog Project could be started in tandem and could be set up very quickly. These two elements provide an immediate start to the strategy. As developer contributions and other funding allows, later discrete projects would include new access infrastructure, the review of parking and commencing work on the codes of conduct. Other elements of the strategy would develop later. This phasing allows mitigation measures to be phased alongside the development and as funding allows, ensuring that the response is proportionate to the impacts and targeted appropriately.

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Table 19: Phasing of the different strategy elements

Elements of the strategy	Phasing
Dog Project	Quick win, website could be established quickly and project started quickly.
Wardening/Visitor Engagement	Establishing wardens at early stage would provide staff resources to oversee later elements. Quickly establishing a base and a team will allow many of the other projects to develop and take place.
New Access Infrastructure	Various small projects, could be phased over a number of years
Parking	Review of parking could be done quickly and easily; measures identified within review could be phased over a number of years
Codes of Conduct	Codes of conduct would need careful planning and consultation. Could start once other elements (above) have commenced.
Interpretation/signage	Would link to code of conduct so should happen in parallel
Work with local club/group	Some links to codes of conduct, so again happen in parallel. Some work could be done earlier (such as contact with micro light club).
Refuge	Long term aim with links to codes of conduct.
Enhancement of existing sites to create hub	More major projects, particularly Cliffe. These elements would be phased much later within the strategy.
Enhancement to existing GI away from SPA	Again, phased later in strategy, potential to be flexible with timing depending on opportunities.
Enforcement	Final elements of strategy, informed by monitoring results and only as required.
Monitoring	On-going through the strategy.

Implementing a cross boundary approach to protecting European sites

- 6.11 There is an increasing interest in developing strategic and cross boundary approaches to mitigating for the impacts of growth on European sites, in recognition of the potential benefits for both the environment and growth. Defra has produced guidance on the development of strategic approaches to Habitats Regulations Assessment, which is currently available in draft form on the Defra website.¹⁶
- 6.12 Any cross boundary approach to European site mitigation requires each planning authority to take full responsibility for the implementation of the strategic approach in their own administrative area. Each remains an individual competent authority and is therefore ultimately responsible for ensuring compliance with the Habitats Regulations for any plan or project taken forward under their authority. However, a strategic and cross boundary approach can provide notable benefits in terms of shared administration, consistency in implementation (proportionate to impacts), collaborative working to rectify existing impacts and fairness to developers across the neighbouring areas.
- 6.13 This SARMP sets out a comprehensive suite of measures to manage access and recreation that may otherwise affect the North Kent European sites. Fundamentally the implementation of the measures is reliant upon funding and resources sourced by each of the planning authorities, and the administration of the Plan, including the

¹⁶ Draft guidance on strategic approaches to HRA can be found at the following link: <http://guidanceanddata.defra.gov.uk/strategicapproacheshra/>

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collection and allocation of funds, is a critical element of that implementation. Decisions therefore need to be made regarding the extent to which each planning authority works in partnership, via an elected lead authority, collaboratively or individually to achieve the objectives of the strategy and fund the implementation of measures on the ground.

- 6.14 Dividing or combining the administration and management of the Plan could potentially be achieved by a number of options: to either implement delivery individually, funded locally by developer contributions obtained within each administrative area and other funding sources pursued; to pool all contributions and implement the entire mitigation package jointly; or an approach that is partially individual and partially collective.
- 6.15 If the entirely individual approach was taken, the implementation of measures would become the responsibility of the administrative area in which they needed to be put in place. An entirely individual approach for a cross boundary scheme does present considerable difficulties in administration. Recognising that the reason for the joint approach is to mitigate for a collective potential impact that is not simply and easily defined by boundaries, an individual competent authority's duty to secure the necessary mitigation measures may not be met. There would potentially be some significant reliance on the implementation of measures in a different area by another competent authority, but in the absence of any joint commitment. It may therefore be difficult to secure adequate mitigation for the full impact of existing and new development across the administrative areas, and difficult to adequately monitor the effectiveness of measures.
- 6.16 A partial approach would be for the access and recreation management measures that relate to the individual authority and a specific geographical area to be taken forward by the individual authority, with funding sourced by the individual authority, and then for those measures relating to the area as a whole or are equally applicable across the administrative areas, to be implemented via a joint approach. A per-house contribution could still be made to a joint fund to implement those joint measures for new development, with the remaining elements of mitigation being the individual authority's responsibility to deliver. This approach would include some additional costs of administering a partial approach with funding moving between the planning authorities, and as with an entirely joint approach, the joint elements of a partial approach would be best administered by a lead authority, where funds are pooled.
- 6.17 An entirely joint approach may be the most appropriate way of delivering and monitoring the package of access and recreation management measures set out within this Plan. A fully joined up approach, working as a partnership, would maintain an overview of the entire project, thus ensuring consistent and timely implementation. The burden of mitigation delivery would be shared with each of the planning authorities, as competent authorities, committing to and assisting in the delivery of the Plan. This approach would be likely to be the most resource efficient method as it is the least administratively complicated.

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- 6.18 An entirely joint approach would require one authority to administer the funding, with contributions paid into the fund on a per house basis via developer contributions. The fund would be used to pay for the full suite of access and recreation management measures, irrespective of which area they need to be implemented in. Whether the administration of the strategy is a full or partial approach, it is strongly advised that a partnership/board/panel needs to be established, to maintain transparency, make democratic decisions, and benefit from a range of expertise when reviews, monitoring and future options are being considered. Any staff funded by the project would be important members of the partnership/board/panel, and would be involved in key aspects of monitoring and review. Monitoring will need to cover three aspects of the overall project; the implementation of measures, the finance and administration, and continued monitoring of numbers of houses coming forward to ensure that the measures continue to be provided in a timely manner, and fully mitigate for potential impacts.

Developer contributions for the impact of new development

- 6.19 Competent authorities are responsible for securing any mitigation necessary to prevent adverse effects on European site interest features, but the mechanisms by which such measures are funded is a decision for the competent authorities, and there may be a range of options for funding some of the initiatives. Primarily however, developer contributions form the main source of funding when avoiding and mitigating for the effects of new development, and follow a principle of each development proportionately mitigating for its own potential impact.
- 6.20 Currently there are essentially two main mechanisms for obtaining funding for measures to avoid and mitigate for impacts on European sites: the Community Infrastructure Levy (CIL), or as an individual planning obligation, commonly referred to as a Section 106, or 'S106' as they are planning obligations as set out in Section 106 of the Town and Country Planning Act 1990. An alternative, third option, applies only to large developments, which may be able to provide mitigation measures as part of the development.

Community Infrastructure Levy (CIL)

- 6.21 The Community Infrastructure Levy was first introduced by the previous Government in the 2008 Planning Act. Section 205(2) of that Act states that the overall purpose of the levy is to ensure that costs incurred in providing infrastructure to support the development of an area can be funded wholly or partly by owners or developers of land. Specific legislation, the Community Infrastructure Levy Regulations 2010, brought the levy into force, with subsequent amendments made to those Regulations in 2011 and 2012. A further amendment is expected in 2014.
- 6.22 The Community Infrastructure Levy places a levy on new development that then provides funding to meet local infrastructure requirements, enabling growth to proceed with adequate and maintained infrastructure in place. As the charging schedule for the levy is a document produced in consultation with the public and taken through an Examination process, and given that the schedule takes into account all infrastructure

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needs for the local area, the Community Infrastructure Levy is promoted as a fairer, more transparent and consistent way of seeking developer contributions for local infrastructure needs.

- 6.23 Importantly, the levy is agreed upfront, having regard for the growth proposed for an area and the consequent infrastructure needs, the needs of the local community, and the viability of the levy, i.e. not making it so onerous that it impedes development in the local area, is the most influential factor in the tariff set.

Section 106 agreements

- 6.24 Prior to the Community Infrastructure Levy, all contributions were obtained via Section 106 legal agreements, which can be bespoke and specific to an individual proposal, or could form part of a wider agreed strategy with numerous developments contributing. A planning obligation is used to fund requirements that are necessary to make the development acceptable in planning terms. With the introduction of the Community Infrastructure Levy to specifically fund infrastructure, the government expects the use of Section 106 agreements to be scaled back, and although there will still be a need for such obligations, they will now be primarily for non-infrastructure or site specific requirements.
- 6.25 Where developer contributions are necessary to fund requirements that do not specifically relate to the provision of infrastructure, or relate to development site specific measures that are necessary to make a development proposal acceptable, contributions can continue to be obtained on a development by development basis through Section 106 agreements. The difference between the application of the Community Infrastructure Levy and Section 106 obligations is that the Community Infrastructure Levy is a levy calculated on the basis of a pre-approved schedule that has taken into account the overall infrastructure needs of an area and its local community. Each new development coming forward will pay a proportionate contribution based on size and nature of the development, whereas Section 106 agreements can contain specific requirements that relate to the development and any particular requirements at that location that are necessary to make the planning application acceptable in planning terms.
- 6.26 There is potentially still provision for infrastructure to be funded through pooled Section 106 agreements, if firstly the infrastructure project requires less than five developments to contribute to its funding and if secondly the infrastructure project has not been listed as an infrastructure project for which the authority will be seeking contributions under the Community Infrastructure Levy. There are other exceptions where use of Section 106 may be the most appropriate means of securing infrastructure funding, particularly where the need is to mitigate for very site specific issues.
- 6.27 Although the Community Infrastructure Levy is relatively new and some local planning authorities are yet to put their charging schedule in place, it is understood that the Government has advised that the levy is appropriate for funding infrastructure required to mitigate for any development impacts on European sites, such as alternative green infrastructure that meets recreational needs of new residents to divert their use away

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from European sites. The new amendments to the Community Infrastructure Levy Regulations, brought into force in November 2012, provide greater clarity regarding the use of the levy, identifying that the provision of infrastructure by the levy includes the provision, improvement, replacement, operation or maintenance of that infrastructure. Critically therefore, the operation and maintenance of alternative green infrastructure, as well as its provision, should be included in the levy.

- 6.28 It is considered that any non-infrastructure related avoidance and mitigation measure for potential impacts on European sites could continue to be funded by Section 106 agreements. Section 106 agreements can therefore cover a wide range of requirements and have successfully been used for European site mitigation for some time. The new restrictions on the use of S106 agreements do still allow non-infrastructure requirements that are directly related to the development to be funded through this mechanism. The restriction also still allows for development site specific infrastructure projects to be funded, if the total funding can be obtained from less than five developments and if the infrastructure project is not listed by the local planning authority as a project to be delivered by the Community Infrastructure Levy. This therefore provides opportunities for obtaining funding for European site mitigation from developments that may be specifically excluded from the Community Infrastructure Levy, but still have a potential impact.
- 6.29 To date, Government has indicated that provision of alternative greenspace does come under the umbrella of infrastructure to be funded by the Community Infrastructure Levy, but has not issued any specific guidance or statement regarding non-infrastructure elements of European site mitigation schemes. Therefore there remains the option of splitting the measures between the two mechanisms for obtaining the funds, with infrastructure paid for by the levy and non-infrastructure elements paid for by S106 obligations, or to fund the entire package through the levy. The planning authorities should give consideration to the two options, and determine which provides the most appropriate way forward in terms of cost, funding available, administration and flexibility.
- 6.30 It is advised that the contribution to be made into the fund for the implementation of the Plan needs to continually be calculated on a per house basis, as this is the measurement unit by which potential impacts are calculated and mitigated for. Particularly because of the way in which the Community Infrastructure Levy is generated (i.e. per sq m), contributions from the developer to the Levy will differ. However, whilst each house may generate differing levels of funding, via its Community Infrastructure Levy and/or S106 contributions, the overall quantity of the contribution for European site mitigation needs to be based on a consistent per house contribution. Expenditure out of the European site mitigation pot needs to equate to the number of houses that have come forward.

On-site provision on development sites

- 6.31 A third opportunity can also present itself when large developments are able to provide mitigation measures alone, as part of the proposed development, removing the

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requirement to contribute to a central pot. The latter requires careful consideration to ensure fairness and adequate mitigation, and is most beneficial when considered upfront as part of large allocations within masterplans and green infrastructure strategies, for example.

- 6.32 The kind of mitigation measures that are applicable, with this third option, include on-site green infrastructure, such as dedicated areas for dog walking (see para 3.9 for more discussion).

Other funding sources

- 6.33 Other funding sources besides developer contributions will be necessary to deliver all the elements within the strategy. This is appropriate as elements such as the new facilities at Cliffe Pools and enhancements to green infrastructure away from the SPA will have a wider function and role than mitigating new development. For these elements (category B in Table 1) developer contributions may be appropriate for a small component, potentially providing match funding. We have also identified a measure that is perhaps more relevant to current impacts rather than impacts from new development (category B in Table 1), and again, this would be best funded through an alternative funding source. Other funding sources would be the best way of also securing habitat management within the SPA (which falls outside the role of mitigation).
- 6.34 Other funding sources could include local NGOs, Heritage Lottery Fund, the Nature Improvement Area (NIA) partnership and the Thames Estuary 2100 (TE2100). Other opportunities may arise over time, and partnership working and innovative approaches may be necessary.

Delivering measures relating to existing impacts

- 6.35 As demonstrated in Table 1 there is relatively little within the overall strategy that can be clearly identified as relating to existing impacts and excluded as mitigation. We have however suggested that structures to prevent access from vehicles – stopping off-road vehicles, motorbikes etc. from accessing key areas – relates primarily to existing impacts. Such measures need to be funded through some other means.
- 6.36 In para 3.6 we discussed habitat management and largely discounted habitat management options from the shortlist because some such management should be taking place anyway (management of the European sites to achieve favourable condition) and because they are not necessarily compliant with the Habitat Regulations if new habitat is being created outside the SPA to compensate for deterioration of the SPA. There may be opportunities that arise, however, linked to other plans and initiatives, in particular relating to shoreline management and managed retreat. We therefore suggest that there may be particular opportunities that arise and these should be considered carefully to check for potential to enhance the area for the SPA interest and help to reverse the bird declines.

Implementation next steps

- 6.37 Following from the discussion above, we set out the following as next steps in implementation:

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- Establishment of a developer contributions tariff, based on calculations within this SARMP
- Continued review of spatial planning documents to ensure that the SARMP is planned
- Establishment of a partnership/board/panel with Terms of Reference and memorandums/commitments agreed
- Agreement on the level of individual/joint working to take the scheme forward.
- Agreement on a lead authority and administrative procedures.
- Consideration of dedicated staff/allocated resources for the SARMP within each organisation
- Planning for the implementation of immediate measures
- Progression on the detail of more aspirational measures to establish level of contribution to the two objectives of the SARMP

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8. Appendix 1: Interest Features of the three SPAs

Table gives the interest features of the three SPAs and recent WeBS alerts (the national standard approach of assessing species populations on estuaries, alerts apply to certain wintering waterfowl, breeding birds are not assessed). Colours reflect alert status (red and amber) for the relevant species at the relevant site. Red shading indicates at least one high alert for a given species across all time periods, and amber at least one medium alert (if no high alerts) across all time periods. No shading indicates the species is not assessed or there is no alert triggered. Ramsar columns simply indicate bird species that are listed under Ramsar criterion 6 – species/populations at levels of international importance at time of designation.

	Thames Estuary & Marshes SPA					Swale SPA					Medway Estuary & Marshes SPA					Ramsar		
	4.1 Breeding	4.2 Passage	4.1 over winter	4.2 over winter	4.2 Assemblage	4.1 Breeding	4.2 Passage	4.1 over winter	4.2 over winter	4.2 Assemblage	4.1 Breeding	4.2 Passage	4.1 over winter	4.2 over winter	4.2 Assemblage	Thames	Swale	Medway
Avocet			✓		✓	✓		✓		✓	✓		✓		✓			
Bar-tailed Godwit								✓		✓								
Black-tailed Godwit					✓				✓	✓			✓	✓	✓			
Curlew										✓	Red	Red	Red	Red	Red			✓
Dunlin	Amber	Amber	Amber	Amber	✓	Amber	Amber	Amber	Amber	✓	Red	Red	Red	Red	Red	✓		✓
Golden Plover								✓		✓								
Grey Plover	Red	Red	Red	Red	✓	Amber	Amber	Amber	Amber	✓	Red	Red	Red	Red	Red	✓	✓	✓
Knot	Red	Red	Red	Red	Red				✓	✓						✓		
Lapwing	Amber	Amber	Amber	Amber	✓	Amber	Amber	Amber	Amber	✓					✓			
Oystercatcher										✓	Amber	Amber	Amber	Amber	Amber			
Redshank					✓	Amber	Amber	Amber	Amber	✓	Red	Red	Red	Red	Red	✓	✓	✓
Ringed Plover	Amber	✓	Amber	✓	✓		✓				Red	✓	Red	Red	Red	✓		✓
Whimbrel					✓										✓			

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	Thames Estuary & Marshes SPA					Swale SPA					Medway Estuary & Marshes SPA					Ramsar		
	4.1 Breeding	4.2 Passage	4.1 over winter	4.2 over winter	4.2 Assemblage	4.1 Breeding	4.2 Passage	4.1 over winter	4.2 over winter	4.2 Assemblage	4.1 Breeding	4.2 Passage	4.1 over winter	4.2 over winter	4.2 Assemblage	Thames	Swale	Medway
Dark-bellied Brent Goose										✓				✓	✓		✓	✓
Gadwall					✓					✓								
Pintail					✓				✓	✓				✓	✓			✓
Shelduck					✓					✓				✓	✓			✓
Shoveler					✓				✓	✓								
Teal										✓					✓			
White-fronted Goose					✓					✓								
Wigeon										✓					✓			
Cormorant										✓					✓			
Great-crested Grebe															✓			
Hen Harrier			✓						✓									
Little Grebe					✓					✓					✓			
Little Tern															✓			
Marsh Harrier						✓												
Mediterranean Gull						✓												

9. Appendix 2: Previous Studies

9.1 There are a range of potential issues and pressures relating to the North Kent sites, these include industrial development, mineral extraction and water quality. Previous studies in North Kent underpin this strategy and provide context in terms of recreation and the other potential threats. Previous studies include:

- 1) What do we know about the birds and habitats of the North Kent Marshes? (Cruickshanks *et al.* 2011)
- 2) Bird Disturbance Study, North Kent 2010/11 (Liley & Fearnley 2011)
- 3) North Kent Visitor Survey Results (Fearnley & Liley 2011)
- 4) North Kent Comparative Recreation Study (Fearnley & Liley 2012)
- 5) Estuary Users Survey (Medway Swale Estuary Partnership, 2011)
- 6) GGKM Roost survey (mapped in Liley & Fearnley 2011)
- 7) Recent Wetland Bird Surveys results produced by the British Trust for Ornithology
- 8) Phase I Bird Disturbance Report (Liley, Lake & Fearnley 2012)
- 9) Detailed analysis of bird trends on individual parts of the Medway, conducted by the BTO (Banks *et al.* 2005)

9.2 The latest bird data (see Appendix 1) for the Medway Estuary and Marshes SPA (WeBS alerts¹⁷) indicate high alerts (declines above 50%) for nine species and medium alerts (declines between 25 and 50%) for a further three species, out of 17 assessed. In all cases comparison of the trends with broadscale trends suggests the declines are site-specific. Five of the high alerts on the Medway are triggered for the long term (i.e. 25 years). The latest WeBS alerts for the Swale SPA indicate alerts triggered for nine out of the 21 species assessed (site specific declines for two species) and for the Thames Estuary and Marshes SPA alerts have been triggered for seven out of the 14 species assessed (site specific declines for three).

9.3 A simple overview of the various reports listed above indicate that:

- There have been marked declines in some of the bird species, particularly around the Medway
- Within the Medway, the areas that have seen the most marked declines are the area north of Gillingham, including the area around Riverside Country Park. This is one of the busiest areas in terms of recreational pressure.
- There is no evidence to support the suggestion that bird declines on the Medway relate to increases on neighbouring sites (i.e. birds simply redistributing)

¹⁷ See [REDACTED]

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- The estuaries and coastline are widely used for recreation and a range of activities take place.
- Recreational activities do result in birds being flushed and displaced.
- Most behavioural responses that were observed from the birds were due to the presence of dogs, particularly those off the lead.
- There was some evidence that bird numbers at locations with high numbers of visitors were low.
- Visitors are mainly local, around a third of people interviewed in the visitor survey had walked from their home and of the two-thirds who had travelled by car, the median distance (home postcode to interview location) was 4.2km.
- Visitor rates decline with distance from the SPAs and indicate that development within a 6km radius of access points is particularly likely to result in increased access levels and activities that relate to day-to-day use of local greenspace.
- The levels of housing around the three European sites are currently relatively high compared to other estuary SPA sites in the UK
- The scale of new development in the general area – as set out in the relevant strategic plans – is considerable and may result in an increase in access levels of around 1700 person visits per day (an increase of 15%).

10. Appendix 3: Our Approach

- 10.1 In this appendix we summarise our approach.
- 10.2 Our approach has been initially to clarify a **framework** (section 3) for the strategy that sets out the aims, the limits (geographical and temporal), legal/planning requirements and guiding principles that underpin the plan. This framework was agreed with the steering group for the project in the early stages of developing the plan.
- 10.3 The next step was to identify a **long list** of all possible measures that could be used to address disturbance issues; this is set out in section 4. This list was then reviewed to consider which approaches have the most merit and the relative advantages and disadvantages of each. From this a **short-list** of measures was compiled that we believe could form the basis of a plan.
- 10.4 In order to identify the **locations** (section 5) that are a focus for the plan, we used GIS data from the previous studies (summarised in paragraph 1.7) to identify areas:
- Important for particular bird species
 - Potentially vulnerable to disturbance/sensitive to disturbance (e.g. high tide roost)
 - That fall within the designated sites or support relevant interest features
 - Where access levels are predicted to increase markedly
 - Where access levels are low
 - Where access levels are high
 - Where there is no or limited public access
 - Where access onto intertidal is limited
 - Where there are particularly high levels of particular activities
- 10.5 These maps provided the information required to identify the locations and geographical focus for the elements within the plan.
- 10.6 The short-list was presented to a workshop¹⁸ comprising local landowners, site managers, countryside staff, rangers, wardens and other stakeholders, whose opinion was sought on how to deliver the different elements. Drawing on their local knowledge we were able to produce a list of detailed, target projects and check the short list. The **detailed strategy** was then finalised after this workshop.

¹⁸ Workshop held at Medway Council offices on 9th September 2013

11. Appendix 4: A ‘long list’

This table provides a broad overview of ways to reduce disturbance to birds at coastal sites. Note that some of these may not necessarily be compliant with the Habitat Regulations, for example habitat management within European sites to enhance the habitat for the interest features would not count as ‘mitigation’.

	Management option	Description
1. Habitat Management		
1a	New habitat creation	Creation of new habitat in areas away from parts of the site with recreation pressure (see also zoning). Examples may include creation of islands for roosts or lagoon areas for additional feeding.
1b	Habitat management	Habitat enhancement may create new breeding/roosting/feeding sites, potentially in areas away from sources disturbance.
2. Planning & Off-site Measures		
2a	Locate development away from sensitive sites	Much recreational use of sites is local, for example from people living within a short drive or walk of sites. Focussing development away from nature conservation sites is a way to reduce the long term future pressures of increased recreation from development.
2b	Management of visitor flows and access on adjacent land (outside European site)	Planting, screening, careful routing, provision of access infrastructure (boardwalks, marked paths, steps etc.) around the periphery and outside European sites can influence how people access sites.
2c	Provision of suitable alternative greenspace sites ('SANGs')	SANGs, sited away from designated sites, have the potential to draw users away from designated sites. Alternative sites need to be tailored to provide a viable and attractive alternative destination, matching the draw of the relevant designated site or providing a near equivalent recreational experience in a more convenient location.
2d	Provision of designated access points for water sports	Provision of public slipways, trailer & vehicle access to shore etc. in predetermined locations where boat access is likely to be away from nature conservation interest.
2e	Enhance access in areas away from designated sites	At a reasonably strategic level it should be possible to encourage people to change access patterns by enhancing access provision at less sensitive sites and not enhancing provision at sensitive locations. Users can be encouraged to locations through the provision of attractions/facilities such as toilets, food, improved walking surfaces, hides etc. Demand can be managed through modification of parking fees and parking capacities, restriction of on-road parking, wardening etc. As such there are parallels with 3e and also the approach is similar to 2d.
3. On-site Access Management		
3a	Restrict/ prevent access to some areas within the site	Potential to restrict access at particular times, e.g. high tide and particular locations (roost sites). Temporary fencing, barriers, diversions etc. all possible.
3b	Provide dedicated fenced dog exercise areas	Allowing dogs off leads etc. in particular locations that are not sensitive for nature conservation or other reasons may increase their attractiveness to dog walkers. Links to 2e.
3c	Zoning	Designated areas for particular activities. Often zones are set out in a code of conduct and prevention of use for the

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		areas outside the zones is enforced through byelaws. We refer to zoning therefore as positive spaces where users are welcomed, as opposed to the exclusion zones described in 3a.
3d	Infrastructure to screen, hide or protect the nature conservation interest	Screens, hides, embankments etc. are commonly used to direct visitors along particular routes and screen people from birds or other features vulnerable to disturbance. Such infrastructure can also provide enhanced viewing facilities and opportunities for people to get close to wildlife without causing disturbance. Path design can enhance the extent to which people stray or roam from the path. Boardwalks etc. can protect vulnerable habitats.
3e	Management of car-parking	Car-park spaces can be redistributed around a site, parking closed in some areas, parking fees modified (e.g. encouraging people not to stay too long) or a permit system be instigated to limit use of car-parks.
3f	Path design and management	Surfacing, path clearance and other relatively subtle measures may influence how people move around a site and which routes they select.
4. Education and Communication to Public/Users		
4a	Signs and interpretation and leaflets	Provision of informative and restrictive signs, and interpretive boards. Directions to alternative less sensitive sites. General information on the conservation interest to highlight nature conservation interest/importance.
4b	Codes of Conduct	Guidance on how to behave to minimise impacts is promoted at a range of sites, through websites, leaflets, interpretation etc. These are sometimes enforced by byelaws and other control measures (see section 5).
4c	Wardening	In addition to an enforcement role (see 5d below) wardens can provide a valuable educational role, showing visitors wildlife etc.
4d	Provision of information off-site to local residents and users.	Local media, newspapers etc. can provide means to highlight conservation importance of sites and encourage responsible access. Educational events, provision of items for local TV/other media. Information can be made available in local shops, tourist centres etc. Potential to promote non-designated sites, for example through web / leaflets listing, for example, dog friendly sites. Can include school visits and working with children.
4e	Contact with relevant local clubs	Agreed codes of conduct (see 4b) and self-policing can be set up with individual groups and provide a means of ensuring users are aware of how to act responsibly (e.g. water-sports club revoking membership for anyone caught speeding).
5. Enforcement		
5a	Covenants regarding keeping of pets in new developments	Covenants prohibiting the keeping of cats and / or dogs.
5b	Legal enforcement	Byelaws can be established by a range of bodies including local authorities, the MOD, National Trust, Parish Councils etc. Other options include special nature conservation orders, dog control orders or prosecution under SSSI legislation. Enforcement can apply to speed limits (e.g. on water), where people go and how they behave. Dog control orders involve a range of options such as dogs on leads only, on leads when asked, no fouling and no dogs at

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		all.
5c	Wardening	<p>Wardens have both educational (see 4c above) and enforcement roles. With respect to the later, wardens can provide direct contact and intervene when they observe particular activities (such as dogs off the lead on mudflats). The ability of a warden to control disturbing activities is clearly related to whether control measures are in place, and their nature. The more specific and statutory in nature the control, the greater the potential for enforcement by a warden.</p>
5d	Limiting visitor numbers	<p>Visitor numbers capped, for example through tickets, permits or a similar system.</p>

12. Appendix 5: Main Matrix

This appendix sets out the 'main matrix', assessing measures against various assessment criteria. The shading reflects how measures are scored. For all shaded cells, the colours go from green (through pink and orange) to dark red. Rows with lots of green cells are therefore those where measures are most likely to be easy, cheap, effective and will work over a wide area. Green cells therefore lend support for a measure while orange or dark red indicates difficulties or issues with a particular measure. Where there is some uncertainty regarding how to categorise a measure (for example the cost), we have coloured the cell orange.

The categories used are broad and we have categorised measures based on our judgement.

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		Activity specific?	Activities relevant	Likely Effectiveness	Practicality of delivery	Scale of measure	Mechanisms for delivery	Time to implement	Potential for phased delivery	Capital Costs	Maintenance Costs (annual/phased)	Notes
1a	New Habitat Creation	No		Likely to work but limited evidence	Some difficulties	Very local /site specific	Local landowner/stakeholder/Developer	Single one-off event	No	£10k - £100k	<£50k	Unlikely to be an option within European site boundaries as already designated. Creating habitat outside the sites a positive measure, but not acceptable if proposed as mitigation to offset harm to the designated site. Dependent on suitable locations with no disturbance; likely to be a very limited range of locations where could be implemented
1b	Habitat management	No		Effectiveness dependent on location and specific circumstances	Some difficulties	Very local /site specific	Local landowner	Requires continuous input	No	negligible	£?	Habitat management within the European sites is necessary to achieve favourable condition and taking place anyway. Habitat management outside the designated sites may provide some opportunities, but dependent on circumstances.
2a	Locate development away from sensitive sites	No		Good evidence that can work	Highly complex to deliver	Sub-regional	Local authority	Single one-off event	No	negligible	negligible	Distance at which development would have to be limited would be considerable and may be unworkable for many local authorities
2b	Management of visitor flows on adjacent land	Yes	General Shorebased	Likely to work but limited evidence	Straight forward & easy to implement	Very local /site specific	Directly linked to developer/local authority	Single one-off event	Yes - but over 5 years or less	£10k - £100k	<£50k	Depends very much on site specific details and opportunities available.
2c	Provision of alternative sites for recreation "SANGs"	Yes	General Shorebased	Effectiveness dependent on location and specific circumstances	Highly complex to deliver	Sub-regional /local	Strategic/partnership working	Single one-off event	No	>£1m	<£50k	large, carefully positioned sites only likelihood of success; 20ha site - land value could be around £1m; capital costs would also need to include landscaping, planting etc.; maintenance costs around £1500 per ha p.a. Very much dependent on opportunities. Inland SANGs may not attract shore users
2d	Provision of designated facilities for watersports outside SPA	Yes	Watersports	Effectiveness dependent on location and specific circumstances	Some difficulties	Sub-regional	Strategic/partnership working	Single one-off event	Yes - but over 5 years or less	£100k - £1m	<£50k	Many activities such as kite surfing rely on specific conditions - wind, tide etc. that mean limited options. Most applicable for jet skis and small craft from trailers.
2e	Enhance access facilities in general area	No		Effectiveness dependent on location and specific	Some difficulties	Sub-regional /local	Strategic/partnership working	Single one-off event	Yes - over many years	£10k - £1	<£50k	Costs, ease and details depend on the enhancement, location etc.

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		Activity specific?	Activities relevant	Likely Effectiveness	Practicality of delivery	Scale of measure	Mechanisms for delivery	Time to implement	Potential for phased delivery	Capital Costs	Maintenance Costs (annual/phased)	Notes
	(away from SPA)			circumstances		I				00k		
3a	Restricted access to parts of site	No		Likely to work but limited evidence	Some difficulties	Very local /site specific	Local landowner/stakeholder/Developer	Single one-off event	No	£10k - £100k	<£50k	Difficult on sites with rights of access
3b	Provide dedicated fenced dog exercise areas	Yes	Dogs/dog walking	Unsure/limited effectiveness	Straight forward & easy to implement	Very local /site specific	Local landowner/stakeholder/Developer	Single one-off event	No	£10k - £100k	<£50k	May draw dog walkers from wide area, therefore probably not effective if on edge of SPA. Likely to be effective only if off site or combined with other measures - i.e. Dogs then subsequently required to be on leads
3c	Zoning	Yes	Most applicable to watersports	Likely to work but limited evidence	Some difficulties	Local	Local authority/Strategic/partnership working	Single one-off event	No	£10k - £100k	<£50k	Single zones could be very local and site specific. Zoning for some watersports could alternatively be established at a broad scale. Would need to be combined with codes of conduct/enforcement etc
3d	Infrastructure to screen, hide or protect the nature conservation interest	Yes	Most applicable to General Shorebased	Effectiveness dependent on location and specific circumstances	Straight forward & easy to implement	Very local /site specific	Local landowner/stakeholder/Developer	Single one-off event	Yes - but over 5 years or less	£10k - £100k	<£50k	Different types of screening likely to work better in different locations.
3e	Management of car-parking	No		Likely to work but limited evidence	Some difficulties	Sub-regional /local	Local landowner/stakeholder/Developer	Single one-off event	Yes - but over 5 years or less	£10k - £100k	<£50k	May be unpalatable/unpopular. Reduction in spaces likely to work better than full closure. Parking charges may even help to cover costs. Dependent on organisations involved working together and agreeing charges
3f	Path design and management	No	Most applicable to General	Effectiveness dependent on location and specific	Straight forward & easy to	Local	Local landowner/stakeholder/Developer	Single one-off event	Yes	£10k - £1	<£50k	Marked routes can provide means to funnel access away from particular areas. Depends on opportunities at site/general area. Resurfacing and modifying particular routes or part of routes may provide opportunities at very local level

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		Activity specific?	Activities relevant	Likely Effectiveness	Practicality of delivery	Scale of measure	Mechanisms for delivery	Time to implement	Potential for phased delivery	Capital Costs	Maintenance Costs (annual/phased)	Notes
			Shorebased	circumstances	implement					00k		
4a	Signs, interpretation and leaflets	No		Unsure/limited effectiveness	Straight forward & easy to implement	Sub-regional/local	Strategic/partnership working	Single one-off event	No	<£10k	<£50k	Difficult to have much confidence of success. May raise awareness of disturbance.
4b	Voluntary codes of conduct developed with local user groups/users	Yes	Watersports/bait digging and others	Likely to work but limited evidence	Straight forward & easy to implement	Sub-regional	Strategic/partnership working	Single one-off event	No	negligible	<£50k	Intensive work to establish, set up and only likely to be effective where good link with users can be established and where scope to develop codes of conduct that resolve issues and do not inhibit users
4c	Wardening (with an education/communication role)	No		Unsure/limited effectiveness	Straight forward & easy to implement	Sub-regional/local	Strategic/partnership working	Requires continuous input	No	negligible	£50k - £500k	Wardens showing people wildlife but not actually asking people to behave differently. May have some success but unlikely to be effective with many user groups. Most likely to work if wardens in an engagement role, talking directly to users about activities and use of site etc.
4d	Provision of information off-site to local residents and users	No		Unsure/limited effectiveness	Straight forward & easy to implement	Sub-regional/local	Strategic/partnership working	Requires continuous input	Yes - over many years	<£10k	£50k - £500k	Labour intensive. Potentially beneficial in terms of local support/awareness for nature conservation, but may have little or no success in reducing disturbance.
4e	Contact with relevant local clubs	Yes	Watersports	Unsure/limited effectiveness	Straight forward & easy to implement	Sub-regional/local	Strategic/partnership working/ Local landowner/stakeholder/Developer	Requires continuous input	Yes - over many years	£10k - £100k	<£50k	Requires staff input to maintain dialogue and connection with clubs. Most likely to work where there is an active local group and potential to enforce further restrictions if self-policing doesn't work.
5a	Covenants regarding keeping of pets in new developments	Yes	Dog walking	Unsure/limited effectiveness	Some difficulties	Very local/site specific	Directly linked to developer	Single one-off event	Yes - over many years	<£10k	negligible	Impossible to be confident of effectiveness in perpetuity. Maintenance costs may need to be high to check and enforce

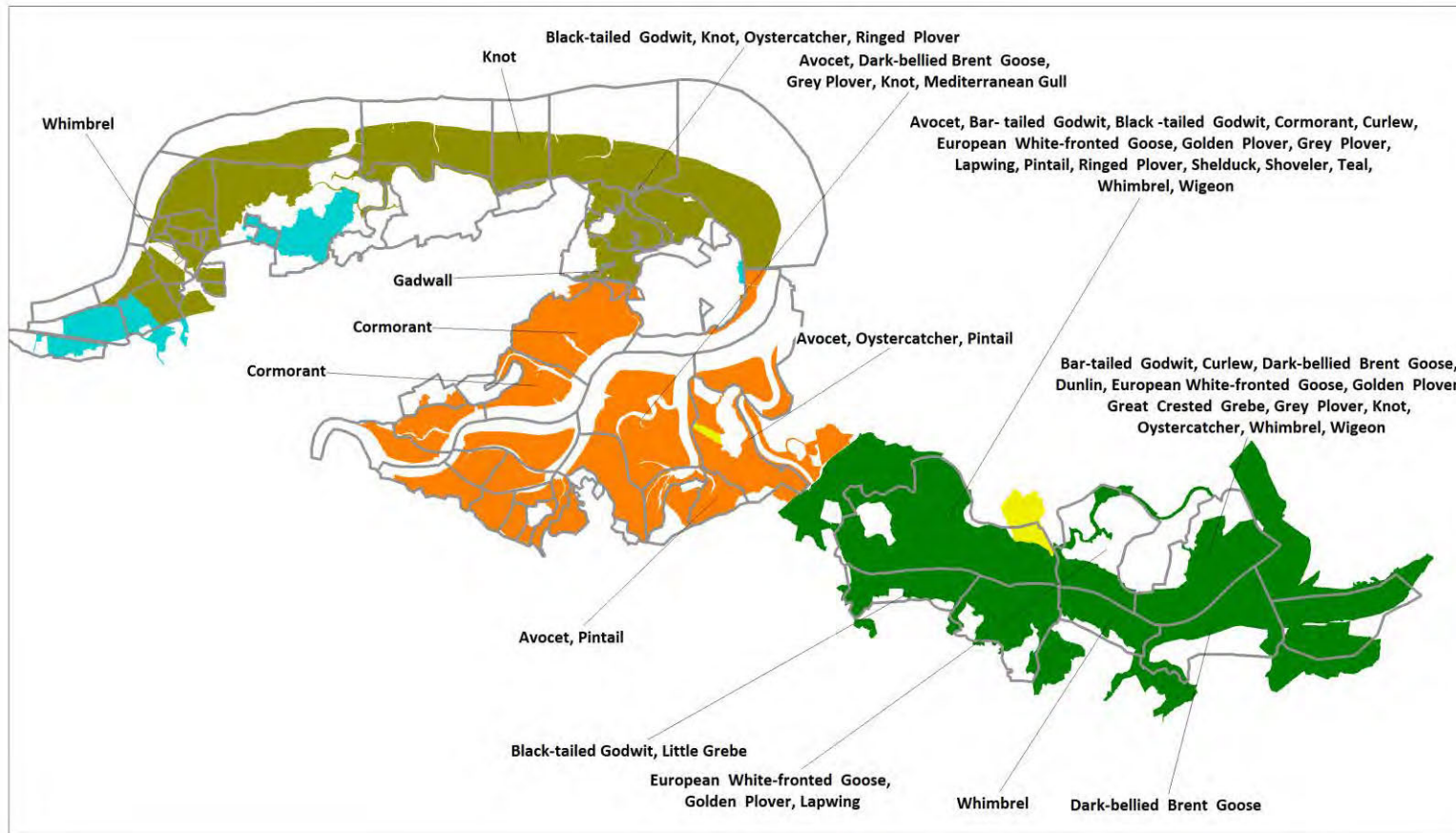
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		Activity specific?	Activities relevant	Likely Effectiveness	Practicality of delivery	Scale of measure	Mechanisms for delivery	Time to implement	Potential for phased delivery	Capital Costs	Maintenance Costs (annual/phased)	Notes
5b	Legal enforcement	No		Likely to work but limited evidence	Some difficulties	Local	Legal framework needs to be established by local authority or other body with appropriate powers	Requires continuous input	No	£10k - £100k	<£50k	Byelaws may take some time to establish and potentially evidence base necessary to establish need
5c	Wardens on site to ask people to behave differently	No		Good evidence that can work	Straight forward & easy to implement	Sub-regional/local	Strategic/partnership working	Requires continuous input	No	<£10k	£50k - £500k	Presence of wardens costly but wardening is possible over wide area/multiple sites. Possibly more effective if wardens are able to enforce.
5d	Limiting visitor numbers	No		Likely to work but limited evidence	Some difficulties	Very local/site specific	Local landowner/stakeholder/Developer		No	<£10k	<£50k	Possible at nature reserves or sites where management of access formalised and in place, can only work where no legal right of access

13. Appendix 6: Spatial Context: Identifying areas that should be a focus for the strategy

- 13.1 Map 11 shows WeBS sectors and those with at least 10% of the mean peak count for the period 1988-2010 for each species across all three SPAs. This allows us to highlight WeBS sectors that are particularly important for given species. A problem with this approach is that the WeBS sectors vary in size and the WeBS counts are high tide counts and therefore do not necessarily reflect the distribution of the birds at other tide states. The map will also not necessarily indicate areas where bird declines have already taken place. The map is however useful in summarising where birds can be concentrated, but other information is important too.
- 13.2 We therefore show roost sites in Map 12. The wader roost locations are extracted from the bird disturbance study. In Map 13 we show the priority habitats within the SPAs. The mudflats (grey) provide the main feeding areas for many species at low tide. The coastal grassland also will provide some important feeding areas for some species (such as golden plover and lapwing). The saline lagoons are used by some breeding species – such as avocets and terns – and also provide important roost and loafing areas for the wintering bird interest. While the intertidal habitat and wet grassland habitats are widely distributed, saline lagoons are more limited in distribution, with Cliffe and Oare Marshes being the main locations.
- 13.3 Visitor data indicates that most visitors live within 6km of the locations where interviewed. Identifying areas that have high levels of new housing within 6km provides a simple way of identifying areas that are most likely to see a change in access. In Map 14 we show these data, and it highlights that the most change will be around the Medway Estuary. The western part of the study area – towards Gravesend – and the Isle of Sheppey are also areas that appear likely to change in access levels.
- 13.4 In considering changes in access it is also important to consider which locations already have high levels of access and which have relatively low levels of access. In Map 15 we show comparative scores (scoring by local experts) that show relative levels of access. It can be seen that the Medway and the area towards Whitstable are the busiest areas currently. Some of the areas with the low scores for access have limited access to the shore. Access infrastructure – such as parking, jetties, slipways etc. are largely focused in the Medway and towards Whitstable (Map 16).

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Map 11: Areas Important for Particular Bird Species

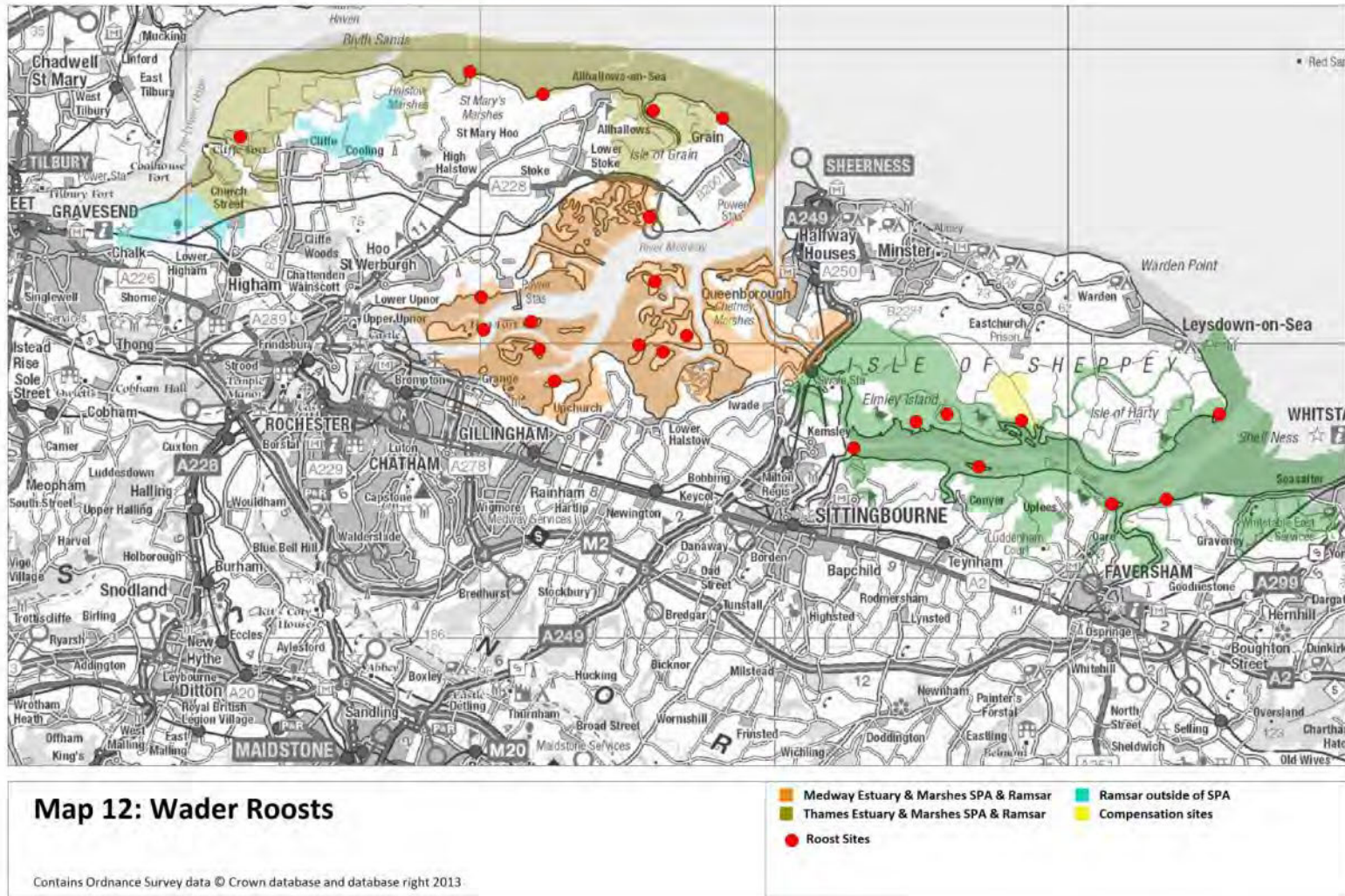
WeBS sectors with at least 10% of counts of given species across all 3 SPAs.

WeBS data as summarised in Liley et al. 2011

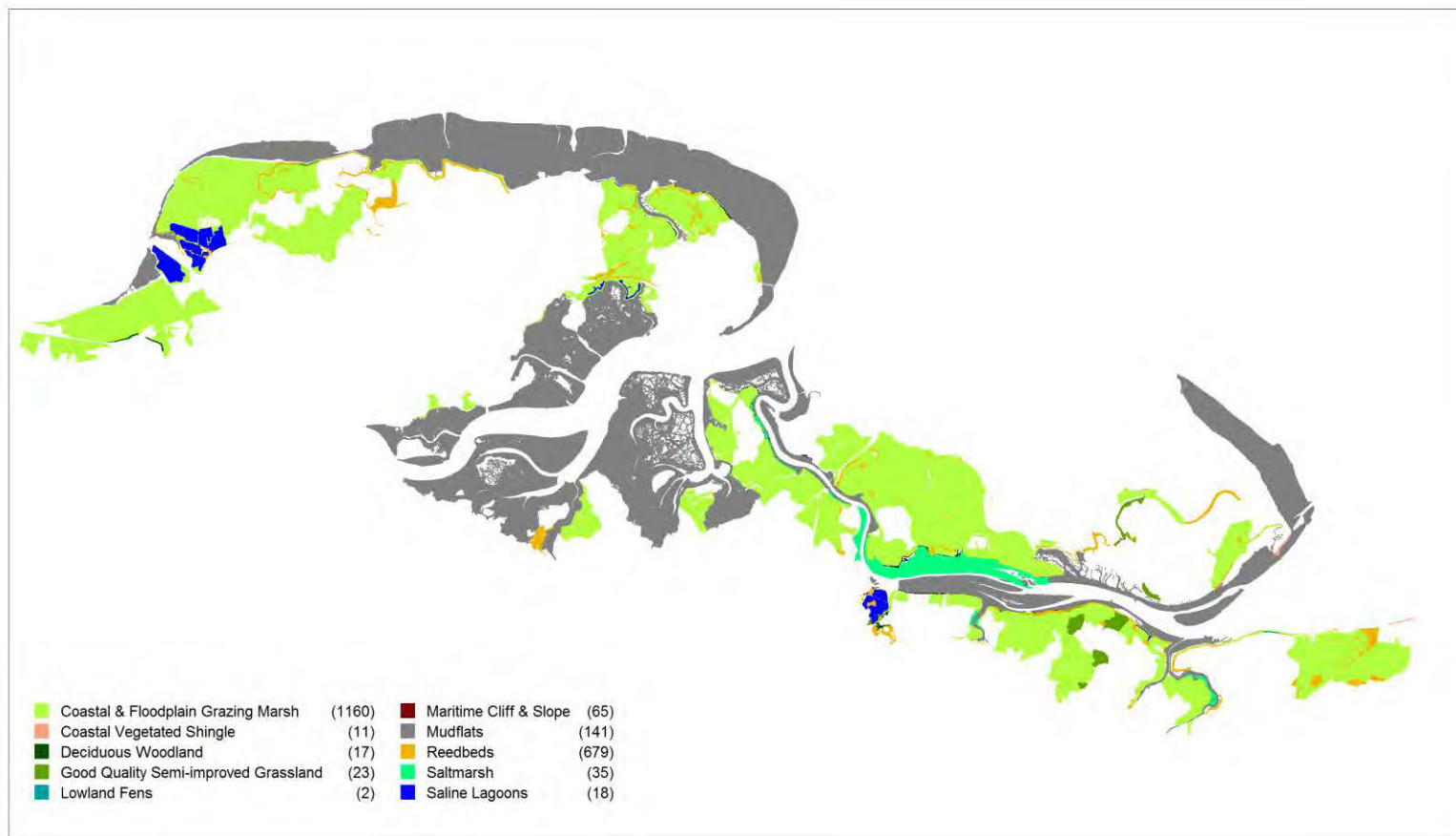
Contains Ordnance Survey data © Crown database and database right 2013

- Medway Estuary & Marshes SPA & Ramsar
- Thames Estuary & Marshes SPA & Ramsar
- Ramsar outside of SPA
- Compensation sites
- WeBS Sectors

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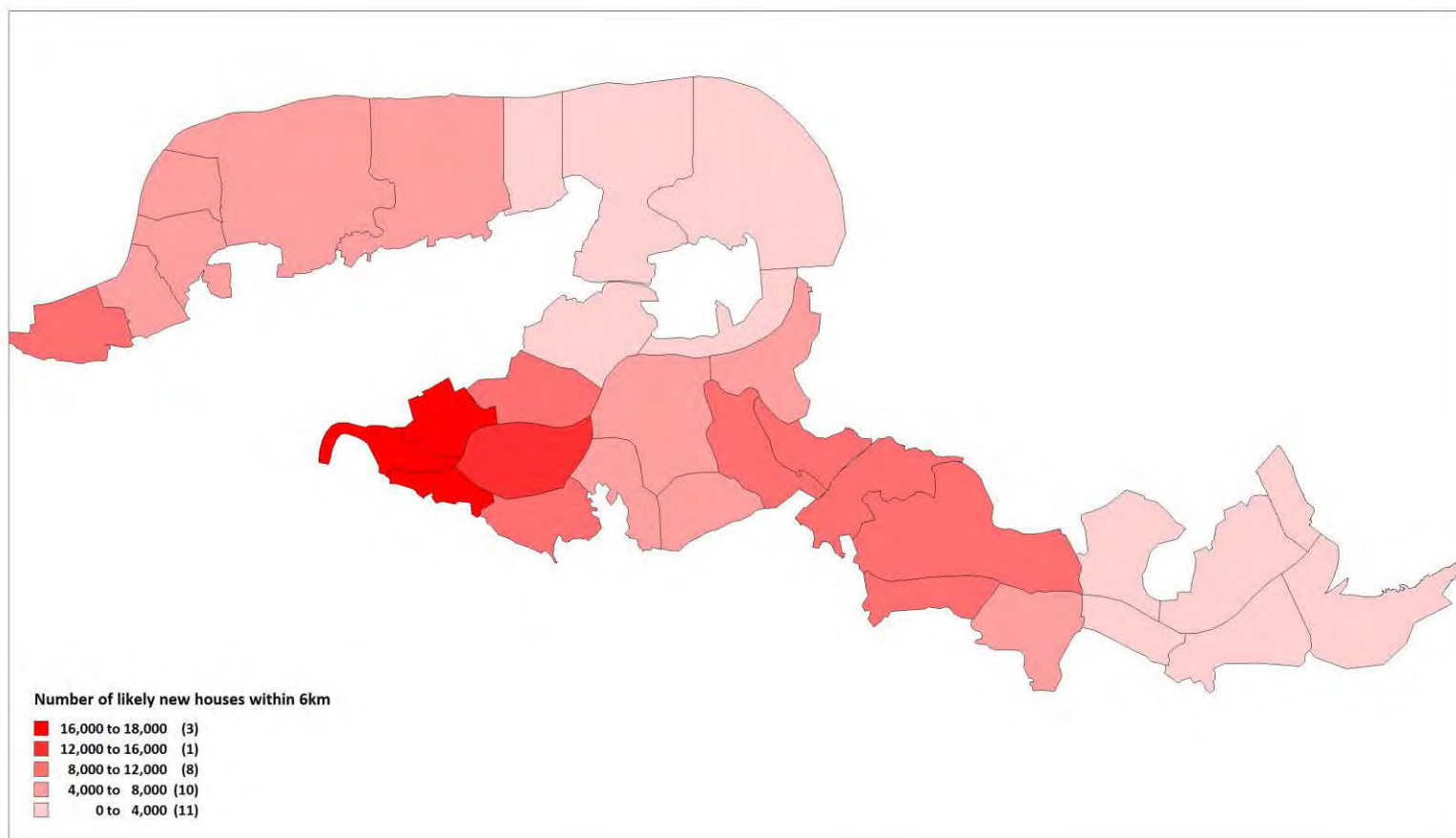


Map 13: Main Priority Habitats Within the SPA and Ramsar Sites

Derived from priority habitats GIS data, provided by Natural England

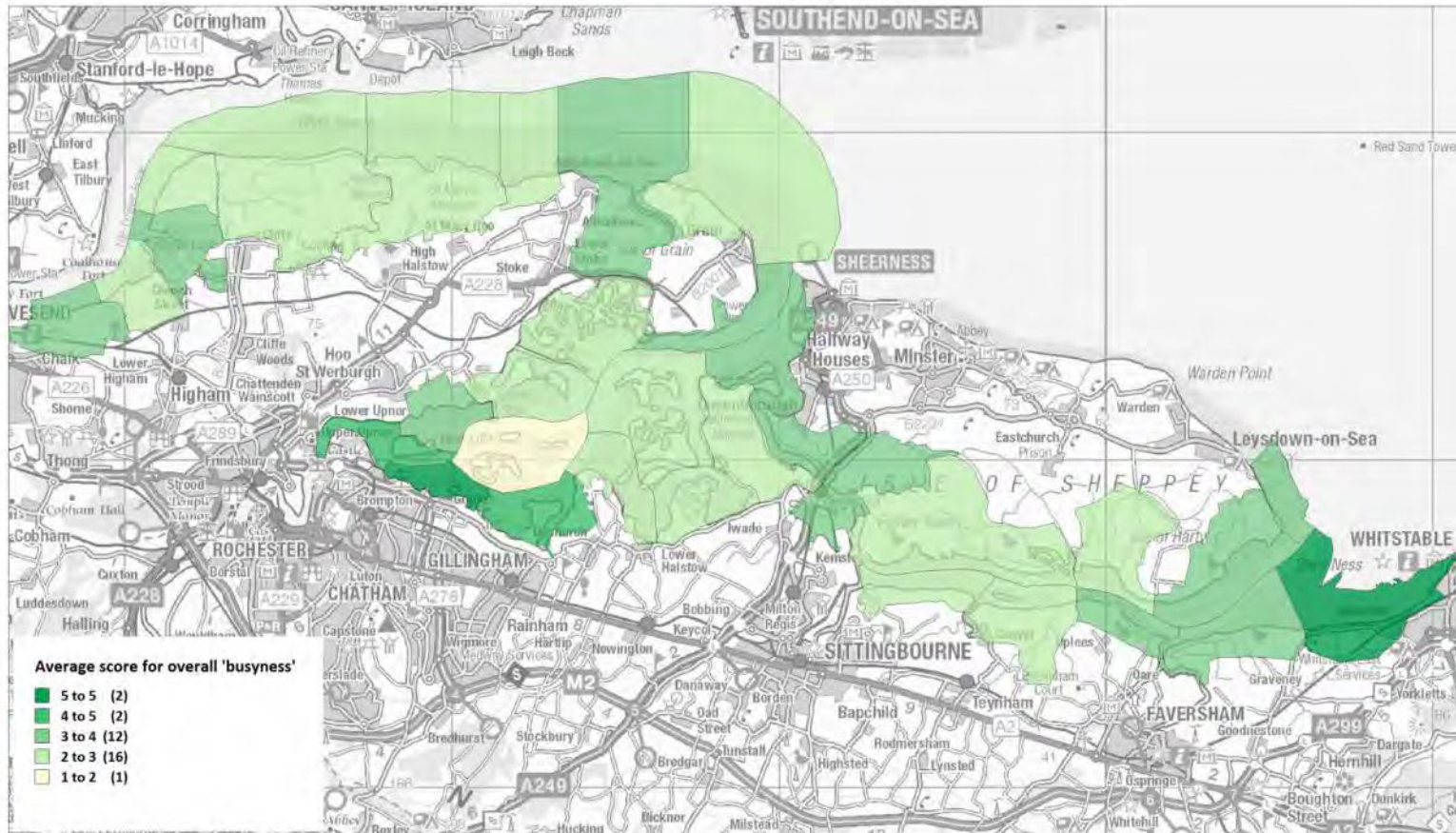
Contains Ordnance Survey data © Crown database and database right 2013

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Map 14: Coast sections shaded to reflect indicative levels of new housing within 6km radius
See Liley, Lake and Feanley 2012 for further details

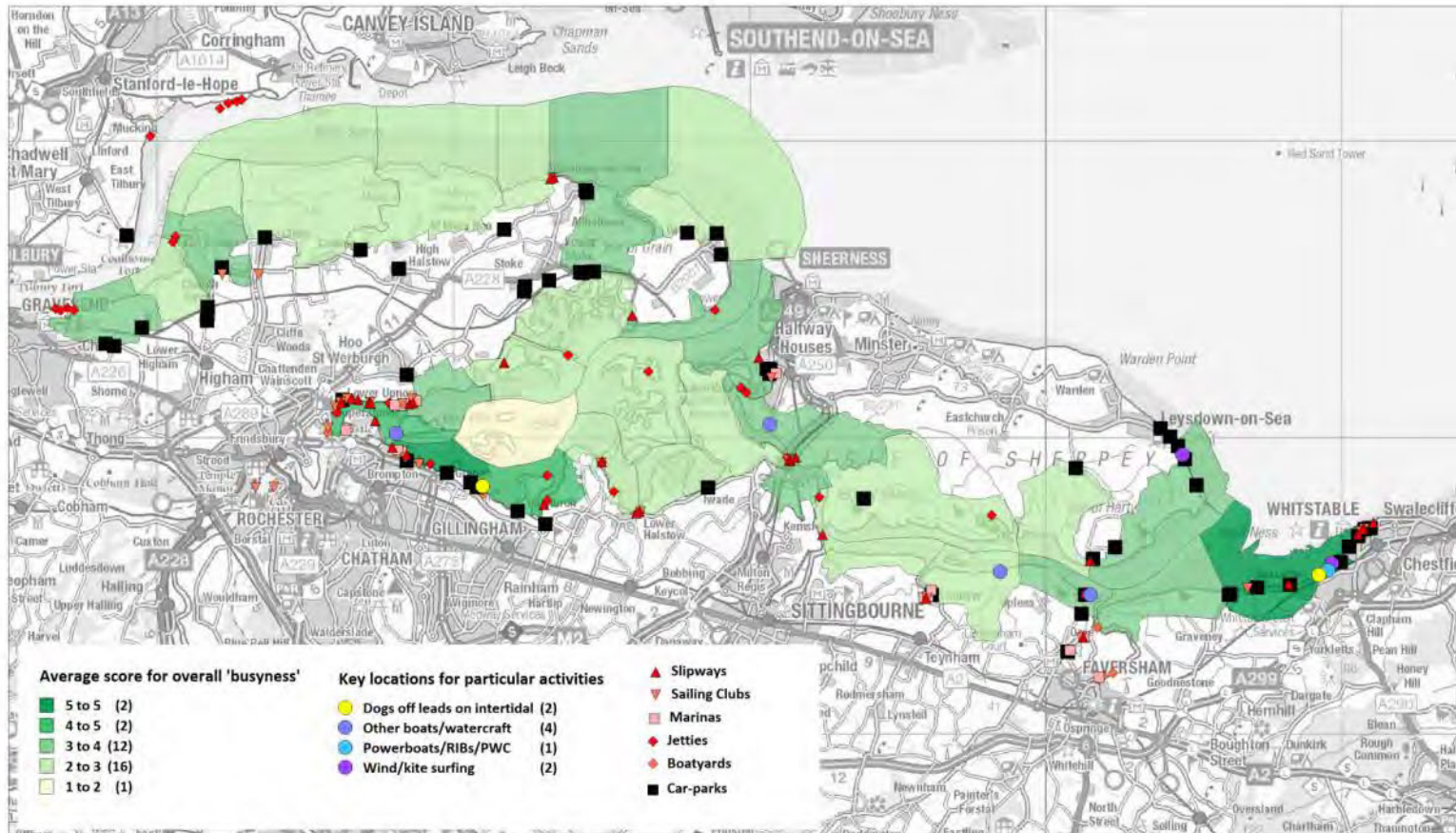
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Map 15: Levels of Current Access (from Fearnley & Liley 2012)

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Map 16: Levels of Current Access (see Map 14), Access Infrastructure and Key Locations for Particular Activities

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14. Appendix 7: Summary Map and Tables for Elements of the Plan

Summary of strategy elements by section. Sections are those used in Maps 14-16. See also Map 17 which shows each section and pie charts coloured to reflect measures within each. Within the table the number of new houses within 6km are the data in Map 14 (see Liley, Lake & Fearnley 2012 for details) and the score for 'busyness' is from Map 15 and reflects a score of 1 (quiet) to 5 (high general levels of access) (see Fearnley & Liley 2012). In all cases the ticks are indicative, additional areas or changes to locations are likely. The dog project, codes of conduct and monitoring are all elements that are generic and therefore difficult to map. Enforcement is an option that can be phased and used when other options fail, hence the brackets.

Map Ref (See Map 17)	LPA	No. of New Houses Within 6km	Score reflecting Current 'Busyness'	Enhancement of existing site to create hub	Interpretation/signage	New Access Infrastructure	Parking	Refuge	Wardening	Work with local club/group	Dog Project	Codes of Conduct	Monitoring	Enforcement
1	Gravesham	9349	3		✓	✓	✓				✓	✓	✓	(✓)
2	Gravesham	7320	2								✓	✓	✓	(✓)
3	Gravesham & Medway	6752	3	✓			✓		✓		✓	✓	✓	(✓)
4	Medway	5018	2								✓	✓	✓	(✓)
5	Medway	6534	2		✓				✓		✓	✓	✓	(✓)
6	Medway	6504	2	✓							✓	✓	✓	(✓)
7	Medway	183	2								✓	✓	✓	(✓)
8	Medway	166	3				✓			✓	✓	✓	✓	(✓)
9	Medway	3834	2								✓	✓	✓	(✓)
10	Medway	3874	3								✓	✓	✓	(✓)
11	Medway	3375	2				✓	✓			✓	✓	✓	(✓)
12	Medway	8951	2								✓	✓	✓	(✓)
13	Medway	16582	3		✓						✓	✓	✓	(✓)
14	Medway	17181	4								✓	✓	✓	(✓)
15	Medway	17155	5		✓	✓					✓	✓	✓	(✓)

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Map Ref (See Map 17)	LPA	No. of New Houses Within 6km	Score reflecting Current 'Busyness'	Enhancement of existing site to create hub	Interpretation/signage	New Access Infrastructure	Parking	Refuge	Wardening	Work with local club/group	Dog Project	Codes of Conduct	Monitoring	Enforcement
16	Medway	15029	1					✓		✓	✓	✓	✓	(S)
17	Medway	8461	4	✓	✓	✓	✓		✓		✓	✓	✓	(S)
18	Swale	6282	2								✓	✓	✓	(S)
19	Swale	5256	2					✓		✓	✓	✓	✓	(S)
20	Swale	6899	2				✓			✓	✓	✓	✓	(S)
21	Swale	8426	2							✓	✓	✓	✓	(S)
22	Swale	5173	3								✓	✓	✓	(S)
23	Swale	8393	3							✓	✓	✓	✓	(S)
24	Swale	9044	3							✓	✓	✓	✓	(S)
25	Swale	9503	2								✓	✓	✓	(S)
26	Swale	8985	2			✓					✓	✓	✓	(S)
27	Swale	5225	2		✓				✓		✓	✓	✓	(S)
28	Swale	2133	2								✓	✓	✓	(S)
29	Swale	1006	3			✓	✓		✓		✓	✓	✓	(S)
30	Swale	1414	3			✓	✓				✓	✓	✓	(S)
31	Swale	2009	3		✓				✓		✓	✓	✓	(S)
32	Swale	1282	3			✓	✓				✓	✓	✓	(S)
33	Canterbury	3610	5		✓		✓				✓	✓	✓	(S)

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