CLEVE HILL SOLAR PARK

UPDATES TO APPLICATION DOCUMENTS
REPORT TO INFORM APPROPRIATE ASSESSMENT (RIAA)

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Revision B

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REPORT TO INFORM AN APPROPRIATE ASSESSMENT

Cleve Hill Solar Park Ltd

Revision B

NOVEMBER 2019

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SUMMARY

This Report to Inform an Appropriate Assessment (RIAA) presents information to support the DCO application for the proposed Cleve Hill Solar Park (CHSP, hereafter 'the Development'). The scope and extent of the RIAA has been determined by a combination of professional judgement, the scoping opinions collated by the Planning Inspectorate (PINS) on behalf of the Secretary of State (SoS), Section 42 responses to Preliminary Environmental Information Report (PEIR) and ongoing consultations with Natural England, Kent Wildlife Trust (KWT) and the Royal Society for the Protection of Birds (RSPB). Regard has also been given to The Planning Inspectorate's (PINS) Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects, Version 8 (November 2017).

Habitats Regulations Assessment (HRA) fulfils the requirements of articles 6(3) and (4) of European Council Directive 92/43/EEC on the conservation of natural habitats of wild fauna and flora (the Habitats Directive) and the first sentence of article 4(4) European Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive) as implemented in English law via the Habitats Regulations (the Conservation of Habitats and Species Regulations 2017). Under the terms of this legislation, a HRA is required before a project which may affect a European Site can be lawfully undertaken or authorised.

Due to the proximity of the Development to the Swale, which is designated as a European site (a Special Protection Area, or SPA), it was recognised at an early stage in the evolution of the project that there was potential for effects of the Development on a European site. As a result, detailed baseline surveys were commissioned by the Applicant to inform an assessment of the potential effects and consultation was initiated with Natural England in this regard during the baseline survey phase of the project.

Based on the consultation responses received and consideration of the likelihood of meaningful connectivity between the Development site and European sites, the following Sites are assessed within this RIAA:

- The Swale SPA and Ramsar site.

No other SACs, pSACs, pSPAs, Ramsar sites or sites required as compensatory measures for adverse effects on European sites, pSPAs, pSACs, or Ramsar sites have been identified for this HRA. During consultation with Natural England, The Swale SPA/Ramsar Site has been the only European designated site identified in relation to the potential effects of the Development.

In the absence of mitigation, likely significant effects of the Development could not be discounted due to the potential effects of:

- Noise and/or visual disturbance to birds during construction/decommissioning;
- Loss of/changes to functionally linked habitats;
- Hydrological impacts during construction/decommissioning; and
- Dust emissions during construction/decommissioning.

Following embedded design measures and applied construction noise mitigation measures as outlined above and detailed in the Outline SPA CNMP (Document Reference 6.4.12.10; noise mitigation), Outline CEMP (Document Reference 6.4.5.4; Breeding Bird Protection Plan) and Outline LBMP (Document Reference 6.4.5.2), it is concluded that the DCO application for the Cleve Hill Solar Park, alone and in combination with other plans or projects, will not undermine the conservation objectives of The Swale SPA/Ramsar Site in a way that will prevent the site contributing to the aims of the Birds Directive. The Development is not predicted to adversely affect the integrity of the Swale SPA/Ramsar Site.

There are no likely significant effects identified for any other European Sites.

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1 INTRODUCTION

1. This Report to Inform an Appropriate Assessment (RIAA) presents information to support the DCO application for the proposed Cleve Hill Solar Park (CHSP, hereafter 'the Development'). The scope and extent of the RIAA has been determined by a combination of professional judgement, the scoping opinions collated by the Planning Inspectorate (PINS) on behalf of the Secretary of State (SoS), Section 42 responses to Preliminary Environmental Information Report (PEIR) and ongoing consultations with Natural England, Kent Wildlife Trust (KWT) and the Royal Society for the Protection of Birds (RSPB). Regard has also been given to The Planning Inspectorate's (PINS) Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects, Version 8 (November 2017)[1].

2. Due to the proximity of the Development to the Swale, which is designated as a European site (a Special Protection Area, or SPA), it was recognised at an early stage in the evolution of the project that there was potential for effects of the Development on a European site. As a result, detailed baseline surveys were commissioned by the Applicant to inform an assessment of the potential effects and consultation was initiated with Natural England in this regard during the baseline survey phase of the project.

3. This RIAA contains the following sections:

    - Project Description - providing a summary of what the Development involves;
    - Legislative Context - overview of the process of Habitats Regulations Appraisal (HRA);
    - Consultation – summary of consultations held regarding the scope of the assessment;
    - HRA STAGE 1:
        - Scope of HRA – identification of European Sites with potential connectivity to the Development site;
        - Details of the Qualifying Interest Features and Conservation Objectives for those European Sites screened into the assessment;
        - Screening for Likely Significant Effects (LSEs), including:
        - a description of the types of potential effects arising from the Development alone and in-combination with other projects; and
        - identification of LSEs (in the absence of any applied mitigation) affecting the qualifying features for each European Site scoped into the assessment;
    - HRA STAGE 2:
        - Assessment of the effects identified in Screening (HRA Stage 1), including mitigating measures to avoid or reduce effects, for each Qualifying Interest Feature screened into the assessment, concluding how the Development alone could affect the Conservation Objectives of the European Site;
        - Assessment of the effects on European Sites in-combination with other plans or projects;
        - Conclusion and statement regarding the effect of the Development on the integrity of each European Site, either alone or in-combination with other plans or projects;
    - HRA STAGES 3/4 – consideration of alternatives and Imperative Reasons of Overriding Public Interest (IROPI), in the event that the HRA is unable to conclude that the Development will not adversely affect the integrity of a European Site.
    - Transboundary Considerations; and
    - Conclusion.

[1] http://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/06/Advice-note-10v4.pdf, last accessed 01/10/2018.

4. As requested in PINS Advice Note Ten[1], HRA Stage 1 Screening and Stage 2 Integrity Matrices have been completed and submitted with the DCO Application.

5. The RIAA draws upon information provided in Chapter 9: Ornithology of the Environmental Statement (ES) and its accompanying Figures and Technical Appendices:

   - Volume 2: Figures:
     - Figure 9.1: Study / Survey Areas;
     - Figure 9.2: Designated Sites with Avian Interest; and
     - Figure 9.3: Habitat Management Areas.
   - Volume 4: Technical Appendices:
     - Technical Appendix A9.1: Ornithology Technical Appendix, which provides details of the methods and results of the baseline surveys and desk study undertaken for the assessment of effects;
     - Technical Appendix A9.2: Cleve Farm – Breeding Bird Survey Report 2014 & 2015 (AECOM), which provides further details specific to the baseline breeding bird surveys carried out by AECOM in 2014 and 2015;
     - Technical Appendix A9.3: Cleve Farm – Passage Bird Survey Report 2015 (AECOM), which provides further details specific to the baseline passage period bird surveys carried out by AECOM in 2015;
     - Technical Appendix A9.4: Cleve Farm – Wintering Bird Survey Report 2013/14 & 2014/15 (AECOM), which provides further details specific to the baseline non-breeding season bird surveys carried out by AECOM in winters 2013/14 and 2014/15; and
     - Technical Appendix A9.5: Natural England Discretionary Advice Service (DAS) letter, which provides initial advice following a consultation held under the DAS that was initiated in October 2016.

6. In addition, reference is made to:

   - Technical Appendix A5.2: Outline Landscape and Biodiversity Management Plan (LBMP), which addresses recommendations set out in Chapter 7: Landscape and Visual, Chapter 8: Ecology and Chapter 9, and as highlighted in the scoping response, to protect ecological resources and enhance biodiversity.
   - Technical Appendix A5.4: Outline Construction Environmental Management Plan (CEMP), which sets out good practice measures to mitigate environmental effects during construction (and decommissioning).
   - Technical Appendix A12.10: Outline SPA Construction Noise Management Plan (SPA CNMP), which sets out measures to be implemented during construction to avoid or minimise disturbance to breeding and wintering birds.

7. This RIAA is supported by five Figures:

   - Figure 1 – Site Location and European Sites
   - Figure 2 – Development and The Swale SPA / Ramsar Site
   - Figure 3 – Wintering Bird Noise Threshold
   - Figure 4 – Breeding Bird Noise Threshold
   - Figure 5 – Haul Road Zone of Noise Influence

8. This RIAA is supported by six Appendices:

   - Appendix 1 – Natural England Initial Advice (December 2016)
   - Appendix 2 – The Swale SPA Citation
   - Appendix 3 – The Swale Standard Data Form 2016
   - Appendix 4 – The Swale SPA Conservation Objectives
   - Appendix 5 – The Swale Ramsar Information Sheet (RIS)

- Appendix 6 – Baseline Survey Counts (dark-bellied brent goose, lapwing, golden plover)

2 PROJECT DESCRIPTION

2.1 Overview

9. The component parts of the Development, along with details of the different phases of the Development, are described in detail in Chapter 5: Development Description of the ES. A summary is provided here.

10. The Development site lies within the administrative districts of Swale Borough Council, Canterbury City Council and Kent County Council, 2 km north east of Faversham and 5 km west of Whitstable on the north Kent coast (Figure 1). The Development site is coastal and the area is identified on Ordnance Survey maps as Nagden, Cleve and Graveney Marshes. The coastal nature of the Development site is in evidence where Faversham Creek forms the western site boundary and The Swale Channel forms the northern boundary.

11. The Development site extends over 491.2 hectares (ha) which mainly comprises:

- Arable Land, within which the solar arrays and energy storage facility will be located;
- Freshwater Grazing Marsh, at the east end of the site that is included in the application boundary solely to provide opportunities to improve its management for nature conservation;
- Flood Defences, which are included in the application boundary to permit access for ongoing maintenance activities; and
- The Existing Cleve Hill Substation.

12. The Development will comprise the following main components (Figure 2):

- Solar PV arrays in Fields A to I and K to X, including solar panels, mounting structures and associated access, electrical and security infrastructure, including fencing and sensor-activated lighting;
- Electrical compound for the solar energy development, including a substation and flood protection bund;
- Energy storage facility (exceeding 50 MW) formed of batteries within a bunded electrical compound;
- Associated Development for the solar PV arrays and energy storage facility, including grid connection, site access tracks and maintenance works on flood defences;
- Arable Reversion Habitat Management Area (AR HMA) of approximately 56 hectares (ha) designed to provide foraging/roosting resources as grassland for wintering geese and waders;
- Grazing marsh in the east of the site extending over approximately 35 ha (the Freshwater Grazing Marsh Habitat Management Area – FGM HMA) and designated as part of The Swale SSSI, SPA and Ramsar Wetland Site, within which opportunities will be taken to improve the current management;
- Lowland Grassland Meadow Habitat Management Area (LGM HMA) of approximately 13.3 ha in Fields Y/Z involving conversion of arable land to wildflower-rich grassland;
- One new permissive footpath along an existing farm track south from the sea wall before running along field edges near the Cleve substation and Development electrical compound to meet an existing footpath at Graveney Hill; and
- Landscaping and habitat management within and around the solar PV arrays.

2.2 Construction Phasing

13. The construction period is likely to be undertaken in at least two phases:

- Phase one will include the construction of all aspects of the Development except the energy storage facility and may take up to 24 months; and

- Phase two will include the construction of the energy storage facility, which may be undertaken more slowly during phase one across a period of 22 months within the 24 month phase one construction phase, or more quickly subsequent to phase one (or at a later date) across a period of up to 6 months.

14. The maximum construction period is expected to be 24 months (and 6 months for phase two if completed separately). The DCO requires a phasing plan to be submitted to the LPA for approval prior to the commencement of development. Subject to achieving the necessary consents, the indicative start date for construction is likely to be spring 2021.

2.2.1 Phase One

15. To build the solar PV array, the field identification detailed in Figure 2 will be utilised. Each large field, or group of smaller fields, will be completed before the construction team moves on to the next field(s). A small temporary field compound will be established in an adjacent field to serve the field under construction.

16. The types of construction activities that may be required during phase one (not necessarily in order) include:

- Site preparation and civil engineering works:
  - Conversion of arable land to grassland for construction;
  - Conversion of arable land to grassland in the AR HMA;
  - Import of construction materials, plant and equipment to site;
  - Establishment of the perimeter fence;
  - The establishment of the main construction compound;
  - Construction of the spine road; construction of new tracks;
  - The upgrade or construction of crossing points (culverts) over drainage ditches; and
  - Marking out the location of the Development infrastructure.
- Solar PV array construction:
  - Import of components to site;
  - Piling of module mount verticals;
  - Erection of module mounting structures;
  - Mounting of modules and inverters;
  - Trenching and installation of electric cabling;
  - Transformer foundation excavation and construction; and
  - Installation of transformers.
- Construction of onsite electrical infrastructure to facilitate the export of generated electricity:
  - Construction of the flood protection bund;
  - Site preparation and civils for the Development substation;
  - Trenching and installation of electric cabling;
  - Import of components to site; and
  - Installation of the Development substation.
- Testing and commissioning;
- Landscaping; and
- Other habitat management works.

2.2.2 Phase Two

17. Construction phase two of the Development is expected to last up to 22 months within the Phase 1 construction timescale, or up to 6 months if completed separately.

18. Provision for the energy storage facility will be made during phase one of construction while the energy storage area will be used as a construction compound and therefore most of the site preparation will have already taken place. The types of construction activities that may be required during phase two (not necessarily in order) are therefore likely to include:

- Energy storage facility construction:
  - Installation of electric cabling;
  - Foundation construction;
  - Import of components to site;
  - Installation of transformers; and
  - Installation of battery pack cabinets, inverters and controllers.

2.3 Construction Control Mechanisms

19. The construction of the Development will be subject to embedded measures designed to avoid or reduce the impacts on the environment. These include an Outline Construction Traffic Management Plan (CTMP), Outline SPA Construction Noise Management Plan (SPA CNMP, Technical Appendix 12.10 of the ES) and Outline CEMP (Technical Appendix A5.4 of the ES). Whilst these are firm commitments embedded into the Development, this RIAA has been completed in cognisance of recent case law (People over Wind and Sweetman vs Coillte ruling 2018) with regards to the treatment of mitigation in the process; specifically, that these embedded mitigation measures have not been taken into account at the screening stage for LSEs.

2.4 Site Reinstatement and Habitat Creation

20. Following construction, a programme of landscaping and habitat creation will commence. An Outline LBMP is provided in Technical Appendix A5.2 of the ES, which sets out the proposals for how the land will be managed throughout the operational phase, and how this will be implemented following the completion of construction.

2.5 Operation

21. During the operational phase, activity on the Development site will be minimal and would be restricted principally to vegetation and livestock management (the Development site is expected to be grazed by sheep), equipment/infrastructure maintenance and servicing including cleaning and replacement of any components that fail, and monitoring to ensure the continued effective operation of the Development.

2.6 Decommissioning

22. When the operational phase ends, the Development will require decommissioning. All solar PV array infrastructure including modules, mounting structures, cabling, inverters and transformers would be removed from the Development site and recycled or disposed of in accordance with good practice and market conditions at that time. The future of the Development substation would be discussed with network operators and agreed with the local planning authority prior to commencement of decommissioning. Decommissioning would be expected to take between 6 and 12 months.

23. A Decommissioning Plan, to include timescales and transportation methods, will be agreed in advance with the local planning authority.

3 LEGISLATIVE CONTEXT

24. HRA fulfils the requirements of articles 6(3) and (4) of European Council Directive 92/43/EEC on the conservation of natural habitats of wild fauna and flora (the Habitats Directive) and the first sentence of article 4(4) European Council Directive 2009/147/EC on

the conservation of wild birds (the Birds Directive) as implemented in English law via the Habitats Regulations (the Conservation of Habitats and Species Regulations 2017). Under the terms of this legislation, a HRA is required before a project which may affect a European Site can be lawfully undertaken or authorised.

25. A European site (also known as a Natura 2000 site) is either a Special Area of Conservation (SAC) or candidate SAC (cSAC) designated to fulfil the requirements of the Habitats Directive, or a Special Protection Area (SPA) designated to fulfil the requirements of the Birds Directive, or a Site of Community Importance (SCI)[2]. It is also a matter of Government policy that these procedures apply to listed or proposed Ramsar Sites identified through the Ramsar Convention 1976, possible SACs (pSAC), potential SPAs (pSPA) and sites identified, or required, as compensatory measures for adverse effects on European sites, pSPAs, pSACs, and Ramsar sites (paragraph 176 of NPPF, 2018)[3]. Therefore, such sites are included under the European Site heading for the purposes of carrying out this RIAA.

26. This RIAA follows the principles set out in PINS Advice Note Ten[1], the Habitats Regulations Assessment Handbook (DTA Publications)[4], which complies with the requirements set out in EU (European Communities 2000, 2002)[5] and national planning policy guidance (National Planning Policy Framework (NPPF 2018)[3] and ODPM Circular 06/2005 / Defra Circular 01/2005)[6].

27. Having ascertained that the project is not connected with the management of any European sites for nature conservation, the HRA comprises four stages:

- Stage 1, Screening: assessing whether or not the project would have a 'likely significant effect' (LSE) on a European Site, either alone, or in combination with other plans or projects. If the Screening procedure cannot conclude that there is a LSE on a European Site, then an Appropriate Assessment (Stage 2) would apply. Otherwise, the project may be authorised.
- Stage 2, Appropriate Assessment (AA): the AA is undertaken by the competent authority responsible for determining the application. Its purpose is to assess the implications of the project in respect of the European Sites' Conservation Objectives, which should enable the competent authority to determine whether or not the project would adversely affect the integrity of the designated sites. If it can be ascertained beyond reasonable scientific doubt that the project would not adversely affect the integrity of the European Sites, then it can be authorised. If not, Stages 3 and 4 would apply.
- Stage 3, Alternative Solutions: where the project would damage the integrity of a European site, alternative solutions which would deliver the project objective(s) need to be considered. If there are no alternatives that do not also affect the integrity of the European Site, Stage 4 applies.

[2] A site that has been adopted by the European Commission but not yet formally designated by the government of each country.

[3] National Planning Policy Framework 2018, published by the Ministry of Housing, Communities and Local Government. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf, last accessed 13/10/2018.

[4] Tyldelsey, D. & Chapmand, C. (2013). *The Habitats Regulations Assessment Handbook*, May 2015 Edition UK. DTA Publications Ltd.

[5] European Communities (2000). *Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/CEE*. Office for Official Publications of the European Communities, Luxembourg.
European Communities (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*. Luxembourg: Office for Official Publications of the European Communities.

[6] ODPM Circular 06/2005 / Defra Circular 01/2005. *Government Circular: Biodiversity and geological conservation – statutory obligations and their impact within the planning system*. Office of the Deputy Prime Minister, London / Department for Environment, Food and Rural Affairs, London.

- Stage 4, Imperative Reasons of Overriding Public Interest (IROPI): projects that adversely affect the integrity of a European site may proceed for imperative reasons of overriding public interest subject to compensatory measures being secured.

28. Many projects do not need to progress beyond Stage 1 where it can be identified that there is no causal link between a project and a European site or that the probability of a significant effect is negligible; however, where LSE cannot be discounted, the AA in Stage 2 is necessary.

29. The application will be determined by the SoS as the competent authority. It is also the responsibility of the SoS to undertake any AA that may be required under the terms of the Habitats Regulations, with statutory advice provided by Natural England. Whilst the competent authority will ultimately undertake the AA, it is the responsibility of the Applicant to provide the relevant information to enable them to do so. This RIAA is intended to provide the SoS with the relevant information for them to discharge their duties under the Habitats Regulations.

4 CONSULTATION

30. A Scoping Report was issued to the Planning Inspectorate in December 2017 (DCO Document Reference 6.4.3.1). The Inspectorate issued a Scoping Opinion on behalf of the SoS in January 2018 collating responses from consultees (DCO Document Reference 6.4.3.2). Those responses were used to guide the assessment of effects.

31. A consultation was initiated with Natural England in October 2016 through their Discretionary Advice Service (DAS). A consultation report was issued prior to a meeting held with representatives from Natural England in December 2016. Following the meeting, Natural England provided a letter (Charged Advice) setting out their initial advice regarding the scope and results of the baseline ecological and ornithological surveys completed up to that date, the implications for the proposal, particularly in relation to The Swale SPA and responding to a number of detailed questions raised during the meeting. A copy of the initial advice letter is provided in Appendix 1 to this RIAA.

32. In recognition of the importance of ecological and ornithological interests relating to the designated sites near the Development site and the opportunities to improve local habitats and biodiversity, a Habitat Management Steering Group (HMSG) was formed in February 2018, comprising representatives of the Applicant and their consultants (Arcus Consultancy Services Ltd), Kent Wildlife Trust (KWT), Natural England (NE),the Royal Society for the Protection of Birds (RSPB) and the Environment Agency (EA). The HMSG is intended to convene at key junctures throughout the pre-application, pre-construction, construction and operational phases of the Development. During the pre-application process, consultations with the HMSG have guided the plans for mitigation and enhancement in the assessment, particularly in relation to the quantification of baseline bird use of the site and the location, extent and management of the AR HMA.

33. A preliminary Environmental Information Report (PEIR) comprising a draft Environmental Statement was published for consultation in May 2018. Section 42 Responses from consultees were collated and actions taken to update the assessment in the ES and to guide the RIAA. Full details of the S42 consultation are presented in the Consultation Report (DCO Document Reference 5.1), with those relevant to the ornithological assessment presented in Table 9.1b of Chapter 9: Ornithology of the ES. Natural England's responses are also specifically addressed in a Statement of Common Ground (SoCG) (DCO Document Reference 7.6).

5 HRA STAGE 1

5.1 European Sites Scoping

34. Table 1 provides details of the European Sites identified for scoping into the HRA. There is no pathway for effects on the qualifying interest features originating from European Sites of non-avian interest beyond 5 km. Qualifying interest features of European Sites of non-avian interest are not considered likely to attend the Development site or its adjacent habitats at a level of frequency where the effects of the Development would cause a material change in their ability to survive or reproduce; therefore it is not considered that significant effects would be likely to occur on European Sites of non-avian interest more than 5 km away.

35. Birds can be highly mobile and some species may range considerable distances from the designated sites with which they are associated to forage in the wider countryside. In order to provide confidence in the HRA with regard to the scope of European Sites assessed, the search zone for European Sites designated for avian interest (SPAs, pSPAs and Ramsar sites) was extended to 10 km from the Development site.

36. Details of all European Sites located within 5 km and those within 10 km that are designated for avian interest are shown in Table 1 and Figure 1.

Table 1: European Sites identified for scoping in the HRA

Site Name	Status	Location	Summary of Qualifying Interest
The Swale	SPA	Adjacent to the north, east and west	Wetland of international importance, comprising intertidal mudflats, shellbeaches, saltmarshes and extensive grazing marshes. It provides habitats for important assemblages of wintering waterfowl and also supports notable breeding bird populations. Non-breeding: dark-bellied brent goose, dunlin Breeding bird assemblage Non-breeding waterbird assemblage
The Swale	Ramsar	Adjacent to the north, east and west	Complex of brackish and freshwater, 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. A number of criteria are applied to Ramsar designation to aid in the identification of wetlands of international importance. The following apply to The Swale Ramsar Site: Criterion 2: The site supports nationally scarce plants and at least seven British Red data book invertebrates. Criterion 5: Non-breeding waterbird assemblage. Criterion 6 qualifying species (passage/wintering): Redshank, dark-bellied brent goose, grey plover, ringed plover, wigeon, pintail, shoveler, black-tailed godwit Noteworthy: Breeding – Mediterranean gull, black-headed gull, little tern Passage/wintering – little egret, whimbrel, curlew, spotted redshank, greenshank, little grebe, European white-fronted goose, shelduck, teal, oystercatcher, avocet, golden plover, lapwing, knot, dunlin, ruff.

Site Name	Status	Location	Summary of Qualifying Interest
Outer Thames Estuary	SPA	1.6 km to the north-east	Coastal waters of the southern North Sea between the Thames Estuary and the east Norfolk coast. The marine habitat supports an internationally important wintering population of red-throated diver, the largest aggregation of this species in the UK. It also protects foraging areas of common tern and little tern, enhancing the protection afforded to their feeding and nesting areas in adjacent coastal SPAs.
Blean Complex	SAC	3.6 km to the east	Ancient woodland, specifically the Annex 1 habitat: Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli*.
Thanet Coast & Sandwich Bay	SPA	7.8 km to the east-northeast	Coastal site consisting of a long stretch of rocky shore, adjoining areas of estuary, sand dune, maritime grassland, saltmarsh and grazing marsh. Qualifying features include: Non-breeding: golden plover and turnstone Breeding: little tern
Thanet Coast & Sandwich Bay	Ramsar	7.8 km to the east-northeast	A coastal site, consisting of a long rocky shore, adjoining estuary, dune, maritime grassland, saltmarsh, and grazing marsh. The wetland habitats support 15 British Red Data Book invertebrates, as well as a large number of nationally scarce species. The site supports internationally and nationally important wintering bird populations and a nationally important population of a breeding seabird. The site is used by large numbers of migratory birds. The Ramsar site boundary is coincident with the SPA. A number of criteria are applied to Ramsar designation to aid in the identification of wetlands of international importance. The following apply to the Thanet Coast and Sandwich Bay Ramsar Site: Criterion 2: Supports 15 British Red Data Book wetland invertebrates. Criterion 6 qualifying species (passage/wintering): Ruddy turnstone. Noteworthy bird populations: Passage/wintering – ringed plover, greenshank, red-throated diver, great crested grebe, golden plover, sanderling.

37. There are no other European Sites within the 5 km and 10 km search zones.

38. The Thanet Coast & Sandwich Bay SPA/Ramsar is approximately 7.8 km east-northeast of the Development site. Its qualifying interest features include breeding little tern, which will be unaffected by the Development. At a distance of nearly 8 km away, numbers of turnstones from the SPA/Ramsar are unlikely to range regularly as far as the Development site (where turnstones are already present within The Swale SPA/Ramsar) and would not make any use of the habitats within the Development site. Wintering golden plover originating from the Thanet Coast & Sandwich Bay SPA could occasionally range as far as the Development site and use the arable habitats. However, the most recent WeBS 5-year peak-mean count of golden plover for the Thanet Coast is only 34 birds. They are extremely unlikely to visit the Development site in numbers or frequency at which there would be any likely significant effects. The Thanet Coast & Sandwich Bay SPA/Ramsar is therefore scoped out of the HRA.

39. The Development will have no effect on the habitats that comprise the Outer Thames Estuary SPA and potential disturbance during any phase of the Development will not extend

far enough to have any effect on red-throated divers or foraging common and little terns in the marine environment. The Outer Thames Estuary SPA is therefore scoped out of the HRA.

40. Similarly, there will be no impacts of the Development extending over a distance that would have any effect on the protected habitats of Blean Complex SAC. Blean Complex SAC is therefore scoped out of the HRA.

41. Based on the consultation responses in section 4 and consideration of the likelihood of meaningful connectivity between the Development site and European sites, the following Sites are assessed within this RIAA:

- The Swale SPA and Ramsar site.

42. No other SACs, pSACs, pSPAs, Ramsar sites or sites required as compensatory measures for adverse effects on European sites, pSPAs, pSACs, or Ramsar sites have been identified for this HRA. During consultation with Natural England, The Swale SPA/Ramsar Site has been the only European designated site identified in relation to the potential effects of the Development.

5.2 Likely Significant Effects on The Swale SPA/Ramsar Site

43. This screening exercise is designed to identify the types of effects that the Development may have on the qualifying interest features of The Swale SPA/Ramsar Site and assess whether or not a 'likely significant effect' (LSE) can be discounted with respect to each of the qualifying interest features.

44. Natural England (NE) guidance[7] on determining LSE states at paragraph 4.1 that:

'Likely significant effect is, in this context, any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the Site was designated, but excluding trivial or inconsequential effects'.

45. The 2001 Joint Nature Conservation Committee (JNCC) SPA Review[8] (Stroud et al. 2001)[9] describes The Swale SPA as:

'The Swale is located on the south side of the outer part of the Thames Estuary in south-eastern England. The Swale is an estuarine area that separates the Isle of Sheppey from the Kent mainland. To the west it adjoins the Medway Estuary. It is a complex of brackish and freshwater, floodplain grazing marsh with ditches, and intertidal saltmarshes and mud-flats. The intertidal flats are extensive, especially in the east of the site, and support a dense invertebrate fauna. These invertebrates, together with beds of algae and Eelgrass Zostera spp., are important food sources for waterbirds. Locally there are large Mussel Mytilus edulis beds formed on harder areas of substrate. The SPA contains the largest extent of grazing marsh in Kent (although much reduced from its former extent). There is much diversity both in the salinity of the dykes (which range from fresh to strongly brackish) and in the topography of the fields. The wide diversity of coastal habitats found on the Swale combine to support important numbers of waterbirds throughout the year. In summer, the site is of importance for Marsh Harrier Circus aeruginosus, breeding waders and Mediterranean Gull Larus

[7] English Nature (1999). *The Determination of Likely Significant Effect under The Conservation (Natural Habitats &c.) Regulations 1994*. Guidance Note HRGN3.

[8] The UK SPA review was published in 2001 providing a snapshot of the SPA network. It has no legal standing and does not provide the accepted qualifying interest list for the SPA suite. However, it provides useful contextual information for the HRA. Up-to-date information on classification status and qualifying species are provided in the current Standard Data Forms available for each European Site, from the JNCC web site: http://jncc.defra.gov.uk/page-4.

[9] Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) (2001). *The UK SPA Network: its Scope and Contents*. JNCC, Peterborough.

melanocephalus. In spring and autumn migration periods, as well as during winter, the Swale supports very large numbers of geese, ducks and waders.'

46. The SPA and Ramsar Site boundaries are coincident. The Development site along its west, north and eastern boundaries partially includes the SPA/Ramsar Site (Figure 2).

47. Those parts of the European Site contained within the Development site include the following SSSI units:

- S15 M ATTWOOD CLEVE MARSH (049): part of the freshwater grazing marsh at the east end of the site adjoining the proposed AR HMA. It is classified as neutral grassland (lowland) and was last assessed by Natural England in 2009 as in favourable condition, with management appropriate to maintain the grassland in suitable condition for the wintering bird assemblage.
- CLEVE MARSH WEST (063): part of the freshwater grazing marsh at the east end of the site adjacent to the Seasalter Road. It is classified as neutral grassland (lowland) and was last assessed by Natural England in 2009 as in favourable condition, with management appropriate to maintain the grassland in suitable condition for the wintering bird assemblage.
- SOUTH SWALE REEDBED (074): part of the freshwater grazing marsh and includes the sea wall owned and managed by KWT. It is classified as mainly neutral grassland (lowland) and was last assessed by Natural England in 2009 as in favourable condition.

5.2.1 The Swale SPA Citation

48. The Citation report (1993) for the SPA (Appendix 2) highlights the following Qualifying Interest features:

- Qualification under Article 4.2 of the Birds Directive as a wetland of international importance by virtue of regularly supporting over 20,000 wintering waterfowl, with an average peak count of 57,600 birds recorded in the five winter period 1986/87 to 1990/91. The citation states that this assemblage includes 17 species present in nationally or internationally important numbers, but only names the following wintering species:
  - dark-bellied brent goose;
  - shelduck;
  - wigeon;
  - teal;
  - oystercatcher;
  - ringed plover;
  - grey plover;
  - dunlin;
  - curlew; and
  - redshank.
- Qualification under Article 4.2 of the Birds Directive by virtue of regularly supporting a diverse assemblage of breeding waterfowl of lowland wet grassland and other estuarine habitats. Named species include:
  - shelduck;
  - mallard;
  - moorhen;
  - coot;
  - lapwing;
  - redshank;
  - reed warbler; and
  - reed bunting.

- Short-eared owl is also cited as a regular wintering and occasional breeding species, which is listed on Annex 1 of the Birds Directive.

49. The JNCC 2001 SPA Review[9] also provided information regarding The Swale SPA. Although it has no legal standing, the JNCC 2001 SPA Review listed the qualifying interests as:

- Under Article 4.1, Annex 1 breeding species:
  - avocet;
  - marsh harrier; and
  - Mediterranean gull.
- Under Article 4.1, Annex 1 wintering species:
  - avocet;
  - bar-tailed godwit;
  - golden plover; and
  - hen harrier.
- Under Article 4.2, migratory species:
  - ringed plover (passage);
  - black-tailed godwit;
  - grey plover;
  - knot;
  - pintail;
  - redshank; and
  - shoveler.
- Under Article 4.2, an assemblage of 65,390 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including:
  - white-fronted goose, golden plover, bar-tailed godwit, pintail, shoveler, grey plover, knot, black-tailed godwit, redshank, avocet, cormorant, curlew, dark-bellied brent goose, shelduck, wigeon, gadwall, teal, oystercatcher, lapwing, dunlin and little grebe.

50. The current Conservation Objectives make clear that previous references to features identified in the JNCC 2001 SPA Review have been removed; however, the assemblage species listed provide a useful background as to the most important features of the SPA wintering and breeding bird assemblages.

51. The Standard Natura 2000 Data Form (update date 2015-12) provides further details of the status of the Qualifying Interest Features of the SPA and is provided in Appendix 3.

52. A further SPA review was undertaken in 2016 by JNCC[10]. The Review included assessment of the adequacy of the SPA network for relevant species and consideration of issues in relation to the inclusion of cropped habitats in SPAs. This is relevant for the Swale SPA, because the review identified the need for Natural England to assess the adequacy of the Swale SPA boundary for (amongst other species) brent goose, lapwing and golden plover. However, the findings of the 2016 Review has not yet been implemented and therefore has no legal standing. The assessment in this chapter and in the RIAA recognises that the Development site provides functionally linked land important to some of the qualifying interest species of the SPA, particularly dark-bellied brent goose, lapwing and golden plover.

[10] http://jncc.defra.gov.uk/page-7309.

5.2.2 The Swale SPA Conservation Objectives

53. The Conservation Objectives for the SPA (Appendix 4) were revised and published by Natural England on 30 June 2014, as follows:

- 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.

54. The Qualifying Features are listed as:

- non-breeding dark-bellied brent goose;
- non-breeding dunlin;
- breeding bird assemblage; and
- waterbird assemblage.

5.2.3 The Swale Ramsar Site Criteria

55. The Ramsar Wetland Information Sheet (RIS) provides details of the Ramsar Site designation (as of 2008) and is provided in Appendix 5. A number of criteria are applied to Ramsar designation to aid in the identification of wetlands of international importance. The Swale qualifies under the following criteria:

- Criterion 2: The site supports nationally scarce plants and at least seven British Red Data Book invertebrates.

- Criterion 5: Assemblages of international importance:
- Species with peak counts in winter: 78,501 waterfowl (5 year peak mean 1998/99-2002/03).

- Criterion 6: Species/populations occurring at levels of international importance.
- Qualifying Species/populations (as identified at designation):
    - Species with peak counts in spring/autumn:
        - redshank.
        - Species with peak counts in winter:
        - dark-bellied brent goose; and
        - grey plover.
        - Species identified for possible future consideration:
        - ringed plover;
        - wigeon;
        - pintail;
        - shoveler; and
        - black-tailed godwit.
- The RIS also provides details of other noteworthy fauna including a number of bird species occurring in nationally important numbers:
    - breeding Mediterranean gull, black-headed gull, little tern;
    - passage (spring/autumn) little egret, whimbrel, curlew, spotted redshank, greenshank; and

- wintering little grebe, European white-fronted goose, shelduck, teal, oystercatcher, avocet, golden plover, lapwing, knot, dunlin, ruff.

- Nationally important invertebrates:
  - *Bagous cylindrus* (a weevil), *Erioptera bivittata* (a cranefly), *Lejops vittata* (sea club-rush hoverfly), *Peocilobothris [Poecilobothrus] ducalis* (a dancefly), *Philonthus punctus* (a rove beetle), *Micronecta minutissima* (a water boatman), *Malchius [Malachius] vulneratus* (a malachite beetle), *Campsicnemus majus [magius]* (fancy-legged fly), *Elachiptera rufifrons* (a true fly), *Myopites eximia* (a true fly).

5.2.4 The Swale SPA/Ramsar HRA Species

56. Advice was sought from Natural England under the DAS during consultation in December 2016 regarding the component species of the wintering and breeding bird assemblages for consideration in the HRA. In response (January 2017, Appendix 1), Natural England stated:

"The integrity of the assemblage (for both breeding and non-breeding) is generally recognised as a product of both abundance and diversity. However, as it is impractical to list all the waterbird species and assess each one individually, it is generally recognised that some constituent species contribute more towards the integrity of the overall assemblage than others, and the assessment should therefore, focus on these.

Recognising this, and as a tool to assist with assessing the ecological impacts of any plan/project on the waterbird assemblage feature, it is useful to identify the 'main component species'. These are:

- *(i) Those present in nationally important numbers and*
- *(ii) Migratory species present in internationally important numbers (which may also be qualifying features on their own right – although this is not always the case) and*
- *(iii) Those that occur in the assemblage in numbers >2000 individuals and*
- *(iv) Named component species otherwise listed on SPA citation*"

57. Following this advice, Natural England identified 22 component species in the wintering waterbird assemblage for consideration in the HRA:

- dark-bellied brent goose;
- European white-fronted goose;
- shelduck;
- shoveler;
- wigeon;
- pintail;
- teal;
- little egret;
- oystercatcher;
- avocet;
- lapwing;
- golden plover;
- grey plover;
- curlew;
- bar-tailed godwit;
- black-tailed godwit;
- knot;
- ruff;
- sanderling;
- dunlin;
- green sandpiper; and
- greenshank.

58. In terms of qualifying breeding bird interests, the Swale SPA citation includes a number of named component species, as wells as bird species 'characteristic' of the particular SPA bird habitat, in this case, grazing marsh. Here, the advice draws on the guidelines for SSSI selection[11], directing attention to 'lowland damp grassland SSSI bird assemblage features'. The breeding bird assemblage features therefore include as named component species:

- shelduck;

[11] Drewitt, A.L., Whitehead, S. and Cohen, S. (2015). *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 17 Birds*. Joint Nature Conservation Committee, Peterborough. http://jncc.defra.gov.uk/pdf/SSSI_Chptr17_Birds2015June.pdf.

- mallard;
- moorhen;
- coot;
- lapwing;
- redshank;
- reed warbler;
- reed bunting;

59. and as other characteristic species:

- breeding ducks;
- breeding waders;
- yellow wagtail; and
- marsh harrier.

60. Further to this advice, it has been recognised that the 1993 SPA citation also names short-eared owl as an Annex 1 breeding and wintering species that is regularly supported by the habitats of the SPA.

61. Natural England advised that in relation to The Swale Ramsar designation, the assessment should consider the qualifying wintering bird species listed under Criterion 6. The list of noteworthy fauna makes up part of the assemblage and Natural England advised that, because the SPA and Ramsar were designated at the same time under the same criterion and that the Conservation Objectives for SPAs cover the management of Ramsar interests, then only one wintering bird assemblage assessment is required on the species named for the SPA. Hence the assessment for The Swale Ramsar designation considers the same 22 wintering bird species listed above for the SPA.

5.2.5 Potential Effects of the Development

62. Through the assessment and consultation process (as set out in the ES Chapter 8: Ecology and Chapter 9: Ornithology), the following potential impacts of the Development which may affect designated flora and fauna were identified:

- Noise and/or visual disturbance caused by personnel, machinery and lighting during construction and decommissioning;
- Noise and/or visual disturbance caused by maintenance activities or lighting during the operation of the solar park;
- Loss/change of habitats, which can be adverse through loss of habitats used by birds within or outside the European Site or positive through creation of enhanced conditions for wildlife through sensitive management of undeveloped areas;
- Fragmentation of habitats hindering the movement of birds and preventing access to favoured foraging or breeding grounds;
- Hydrological changes, which alter the character of habitats or the availability of water;
- Deposition of dust during construction and decommissioning affecting habitats used by birds;
- Collision of birds if they fly into the solar panels, for example if mistaking them for water, or into the perimeter fence;
- Indirect effects through changes in recreational access to areas used by birds; and
- Attraction of solar panel surfaces resulting in an ecological sink for egg-laying invertebrates associated with the Ramsar designation.

5.2.5.1 Noise and visual disturbance during construction and decommissioning

63. Noise and visual stimuli during construction and decommissioning of the Development may cause disturbance to breeding, foraging and resting/roosting birds both within the Development site and beyond its boundaries, potentially extending into the intertidal

habitats of the Swale. There will be construction/decommissioning activities in the local landscape during works, including movements of large plant vehicles (e.g., excavator, dump truck, and transport), presence of personnel and operation of one or more pilers. Lighting may be used during the construction phase but will be kept to a minimum through lighting mitigation measures set out in the Outline CEMP such as pointing lights away from the SPA and avoiding unnecessary light spill onto adjacent areas.

64. The construction period is expected to last 24 months. Phase one includes the installation of the solar panels and associated infrastructure over approximately 24 months. Phase two includes the installation of the energy storage facility and would either be undertaken during phase one, or separately, when it would last up to 6 months.

65. In the absence of mitigation to reduce the effects of noise and visual disturbance to birds, reduced foraging, resting and breeding opportunities are likely to cause negative effects as a result of decreased survival and productivity of individuals.

66. LSEs as a result of noise and visual disturbance to wintering or breeding birds during construction and decommissioning cannot therefore be discounted, with regards to the wintering and breeding bird assemblage of the European Site. Mitigation is therefore proposed to reduce the magnitude of effects as set out in the Outline SPA CNMP, Outline BBPP and Outline CEMP.

67. When the operational phase ends, the Development will require decommissioning. All solar PV array infrastructure including modules, mounting structures, cabling, inverters and transformers would be removed from the Development site and recycled or disposed of in accordance with good practice and market conditions at that time. The future of the Development substation would be discussed with network operators and agreed with the local planning authority prior to commencement of decommissioning. Decommissioning would be expected to take between 6 and 12 months. A Decommissioning Environmental Management Plan (DEMP), to include timescales and transportation methods, as well as noise management measures, will be agreed in advance with the local planning authority in consultation with appropriate stakeholders.

68. During decommissioning, noise levels are expected to be of lower magnitude than during construction and the duration is expected to be shorter. With similar embedded noise and bird protection control measures set out in a DEMP, decommissioning effects would be of a similar character to construction effects.

5.2.5.2 Noise and visual disturbance during operation

69. During the operational phase, activity on the Development site will be minimal and would be restricted principally to vegetation and livestock management, equipment/infrastructure maintenance and servicing including replacement of any components that fail, and monitoring to ensure the continued effective operation of the Development. The current baseline levels of activity are associated with the farming of arable land, comprising intermittent activity of sowing, spraying and harvesting of crops and ploughing and preparation of the soil for the next sowing. The low levels of activity and noise generated during the operational phase (mainly associated with four-wheel drive vehicles accessing operational areas for maintenance and checks) will be of lower magnitude than the arable farming baseline.

70. The potential effects of operational noise have been assessed in Chapter 12: Noise of the ES. The noise assessment states that the operational noise levels will be 8 dB below a threshold 50 dB(A) significance criteria for ecological receptors and concluded that the "*effect of operational noise on the identified ecological receptors is therefore assessed as negligible, and* ***not significant*** *in terms of the EIA Regulations.*"

71. No specific flood defence works over and above those likely to be undertaken on an ongoing basis by the Environment Agency (EA) to maintain the current standard of

protection are currently proposed. For the purposes of this assessment, the assumption is made that there will be no change in the flood defence works over and above the future baseline.

72. Operational activity will not exceed the current baseline levels of activity associated with farming the land. Other than the manned substation, there will be no continuous lighting of the Development, with lighting restricted to the security sensor lighting. Effects of operational disturbance on European Site features will be of negligible magnitude.

73. There are therefore no LSEs from noise and visual disturbance during operation, with regards to the Qualifying Interest Features of the European Site.

5.2.5.3 Loss/change of habitats

74. The Development site includes areas that comprise part of The Swale SPA/SSSI/Ramsar Site, these being (i) the flood defences, (ii) the freshwater grazing marsh and associated habitats (managed by KWT) within the strip landward of the flood defence bund, and (iii) the freshwater grazing marsh at the eastern extent of the site between the proposed AR HMA and the Seasalter Road (Figure 2).

75. No development is proposed in these areas. The flood defences have been included in the Development to permit future maintenance work and no specific flood defence works over and above those likely to be undertaken on an ongoing basis by the Environment Agency to maintain the current standard of protection are currently proposed. There are no planned flood defence works as part of the Development that would result in a loss or change of habitats within the SPA/Ramsar Site. No works or development are proposed in the strip landward of the flood defence that is owned and managed by KWT. No development is proposed in the extent of grazing marsh at the eastern extent of the site – its inclusion in the Development (FGM HMA) is for the purposes of offering enhanced management for the benefit of wildlife and the features for which the SSSI is notified (see FGM HMA Management Plan in the Outline LBMP).

76. There will therefore be no loss or change of habitat within The Swale SPA/Ramsar Site and as a result no LSEs on its qualifying interests in this regard.

77. The Development occupies land that has been identified as functionally linked to The Swale SPA/Ramsar Site; i.e. it is an area of land outside the boundary of the European Site that is used by its qualifying features. Some species forming part of the wintering waterbird assemblage, breeding/wintering short-eared owl and breeding marsh harrier (which is part of the breeding bird assemblage) regularly use the Development site.

78. Section 9.5.3 of Chapter 9: Ornithology of the ES sets out the predicted effects of the loss and change in habitats across the Development site for the breeding and wintering species associated with The Swale SPA/Ramsar Site. Table 2 provides a summary of the importance of the arable fields as functionally linked land for the 22 component winter bird species that make up the wintering waterbird assemblage of the SPA/Ramsar designation. This is presented in terms of the number of foraging birds.

Table 2: Summary of site importance for wintering SPA waterbirds

Qualifying species	**Inter-seasonal peak-mean monthly count of foraging birds**	**Importance of arable land**
Dark-bellied brent goose	849.5	High
European white-fronted goose	0	No importance
Shelduck	0	No importance
Shoveler	0	No importance

Qualifying species	Inter-seasonal peak-mean monthly count of foraging birds	Importance of arable land
Wigeon	0	No importance
Pintail	0	No importance
Teal	0	No importance; birds recorded within the arable area were in ditches between fields
Little egret	0	No importance; birds recorded within the arable area were in ditches between fields
Oystercatcher	0.21	Negligible
Avocet	0	No importance
Lapwing	307.8	High
Golden plover	158.3	High
Grey plover	1.1	Negligible
Curlew	1.9	Negligible
Bar-tailed godwit	0	No importance
Black-tailed godwit	0	No importance
Knot	0	No importance
Ruff	0.6	Negligible
Sanderling	0	No importance
Dunlin	32.1	Negligible; very occasional (two surveys) presence of flock of 2-300 birds in field at east end near sea wall
Green sandpiper	0	No importance; birds recorded within the arable area were in ditches between fields
Greenshank	0	No importance

79. The arable land within the development area is of no/negligible importance to 19 out of the 22 component wintering waterbird assemblage species. LSEs are therefore discounted for:

- European white-fronted goose;
- Shelduck;
- Shoveler;
- Wigeon;
- Pintail;
- Teal;
- Little egret;
- Oystercatcher;
- Avocet;
- Grey plover;
- Curlew;
- Bar-tailed godwit;
- Black-tailed godwit;
- Knot;
- Ruff;
- Sanderling;
- Dunlin;
- Green sandpiper; and
- Greenshank.

80. It is of high importance, providing foraging and roosting resources in functionally linked land for dark-bellied brent goose, lapwing and golden plover. The installation of the Development will result in the displacement of these three species from the fields that they would otherwise have used for foraging during the arable baseline. A LSE cannot therefore be discounted with respect to loss of functionally linked habitat for wintering:

- Dark-bellied brent goose;
- Lapwing; and
- Golden plover.

81. Baseline flight activity surveys over a 12 month period in 2015/16 demonstrated that the Development site forms an important foraging area for marsh harriers throughout the year, with birds being recorded in flight for 10.5% of survey observation time in the breeding season and 17.9% of survey observation time in the non-breeding season. This comprised an unknown number of individuals. Marsh harriers were mostly recorded hunting along the linear ditch and narrow rough grassland strips at the edges of the arable fields, with the majority of activity recorded over the coastal grazing marsh/reedbed strip that forms the KWT South Swale reserve just inland of the sea wall. The installation of the Development in the absence of mitigation has the potential to cause displacement of foraging marsh harriers. A LSE cannot therefore be discounted with respect to loss of functionally linked habitat for foraging marsh harriers.

82. The baseline flight activity surveys in 2015/16 demonstrated that the Development site, particularly the area proposed for solar panel and energy storage installation, does not form an important foraging area for short-eared owls throughout the year. A single short-eared owl was observed on one survey in January 2016 and single owls were recorded in April and July 2016. Birds were recorded in flight for 0.3% of survey observation time in the breeding season and 0.9% of survey observation time in the non-breeding season. The installation of the Development in the absence of mitigation has the potential to cause displacement of foraging short-eared owls; however, the effect is assessed as of negligible magnitude therefore there is not predicted to be a LSE with respect to loss of functionally linked habitat for foraging short-eared owls.

83. As advised by Natural England, the SPA populations of other typical grazing marsh species that are present within the area proposed for development, for example reed bunting and yellow wagtail, are not dependant on the development area for their ecological functioning, and therefore, are not functionally linked. The individuals that nest within the development area are not part of the SPA population. With the exception of marsh harrier, there are no LSEs with regards to loss of functionally linked land for species comprising the breeding bird assemblage of the SPA.

5.2.5.4 Fragmentation of habitats

84. Although the Development site is large, it will not be one continuous block of developed land and includes open areas of land managed around and between the arrays for the benefit of wildlife. Across the majority of the site, with the exception of fields inland in the south-east of the site, the minimum separation between ditch bank top and solar panels is 15 m. Because of the alignment of panels relative to the ditches, this provides open areas between the panels across the majority of the site ranging between approximately 30 and 80 m wide. In the south-east of the site, minimum separation is 5 m from ditch bank top.

85. Birds are, by their nature, highly mobile species and given the extents of interconnecting habitats, it is predicted that the Development will not cause a barrier to movement that prevents or hinders birds moving between other areas.

86. There are therefore no LSEs from fragmentation of habitats in the landscape during operation, with regards to the Qualifying Interest Features of the European Site.

5.2.5.5 Hydrological changes

87. Chapter 10: Hydrology, Hydrogeology, Flood Risk & Ground Conditions of the ES describes the assessment of the Development's potential effects on the water environment. The Development includes a number of embedded, designed-in good construction practice measures that are set out in the Outline CEMP with the specific aim of avoiding adverse

effects caused by increased sediment loading or pollution in the local hydrological environment. However, at the HRA screening stage for LSEs, such avoidance measures cannot be taken into account (case law: Sweetman/People over Wind vs Coillte). A precautionary assessment would conclude that the probability of a pollution event occurring during any phase of the Development to such an extent that it undermines the conservation objectives of The Swale SPA/Ramsar Site is negligible, even in the absence of the preventative measures. Nevertheless, there remains a remote possibility that in the absence of all best practice measures, under extreme circumstances, a catastrophic failure of fuel or concrete carrying vehicles leading to a pollution event could occur close to a drainage ditch directly connected to the European Site.

88. LSEs cannot therefore be discounted from adverse changes to surface water quality in the European Site during construction and decommissioning (in the absence of mitigation), which could have consequential effects on the bird or invertebrate communities, in the highly unlikely event that a catastrophic failure of fuel or cement carrying construction vehicles close to the drains closest to the SPA were to occur. Mitigation set out in the CEMP (Technical Appendix 10.2 of the ES) describes the good construction (and decommissioning) practice measures to be undertaken that result in no effect of hydrological impacts; these are examined further in Stage 2 of the HRA. No other construction/decommissioning effects on the hydrological environment are considered likely to cause a significant effect on the European Site.

89. In the long-term, during operation of the Development, there will be a substantive reduction in the application of herbicides, pesticides and fertiliser below the current baseline use for arable farming practice at the site. The ecological and hydrological assessments predict a net positive effect on local habitats as a result. There are therefore no LSEs from changes in surface water quality in the landscape during operation, with regards to the wintering and breeding bird assemblage of the SPA/Ramsar Site, or with regards to the notable invertebrate community of the Ramsar Site.

90. The Development includes grazing marsh within designated land (SSSI/SPA/Ramsar) at the east end of the site and management measures are being developed with Natural England to provide further enhancement to this area for the benefit of qualifying species associated with the designations. These measures are likely to include modifications to the hydrology of the area, locally increasing the height of the water table. However, the inclusion and modified management of this area in the Development are not designed to provide specific mitigation or compensatory measures for potential effects caused by the Development. Although effects of the modified management of the area are designed to be positive, they are excluded from the HRA, because the current objectives for the area to be in favourable condition should be assumed to be successfully delivered in the future baseline scenario.

5.2.5.6 Deposition of dust

91. Fugitive dust emissions and track-out dust during construction and decommissioning have the potential to affect ecological receptors. Chapter 16: Air Quality of the ES provides an assessment of the potential effects of the impacts of dust emissions and track-out dust. The assessment concluded that there was a low risk of dust soiling to ecological receptors as a result of the earthworks and track-out and a negligible risk from the construction works (building of substation, control building, battery storage units, transformers and solar panel installation). Decommissioning effects were assessed to be similar in nature and no greater than those predicted for the construction phase.

92. LSEs cannot therefore be discounted as a result of adverse changes to habitats from dust soiling in the European Site during construction and decommissioning (in the absence of mitigation), which could have consequential effects on the bird or invertebrate communities. Mitigation set out in the Outline CEMP describes the good-practice measures

to be adopted during construction (with similar measures applicable during decommissioning) to control the generation and dispersion of dust such that significant impacts on neighbouring habitats will not occur; these are examined further in Stage 2 of the HRA.

5.2.5.7 Collision (birds)

93. Natural England has published a review of the impacts of solar farms on birds, bats and general ecology[12]. The review concluded that there is no scientific evidence of collision risk associated with solar PV arrays and the risk of collision with solar panels is likely to be very low but not impossible, although there could be risk associated with overhead power lines. At the Development, all electrical cabling will either be above ground fixed to the mounting structures of the solar panels, or undergrounded. The existing 11 kV overhead line crossing the south of the Development site from Nagden in a straight line westwards towards Cleve Farm with a short spur south to Warm House, will be undergrounded, reducing the collision risk to birds below that of the baseline (for example, a dead mute swan was found under this existing overhead line during the baseline surveys in winter 2017/18).

94. In the absence of any evidence to indicate that there is a significant risk of collision of birds with the solar panels, the RIAA concludes that there are no LSEs associated with collision on the wintering or breeding bird assemblages of the European Site.

95. A security fence will be installed surrounding the solar panel arrays, which in parts along the north, west and south-west boundaries of the Development site, will be set back 15 m from the SPA boundary and located 5 m away from the edge of the solar panel arrays. Waterbirds associated with the wintering bird assemblage are highly unlikely to interact with the fence in these areas as they would not be attracted to the land close to the solar panels. There is potential for birds associated with the breeding assemblage to interact with the fence as they would be attracted to the enhanced foraging conditions provided by the grassland habitat enhancements between and around the solar panel arrays. Collision risk as a result of deer fences has been highlighted as a potential threat to grouse populations in woodland habitats. However, collision risk for birds in agricultural habitats has not been documented as a significant risk to populations. Some species make use of fences and fence posts as song posts (passerine species) and perches (some raptors, such as kestrel, merlin and marsh harrier). Furthermore, fencing already exists to some extent in the local landscape around the Development site, including within the SPA boundary.

96. In the absence of any evidence to indicate that there is a significant risk of collision of birds with the perimeter fence, the RIAA concludes that there are no LSEs associated with collision on the wintering or breeding bird assemblages of the European Site.

5.2.5.8 Disturbance through changes in recreational access

97. One new permissive footpath is proposed during the operational phase to provide additional public access to the Development site over and above the existing public rights of way.

98. In the east of the Development site, a new permissive footpath will extend from the sea wall, running south to the substation and then south-east to join the existing public footpath to Seasalter Road. This creates a circular walking route from the Sportsman immediately to the east of the Development site. The new part of the route travels along an existing farm access track and the edges of fields within which solar panels will be located. There is no line of sight between the new route and the SPA that would cause any increase in disturbance to birds within the SPA or within functionally linked habitats.

[12] Natural England (2017). *Evidence review of the impact of solar farms on birds, bats and general ecology (NEER012).*

99. There is not expected to be any notable change in the recreational footfall on the footpaths within and adjacent to the European Site. The effects of these changes in recreational access may be positive in that they potentially reduce the disturbance to birds in the intertidal habitats. However, the effect is not likely to improve significantly the conservation status of the populations. There are therefore no LSEs from changes in recreational access during operation, with regards to the wintering and breeding bird assemblage of the European Site.

5.2.5.9 Attraction of egg-laying invertebrates

100. Natural England highlighted in their initial advice (January 2017) that research has demonstrated that insects that lay their eggs in water may mistake solar panels for water bodies and try and lay their eggs on them, which can affect their reproductive biology.

101. The Swale Ramsar Information Sheet cites ten nationally important invertebrate species occurring at the Swale Ramsar Site:

- *Bagous cylindrus* (a weevil);
- *Erioptera bivittata* (a cranefly);
- *Lejops vittata* (sea club-rush hoverfly);
- *Peocilobothris [Poecilobothrus] ducalis* (a dancefly);
- *Philonthus punctus* (a rove beetle);
- *Micronecta minutissima* (a water boatman);
- *Malchius [Malachius] vulneratus* (a malachite beetle);
- *Campsicnemus majus [magius]* (fancy-legged fly);
- *Elachiptera rufifrons* (a true fly); and
- *Myopites eximia* (a true fly).

102. With the exception of the Dolichopodidae and Corixidae species, all of the species cited are either saltmarsh specialists or associated with flowering plants (galls) or emergent vegetation (leaf minors). So they are either not likely to be affected by solar panels or are exclusively found outside the Development site.

103. For the Dolichopodidae and Corixidae species:

- The majority of the ditch habitats that the Corixidae and Dolichopodidae species are likely to be found in are separated from the solar panel areas by a distance of least 15 m;
- The ditch habitats/marshland/saltmarsh/pools/mudflats within the Ramsar Wetland designation are the main focus for invertebrates, so those species mentioned are less likely to be impacted by solar panels and more likely to be outside of the study area;
- Invertebrates are unlikely to fly at heights where the solar panels are; and
- Wind-blown invertebrates are unlikely to be blown onto the panels due to the sheltering effects of the ditches and the panels themselves.

104. During the operational phase, there is expected to be an improvement in invertebrate habitats (mainly due to the reduction in the use of pesticides) and there is the potential that egg laying aquatic invertebrates may lay eggs on the solar panels they mistake for aquatic habitat, which can lead to a reduction in recruitment. However, the majority of the solar panels will be positioned at least 15 m away from riparian habitats, which is separated from where aquatic or marginal invertebrate species emerge, mate and typically oviposit, whilst the base of the panels themselves will be raised above ground level (circa 1.2 m to 3.9 m above ground level – detailed in ES Chapter 5: Development Description). This is above the typical flight height of many egg laying invertebrates. The effects of invertebrates being blown away from egg laying habitat by the wind towards the solar panels, is likely to be reduced by the sheltering effects of the ditches and the solar panels. It is therefore unlikely that egg laying invertebrates will lay their eggs on the solar panels. There are therefore no LSEs from changes to the reproductive biology of invertebrates,

with regards to the nationally important invertebrate species which occur within the European Site.

5.2.6 Summary of Likely Significant Effects

105. Table 3 provides a summary of the LSEs on The Swale SPA/Ramsar Site that are screened in and out of the HRA.

106. Potential effects on all other European Sites are screened out of the HRA.

Table 3: Summary of screening for Likely Significant Effects on The Swale SPA/Ramsar Site

Impact	Development Phase	LSE?	Feature
Noise/visual disturbance	C, D	Yes	Breeding and wintering bird assemblages
Noise/visual disturbance	O	No	-
Loss/change in habitats	C, O	Yes	Breeding marsh harrier Wintering dark-bellied brent goose, lapwing and golden plover
Habitat fragmentation	C, O	No	-
Hydrological changes	C, D	Yes	Breeding and wintering bird assemblages Ramsar invertebrate community
Hydrological changes	O	No	-
Dust emission	C, D	Yes	Breeding and wintering bird assemblages Ramsar invertebrate community
Collision	O	No	-
Recreational access changes	O	No	-
Invertebrate attraction	O	No	-

C = Construction

D = Decommissioning

O = Operation

6 HRA STAGE 2

107. As LSEs on The Swale SPA/Ramsar Site have been identified in the absence of mitigation, Stage 2 of the HRA process applies. This provides a 'shadow' Appropriate Assessment of the effects summarised in Table 3, concluding how the Development could affect the Conservation Objectives of the European Site with respect to that effect.

108. An assessment of the effects of the Development on The Swale SPA/Ramsar Site is then carried out in-combination with other plans or projects to determine whether or not the integrity of the European Site will be adversely affected.

6.1 Potential Adverse Effects

6.1.1 Noise/Visual Disturbance

109. The potential for LSEs of noise and visual disturbance to birds has been identified for the construction and decommissioning phases of the Development.

110. Noise and visual stimuli during construction and decommissioning of the Development may cause disturbance to breeding, foraging and resting/roosting birds both within the Development site and beyond its boundaries, such as in the adjacent freshwater grazing marsh/reedbeds and intertidal habitats of the Swale. There will be construction/decommissioning activities in the local landscape during works, including movements of large plant vehicles (e.g., excavator, dump truck, and transport), presence of personnel and operation of one or more pilers.

111. The assessment in Chapter 9: Ornithology of the ES identifies four areas within or around the Development site in which noise and visual disturbance would have effects. The sensitivity of the different areas varies depending on the season during which the construction activity affects it. These are:

- Intertidal habitat within the SPA/Ramsar Site: non-breeding season;
- Grazing marsh and reedbed habitat within the SPA/Ramsar Site to the north and west of the solar panel development area in the coastal strip landward of the sea wall: breeding season;
- Grazing marsh within the SPA/Ramsar Site to the east of the solar panel development area and AR HMA: breeding and non-breeding season;
- Arable land within the solar panel development area: breeding and non-breeding season.

112. Chapter 12: Noise of the ES provides details of the noise emitting activities during construction in relation to the surrounding ecological receptors. Construction activities will vary as the site is developed, however the main activities are anticipated to be as follows:

- Site Preparation – including hardstanding and track construction;
- Installation of PV panel framework;
- Installation of PV panels;
- Installation of electrical compound equipment including substation and energy storage; and
- Ongoing traffic over access road.

113. The assessment of active piling operations has been undertaken based on predicted L_{Amax} levels, while all other construction activities are based on predicted L_{Aeq} levels. Active piling has been assessed based on a L_{Amax} as this activity will result in repeated impulsive high noise levels. Active piling has the potential to be intermittent, therefore it is considered appropriate to use L_{Amax} as a worst case. Other construction activities (e.g. engine noise, manoeuvring plant) will not emit impulsive, intermittent noise, and as such have been assessed as L_{Aeq} levels.

114. There are no specific criteria or thresholds for the assessment of noise (and visual) disturbance on ecological receptors. Dooling and Popper (2016)[13] provide a comprehensive literature review of the effects of traffic noise and road construction noise on birds. The key findings of this review are that the effects of traffic and construction noise may be insignificant when the noise adds little to the ambient background level, but has the potential to produce significant short- and long-term behavioural and physiological changes in birds when adding significantly to the natural ambient noise. Such impacts may include

[13] Dooling, R.J. & Popper, A.N. (2016). *Technical Guidance for Assessment and Mitigation of the Effects of Highway and Road Construction Noise on Birds*. California Department of Transportation Division of Environmental Analysis, Sacramento, California.

changes in foraging location and behaviour; interference in communication; failure to recognize other important biological signals, such as sounds of predators and/or prey; decreasing hearing sensitivity temporarily or permanently; and/or increasing stress and altering steroid hormone levels. These impacts have the potential to cause effects on populations through reduced survival or productivity.

115. The review culminates in guidance regarding the types of impacts on birds and the noise thresholds at which they occur. Four categories of noise effect (with increasing distance from source) were identified:

- Zone 1: Hearing damage & PTS (permanent threshold shift) – permanent hearing loss);
- Zone 2: TTS (temporary threshold shift) - temporary hearing loss which recovers over a period of minutes to days after exposure;
- Zone 3: Masking of communication signals which may also result in other behavioural and/or physiological effects; and
- Zone 4: Potential behavioural/physical response – communication is no longer masked but faintly heard sounds intruding above others may still lead to alertness and, thus, lead to other behavioural and/or physiological effects.

116. Beyond Zone 4, noise at all frequencies is completely inaudible, falling below the level of the ambient noise) and there is no effect.

117. Dooling and Popper report that previous guidelines recommended a level of 60 dBA for continuous noise (such as from traffic), but recent research demonstrated considerable variation in sensitivity between species by as much as 10 dB. They proposed updated interim guidelines as shown in Table 4.

Table 4: Guidelines for potential effects of noise from different noise sources (from Dooling & Popper (2016))[13]

Noise Source Type	Hearing Damage	TTS	Masking	Potential Behavioural Physiological Effects
Single impulse (e.g., starter's pistol 6" from the ear)	140 dBA (1)	NA (3)	NA (5)	Any audible component of traffic and construction noise has the potential of causing behavioural and/or physiological effects independent of any direct effects on the auditory system of PTS, TTS or masking
Multiple impulse (e.g., jack hammer, pile driver)	125 dBA (1)	NA (3)	Ambient dBA (6)	
Non-strike continuous (e.g., construction noise)	None (2)	93 dBA (4)	Ambient dBA (6)	
Traffic and construction	None (2)	93 dBA (4)	Ambient dBA (6)	
Alarms (97 dB/100 ft)	None (2)	NA (2)	NA (7)	

TTS = temporary threshold shift

dBA = A-weighted decibel

PTS = permanent threshold shift

(1) Estimates based on bird data from Hashino et al. (1988) and other impulse noise exposure studies in small mammals

(2) Noise levels from these sources do not reach levels capable of causing auditory damage and/or permanent threshold shift based on empirical data on hearing loss in birds from the laboratory.

(3) No data available on TTS in birds caused by impulsive sounds.

(4) Estimates based on study of TTS by continuous noise in the budgerigar and similar studies in small mammals.

(5) Cannot have masking to a single impulse.

(6) Conservative estimate based on addition of two uncorrelated noises. Above ambient noise levels, critical ration data from 14 bird species, well-documented short-term behavioural adaptation strategies and a background of ambient noise typical of a quiet suburban area would suggest noise guidelines in the range of 50-60 dBA.

(7) Alarms are non-continuous and, therefore, unlikely to cause masking effects.

118. Clearly, permanent or temporary damage to birds' hearing must be avoided during the construction of the Development. The guidance described above suggests that this would be above a threshold of 110 dBA (Lmax). Such levels will not be exceeded within the SPA boundary.

119. In considering appropriate thresholds of noise at the SPA from the Development, it is known that the ambient noise level is relatively low as it is in a rural setting away from human habitation. The threshold at which 'disturbance' might occur, whereby there is a behavioural change in birds that could affect their feeding or incubating, or cause them to move away is difficult to determine. A study in the US investigated the effects of noise on owls and murrelets, culminating in guidance issued by the US Fish and Wildlife Service (AFWO, 2006)[14]. The purpose of the FWS guidance was to promote consistent and reasonable determinations of potential effects on either species that could result from elevated human-generated sounds or human activities in close proximity to nests during the breeding season. This guidance defined a level of disturbance termed 'harassment' which results in flushing of birds from the nest or abandonment or delaying of feeding and provisioning young. Such behaviours were interpreted to occur when noise levels at the bird exceeded ambient conditions by 20-25 dB or when visual activity of humans was within 40 m of the nest. Whilst lower noise levels and human activity further away were deemed to also cause altered behaviours, these did not result in behaviour defined as 'harassment'. Based on a low ambient noise level of around 40 dB at the Development site, noise levels causing harassment would be at 60-65 dBA (Lmax). However, recognising that this was highly precautionary, more recent interpretation of this study by the US Nuclear Regulatory Commission (2012)[15] identifies other categories of behaviour and detectability of noise. These are interpreted as (for 40 dB ambient level and assumed to be LMAX values at the receptor):

- 92 dB – threshold below which flushing and visible disturbance unlikely to occur;
- 70 dB – threshold above which behavioural defence likely, such as hiding, moving body or postponing feeding;
- 57 dB – arbitrary threshold for 'alertness' between detectability and behavioural-change thresholds; and
- 44 dB – threshold for detectability.

[14] AFWO (2006). *Estimating the effects of auditory and visual disturbance to northern spotted owls and marbled murrelets in Northwestern California*. U. S. Fish and Wildlife Service, Arcata, California.

[15] https://www.nrc.gov/docs/ML1225/ML12250A723.pdf

120. Other sources of guidance are available from the UK; the assessment in Chapter 9: Ornithology of the ES draws upon the evidence gathered by the Institute of Estuarine and Coastal Studies (IECS)[16] culminating in a 'Waterbird Disturbance Mitigation Toolkit'[17]. This provides a guide to noise thresholds for different categories of noise type and level received by wintering birds in intertidal habitats. These are repeated here for reference.

121. The IECS Toolkit described the types of disturbance effect and the sensitivity of different receptor species, emphasising that there will be local differences as a result of the background environment and habituation. As a general guide (a "rule of thumb"), noise and visual stimuli are classified into three categories:

- *"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.*

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

[17] Cutts, N., Hemingway, K. and Spencer, J. (2013). *Waterbird Disturbance Mitigation Toolkit: Informing Estuarine Planning & Construction Projects.* Produced by the Institute of Estuarine & Coastal Studies (IECS) University of Hull.

- *Moderate level works where the birds are over 300m away (before start up). Potential for further slight range reduction with habituation (c. 250m)"*

122. On the basis of the IECS studies, in the PEIR, a noise threshold of 70 dB L_{Aeq} was assessed as a suitable threshold for significant effects on ecological designations. However, in response to the PEIR, Natural England suggested that a noise threshold of 70 dB L_{Aeq} (at the bird receptor location) is too simplistic and recommended that such a value is not used as a generic threshold for noise levels which could result in moderate to high disturbance of birds.

123. As an alternative, Natural England advised that an assessment of the change in noise levels should be used instead, suggesting that a change in 3 dB of similar noise types would be unlikely to be significant (on the basis that such change is not perceptible to the human ear, although it is known that the auditory threshold for birds is lower than that for humans (Dooling & Popper, 2016)[13] – humans hear sound at twice the distance that birds would hear the same sound).

124. A change of +3 dB or less above background noise levels during construction is defined by detectability, rather than potential impact, therefore the assessment in Chapter 9: Ornithology of the ES applies a precautionary threshold noise level against which to assess the effects of disturbance and to devise a suitable construction plan that minimises the effects of noise on birds associated with The Swale SPA/Ramsar Site. In the PEIR a threshold of 70 dB L_{Aeq} was used to determine whether or not there would be a significant effect on birds. Since PEIR, this approach has been amended; instead, a lower threshold of 55 dB L_{Amax} has been set as a level below which it is considered that birds would not be disturbed at all in intertidal habitats. This is considered to be precautionary, as it is 5 dB below the 60 dBA (assumed to be Lmax) threshold for continuous, repetitive noise recommended in the IECS Toolkit for 'low level disturbance stimuli'[18]. In intertidal habitats, noise and visual disturbance to birds on the mudflats would be also screened by the sea wall, although construction activity might still be visible to birds in flight. Low level noise effects are those classified in the IECS Toolkit as '*…that which is unlikely to cause response in birds using a fronting intertidal area*.'

125. Between levels of 55 dB L_{Amax} and 70dB L_{Amax}, birds in intertidal habitats would be expected to become alert and possibly reduce feeding efficiency but not move away (i.e. moderate disturbance effects), such that it is unlikely to result in detrimental effects that reduce their ability to survive or reproduce and would not affect their distribution. Arcus Consultancy Services undertook an assessment of the impact of piling noise at Arna Wood Solar Farm near Morecambe Bay SPA and subsequently carried out monitoring of bird behaviour during the piling activity[19]. The recommendation was to maintain noise levels in the SPA below 70 dB L_{Aeq} (by operating a single piler in areas close to the SPA and using acoustic screening in the most proximal areas within 90 m of the SPA) and to avoid sudden irregular noise above 50 dB L_{Aeq}. The bird monitoring concluded that there were no bird disturbance events that could be attributed to the construction activity. Therefore in practice, only those areas of the intertidal habitat receiving in excess of 70 dB are considered likely to be disturbed by noise. Unlike the Arna Wood assessment, the threshold for the assessment of the CHSP Development is L_{max} rather than L_{eq} and is therefore considered to be precautionary.

126. For breeding birds, on the basis of the research described above, a suitable threshold noise level in the SPA during construction is considered to be 65 dB (L_{Amax}), below which birds

[18] More specifically, the threshold for moderate disturbance stimuli for repetitive, continuous noise is 60-72 dB (at the bird), so it is assumed that noise below that threshold for repetitive/continuous sources (typically measured in dB L_{Aeq}) is in the low disturbance category.

[19] Arcus Consultancy Services (2017a). *Arna Wood Solar Farm Piling Noise Investigation*. Report to Canadian Solar, February 2017.
Arcus Consultancy Services (2017b). *Arna Wood Solar Farm Wintering Bird Mitigation Report*. Report to Canadian Solar.

are not expected to react in a way that interrupts communication, feeding, incubating or provisioning of young. Furthermore, the noise reaching the coastal strip of grazing marsh/reedbed will not be continuous in any one location for long durations within the breeding season; any one part of the SPA will be subject to noise emissions approaching the threshold only for a few days.

127. The noise assessment (Chapter 12) demonstrates that, applying worst-case predictions, the predicted noise levels at the closest part of the SPA boundary could exceed 65 dB (L_{Amax}) during activities such as hardstanding construction, the manoeuvring of piling equipment, active piling, and the installation of the PV panels during periods when the activity comes closest to the SPA boundary. Noise from the haul road would also exceed this threshold during construction/decommissioning where the haul road is closest to the SPA near to the existing site entrance off Seasalter Road.

128. The installation of the perimeter fence located within 15 m of the SPA boundary will involve the sequential installation of fence posts along the boundary. The noise and visual disturbance generated from installation of the fence (e.g. a team of two workers using percussive or vibratory piler) will be relatively quiet (hammer piling of wooden posts) and very localised at any one time, therefore potential disturbance events at any one location will be very short-term; it is estimated that 350-400 m of fence would be erected each day. Such localised disturbance will not exceed the baseline disturbance that occurs due to the operation of machinery during the baseline farming practices, which comprises several tractor/harvester and associated vehicles movements for sowing in autumn or spring, spraying during crop growth, harvesting in summer/autumn and ploughing and soil preparation between autumn and spring. Due to its temporary, localised impact, the installation of the fence is not expected to cause significant disturbance to breeding or non-breeding birds and is therefore not considered in further detail in this assessment.

6.1.1.1 Intertidal habitats: non-breeding season

129. Figure 3 shows indicative noise contours for a location at the most northerly edge of the solar panel development area closest to the intertidal area of the SPA/Ramsar Site including:

- Piling Noise:
  - 55 dB L_{Amax};
  - 70 dB L_{Amax};
- Other Construction Noise:
  - 55 dB L_{Aeq}; and
  - 70 dB L_{Aeq}.

130. The noise contours shown in Figure 3 show that the noise level received by birds in intertidal habitats will not exceed 70 dB L_{Amax} or 70 dB L_{Aeq} and therefore flight responses by birds are considered unlikely to occur – i.e., the moderate/high level disturbance effects do not occur. Prior to the commencement of construction, the SPA CNMP will be updated to confirm that this is still the case.

131. Birds in intertidal habitats in a wider area up to 320 m from the noise source could receive noise levels above 55 dB L_{Amax} for some of the time when piling activity takes place within the fields closest to MHWS. These comprise parts of Fields A, B, C, D, E, F, H, I, K, L, M and R. The L_{Amax} levels are generated by a single active piler with acoustic screening mitigation as described in Chapter 12: Noise of the ES. The screening effect of the sea wall has also been taken into account.

132. During other construction activity, an area of up to 150 m from the noise source could receive noise levels above 55 dB L_{Aeq}. The L_{Aeq} levels are generated by manoeuvring plant and other construction activities as described in Chapter 12: Noise of the ES.

133. In order to minimise the noise exceeding 55 dB L_{Amax} reaching the SPA from the piling rig, the embedded mitigation will apply in all areas where it is demonstrated in the Outline SPA CNMP that piling noise has the (unmitigated) potential to exceed 55 dB beyond Mean High Water Springs (MHWS).

134. When construction piling occurs during the winter which could result in noise levels in excess of 55 dB L_{Amax} being received beyond MHWS, only a small area of the intertidal habitats of the Swale SPA/Ramsar Site will be affected at any one time. It is proposed to minimise the noise emission of the construction activity by only actively piling using a single piling rig (in areas with the greatest potential for 55 dB L_{Amax} being exceeded within the intertidal zone) and to include acoustic screening around the piler (as set out in the Outline SPA CNMP). The resulting intertidal area receiving >55 dB L_{Amax} noise level is approximately 10.6 ha at the point when the piling occurs at its closest location to MHWS (approximately 80 m). Based on the worst case location closest to MHWS, 10.6 ha of intertidal habitat represents 0.16% of the area within The Swale SPA/Ramsar Site or 0.42% of the estuarine mudflats in The Swale. For the majority of the time, the piler will be operating further away from MHWS than this minimum distance of 80 m and consequently the intertidal area affected by noise will become smaller with increasing distance from MHWS. In areas increasingly further from MHWS, consideration will be given to increasing the number of piling rigs able to operate simultaneously in order to reduce the amount of time that noise from piling is occurring in the area. In any case, the piling schedule will be designed to ensure that noise levels will not exceed the 70 dB noise threshold at MHWS.

135. As explained above, the proportions of the intertidal area affected by noise will only occur temporarily when piling operations take place near MHWS (i.e., for a proportion of the time in each field shown in Table 5).

136. The IECS Toolkit predicts that there would be 'moderate to low' effects on wintering waterbirds in intertidal habitats experiencing between 50-70 dB L_{Amax} levels of noise emitted from construction piling. This category of effect is one in which birds would not move away and are likely to become habituated to the regular noise. Birds within the area of 10.6 ha within the 55 dB L_{Amax} contour shown on Figure 3 have the potential to experience noise levels of between 55 dB and 65 dB under a worst case scenario of construction activities occurring closest to the MHWS which could result in moderate to low effects on wintering waterbirds in this area, i.e., the birds would not be expected to move away and would be expected to habituate to the noise.

137. The mitigation proposed below to protect breeding birds within the SPA/Ramsar Site means that construction in Fields A, B, C, D, E, F, G, H and I will be restricted outside the breeding season (i.e., September to February inclusive). Construction within Fields A, B, C, D, E, F, H, I, K, L, M and R is expected to take approximately 43 weeks (Table 5). As there is a maximum of 25 weeks within the period outside the breeding season, the disturbance would occur during all of one winter season and part of a second, or parts of two winter seasons.

138. The scheduling of construction is planned such that each field, or block of solar panel arrays would be installed sequentially. Within the approximately 43 weeks that construction in Fields A, B, C, D, E, F, H, I, K, L, M and R takes place, only a proportion of the time taken to install panels in each field will result in noise levels exceeding 55 dB L_{Amax} in intertidal habitat.

Table 5: Estimated construction duration in fields causing > 55 dB L_{Amax} noise levels received in intertidal areas

Field/ Block	Estimated construction duration (weeks)
A	4
B	5
C	6
D	4
E	3
F	4
G	3
H	3
I	3
K	3
L	With K
M	5
R	With M

139. Castle Coote is part of the SPA adjoining the north of the Development site and is an important roosting area for wintering birds. The updated noise assessment provided in the SPA CNMP demonstrated that the roosting birds at Castle Coote could experience noise levels exceeding 55 dB L_{Amax} during construction in areas close to the sea wall near Castle Coote. In order to reduce the likelihood of disturbance to roosting birds during the mid-winter period when individual birds' energetic resources may be more critical, set-back distances will be implemented for specific construction activities to avoid the Castle Coote roost receiving noise levels above 55 dB L_{Amax} during the core winter period between 1 November – 28 February (as well as during periods of two or more consecutive days in October or March of temperatures below 0°C). The construction restriction zone around Castle Coote and full details of the implementation of the set-back distance and timing are set out in the SPA CNMP.

140. The majority of the intertidal habitat fronting the Development site would remain largely undisturbed by construction noise at any one time and would also be visually screened by the sea wall. Given the precautionary criteria for noise disturbance affecting birds in the intertidal habitats in the SPA/Ramsar Site adjacent to the Development site, the intermittent and temporary nature of its occurrence and the very small proportion of the SPA being affected at any one time, it is concluded that assuming implementation of the embedded and applied noise mitigation measures, the conservation objectives would not be undermined with respect to construction disturbance to intertidal habitat:

- The extent and distribution of the habitats of the qualifying features remain unaffected by construction disturbance;
- The structure and function of the habitats of the qualifying features remain unaffected by construction disturbance;
- The supporting processes on which the habitats of the qualifying features rely remain unaffected by construction disturbance;
- The population of each of the qualifying features will be maintained because there would be no material decline in survival or productivity; and

- The distribution of the qualifying features within the site would be negligibly affected by construction disturbance.

141. Subject to the embedded noise mitigation measures, there would therefore be no long-term adverse effects on the integrity of The Swale SPA/Ramsar Site from construction disturbance.

142. During decommissioning, noise levels are expected to be of lower magnitude than during construction and the duration is expected to be shorter. It is therefore concluded that with similar noise control measures set out in a decommissioning plan, decommissioning disturbance with respect to the intertidal habitats would not have an adverse effect on the integrity of The Swale SPA/Ramsar Site.

6.1.1.2 Grazing marsh/reedbed (north/west): breeding season

143. The Swale SPA/Ramsar site includes the parts of the KWT nature reserve on the landward side of the sea wall embankment adjacent to the solar PV development area. The baseline surveys have demonstrated that this area does not provide frequent or important resources for the 22 wintering waterbird qualifying interest species (Count Sectors 10 to 17 and 37 during baseline surveys, counts summarised in Table 6); however, it provides breeding habitat for a number of species that are important components of the breeding assemblage (see paragraph 58), such as mallard, moorhen, sedge warbler, reed warbler, yellow wagtail and reed bunting, as well as marsh harrier.

Table 6: Summary of wintering waterbird counts in SPA coastal grazing marsh/reedbed strip between development area and sea wall

Species	Inter-seasonal monthly peak-mean
Dark-bellied brent goose European white-fronted goose Shelduck Shoveler Wigeon Pintail Avocet Bar-tailed godwit Black-tailed godwit Knot Ruff Sanderling Green sandpiper Greenshank	No records in coastal strip grazing marsh count sectors
Teal Little egret Oystercatcher Lapwing Golden plover Grey plover Curlew Dunlin	Less than 1.0 birds

144. For the passerine species that nest in reedbeds, the distance over which disturbance might cause an effect is likely to be small, with visual disturbance having little influence because there is no direct line of sight. However, other species such as marsh harriers may be

highly sensitive to disturbance. A review carried out for Scottish Natural Heritage (SNH)[20] provided expert opinion and literature review of disturbance distances for selected species of bird. This indicated that the disturbance distance within which effects could occur on marsh harrier was between 300-500 m.

145. Without mitigation to avoid noise-related disturbance to this area, breeding birds could be subject to noise and visual disturbance at a level that has the potential to cause disturbance at nest sites, from behavioural stress resulting in lower provisioning rates, to the most extreme result being the abandonment of nesting attempts.

146. There are no specific criteria or thresholds for the assessment of noise on ecological receptors, such as breeding birds. BS 5228[21] advises that noise levels generated by construction activities are deemed to be significant for humans if the L_{Aeq},period level of construction noise exceeds lower threshold values of 65 dB(A) during daytime. As described above in relation to the reactions of wintering birds, continuous levels of 65 dB(A) are considered to be in the range that cause moderate disturbance. The acceptable threshold level to avoid disturbance to breeding birds should therefore be below this level. It is unclear whether this is L_{Aeq} or L_{Amax} therefore the precautionary approach is taken in this assessment and the threshold is set in L_{Amax}. This ensures that sudden or intermittent loud noises at a level that might cause disturbance or harm to birds is completely avoided. Based on the information provided by Dooling & Popper (2016), the USFWS and in the IECS Toolkit (paragraphs 114 to 126), for the purposes of this assessment and in consideration of the sensitivity of the receptor, a value of 65 dB L_{Amax} is set as a threshold below which it is not predicted that there would be behavioural responses by breeding birds to a degree that results in decreased survival or productivity.

147. Figure 4 shows indicative noise contours for a location at the most northerly edge of the solar PV development area closest to the SPA/Ramsar Site boundary including:

- Piling Noise:
  - 65 dB L_{Amax}.
- Other Construction Noise:
  - 65 dB L_{Aeq}.

148. The noise contours shown in Figure 4 show that the noise level received by birds in the SPA could exceed 65 dB L_{Amax} / L_{Aeq} and therefore there is potential for moderate/high level disturbance effects to occur.

149. Construction noise exceeding 65 dB L_{Amax} / L_{Aeq} at the SPA boundary will be avoided during the bird breeding season, defined as 1 March to 31 August inclusive. This could exclude movement of heavy plant and installation of the piles in the areas of fields adjacent to the SPA boundary during the breeding season. Aside from avoiding disturbance to birds forming the SPA breeding assemblage populations, such mitigation is required as good practice to avoid disturbance to breeding birds listed on Schedule 1 of the Wildlife and Countryside Act (1981, as amended), including Cetti's warbler, bearded tit and possibly marsh harrier, if this species chooses to nest there during the construction phase.

150. With the restriction of activities which could exceed the 65 dB L_{Amax} / L_{Aeq} construction noise thresholds during the breeding season, as set out in the Outline SPA CNMP, there will be no adverse effect on breeding bird species in the coastal strip landward of the sea wall that are associated with The Swale SPA/Ramsar Site. A similar plan for decommissioning would be drawn up prior to its commencement. As there is no adverse

[20] Ruddock, M. and Whitfield, D.P. (2007). *A Review of Disturbance Distances in Selected Bird Species*. Report from Natural Research (Projects) Ltd to Scottish Natural Heritage.

[21] *British Standards 5228: Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*.

effect of construction/decommissioning disturbance on breeding birds in this part of the SPA, none of the conservation objectives of the SPA would be undermined in this respect.

151. It is concluded that construction/decommissioning disturbance with respect to this habitat would not have an adverse effect on the integrity of The Swale SPA/Ramsar Site.

6.1.1.3 Grazing marsh (east): breeding and non-breeding season

152. The grazing marsh at the east end of the site that is within the SSSI/SPA/Ramsar site (and included in the Development as the FGM HMA) is adjacent to the site access road and there is potential for disturbance to breeding and non-breeding (e.g., foraging) birds using the grazing marsh from the movement of construction vehicles entering and exiting the Development site. As with the effects of installation works, the distance over which effects might occur will vary between species and between different times of the year and life-cycle of the birds.

153. There will be an increase in noise levels received in the SPA/Ramsar site near the access road as a result. Noise levels exceeding 65 dB L_{Amax} will occur up to 55 m into the SPA grazing marsh habitat at this location; noise levels exceeding 70 dB L_{Amax} will occur up to 35 m into the SPA.

154. In terms of disturbance to wintering birds, this area was not found to be an important resource for any species. Lapwing, golden plover and curlew were recorded in the two fields comprising the zone within 55 m of the haul road. The mean count of curlew during the baseline surveys was less than one bird in each field, whilst mean counts of lapwing and golden plover were less than five birds in each field, these values being driven by infrequent observation of larger numbers in those fields. These two fields extend up to 190 – 400 m from the access road, so as a proportion of the field affected by noise up to the defined thresholds, it is clear that very few birds will be affected, or that the majority of each of those fields will be beyond the threshold zone of likely disturbance. The breeding bird survey did not identify this area as important for breeding birds that form the SPA assemblage.

155. There is not predicted to be disturbance effects resulting in any material change to the populations of wintering or breeding birds associated with the SPA/Ramsar Site. The conservation objectives would not be undermined with respect to construction disturbance cause by traffic on the site access road:

- The extent and distribution of the habitats of the qualifying features remain unaffected by disturbance;
- The structure and function of the habitats of the qualifying features remain unaffected by disturbance in the long-term, although there may be short-term (maximum two seasons) displacement of a small number of birds from localised areas;
- The supporting processes on which the habitats of the qualifying features rely remain unaffected by disturbance;
- The populations of the qualifying features will be maintained because there would be no material decline in survival or productivity; and
- The distribution of the qualifying features within the designated site would be unaffected by construction disturbance.

6.1.1.4 Arable land: breeding and non-breeding season

156. During the breeding season, the arable land, or more specifically the grassland margins and ditch/reed habitats between arable fields, have been identified as providing important resources for foraging marsh harrier, a component of the breeding bird assemblage of The Swale SPA. During the non-breeding season, the arable land has been identified as

providing important foraging and roosting resources for dark-bellied brent goose, lapwing and golden plover.

Breeding marsh harrier

157. As assessed in Chapter 9: Ornithology of the ES, during the construction phase, plant movement and installation of the Development will cause localised disturbance to foraging marsh harrier. This is predicted to occur within up to 100 m of construction activity (access routes and any active construction areas) at any one time. The 100 m threshold in this case is based on personal observations by the author of marsh harriers foraging within 100 m of operating plant machinery near Great Bells Farm on the Isle of Sheppey, as well as Bright et al. (2009)[22] (quoting from Gamauf, 1993) that marsh harriers would not fly closer than about 90 m to visible tourist activity in the open. In addition, baseline surveys for Kemsley Mill K4 Combined Heat and Power Generating Station in 2009 and 2016 (described in the HRA Report submitted with the DCO for that application by RPS)[23] demonstrated that marsh harriers nested within 100 m of a busy haul road subject to heavy HGV traffic. The construction phase may extend over two breeding seasons and as construction progresses, more of the open, formerly arable habitat will be replaced with the installation of solar panels. The effect of localised disturbance is therefore likely to increase in the context of the available area for foraging as the construction phase progresses. However, the extents of open habitats managed to provide enhanced foraging for marsh harrier between the arrays are substantial, with minimum set back of 15 m either side of the ditch banks separating the arrays across the majority of the site (in places this could extend up to 80 m at some points between arrays). It is predicted that marsh harriers will continue to forage in the favourable habitat between arrays which will be larger in extent following installation of the development than in the baseline condition, where arable crops, which comprise unsuitable foraging habitat, extended to within 2 m of the ditch banks.

158. Based on the tolerance of marsh harriers to such activities as described above (and in Ruddock and Whitfield, 2007)[24], it is considered that marsh harriers will continue to forage in undisturbed areas beyond 100 m from sources of construction works. The majority of the grazing marsh/reedbed in the north and west (the KWT South Swale Reserve) and majority of the ditches and associated adjacent meadow habitat will therefore be available for marsh harriers to forage along during the construction works. Marsh harriers have large foraging ranges and there are also considerable extents of suitable foraging habitat outside the Development site to support them.

159. Due to the localised nature of the disturbance at any one point in time and the temporary nature of the effect extending over two (or possibly three) breeding seasons or parts of breeding seasons, it is not considered that construction disturbance will cause displacement of marsh harriers to the extent that it would affect their ability to survive and reproduce during the breeding season. The conservation objectives would not be undermined with respect to construction disturbance to foraging marsh harriers in functionally linked land:

- The extent and distribution of the habitats of foraging marsh harrier remain unaffected by disturbance;
- The structure and function of the habitats of foraging marsh harrier remain unaffected by disturbance in the long-term, although there may be short-term (maximum two seasons) displacement from localised areas;

[22] Bright, J.A., Langston, R.H.W. & Anthony, S. (2009). *Mapped and written guidance in relation to birds and onshore wind energy development in England*. RSPB Research Report No 35.

[23] DHA Environment (2018). Document 3.1- ES Volume 2; Appendix 10.2; *Habitats Regulation Assessment: The Kemsley Mill K4 Combined Heat and Power Generating Station Development Consent Order.* June 2018 - Section 51 Version. PINS Ref: EN010090.

[24] Ruddock, M., Whitfield, D.P., (2007). *A review of disturbance distances in selected bird species*. Report from Natural Research (Projects) Ltd. to Scottish Natural Heritage. Natural Research, Banchory, UK.

- The supporting processes on which the habitats of foraging marsh harrier rely remain unaffected by disturbance in the long-term, although there may be short-term (maximum two seasons) displacement of prey from localised areas;
- The population of marsh harriers will be maintained because there would be no material decline in survival or productivity; and
- The distribution of marsh harriers within the designated site would be unaffected by construction disturbance.

160. It is therefore concluded that there would be no adverse effect on the integrity of the Swale SPA in this respect.

6.1.1.5 Wintering brent goose, lapwing and golden plover

161. Wintering species, including brent goose, lapwing and golden plover, that would frequently use the arable fields for foraging or roosting/loafing within the solar array part of the Development site are expected to be temporarily displaced by works during the construction phase of the Development, either as the site becomes incrementally developed with the solar panel arrays, or because the construction activities will disturb the birds and displace them from the area. The IECS Toolkit[17] suggests that brent goose is of high sensitivity to disturbance, whilst golden plover and lapwing are of moderate sensitivity.

162. The 24-month construction phase is expected overall to affect two full winter seasons, or the equivalent time across three winter seasons. As installation of the solar arrays will be completed on a field-by-field basis, then in the first winter season, there would be a substantial part of the Development site remaining free of installation and free of disturbance.

163. Prior to the start of construction in each field, the arable land will be converted to grassland in readiness for the establishment of the grassland management areas under, between and around the solar panel tables and arrays. The newly established and growing grass will provide good quality feeding resources for brent geese, as well as foraging resources for lapwing and golden plover, accepting that newly establishing grassland is not as favourable for these latter two species than long-established grassland (Barnard & Thompson, 1985; Shrubb, 2007)[25,26].

164. Prior to the first winter of construction, the Development will also include the establishment of the 56 ha grassland in the AR HMA north of the Cleve Hill Substation. Further details regarding the AR HMA are provided in section 6.1.2 under the assessment of habitat loss/change. Sowing of the AR HMA grassland will occur prior to any construction occurring during the winter, therefore the AR HMA will be capable of providing resources to brent geese during the first winter of the construction phase; however, it is adjacent to the main site access route and the movements of construction traffic might reduce the attractiveness of southern parts of the AR HMA at this time. The IECS Waterbird Disturbance Mitigation Toolkit suggests 400 m as a zone in which mitigation should be considered, therefore the assessment of construction disturbance takes the precautionary view that the AR HMA would not be capable of supporting brent geese in approximately half of its extent during the construction phase. In combination with the newly growing grassland in the remainder of the Development site during the first winter season, there is considered to be sufficient extent of suitable habitat beyond a zone of disturbance (of up to 400 m for brent geese) to provide resources to support brent geese at least equivalent in numbers supported in the pre-development baseline. The newly established grassland habitat will also provide foraging resources for lapwing and golden plover, although as the new grassland habitat

[25] Barnard, C.J. & Thompson, D.B.A. (1985). *Gulls and Plovers: The Ecology and Behaviour of Mixed-Species Feeding Groups*. Springer, Netherlands.
[26] Shrubb, M. (2007). *The Lapwing.* T & A.D. Poyser, London.

is not optimal for these species, it is predicted that there will be a temporary reduction in resources to support these two species.

165. During the second (or third) winter season, the already developed area of solar panels and the disturbance caused by installation of the remaining solar panels would displace brent geese, lapwing and golden plover from all areas within the solar array development area. By this time, the AR HMA grassland refuge area will have been fully established to provide foraging and roosting opportunities for brent geese, lapwing and golden plover throughout the winter; however, as described above, the movement of construction traffic along the site access route and installation of the solar arrays in fields proximal to the AR HMA will reduce its attractiveness to brent geese during this period and the precautionary approach is that approximately half of the AR HMA would not be available to brent geese during this part of the construction phase.

166. The impact of construction disturbance is therefore predicted to result in partial displacement of brent goose, lapwing and golden plover from foraging within the Development site during two or possibly three winter seasons, with the AR HMA partially providing alternative resources during this time. This is a negative effect of probable likelihood that would occur in the short-term two or possibly three winter seasons. The effect is temporary in that construction disturbance will cease on completion of the works and the whole extent of the AR HMA will become available. Birds that are potentially displaced from the local area will return in future seasons. The baseline data show that the Development site is largely unsuitable for foraging by these species in some winter seasons, such as for brent goose as in 2017/18, lapwing in 2013/14 or golden plover in 2014/15 (Section A9.8 in Technical Appendix A9.1 to the ES). During these conditions, birds forage in other areas around the Swale, including arable fields, intertidal areas and within the protected areas of grazing marsh on the Isle of Sheppey and the south shore of the Swale. In subsequent winters, when foraging resources are optimal again, these species return to the site.

167. If Phase 2 of the Development is completed separately from Phase 1, construction activities undertaken between 1 September to 28 February will be controlled using the methodology set out in the Outline SPA CNMP to ensure there is no additional disturbance to wintering geese using the AR HMA.

168. Due to the temporary nature of the effects of disturbance during construction and the proven resilience to the absence of availability of foraging resources within functionally linked arable land over the course of some winter seasons, there would be no long-term decline in the survival or productivity of the qualifying interest features. The conservation objectives would not be undermined in the long-term with respect to construction disturbance for wintering brent geese, lapwing and golden plover:

- The extent and distribution of the habitats of the qualifying features will be temporarily affected but mitigated in the long-term;
- The structure and function of the habitats of the qualifying features will be temporarily affected but mitigated in the long-term;
- The supporting processes on which the habitats of the qualifying features rely remain will be temporarily affected but mitigated in the long-term;
- The population of the qualifying features will be maintained because there would be no material decline in survival or productivity; and
- The distribution of the qualifying features within the designated site would be unaffected by construction disturbance affecting the arable land.

169. The decommissioning phase is expected to be approximately the reverse of construction, with increased extents of undisturbed habitat becoming available as the phase progresses.

170. It is concluded that construction/decommissioning disturbance with respect to the functionally-linked arable land would not have an adverse effect on the integrity of The Swale SPA/Ramsar Site.

6.1.2 Habitat Loss/Change

171. No development works are proposed within the boundaries of The Swale SPA/Ramsar Site, therefore there will be no loss or adverse change of habitats within the European Site. The area within which development of solar energy and battery storage facilities is proposed occupies land that has been identified as functionally linked to The Swale SPA/Ramsar Site; i.e. it is an area of land outside the boundary of the European Site that is used by its qualifying features.

172. The arable land within the development area is of no/negligible importance to 19 out of the 22 component wintering waterbird assemblage species (Paragraph 78, Table 2). It is of high importance, providing resources in functionally linked land for dark-bellied brent goose, lapwing and golden plover, which forage and roost within the arable fields. The margins and ditches around the arable fields are also an important foraging resource for marsh harrier which forms part of the breeding assemblage feature of the SPA.

6.1.2.1 Brent Goose, Lapwing and Golden Plover

173. The installation of the Development will result in the displacement of the three wintering waterbird species from the fields that they would otherwise have used for foraging during the arable baseline. This potential adverse effect was recognised at an early stage in the project, therefore an undeveloped area of the Development site was identified for habitat management to provide foraging and resting/roosting opportunities for geese and other waterbirds. This has been referred to as the AR HMA.

174. Prior to the first winter of construction, the Development will include the reversion of approximately 56 ha of arable fields to grassland in the AR HMA north of the Cleve Hill substation, which provides 50.1 ha of functionally available grassland area after taking into account a 50 m avoidance zone near the solar panel arrays in which there may be a reduced density of birds (see Technical Appendix A9.1, DCO Document Reference 6.4.9.1).

175. Baseline surveys comprised 'snapshot' counts of the number of birds of each species in each field/compartment. The number of surveys in each month and in each season has varied across the course of the survey period. A number of metrics were explored to describe bird-use of the site. Following consultation with Natural England and the HMSG, it was considered that the most appropriate metric to provide a precautionary measure of average use of the site each season is the 'inter-annual mean of the intra-annual mean of the peak monthly counts' derived from the survey data (hereafter called 'peak-mean'). Survey count data for brent goose, lapwing and golden plover are provided in Appendix 6.

176. The approach to devising mitigation requirements for loss of foraging resources for wintering waterbirds is to calculate the amount of land and type of management that would be needed to support the number of foraging bird-days that the arable land within the Development site has supported in the four winters studied.

177. The total number of birds of each species in the arable parts of the Development site on each survey were obtained by summing the number of birds in each arable count sector on each survey (made during baseline surveys as described in Technical Appendix 9.1 to Chapter 9: Ornithology of the ES, with accompanying Figure A9.6), taking action where necessary to remove double counts (when the same flock of birds was recorded in two different fields on the same survey). The peak-mean counts for the arable area were then calculated for each season (i.e. the intra-annual mean of the highest counts each month) and the means of those seasonal peak-means (i.e. 'inter-annual mean of the intra-annual mean of the peak monthly counts) were obtained for each species by averaging across the

seasons. This was done to smooth out the variation in the number of surveys in each season.

178. Metrics were calculated on the November to February period for brent goose because the number of birds recorded in the arable fields outside this period was almost zero. Metrics for golden plover and lapwing were based on the October to March period, because birds were recorded in the arable fields throughout those months.

179. The peak-mean counts of foraging birds were as follows:

- Dark-bellied brent goose: 849.5 birds;
- Lapwing: 307.8 birds;
- Golden plover: 158.3 birds.

180. These metrics represent an average number of birds per day foraging within the arable fields of the Development site in the period, calculated in a precautionary manner by using only the highest (peak) counts of birds in that area each month.

181. An alternative method to describe the average site use by each species was explored, whereby the highest count of a species in each month across seasons was averaged and summed over the months in the period under consideration. However, this method was dismissed because it was considered that the driving factor behind the variability in numbers was the crop type, which varies with season, rather than the month of the season; however, it is recognised that the month in the season also influences variability because crops have different stages of growth through the season which may make them more or less attractive at different times. An analysis of cropping patterns over the last ten years is presented in Technical Appendix A9.1 to the ES (DCO Document Reference 6.4.9.1) to assess the representativeness of the baseline survey sample, particularly in the potential suitability of the crops in the site for geese. Cropping varies between years with planting of winter and spring cereals, oil seed rape, winter and spring beans, with fields occasionally left fallow. The analysis concluded that the baseline bird survey data coincide with a representative sample of the longer-term cropping pattern.

6.1.2.2 Bird-days

182. Seasonal bird-days for the arable area were calculated by multiplying the peak-mean number of foraging birds by the number of days in the season (brent goose: 120 days; golden plover and lapwing: 182 days). This provides a measure of the utilisation of the arable area of the Development site and a basis on which to establish an appropriate area within the site to manage for the benefit of birds that will be prevented from using other parts of the site that will be under the solar panels:

- Dark-bellied brent goose: 101,940 bird-days per winter;
- Lapwing: 56,023 bird-days per winter;
- Golden plover: 28,802 bird-days per winter.

6.1.2.3 Mitigation Area

183. It has been agreed in principle with Natural England that loss of arable functionally linked habitat can be mitigated by the provision of permanent grassland. This is the provision of the AR HMA within the Development site that has specific management tailored towards enhancing foraging resources for these species – a 'waterbird refuge'. Further details of the location, management and monitoring of the refuge are set out in the Outline LBMP.

184. Brent geese prefer to feed on intertidal algae and Zostera (Eel Grass) where it is available. However, following a rapid increase in their population and lack of traditional feeding areas, they have expanded their range of feeding sites in recent decades to include agricultural fields inland with a short sward height (e.g. Summers 1990; Rowcliffe & Mitchell 1996,

Hassall et al. 2001)[27,28,29], where they feed on the vegetation. Golden plover and lapwing generally exhibit preference for feeding in grassland with a short sward height, but also use open arable habitats such as open ploughed land and young winter cereals, preferring large open fields providing good visibility for predators (e.g. Mason and Macdonald 1999; Gillings et al. 2007)[30,31]. Lapwing and golden plover feed on surface and soil invertebrates, therefore there is no direct competition between these species and brent goose for foraging resources; the AR HMA is therefore designed in a way that the species can be co-located within the same area (i.e. the mitigation area needed for lapwing, golden plover and brent geese is not additional).

6.1.2.4 Brent Goose

185. In order to mitigate fully for the loss of foraging resources to brent geese, the AR HMA needs to provide for 101,940 brent goose bird-days of feeding potential per winter. This resource for brent goose could be provided through some of the following management options:

- Re-seeded grassland areas (e.g. Percival 1993)[32];
- Grassland cut to produce an optimal short sward of c. 5-7 cm (Hassall et al. 2001)[33];
- Grassland of higher sward height with an increased nitrogen content (Percival 1993; Hassall et al. 2001)[32,33];
- Sacrificial crops e.g. wheat (McKay et al. 1993)[34]; and
- Removal of bird scaring (Bos and Stahl 2003)[35].

186. The optimal management for the refuge is considered to be the conversion of arable land to permanent pasture (grassland). The proposal and rationale for this is set out below and it also fits with the mitigation requirements outlined for golden plover and lapwing.

187. The Solent Waders and Brent Goose Strategy website[36] cites an example of a successful refuge:

"*In 2009, Portsmouth College developed an area of their playing fields. The grassland area was used by Brent geese and therefore mitigating for the loss of feeding areas was made a condition of their planning permission. The mitigation involved creating a Brent goose "refuge" an area of fenced-off grassland close to the area being lost. The refuge area was a success and post-mitigation monitoring has shown that geese continue to use the site.*"

188. The AR HMA is, in essence, a high quality managed refuge area mitigating for the loss of a larger but lower quality area and, as such, should be as close as is possible to being disturbance free. There is a public footpath running along the sea wall at the northern perimeter of the site. However, the refuge will not be located further inland away from the

[27] Summers, R.W. (1990). The effect of grazing on winter wheat by brent geese *Branta. B. bernicla*. *Journal of Applied Ecology* **29**: 35-40.

[28] Rowcliffe, J.M. and Mitchell, C. (1996). *The Conservation Management of Brent Geese in the UK.* WWT, Slimbridge.

[29] Hassall, M., Riddington, R. and Helden, A. (2001). Foraging behaviour of brent geese, *Branta b. bernicla*, on grasslands: effects of sward length and nitrogen content. *Oecologia* **127**: 97-104.

[30] Mason, C.F. and Macdonald, S.M. (1999). Habitat use by Lapwings and Golden Plover in a largely arable landscape. *Bird Study* **46**: No. 1: 89-99.

[31] Gillings, S., Fuller, R.J. and Sutherland, W. (2007). Winter field use and habitat selection by Eurasian Golden Plovers *Pluvialis apricaria* and Northern Lapwings *Vanellus* on arable farmland. *Ibis* **149**: 509-520.

[32] Percival, S.M. (1993) The effects of reseeding, fertilizer application and disturbance on the use of grasslands by barnacle geese, and the implications for refuge management. *Journal of Applied Ecology* **30**: 437-433.

[33] Hassall, M., Riddington, R. and Helden, A. (2001). Foraging behaviour of brent geese, *Branta b. bernicla*, on grasslands: effects of sward length and nitrogen content. *Oecologia* **127**: 97-104.

[34] McKay, H.V., Bishop, J.D. and Ennis, D.C. (1993). The possible importance of nutritional requirements for dark-bellied brent geese in the seasonal shift from winter cereals to pasture. *Ardea* **82**: 123-132.

[35] Bos, D. and Stahl, J. (2003). Creating new foraging opportunities for Dark-bellied Brent *Branta bernicla* and Barnacle Geese *B. leucopsis* in spring – insights from a large-scale experiment. *Ardea* **91** (2): 153-166.

[36] https://solentwbgs.wordpress.com/ accessed 20/05/2017.

footpath – the attraction of the proximity of the refuge to the estuary frontage outweighs the possibility of potential disturbance caused by users of the sea wall footpath; furthermore, the sea wall is separated from the Development site by a strip of grazing marsh approximately 50-70 m wide and there may be a high degree of habituation already in practice. Round (1982)[37], for example, studied the inland feeding habits of brent geese in Sussex and found that 70% of birds fed within 200 m of the coast through the winter, 68% of these being on grass.

189. The landowner does not currently employ any deliberate scaring activities to protect crop damage by birds, although this practice has been carried out in the past (e.g. 2008/09 – 2011/12). There will be a commitment to maintain an undisturbed (no scaring) area around the refuge in order to maximise its potential to provide resources for brent geese. This form of management has been proven to increase carrying capacity of land for brent goose; for example, Bos and Stahl (2003)[35] reported a doubling of numbers of spring staging geese on the island in The Netherlands (Schiemonnikoog: Dutch Wadden Sea islands) in the years without scaring.

190. As well as being disturbance-free, it is essential that the refuge is an area known to be capable of supporting geese (as well as golden plover and lapwing). To take this into account in designing the refuge area, the distribution of geese in the Development site during baseline surveys of each field (Appendix 6) was examined. Nearly 55% of the brent geese counted throughout the surveys were in the fields that will make up the 56 ha AR HMA, demonstrating that its location is highly appropriate.

191. Vickery et al. (1994)[38] conducted surveys of brent goose in a 20 ha grassland field in Norfolk in order to provide information for proposed Alternative Foraging Areas for the species. This study involved managing different areas with different management regimes (e.g. application of fertilizer, cutting patterns, grazed (cow/sheep), ungrazed etc.) and found that farmland can be managed in a number of ways and can sustain a large number of birds. Vickery et al. reported that grassland cut five times and fertilized was grazed at an intensity of 2,097 bird-days per ha, compared with 1,562 bird-days per ha on grass cut twice and left unfertilized.

192. There is other evidence that a managed grassland refuge would be able to support such densities of geese throughout the winter. Round (1982)[37] found that grassland habitat around Chichester Harbour in Sussex supported 1,908 goose-days per ha of heavy grazing by geese. The grassland around Chichester Harbour was just the subject of the study, not habitat specifically managed to be beneficial for brent geese; it is likely therefore that grassland managed correctly as a refuge for geese could support more bird-days through the winter. Owen (1977)[39] reported a carrying capacity of 2,250 goose-days per ha of grassland and suggested that the grass within refuge areas should be mown or heavily grazed by farm stock in summer, though not in late autumn, winter or early spring, when there would be competition with geese for food.

193. Owen (1977)[39] suggested that applications of nitrogenous fertiliser would tend to increase the attractiveness of grass to geese, whilst Bachman (2008)[40] stated that fertilized plots support 200 more goose-days per ha than unfertilized plots and that grassland with fertiliser has the potential to attract and sustain more geese per ha if fertilized. The application of organic matter will be required to provide the best growth and suitable foraging conditions for brent geese. If organic fertiliser, such as farmyard manure, is

[37] Round, P. (1982). Inland feeding by brent geese *Branta bernicla* in Sussex, England. *Biological Conservation* **23**: 15-32.

[38] Vickery, J.A., Sutherland, W.J. and Lane, S.J. (1994). The management of grass pastures for brent geese. *Journal of Applied Ecology* **31**: 282-290.

[39] Owen, M. (1977). The role of wildfowl refuges on agricultural land in lessening the conflict between farmers and geese in Britain. *Biological Conservation*, **11**: 209-222.

[40] Bachman, D.C. (2008). *Managing grassland pastures at Humboldt Bay National Wildlife Refuge for Aleutian Geese*. Masters of Science in Natural Resources: Wildlife. A Thesis presented to Humboldt State University.

applied, this will also have benefit to golden plover and lapwing, as invertebrate prey populations in the AR HMA will be improved.

194. There is evidence that clovers (Trifolium sp.) may be an effective way to attract geese to a site (Owens 1976; McKay et al. 1996; McKay et al. 2001)[41,42,43]. Clovers are generally high in protein and are nitrogen-fixing plants which can enhance fertility of soil and increase the quality of pasture (Marriott 1988)[44]. McKay et al. (2001)[43] found an overwhelming goose grazing response to clover during the first year after re-seeding of a field – with more protein, higher live matter and less fibre than several species of freshly planted grass. It is therefore considered that with the addition of clover into the grassland mix, the carrying capacity in the early life of the refuge can be increased; this may also benefit golden plover and lapwing through provision of additional habitat for their invertebrate prey.

195. The current management of the site as arable crops typically renders the majority of the area unsuitable for foraging geese by late February, as the crop sward becomes too high. Winter 2015/16 was very mild and the surveyors noted that the height of the crop sward had already become unsuitable for plovers and geese by late December; hence the site supported comparably few geese during that winter. In winter 2017/18, the arable parts of the survey area comprised winter beans and fallow, which were barely used by brent geese at any time in that winter. The managed grassland in the refuge will be capable of sustaining geese for a longer period throughout the winter, until birds depart on northward migration. The refuge should therefore be beneficial in providing the resources for longer in the winter season than the arable baseline and potentially helping geese to maintain better fitness for migration and productivity.

196. The evidence set out above demonstrates that improved grassland, even during early establishment, is capable of supporting high numbers of brent geese throughout the winter. On the basis of the synopsis above, the AR HMA will support 2,097 foraging brent-goose days per hectare. 101,940 brent goose bird-days will therefore require 48.6 ha of functionally available land within the AR HMA.

197. The total area of the AR HMA is approximately 56 ha. However, it is possible that brent geese will not forage close to the solar panels. A review of the literature available regarding goose avoidance of boundary features suggests that there would be lower density of foraging birds within 50 m of constructed boundary features (e.g. Larsen and Madsen, 2000; Harrison et al. 2017)[45],[46]. Assuming on a precautionary basis a reduction in density within 50 m of site infrastructure such as the solar PV arrays and the flood protection bund, approximately 50.1 ha of grassland remains functionally available for geese.

198. Application of farmyard manure would need to be restricted in extent to exclude the area within 10 m of ditches to prevent nutrient enrichment of the water courses, in line with best practice management. This has potential to reduce the capacity for supporting brent geese in the unfertilised areas at the periphery of the fields. The capacity figure of 2,097 goose-days per hectare for fertilised grassland was taken from Vickery et al. (1994). The

[41] Owens, M. (1976). The selection of winter food by white-fronted geese. *Journal of Applied Ecology* **13**: 715-729.

[42] McKay, H.V., Langton, S.D., Milsom, T.P. and Feare, C.J. (1996). Prediction of field use by brent geese to aid crop management. *Crop Protection* **15**: 259-268.

[43] McKay H.V., Milsom T.P. and Feare C.J. (2001). Selection of forage species and the creation of alternative feeding areas for dark-bellied brent geese *Branta bernicla* in southern UK coastal areas. *Agriculture Ecosystems & Environment* **84**: 99-113.

[44] Marriott, C.A. (1988). Seasonal variation in white clover content and nitrogen fixing (acetylene reducing) activity in a cut upland sward. Grass and Forage Science 43: 253-262.

[45] Larsen, J.K. & Madsen, J. (2000). Effects of wind turbines and other physical elements on field utilization by pink-footed geese (*Anser brachyrhynchus*): A landscape perspective. *Landscape Ecol.* 15: 755–764

[46] Harrison, A.L., Petkov, Mitev, D., Popgeorgiev, G., Gove, B. & Hilton, G.M. (2018). Scale-dependent habitat selection by wintering geese: implications for landscape management. *Biodiversity and Conservation* 27:1, 167-188.

same study reports a capacity of 1,562 goose-days per hectare in unfertilised plots of grassland. Using these same figures results in the following calculation:

- Functional area: 50.1 ha;
- Fertilised functional area: 43.6 ha;
- Unfertilised functional area: 6.5 ha;
- Capacity = (43.6 × 2,097) + (6.5 × 1,562) = 101,580 goose-days.

199. This is very similar to the 101,940 goose-days as measured by the peak-mean metric in arable fields of the Development site. The difference of 360 goose-days when taking into account the unfertilised buffer along the ditches is not significant in the context of the number of goose-days supported by the whole AR HMA and considering that the goose-day capacity figures used in the calculations may not represent a maximum capacity of grassland to support geese; other sources of management advice suggest that larger numbers of birds could be accommodated in the same or smaller extent of land (as set out above).

6.1.2.5 Golden Plover and Lapwing

200. In order to mitigate fully for the loss of foraging resources to lapwing and golden plover, the AR HMA needs to provide for 56,023 lapwing bird-days and 28,802 golden plover bird-days per winter of feeding potential.

201. Gillings et al. (2007)[31] reported golden plover densities of 1,560 bird-days per ha and 1,000 lapwing bird-days per ha from mixed arable farmland. However, golden plover and lapwing can be found on a variety of grassland types, including pastures and airfields (Gillings and Fuller 1999)[47]. Most studies of habitat use report a strong preference for feeding on grassland, particularly permanent pastures (e.g. Milsom et al. 1985, Fuller 1988 and Tucker 1992)[48],[49],[50]. Gillings and Fuller (1999)[47] state that the abundance and availability of potential prey items present in different habitats is likely to be an important factor shaping the distribution of plovers between fields. Golden plover and lapwing both consume invertebrates found in field vegetation and just below the soil surface (e.g. earthworms, beetles etc.). Prey availability is probably higher in vegetated fields than bare till because the vegetation insulates the soil surface and creates a suitable microclimate for soil invertebrates which would otherwise be buried deeper below ground (Parr 1992)[51], especially during the winter months. Soil protected by a dense layer of insulating vegetation may remain unfrozen during periods of ground frost and thus render soil invertebrates relatively more surface-active and relatively more available to plovers foraging on grassland than those foraging on cultivated land. Barnard and Thompson (1985)[52] state that earthworms are a common dietary component for golden plover and lapwing and for whose abundance can be estimated. Permanent pastures are richest in earthworms, with less in winter cereals and the least in root crops. In grassland, worm biomass increases as a function of the time since last ploughing, hence permanent pastures attain a higher biomass of earthworms than temporary grasslands. Plover distribution is positively correlated both with the biomass of earthworms and with field age (Gillings and Fuller

[47] Gillings, S. and Fuller, R.J. (1999) *Winter Ecology of Golden Plovers and Lapwings: A Review and Consideration of Extensive Survey Methods*. BTO Research Report No. 224. BTO, Thetford.

[48] Milsom, T.P., Holditch, R.S. and Rochard, J.B.A. (1985). Diurnal use of an airfield and adjacent agricultural habitats by Lapwings *Vanellus*. *Journal of Applied Ecology* **22**: 313-326.

[49] Fuller, R.J. (1988). Wintering golden plovers in central Buckinghamshire: annual variation in numbers and distribution. *Buckinghamshire Bird Report 1988*: 4-8.

[50] Tucker, G. M. (1992). Effects of Agricultural Practices on Field Use by Invertebrate-Feeding Birds in Winter. *Journal of Applied Ecology* **29**:779-790.

[51] Parr, R. (1992). The decline to extinction of a population of Golden Plover in north-east Scotland. *Ornis Scandinavica* **23**: 152-158.

[52] Barnard, C.J. and Thompson, D.B.A. (1985). *Gulls and plovers: the ecology and behaviour of mixed species feeding groups*. Croom Helm Ltd, London.

1999) [47]. Furthermore, both species have higher net rates of energy intake in old compared with recent pasture (Barnard and Thompson 1985)[52]. Tucker (1992)[50] reports that grassland feeding habitat has the potential to support a food biomass density about three-fold greater than arable, however this biomass level takes several years to be realised.

202. In the Lower Derwent Valley, North Yorkshire, lapwings generally preferred short swards and avoided swards more than 10 cm tall (Gregory 1987)[53]. Milsom et al. (1998)[54] also demonstrated that both golden plovers and lapwings preferred to feed in fields that had been mown twice, rather than fields that had been mown only once, and unmown fields were virtually avoided. The optimum sward height appeared to be around 7 cm. However, heavy grazing can decrease the diversity and abundance of spiders, surface-active beetles and productivity of emergent flies (Keiller et al. 1995)[55]. Conversely, grazing may benefit foraging plovers through 'dunging'. Not only does dung harbour its own invertebrate fauna but soil productivity may be increased as grazing animals convert unavailable nutrients into simpler nutrients which soil invertebrates can readily assimilate (Keiller et al. 1995)55.

203. Based on the above evidence, it is likely that an increased carrying capacity compared to the existing arable crop rotation can be reached by the introduction of permanent grassland under the correct management (e.g. application of organic matter, cutting regime etc.) when compared with arable farmland. Parr (1992)[51] suggests there is a greater prey availability in grassland; Tucker (1992)[50] suggests there is a three times greater biomass in grassland areas. However, for the purposes of this RIAA and under the advice through consultation with Natural England, the precautionary assumption is applied, which is that the grassland would only have similar capacity to that of mixed arable farmland as recorded by Gillings et al. (2007)[31]: 1,000 lapwing bird-days/ha and 1,560 golden plover bird-days/ha. These are the capacity values for both lapwing and golden plover within fields used in Gillings' study area and represent simultaneous use, rather than separate, additional usage (i.e., the AR HMA will have capacity for 2,560 lapwing+plover-days/ha over the winter). The four seasons of surveying at the Development site demonstrated that there was a great deal of evidence during the surveys of golden plover and lapwing utilising the same fields in the same season (Appendix 6).

204. 56,023 lapwing bird-days per winter will therefore require 56.0 ha and 28,802 golden plover bird-days per winter will require 18.5 ha of functionally available land within the AR HMA. These areas are not additional to each other.

205. Taking account of the same boundary restrictions described in paragraph 197 above, approximately 50.1 ha of grassland remains functionally available for lapwing and golden plover. This theoretically falls short of the requirement for lapwing, but well exceeds the requirement from golden plover. Lapwing and golden plover overlap to a large extent in their foraging requirements, feeding on similar invertebrate prey, and therefore assuming they are interchangeable, the AR HMA would support more lapwing-days if there are fewer golden plover-days to support. As there are more than 6 ha spare capacity in the AR HMA for golden plovers, these could be utilised by lapwing and the AR HMA will provide sufficient resources to accommodate the average Development site use based on the baseline survey counts.

206. The mitigation area proposed for golden plover and lapwing can be co-located in the same area and under the same management as that for brent goose. Plovers/lapwing and geese feed on different items, therefore there is not competition for resources between them and

[53] Gregory, R.D. (1987). Comparative winter feeding ecology of Lapwings *Vanellus* and Golden Plovers *Pluvialis apricaria* on cereals and grassland in the Lower Derwent Valley. *Bird Study* **34**: 244-250.

[54] Milsom, T.P., Ennis, D.C., Haskell, D.J., Langton, S.D. and McKay, H.V. (1998). Design of grassland feeding areas for waders during winter: the relative importance of sward, landscape factors and human disturbance. *Biological Conservation* **84**: 119-129.

[55] Keiller, S.W., Buse, A. and Cherrett, J.M. (1995). *Effects of sheep grazing on upland arthropods in Snowdonia and mid-Wales, 6.* ITE, Bangor.

brent geese. Based on the four seasons of baseline surveys, there was almost no coincidence between geese and lapwing/plovers in the same fields at the same time, although the same fields were utilised at different times. The AR HMA for golden plover and lapwing will consequently be the same extent as for brent goose, at approximately 56 ha.

6.1.2.6 Conservation Objectives and Integrity

207. The AR HMA will be established during the construction phase. There is therefore predicted to be a constantly available area during the operational phase of the Development that provides resources for foraging brent goose, lapwing and golden plover. The area is of sufficient size with appropriate management to mitigate for the average loss of resources provided by the arable baseline, such that there would not be any net loss for these species.

208. It is concluded that the conservation objectives would not be undermined in the long-term with respect to loss of functionally-linked habitat for wintering brent geese, lapwing and golden plover:

- The extent and distribution of the habitats of the qualifying features will be maintained by providing foraging resources and roosting area for the qualifying interests in the same location;
- The structure and function of the habitats of the qualifying features will be maintained – the AR HMA provides the function of foraging resources;
- The supporting processes on which the habitats of the qualifying features rely are not affected;
- The population of the qualifying features will be maintained because there would be no material decline in survival or productivity; and
- The distribution of the qualifying features within the designated site would be unaffected by the loss/change in habitats.

209. Subject to the establishment and ongoing management of the AR HMA, it is concluded that habitat loss/change with respect to the functionally-linked arable land for wintering brent goose, lapwing and golden plover would not have an adverse effect on the integrity of The Swale SPA/Ramsar Site.

6.1.2.7 Marsh Harrier

210. Baseline flight activity surveys over a 12 month period in 2015/16 demonstrated that the Development site forms an important foraging area for marsh harriers throughout the year, with birds being recorded in flight for 10.5% of survey observation time in the breeding season and 17.9% of survey observation time in the non-breeding season. This comprised an unknown number of individuals. Marsh harriers were mostly recorded hunting along the linear ditch and narrow rough grassland strips at the edges of the arable fields, with the majority of activity recorded over the coastal grazing marsh/reedbed strip that forms the KWT South Swale reserve just inland of the sea wall.

211. The installation of the Development will result in a change from growing crops in the arable fields to the presence of solar panels and the energy storage facility. This potentially reduces the area available for foraging marsh harriers, although the arable crops are not favoured foraging habitat, rather, they focus foraging efforts on the grassland field margins and throughout the coastal strip of grazing marsh/reedbed. This potential adverse effect was recognised at an early stage in the project and areas between the arrays in each field were identified as potential habitat enhancement areas for marsh harriers and other wildlife. Since PEIR, the set-back of the extent of the solar arrays across the majority of the Development site has been increased from a minimum of 5 m to a minimum of 15 m, resulting in a substantial increase in the amount of suitable habitat available to be managed for the benefit of foraging marsh harriers.

212. The extents of open habitats that will be managed to provide enhanced foraging for marsh harrier between the arrays are substantial, with minimum set back of 15 m either side of the ditch banks separating the arrays across the majority of the site (in places this could extend up to 80 m at some points between arrays). It is predicted that marsh harriers will continue to forage in the favourable habitat between the arrays which will be larger in extent following installation of the development than in the baseline condition, where arable crops, which comprise unsuitable foraging habitat, extended to within 2 m of the ditch banks.

213. Due to the increased extent of suitable foraging habitat available with the Development, the conservation objectives would not be undermined with respect to the change of habitats for foraging marsh harriers in functionally linked land:

- The extent and distribution of the habitats of foraging marsh harrier are maintained;
- The structure and function of the habitats of foraging marsh harrier are maintained;
- The supporting processes on which the habitats of foraging marsh harrier rely remain unaffected;
- The population of marsh harriers will be maintained because there would be no decline in survival or productivity; and
- The distribution of marsh harriers within the designated site would be unaffected.

214. Subject to the appropriate management of large grassland swathes between the solar arrays, it is therefore concluded that there would be no adverse effect on the integrity of the Swale SPA in this respect.

6.1.3 Hydrological Changes

215. In terms of hydrological changes, LSEs were only identified as a result of the potential impact of a catastrophic failure of fuel- or concrete-carrying vehicles leading to a pollution event occurring close to a drainage ditch directly connected to the European Site.

216. The Development has been designed to have a minimum buffer of 5 m between solar PV array infrastructure and non-IDB drainage ditches and 8 m from IDB drainage ditches. In the majority of the site, this has been extended to a minimum of 15 m separation to provide grassland habitat enhancements. These distances reduce the potential for chemical pollutants to be transferred to the water environment.

217. The Development also includes a number of embedded good practice measures that are set out in the Outline CEMP with the specific aim of avoiding adverse effects of pollutants entering the local hydrological environment. These include the deployment of spill pads/kits, speed limits for construction vehicles on site, maintenance of vehicles and training of personnel. The measures will effectively limit the uncontained release of chemicals to minor fugitive releases (if at all). Such prescriptions are established and effective good practice measures to which the Applicant will be committed through the development consent. Good practice will be followed in all aspects of construction, operation and decommissioning, specifically through a Pollution Prevention Plan (PPP), which will be incorporated into a full CEMP, to be agreed with EA prior to the construction phase.

218. Chapter 10: Hydrology, Hydrogeology, Flood Risk & Ground Conditions of the ES assesses the potential residual effects on watercourses, drainage ditches and coastal waters to be of negligible magnitude and of negligible significance. The assessment concluded that there will be no effect on The Swale SPA/Ramsar Site.

219. In combination with sensitive design, there is confidence in the effectiveness of the mitigation measures embedded in the Outline CEMP to conclude that there will be no adverse effects of the Development due to hydrological changes on the integrity of The Swale SPA/Ramsar Site.

6.1.4 Dust Emission

220. In terms of air quality, LSEs were only identified in the absence of good practice measures to avoid the impacts of dust soiling of habitats within The Swale SPA/Ramsar Site caused by earthworks and track-out during construction and decommissioning.

221. Chapter 16: Air Quality of the ES and the Outline CEMP describe the good practice measures that will be adopted during construction (and decommissioning) to control the generation and dispersion of dust such that significant impacts on neighbouring habitats will not occur. This includes a hierarchy of prevention, suppression then containment.

222. Such measures are routinely and successfully applied to construction projects throughout the UK. They are proven as capable of significantly reducing the potential for adverse nuisance dust effects associated with the various stages of construction work.

223. There is confidence in the effectiveness of the mitigation measures embedded in the CEMP to conclude that there will be no adverse effects of the Development due to dust emissions/deposition on the integrity of The Swale SPA/Ramsar Site.

6.2 In-combination Effects

224. This section compiles information on other plans and projects that might affect the interest features of The Swale SPA/Ramsar Site in combination with the Development. An assessment is made as to whether any adverse effects might occur in-combination that did not result from the Development alone.

225. A long list of other developments has been identified in Chapter 2: Environmental Impact Assessment of the ES. The search criteria included a zone of influence of up to 10 km from the Development site. These include projects at various stages in the planning system, as recommended in 'Planning Inspectorate Advice Note 17: Cumulative Effects Assessment' as those:

- "under construction;
- permitted application(s), whether under the Planning Act 2008 or other regimes, but not yet implemented;
- submitted application(s) whether under the Planning Act 2008 or other regimes but not yet determined;
- projects on the Planning Inspectorate's Programme of Projects where a scoping report has been submitted;
- projects on the Planning Inspectorate's Programme of Projects where a scoping report has not been submitted.
- identified in the relevant Development Plan (and emerging Development Plans - with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited;
- identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward."

226. The planning documents for each in-combination project were examined to extract the information regarding the residual effects of the project on The Swale SPA/Ramsar Site.

227. Table 7 provides each in-combination project's application reference, location, status and type along with a summary of the residual effects assessed for The Swale SPA/Ramsar Site. The list is presented in three tiers as defined by Planning Inspectorate Guidance[56]. In combination developments are grouped into tiers, reflecting the likely degree of certainty

[56] Planning Inspectorate Guidance Note Seventeen on Cumulative Effects Assessment, December 2015. Available online: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf Accessed 12/02/2018

attached to each development, with Tier 1 being the most certain and Tier 3 least certain and most likely to have limited publicly available information to inform assessments.

228. The Environment Agency has published its Medway Estuary and Swale Strategy (MEASS) to manage the risks from flood and coastal erosion over the next 100 years. A HRA for the strategy was carried out by the EA and is considered within this in-combination assessment for the Development.

Table 7: In-combination projects and summary of residual effects on The Swale SPA/Ramsar Site

Cumulative Development Address	Planning Ref	Location and Status	Summary of Development	Summary of residual effects assessed for The Swale SPA/Ramsar Site	Contribution to in-combination effect
TIER 1 SITES					
Land At Oare Gravel Works, Ham Road, Faversham, Kent, ME13 7TS	SW/14/0257	1 km southwest, 272 m west of SPA Permitted	Residential development for 330 dwellings.	Potential adverse impact as a result of increased recreational pressure on the SPA. Incorporation of new greenspace for recreation diverting visitors away from the SPA, with contributions to the Strategic Access Management and Monitoring Plan (SAMM) results in No LSE.	None
Land at, and adjacent to, Site D, Oare Creek, Faversham, Kent, ME13 7TX	KCC/SW/0090/2018	1.1 km southwest, 100 m south of SPA Awaiting Decision	Redevelopment of an existing waste management facility and inclusion of additional land into a waste management use (part retrospective)	Preliminary Ecological Appraisal (PEA) completed by KB Ecology did not undertake HRA, but recommended that proposals are in line with recommendations of the North Kent Environmental Planning Group's access management strategy (the SAMM). Natural England advised that with appropriate financial contribution to the SAMM and inclusion of measures to avoid water quality impacts, there would be no LSE.	None
Land To The East Of Ham Road Faversham Kent ME13 7ER	16/504575/OUT	1.7 km south, 500 m south of SPA Awaiting Decision	Outline application for residential development (30 units) including access and parking, together with public open space and drainage.	PEA completed by KB Ecology did not undertake HRA, but recommended that proposals are in line with recommendations of the North Kent Environmental Planning Group's access management strategy (the SAMM). Natural England advised that with appropriate financial contribution to the SAMM and inclusion of measures to avoid water quality impacts, there would be no LSE.	None

Cumulative Development Address	Planning Ref	Location and Status	Summary of Development	Summary of residual effects assessed for The Swale SPA/Ramsar Site	Contribution to in-combination effect
Land North Of Graveney Road Faversham Kent ME13 8UJ	16/508643/FULL	2.7 km south, 1.2 km SE of SPA Permitted	105 residential units, comprising 72 houses and 33 flats, and associated, parking, landscaping and open space.	No HRA documentation provided by the applicant. Natural England advised that additional recreational pressure on the SPA would be adequately mitigated by appropriate contribution to the SAMM leading to no LSE, therefore could be screened out of AA.	None
Ospringe Brickworks Sumpter Way Faversham Kent ME13 7NT	17/502604/REM / 14/502729/OUT	3.1 km southwest, 1 km south of SPA Permitted / Awaiting Decision	Demolition of brick making and drying shed, 2 stores, existing site office and a cottage; Construction of up to 250 dwellings, new vehicular access and roundabout on Western Link, public open space and associated infrastructure.	Extended Phase 1 Habitat Survey by Soltys Brewster Ecology stated that due to the distance between the project and the European sites, they were of no direct relevance to the appraisal. Online documents available on the Council Planning Portal are not clear with respect to the consideration of impacts on The Swale SPA. However, information available in NE and KWT responses indicates that with appropriate contribution to the SAMM, recreational pressure on the SPA would be adequately mitigated and there would be no LSE.	None
Land At Perry Court London Road Faversham Kent ME13 8YA	15/504264/OUT / 17/506603/REM	3.9 km south, 2.1 km south of SPA Permitted / Awaiting Decision	Outline application for a mixed use development comprising: up to 310 dwellings, 11,875sqm of B1a floorspace; 3,800sqm of B1b floorspace; 2,850sqm of B1c floorspace; a hotel (up to 3,250sqm) of up to 100 bedrooms including an ancillary restaurant; a care home (of up to 3,800sqm) of up to 60 rooms and ancillary floor space; a local convenience store of 200sqm; 3 gypsy pitches and associated landscaping.	Assessment by FCPR identified potential effects as a result of increased recreational pressure on the SPA. Incorporation of 15 ha of green infrastructure for recreation diverting visitors away from the SPA, with contributions to the SAMM results in No Likely Significant Effect. Natural England advised that additional recreational pressure on the SPA would be adequately mitigated by appropriate contribution to the SAMM leading to no LSE.	None

Cumulative Development Address	Planning Ref	Location and Status	Summary of Development	Summary of residual effects assessed for The Swale SPA/Ramsar Site	Contribution to in-combination effect
Land At Preston Fields Salters Lane Faversham Kent ME13 8YD	16/508602/OUT	4.1 km south, 1.9 km south of SPA Awaiting Decision	Outline application for erection of up to 250 dwellings with all matters reserved except for access.	Royal Haskoning DHV assessed all impacts on designated sites as imperceptible and negligible. KCC and NE advised that with appropriate financial contribution to the SAMM, recreational disturbance impacts would be adequately mitigated and there would be no LSE.	None
Land Between Frognal Lane And Orchard View Lower Road Teynham Kent ME9 9TU	16/507689/OUT	6.7 km west, 1.8 km south of SPA Permitted	Outline Application for mixed use development including up to 300 dwellings; employment area; sports ground; open space; access; reserve site for health centre; and associated parking and servicing areas, landscaping, wildlife areas, swales and other drainage / surface water storage areas, and related development.	ESL (Ecological Services Ltd) concluded that there would be no direct effects on the SPA or its qualifying species. Increased recreational disturbance would be mitigated by contribution to the SAMM. KCC and NE advised that with appropriate financial contribution to the SAMM, recreational disturbance impacts would be adequately mitigated and there would be no LSE.	None
Blacketts Farm House Blacketts Road Tonge Sittingbourne Kent ME9 9AU	17/501404/FULL	7.3 km west, 160 m south of SPA Permitted	Proposal to create a wetland complex within a 12ha field to enhance, extend and link the existing available habitats for a suite of wetland species, including water voles, wetland birds and aquatic invertebrates.	NE advised that the proposals would enhance the adjacent designated sites.	Positive contribution
Eurolink V Swale Way Sittingbourne Kent ME9 9AR	15/510589/OUT	8.3 km west, 356 m south of SPA Permitted	Construction of business park), including associated accesses (including alteration to existing northern relief road), parking and servicing areas, landscaping, bunds, surface water storage area, and related development.	The ES concluded no adverse effects on the integrity of the SPA. NE advised no LSE and no requirement for Appropriate Assessment.	None
Land North & West Of Tonge Corner Farm Tonge Corner Road Tonge Kent ME9 9BB	SW/14/0224	8.7 km east, 150 m south of SPA Permitted	Solar farm, comprising the erection of solar arrays of photovoltaic panels and associated equipment.	Assessment by Michael Woods Associates Ltd concluded no residual adverse effects on ecological receptors.	None; already operational and part of baseline

Cumulative Development Address	Planning Ref	Location and Status	Summary of Development	Summary of residual effects assessed for The Swale SPA/Ramsar Site	Contribution to in-combination effect
New Hook Farm Lower Road Minster-on-sea Kent ME12 3SU	16/507943/FULL	8.7 km north west, 1.4 km south of SPA Permitted	Construction of an agricultural anaerobic digestion plant and associated infrastructure.	Ecological appraisal by Ecus concluded that development is unlikely to result in any significant effects on the designated sites. NE advised no LSE.	None
Land At Stones Farm The Street Bapchild Kent ME9 9AD	14/501588/OUT	8.8 km west, 1 km south of SPA Permitted	Hybrid application: Outline consisting of development of 550-600 houses and all necessary supporting infrastructure	Ecosulis carried out an ecological assessment concluding that with provision of open green space, the development would be unlikely to lead to a significant adverse impact on The Swale SPA/Ramsar site and the features for which it has been designated. NE advised that contribution to the SAMM would be required in addition to the provision of natural green space to avoid LSE of increased recreational pressure. S106 states that the developer covenants that appropriate contribution to the SAMM would be made prior to occupation.	None
Parcel H East Hall Farm Sittingbourne Kent ME10 3TJ	15/510149/REM / SW/12/0260	9.5 km west, 550 m SW of SPA Permitted	Approval of Reserved Matters following outline approval SW/12/0260 for the construction of 68 dwellings with associated estate roads, parking and landscaping.	NE advised that with appropriate mitigation and financial contribution to the SAMM, recreational disturbance impacts would be adequately mitigated and there would be no LSE on The Swale SPA.	None
Ceres Court Sittingbourne Kent ME10 3RJ	15/508661/FULL	9.6 km west, 1 km SW of SPA Permitted	Demolition of existing 3 x four storey block of flats and erection of 40 affordable dwelling houses with associated parking and landscaping.	PEA carried out by KB Ecology identified no impacts on designated sites. NE advised no LSE. KCC advised no LSE with appropriate financial contribution to the SAMM if necessary, to avoid recreational disturbance impacts on The Swale SPA.	None
Kemsley Paper Mill (K4) CHP Plant	NSIP	10 km northwest,	A Combined Heat and Power Plant comprising a gas turbine (52MW), Waste Heat Recovery Boilers (105MWth steam)	Currently in examination phase. HRA Report completed by RPS Group concluded that the DCO application for	None, further details regarding the developments

Cumulative Development Address	Planning Ref	Location and Status	Summary of Development	Summary of residual effects assessed for The Swale SPA/Ramsar Site	Contribution to in-combination effect
		350m NW of SPA Accepted for Examination	and Steam Turbine (16MW). Land within the south-eastern part of the Kemsley Paper Mill, Kemsley, Sittingbourne	the Kemsley CHP Plant will not compromise the conservation objectives of Natura 2000 sites, and there will be no adverse effect on site integrity. The HRA report included a comprehensive in-combination assessment, which identified no additional significant effects.	assessed in-combination is provided below.
Land north of Thanet Way, Whitstable, CT5	CA//15/01296	5.89 km east of site, 1.4 km south of SPA Permitted	Outline planning application for the demolition of existing buildings and the erection of up to 400 dwellings including affordable housing, extension to Duncan Down, green infrastructure, multi-use games area, parking, access and associated infrastructure and other ancillary works.	NE advised that with appropriate mitigation and financial contribution to the SAMM, recreational disturbance impacts would be adequately mitigated and there would be no LSE on The Swale SPA.	None
Land off Plover Road Minster-on-sea, Kent, ME12 3BT	18/503855/OUT	1.5 km north of SPA, 12 km NW of site boundary Awaiting decision	Outline application for the residential development on the land off Plover Road, including associated access, parking and landscaping.	NE advised that with financial contribution to the SAMM, recreational disturbance impacts would be adequately mitigated and this would need to be confirmed through appropriate assessment.	None
Land West Of Barton Hill Drive Minster-on-sea Kent ME12 3LZ	18/503135/OUT	970 m north of SPA, 12 km NW of site boundary Awaiting decision	Outline application for the development of up to 700 dwellings and all necessary supporting infrastructure including land for provision of a convenience store / community facility, internal access roads, footpaths, cycleways and parking, open space, play areas and landscaping, drainage, utilities and service infrastructure works.	NE and KCC advised that with provision of greenspace and financial contribution to the SAMM, recreational disturbance impacts would be adequately mitigated and this would need to be confirmed through appropriate assessment.	None
Neatscourt Marshes Brielle Way Queenborough Kent	14/506802/FULL	500 m north of SPA, 13 km NW of site boundary	Erection of a regional distribution centre (Use Class B8) with ancillary office accommodation (use Class B1 (a)) and associated gatehouse and access arrangements, service station, refuse and	Tyler Grange assessed potential adverse impacts from habitat loss, noise, lighting and water quality. Compensatory habitat had already been created at Harty Marshes to mitigate habitat loss and	None

Cumulative Development Address	Planning Ref	Location and Status	Summary of Development	Summary of residual effects assessed for The Swale SPA/Ramsar Site	Contribution to in-combination effect
		Permitted	recycling area, car parking and landscaping	construction and design mitigation measures were appropriate to mitigate other potential effects. NE advised no objection	
Land At Great Grovehurst Farm Grovehurst Road Sittingbourne Kent ME9 8RB	18/502372/EIOUT	880 m south of SPA, 11.3 km NW of site boundary Awaiting decision	EIA Outline application for the development of up to 110 dwellings and all necessary supporting infrastructure including emergency access, roads, footpath and cycle links, open space, play areas and landscaping, parking, drainage and all utilities and service infrastructure works. All detailed matters are reserved for subsequent approval except (a) mitigation of impacts on Great Crested Newts; (b) vehicular access to Grovehurst Road and (c) extraction of brickearth.	HRA Screening Report completed by The Ecology Partnership concluded no LSE. NE and KCC advised that with provision of greenspace and financial contribution to the SAMM, recreational disturbance impacts would be adequately mitigated and this would need to be confirmed through appropriate assessment. Water quality and construction impacts would be suitably mitigated by SuDS provision and CEMP; this would need to be confirmed through appropriate assessment.	None
Land North Quinton Road Sittingbourne Kent ME10 2SX	18/502190/EIHYB	1.1 km north of SPA, 12 km west of site boundary Awaiting decision	Full Planning Application - Phase 1 North - Erection of 91 dwellings accessed from Grovehurst Road, public open and amenity space (including an equipped children's play area) together with associated landscaping and ecological enhancement works, acoustic barrier to the A249, internal access roads, footpaths, cycleways and parking, drainage (including infiltration basins and tanked permeable paving), utilities and service infrastructure works. Full Planning Application - Phase 1 South - Erection of 252 dwellings (including 34 affordable dwellings) accessed from Quinton Road, public open and amenity space, together with associated landscaping and ecological enhancement works, internal access roads, footpaths, cycleways and	HRA Screening Report completed by The Ecology Partnership concluded no LSE. NE and KCC advised that with provision of greenspace and financial contribution to the SAMM, recreational disturbance impacts would be adequately mitigated and this would need to be confirmed through appropriate assessment. Water quality and construction impacts would be suitably mitigated by SuDS provision and CEMP; this would need to be confirmed through appropriate assessment.	None

Cumulative Development Address	Planning Ref	Location and Status	Summary of Development	Summary of residual effects assessed for The Swale SPA/Ramsar Site	Contribution to in-combination effect
			parking, drainage (including infiltration swales, ring soakaways, and permeable paving), utilities and service infrastructure works. Outline Planning Application - for up to 857 new dwellings (including 10% affordable housing, subject to viability), a site of approximately 10 ha for a secondary and primary school, a mixed use local centre, including land for provision of a convenience store, public open and amenity space (including equipped children's play areas), together with associated landscaping and ecological enhancement works, acoustic barrier to the A249, internal access roads, footpaths, cycleways and parking, drainage (including a foul water pumping station and sustainable drainage systems), utilities and service infrastructure. All matters reserved, except for access for the schools site from Grovehurst Road.		
Milton Pipes Site, Gas Road, Sittingbourne, Kent, ME10 2QB	SW/14/503276 OR KCC/SW/0282/2014	1.7 km west of SPA, 11. km west of Site boundary Granted with conditions	Location and operation of an aggregate recycling plant (including weighbridge office and car parking) to process up to 150,000 tpa of construction, demolition and excavation materials from local developments and crushing and screening, via industry standard processes, into recycled secondary aggregates for re-sale into the local market	Ecological assessment by SLR concluded no impacts predicted on The Swale SPA/Ramsar Site.	None
Land off Barge Way, Kemsley Fields Business Park, Kemsley,	SW/15/500348 KCC/SW/0010/2015	1.2 km west of SPA, 11 km	4Evergreen Technologies is proposing to install an advanced thermal conversion and energy facility at the Kemsley Fields Business Park to produce energy and heat	The environmental assessment concluded no significant impact on protected sites. Argus Ecology carried out an assessment of air quality impacts on the SPA and	None, no air quality impacts of the Development.

Cumulative Development Address	Planning Ref	Location and Status	Summary of Development	Summary of residual effects assessed for The Swale SPA/Ramsar Site	Contribution to in-combination effect
Sittingbourne, Kent, ME10 2FE		west of site boundary Granted with conditions	a project known as the Garden of England Energy Project. The project will involve: construction of new buildings to house the thermal conversion and energy generation plant and equipment; construction of associated offices; erection of external plant including storage tanks; and the erection of a discharge stack	concluded there would be no significant ecological impact although critical load of nitrogen deposition would be exceeded cumulatively.	
Countrystyle Recycling Storage Land, Ridham Dock, Iwade, Sittingbourne, Kent, ME9 8SR	SW/16/501484 KCC/SW/0019/2016	300m west of SPA, 10.8 km NW of site boundary	The construction and operation of a gypsum recycling building with plant and machinery to recycle plasterboard and the re-configuration of the existing lorry park to include office/welfare facilities and ancillary supporting activities, including rain water harvesting tanks, container storage, new weighbridges, fuel tanks, hardstanding, safe lorry sheeting access platform and automated lorry wash	SLR completed a HRA, which concluded that subject to construction timing being restricted to the summer months, there would be no adverse effect on integrity of The Swale SPA/Ramsar Site	None
Kemsley IBA Recycling Facility, Ridham Avenue, Sittingbourne, Kent, ME10 2TD	SW/16/507687 KCC/SW/0265/2016	350 m west of SPA, 10.1 km NW of site boundary Granted	The construction and operation of an Incinerator Bottom Ash (IBA) Recycling Facility on land adjacent to the Kemsley Sustainable Energy Plant	RPS concluded no likely significant effects subject to fence screening and provision of alternative habitat for breeding marsh harrier elsewhere.	None
LKM Recycling, Bonham Drive, Eurolink Business Park, Sittingbourne, Kent, ME10 3SY	KCC/SW/0050/2018	1 km west of SPA, 10.2 km west of site boundary Under Construction	A part retrospective application to allow the development and operation of a Materials Recycling Facility (MRF), including construction of a number of external covered storage bays and provision of a site office. The construction of a waste reception/handling building and the installation of materials recycling plant/equipment	No significant noise or air quality impacts were predicted.	None

Cumulative Development Address	Planning Ref	Location and Status	Summary of Development	Summary of residual effects assessed for The Swale SPA/Ramsar Site	Contribution to in-combination effect
Land at Ladesfield, Vulcan Close, Whitstable, CT5 4LZ	CA//18/01280	435 m south of SPA, 4.1 km east of site boundary Registered	Outline application for proposed 14 no. dwellings with all matters reserved except access	Tim Moya Associates concluded no direct impacts on the Swale SPA/Ramsar Site and no significant impacts of increased recreational pressure. KCC Ecology response advised that contribution to the SAMM would be required and tested through appropriate assessment.	None
TIER 2 SITES					
Land South and East Of Sittingbourne Kent	Scoping - 17/506551/EIASCO	8.7km east, 1.9 km south of SPA Unknown	Mixed-use development including up to 11,250 residential dwellings, commercial space, new infrastructure to create new junctions onto the M2 and A2 joined by a new relief road, new retail and health facilities, leisure facilities, educational facilities and community facilities at land to the south and east of Sittingbourne.	NE scoping response identifies potential impacts on designated sites through changes in air quality and increased recreational pressure. This application is substantially larger than other residential developments in the impact risk zone and NE advise that avoiding adverse effects on the integrity of the SPA would require site specific measures, in addition to the appropriate SAMM contributions.	None predicted with appropriate mitigation
TIER 3 SITES					
None considered					

229. The DCO application for the Kemsley Paper Mill (K4) CHP Plant[23] includes a HRA Report that was most recently updated in June 2018. The in-combination assessment provided therein comprised a cumulative assessment of the scheme 'with proposed developments near the [Kemsley Paper Mill] site that are currently in the planning process or have been approved but are not yet constructed'. A summary of the in-combination developments reviewed in the Kemsley Paper Mill (K4) CHP Plant HRA Report is provided here in order to demonstrate that there are no other projects likely to have additional impacts beyond those described above in Table 7 that would lead to significant effects on The Swale SPA/Ramsar Site.

- SW/10/444 Kemsley K3 SEP Plant: construction and operational disturbance to breeding marsh harrier mitigated by screening and alternative habitat provided resulting in no in-combination effects. No in-combination effects are therefore predicted for the Development.
- EN010083 Kemsley K3 Wheelabrator Power Upgrade: construction and operational disturbance to breeding marsh harrier mitigated by screening and alternative habitat provided resulting in no in-combination effects. No in-combination effects are therefore predicted for the Development.
- 16/507687/COUNTY Incinerator Bottom Ash Recycling Facility at Kemsley: construction and operational disturbance to breeding marsh harrier mitigated by screening and alternative habitat provided resulting in no in-combination effects. No in-combination effects are therefore predicted for the Development.
- 16/501484/COUNTY Gypsum recycling building 650 m north of Kemsley: water quality changes and wintering bird disturbance during construction. Construction timed to avoid winter so no disturbance to wintering birds. No in-combination effects are therefore predicted for the Development.
- SW/11/1291 Kemsley Anaerobic Digestion (AD) Plant: cumulative air quality impacts below critical threshold and disturbance to marsh harrier mitigated by provision of alternative habitat. No in-combination effects are therefore predicted for the Development.
- SW/12/1001 Access road extension for Kemsley Paper Mill: no additional in-combination impacts beyond those assessed for Kemsley K3 SEP Plant. No in-combination effects are therefore predicted for the Development.
- 14/500327/OUT 8000 m2 Class B1/B2 floorspace with extension to Milton Country Park: potential cumulative effects associated with increased recreational use were dismissed because Kemsley K4 has no recreational disturbance impacts. The same applies for the Development, therefore no in-combination effects are predicted.
- 14/502737/EASCO and 16/506935/COUNTY various industrial uses at Ridham Docks: variations to existing conditions, none of which were likely to have cumulative effects with Kemsley K4. No in-combination effects are therefore predicted for the Development.
- SW/15/500348 Thermal conversion and energy facility: cumulative air quality impacts were assessed as unlikely. There are no air quality impacts associated with the Development therefore there are no in-combination effects with the Development.
- 17/505073/FULL Tile Factory: slight increase in noise not considered to negatively affect birds using the SPA/Ramsar Site. No in-combination effects are therefore predicted for the Development.
- 16/506193/ENVSCR outline application for 275 dwellings: effects likely to be associated with increased recreational access which would be mitigated through contribution to the SAMMS. No in-combination effects are therefore predicted for the Development.
- 17/503713/ENVSCR new residential development of 440 dwellings: effects likely to be associated with increased recreational access which would be mitigated through contribution to the SAMMS. No in-combination effects are therefore predicted for the Development.

- 18/500257/EIFUL new residential development of 155 dwellings: potential adverse effects likely to be associated with increased recreational access which would be mitigated through contribution to the SAMMS and provision of new greenspace. No in-combination effects are therefore predicted for the Development.
- 18/500393/FULL gas power plant: effects likely to be associated with changes in air quality, assessed as likely to be within relevant thresholds. No in-combination effects are therefore predicted for the Development.
- 16/506014/EIASCO sustainable urban extension with 1,100 new dwellings: potential adverse effects are associated with increased recreational access which would be mitigated through contribution to the SAMMS and new greenspace. No in-combination effects are therefore predicted for the Development.
- 16/501228/FULL new baling plant building at Kemsley Mill: no LSE predicted. No in-combination effects are therefore predicted for the Development.
- SW/12/0816 relocation of transport depot: potential noise impacts were screened out and air quality impacts were mitigated. No in-combination effects are therefore predicted for the Development.
- SW/12/0224 Solar farm at Tonge Corner (already included in Table 7): already operational; no adverse effects were predicted. No in-combination effects are therefore predicted for the Development.
- SW/12/1211 Materials recycling facility and waste transfer station: no adverse impacts of noise or air quality were predicted. No in-combination effects are therefore predicted for the Development.

230. The aim of the MEASS HRA is to identify any aspects of the Strategy that would have the potential to cause a likely significant effect on Natura 2000 or European sites and to begin to identify appropriate mitigation strategies where such effects were identified. In summary, the MEASS HRA identified adverse effects on the integrity of The Swale SPA/Ramsar site and sets out the required compensatory measures, having concluded there are IROPI and no suitable alternatives. The Development site at Cleve Hill is identified as a managed realignment site for Epoch 2 of the strategy (20-50 years). The MEASS HRA states that if the solar park is developed, managed realignment plans at Chetney Marshes could be accelerated to provide the saltmarsh and intertidal habitats necessary to compensate for coastal squeeze during Epoch 1 (0-20 years), with further compensation assessed and developed at the individual project level to compensate for associated loss of designated freshwater habitat. Managed realignment could be undertaken at the Cleve Hill site in the latter part of Epoch 2 (20-50 years) following decommissioning of the solar park after 40 years in order to compensate for loss of intertidal habitats in Epoch 2, if it is demonstrated by the Environment Agency that managed realignment at the site at that time is viable (as secured by a Requirement of the draft DCO). The updated in-combination assessment in the RIAA concludes that there is no AEoI of The Swale SPA/Ramsar as a result of the solar park in combination with the MEASS, as the solar park does not contribute to the AEoI predicted by the MEASS. Under either scenario (with or without solar park) the MEASS identifies an approach to providing the required compensatory measures under the Habitats Regulations.

6.2.1 Conclusion of In-combination Assessment

231. No in-combination effects have been identified that would elevate the magnitude of the effects of the Development to a level that would be significant.

7 TRANSBOUNDARY CONSIDERATIONS

232. As the Development is a NSIP that falls within the remit of an EIA development, it will be necessary for the Secretary of State (SoS) to determine whether or not the Development is likely to have significant effects on Natura 2000 sites or candidate sites in other European Member States. These are termed 'transboundary effects'.

233. Whether or not a development is likely to result in transboundary effects is determined by a screening process undertaken by the Planning Inspectorate on behalf of the SoS.

234. PINS issued the Applicant with notification of the outcome of the first transboundary screening on 13th July 2018 following the Request for a Scoping Opinion and publication of the Preliminary Environmental Information Report:

"Under Regulation 32 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations) and on the basis of the current information available from the Applicant, the Inspectorate is of the view that the Proposed Development is not likely to have a significant effect on the environment in another EEA State."

235. Information is provided here to assist the Inspectorate in continuing to fulfil this duty.

236. The Swale SPA/Ramsar includes a number of migratory species of bird. During consultation, Natural England have advised that the non-breeding interests of the SPA include 22 species that qualify in their own right as cited species or as important parts of the non-breeding bird assemblage:

- Dark-bellied brent goose
- European white-fronted goose
- Shelduck
- Shoveler
- Wigeon
- Pintail
- Teal
- Little egret
- Oystercatcher
- Avocet
- Lapwing
- Golden plover
- Grey plover
- Curlew
- Bar-tailed godwit
- Black-tailed godwit
- Knot
- Ruff
- Sanderling
- Dunlin
- Green sandpiper
- Greenshank

237. These species are migratory and will occur as qualifying interests in their own right, or as important assemblage features, in numerous Natura 2000 sites in other EEA States. In theory, therefore, there is a risk of potential transboundary, or long-range, effects. However, DECC (now BEIS) guidelines relating to transboundary effects[57] make it clear that proximity is an important factor and that transboundary effects are primarily concerned with offshore wind energy developments where there can be effects on highly mobile seabird or marine mammal species associated with protected sites in other EEA States. This implies that the qualifying feature potentially affected should originate from the protected site in the other EEA State, rather than the idea that the qualifying feature potentially affected might also spend some of its time at a protected site in another EEA State.

[57] https://www.gov.uk/government/publications/guidelines-on-the-assessment-of-transboundary-impacts-of-energy-developments-on-natura-2000-sites-outside-the-uk

238. The Development has the potential to affect the qualifying features of The Swale SPA, through short-term disturbance during construction and through long-term displacement from foraging/resting areas in functionally-linked land during the operational lifetime of the Development. The closest Natura 2000 site outside the UK that includes some of the same features that might be affected by the Development is located approximately 50 km away in coastal France (Cap Gris-Nez). The features potentially affected by the Development are directly associated with The Swale SPA and it is not considered feasible that migratory birds directly associated with Natura 2000 sites in other EEA States at least 50 km away would be disturbed or suffer from loss of foraging or resting opportunities in any way that would result in likely significant effects on those Natura 2000 sites.

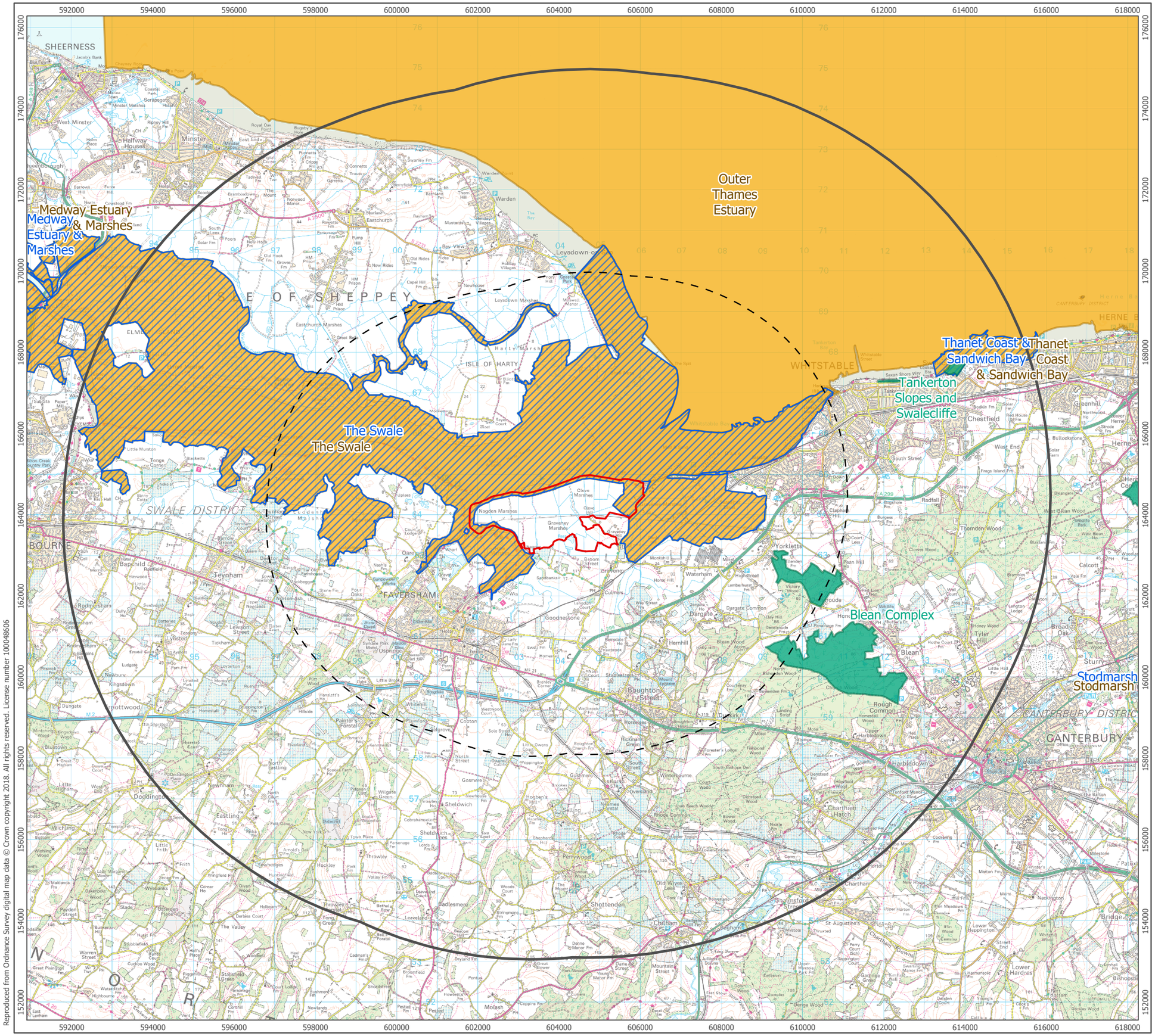
239. As such, the Applicant is of the view that the Development is not likely to have a significant effect on Natura 2000 sites or candidate sites in another EEA State.

8 CONCLUSIONS OF RIAA

240. Following embedded design measures and applied construction noise mitigation measures as outlined above and detailed in the Outline SPA CNMP (Document Reference 6.4.12.10; noise mitigation) and Outline LBMP (Document Reference 6.4.5.2; AR HMA habitat loss mitigation), it is concluded that the DCO application for the Cleve Hill Solar Park, alone and in combination with other plans or projects, will not undermine the conservation objectives of The Swale SPA/Ramsar Site in a way that will prevent the site contributing to the aims of the Birds Directive. The Development is not predicted to adversely affect the integrity of the Swale SPA/Ramsar Site.

241. There are no LSEs identified for any other European Sites.

FIGURES



P:\Projects\Ornithology\Projects\2238 Cleve Hill\HRA.aprx\2238-REP-229 Fig01 Site Location and European Sites

CLEVE HILL SOLAR PARK

ARCUS

- Site Boundary
- 10 km Study Area
- 5 km Search Area
- Ramsar Site
- Special Protection Area
- Special Area of Conservation

1:90,000 Scale @ A3

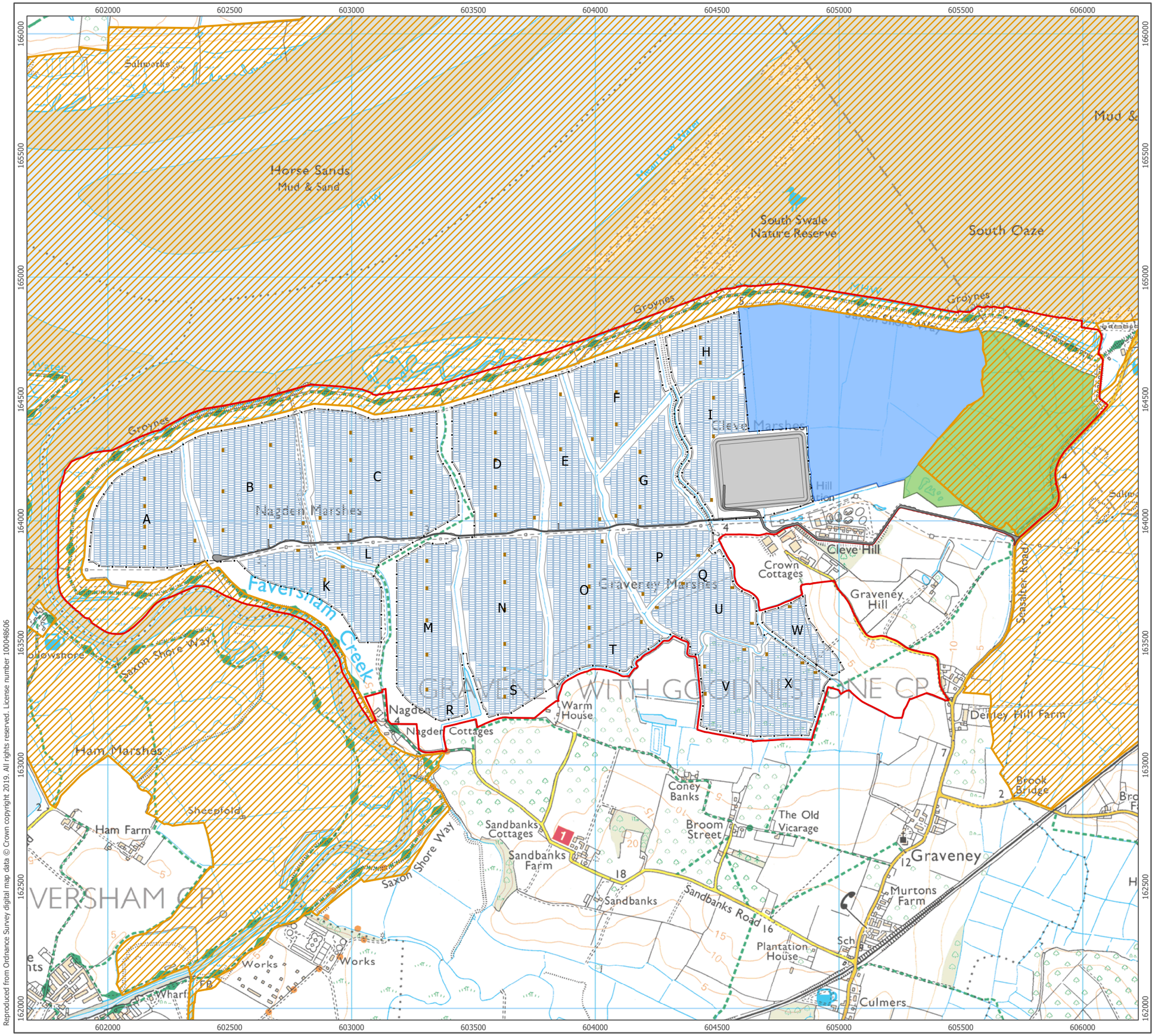
0 2 4 km

NORTH

Produced By: SC	Ref: 2238-REP-229
Checked By: MA	Date: 07/11/2018

Site Location and European Sites
Figure 1

Cleve Hill Solar Park
RIAA



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CLEVE HILL SOLAR PARK

ARCUS

- Site Boundary
- The Swale SPA and Ramsar Site
- Freshwater Grazing Marsh HMA
- Arable Reversion HMA

Site Layout

- Transformer
- Solar Panels
- Boundary Fence
- Proposed Compound
- Haul Road

1:15,000 Scale @ A3

0 250 500 m

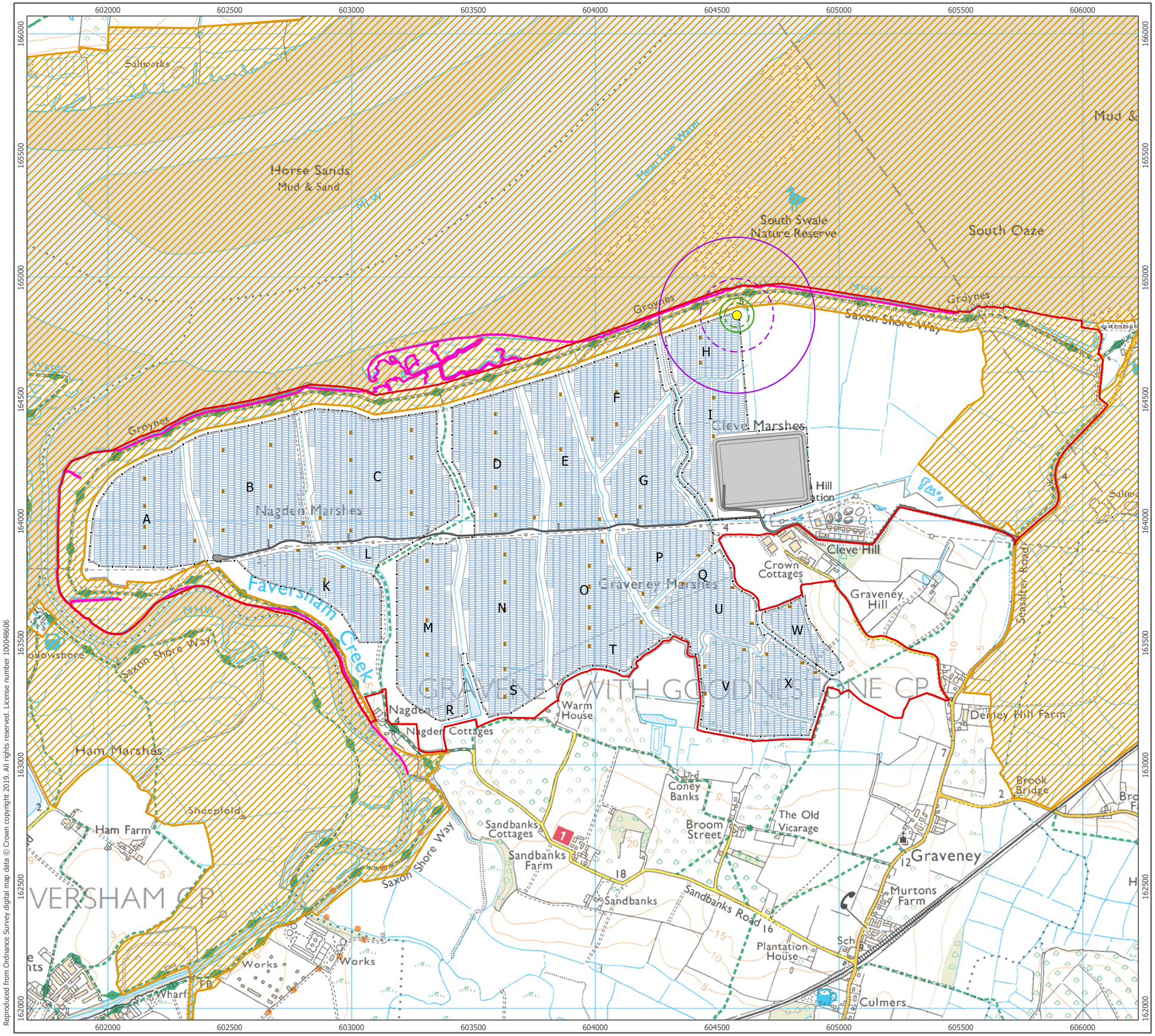
NORTH

Produced By: SC	Ref: 2238-REP-230 Rev B
Checked By: MA	Date: 17/06/2019

Proposed Development and The Swale SPA/Ramsar Site

Figure 2

Cleve Hill Solar Park RIAA



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P:\Projects\Ornithology\Projects\2238 Cleve Hill\HRA.aprx\2238-REP-231 Fig03 Wintering Bird Noise Threshold

CLEVE HILL SOLAR PARK

ARCUS

- Site Boundary
- The Swale SPA and Ramsar Site

Indicative Noise Contours
Piling Noise (LAmax)
- 70 dBA (70 m)
- 55 dBA (320 m)

Other Construction Noise (LAeq)
- 70 dBA (50 m)
- 55 dBA (150 m)
- MHWS

Site Layout
- Transformer
- Solar Panels
- Boundary Fence
- Proposed Compound
- Development Parcel
- Haul Road

1:15,000 Scale @ A3

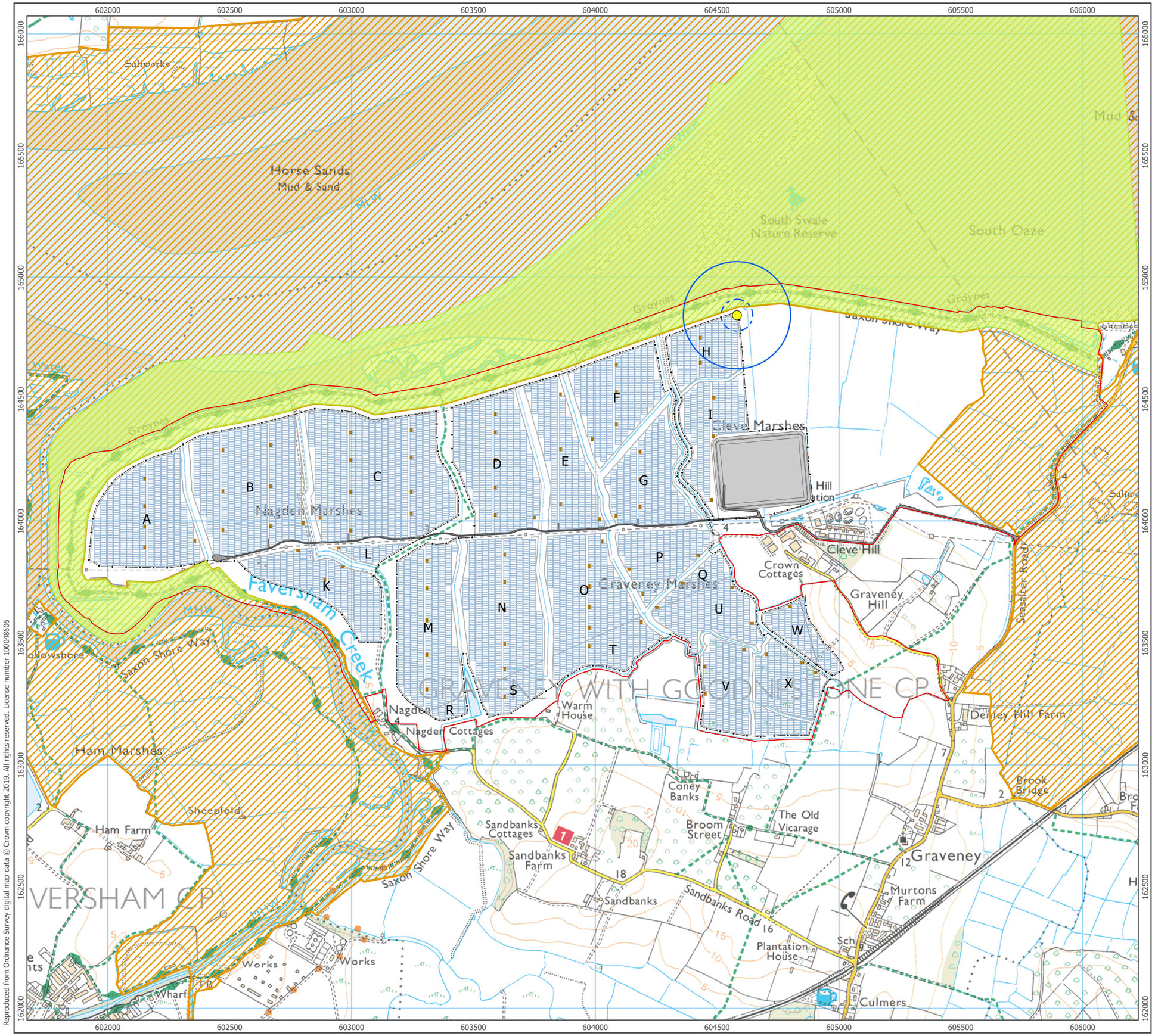
0 250 500 m

NORTH

Produced By: SC	Ref: 2238-REP-231
Checked By: MA	Date: 12/11/2019

Wintering Bird Noise Threshold
Figure 3

Cleve Hill Solar Park
RIAA



P:\Projects\Ornithology\Projects\2238 Cleve Hill\HRA.aprx\2238-REP-232 Fig04 Breeding Bird Noise Threshold

CLEVE HILL SOLAR PARK

ARCUS

- Site Boundary
- The Swale SPA and Ramsar Site
- South Bank of The Swale LNR
- Piling Location

Indicative Noise Contours

Piling Noise (LAmax)

- 65 dBA (220 m)

Other Construction Noise (LAeq)

- 65 dBA (65 m)

Site Layout

- Transformer
- Solar Panels
- Boundary Fence
- Proposed Compound
- Development Parcel
- Haul Road

1:15,000 Scale @ A3

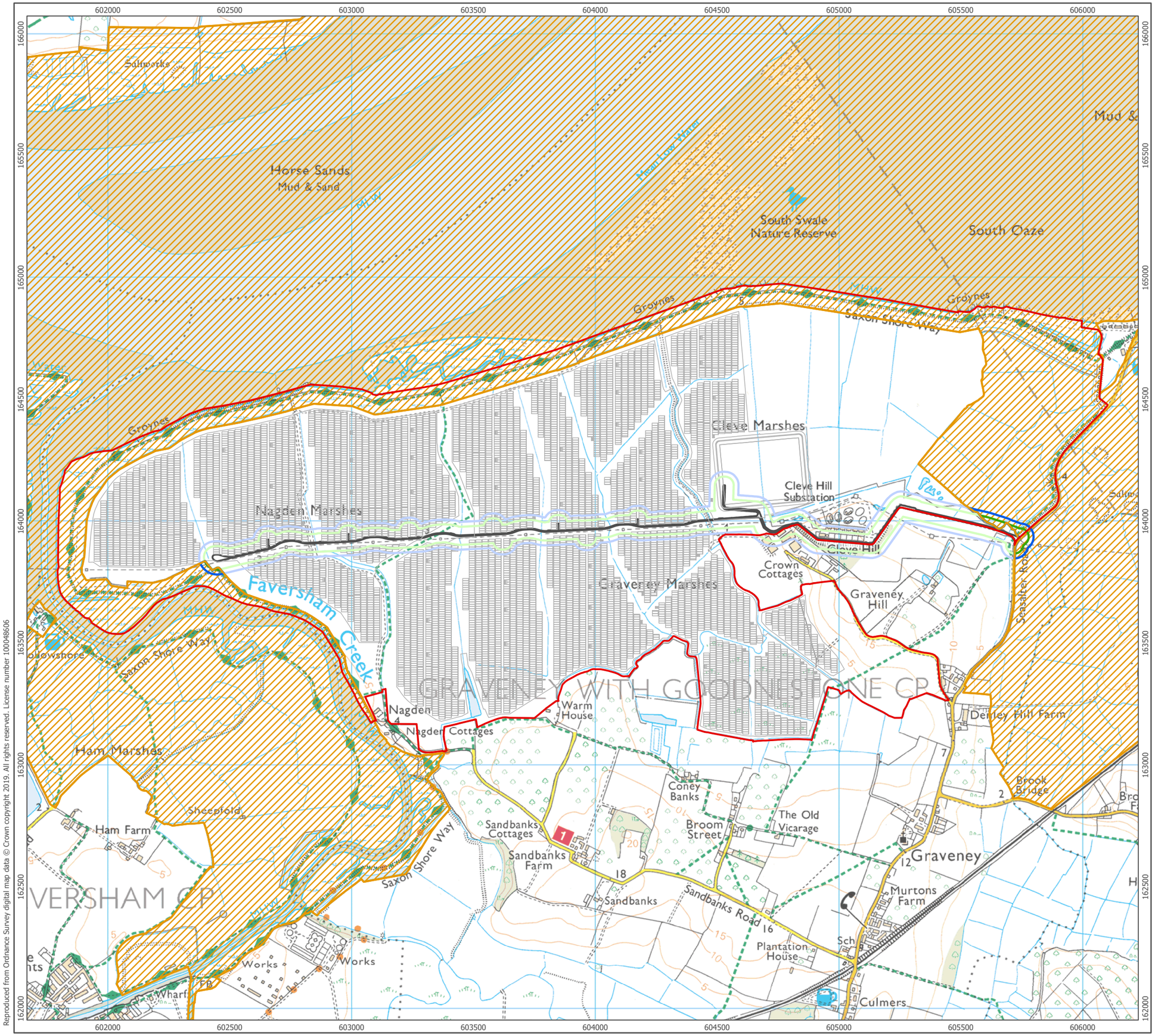
0 250 500 m

NORTH

Produced By: SC	Ref: 2238-REP-232
Checked By: MA	Date: 12/11/2019

Breeding Bird Noise Threshold
Figure 4

Cleve Hill Solar Park
RIAA



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CLEVE HILL SOLAR PARK

ARCUS

- Site Boundary
- The Swale SPA and Ramsar Site

Haul Road - LAmax

- 65 dB (55 m)
- 70 dB (35 m)
- Site Infrastructure
- Haul Road

1:15,000 Scale @ A3

0 250 500 m

NORTH

Produced By: SC	Ref: 2238-REP-233
Checked By: MA	Date: 12/11/2019

Haul Road Zone of Noise Influence
Figure 5

Cleve Hill Solar Park
RIAA

APPENDIX 1 - NATURAL ENGLAND INITIAL ADVICE (DECEMBER 2016)

Date: 26 January 2017
Our ref: DAS/11342/198096
Your ref: 2238 Cleve Hill

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BY EMAIL ONLY
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Dear Mike

Discretionary Advice Service (Charged Advice)
DAS/11342/198096
Development proposal and location: Cleve Hill Solar Photovoltaic Array, near Faversham, Kent

Thank you for your consultation on the above dated 06 October 2016, which was received on the same date.

This advice is being provided as part of Natural England's Discretionary Advice Service. Arcus Consultancy Services has asked Natural England to provide advice upon:

- The scope and results of the baseline ecological and ornithological surveys completed
- Implications of the above for the proposal, particularly in relation to The Swale Special Protection Area (SPA).
- At the meeting on 14 December 2016, a number of detailed questions were posed, which are considered in an annex to this letter.

This advice is provided in accordance with the Quotation and Agreement dated 17 November 2016.

The following advice is based upon the information within the following documents:

1. Cleve Hill Solar PV Array Ornithology Consultation Report (Arcus, Dec 16)
2. Cleve Hill Solar PV Array Non-avian Ecology Summary Report (Arcus, Dec 16)
3. Note of meeting held on 14 Dec 16 (Arcus, sent 23 Dec 16)

As the proposal is in the early stages of development a detailed layout is not yet available. Therefore the Potential Development Area (PDA) shown in figure 1 of the Ornithology Report, encompasses the entire area in which development could occur. It is recognised that the proposal may be refined to take account of constraints, including ecological and landscape considerations, during the course of the Environmental Impact Assessment.

Designated Nature Conservation Sites

The Swale Special Protection Area (SPA) and Ramsar site

The location of the proposal, outside, but adjacent to, The Swale SPA/Ramsar site, means that it has the potential to impact the features[1] for which the sites are designated, for example:

[1] See Annex 2 for advice on the species which make up the wintering and breeding bird assemblages, and Ramsar features.

- Disturbance to birds using adjacent habitats during construction, any maintenance activities during operation, and during decommissioning;
- Loss of functionally linked habitat (ie. land outside the designated site but which is necessary for the ecological or behavioural functioning, in the relevant season, of a qualifying feature for which the site has been designated);
- Potential for the solar panels to act as an ecological sink to any Ramsar invertebrates that lay they eggs on water.

Scope of surveys

Assessment of the scale and importance of the potential impacts identified above on the features of the designated sites depends on robust baseline survey data. The methodology for each of the surveys undertaken are set out in the Ornithology Report, and were discussed at the meeting on 14 December 2016.

I am satisfied that as the wintering bird surveys cover three winters (recognising that although the first winter only included Jan – Mar 14, this would have covered the time when, from our experience, the larger numbers of birds are found in the Swale), this is sufficient survey effort to gain a picture of bird use on the PDA and surrounds. At the meeting, Arcus clarified that, although there was a change in methodology for the surveys carried out between Sept 15 and Oct 16, the results allow comparison across the different wintering periods. The inclusion of flight activity surveys undertaken between Nov 15 and Oct 16, and nocturnal surveys in the winter 15-16 are welcomed. These additional surveys are helpful in understanding how key bird species use the area.

I am also satisfied that as the breeding bird surveys covered three seasons, this is sufficient. The inclusion of breeding raptor and owl surveys, are welcomed, which aid understanding of the significance of the site for these species groups.

My view is, therefore, that the coverage of surveys completed is sufficient to enable a thorough assessment of the potential impacts on SPA/Ramsar birds, and other important bird species.

Survey Results

It is recognised that the results presented in the Ornithology Report are in summary form and that further information and analysis will be presented in the Habitats Regulations Assessment and Environmental Statement. Therefore, the following are initial comments, and I will comment in detail at later stages in the process.

Taking each of the potential impacts identified above in turn:

<u>Potential disturbance to birds</u>

The Ornithology Report shows that the intertidal area of the Swale and Faversham Creek, adjacent to the PDA, is used by a wide range of wintering SPA/Ramsar birds at both high and low tide. Therefore, there are potentially significant numbers of birds that may be impacted by visual and noise disturbance during construction. Depending on the predicted maintenance needs for the array, there may also be potential for disturbance to occur during operation.

I recommend considering whether disturbance during construction can be avoided by timing works outside the wintering period. Alternatively, the use of less disturbing methods of construction, eg avoiding impact piling, should be explored.

<u>Loss of functionally linked land for wintering birds</u>

It is now well-established that where European site qualifying features might rely on nearby but undesignated functionally linked land, then this is within the scope of Habitats Regulations Assessments (HRAs) of new plans or projects.

The Ornithology Report shows that dark-bellied brent geese were recorded within the PDA in all three winters, and our site visit demonstrated that they were present in this winter. Therefore, it can be concluded from the summary data that brent geese regularly use the PDA, and hence my view is that it is functionally linked to the SPA.

The Ornithology Report also shows that the PDA is used by wintering waders including dunlin, golden plover, lapwing and curlew. These are species that qualify in their own right (dunlin) or as part of the wintering assemblage (see Annex 1), therefore, should be included in the assessment of the loss of functionally linked land.

At the meeting on 14 December Arcus outlined the intention to use 'bird days' to quantify the importance of the site to different species. My view is that this seems a sensible way to assess how important the PDA is to the functioning of the SPA.

Loss of functionally linked land for breeding birds

As outlined in Annex 1, The Swale SPA is designated for its assemblage of breeding birds of grazing marsh, which is made up of species named on the citation and species 'characteristic' of the habitat. The Ornithology Report indicates that a number of these species have been recorded breeding within the PDA, eg: marsh harrier, cuckoo, yellow wagtail, reed bunting and lapwing (from tables 5 and 9).

In assessing whether the PDA is functionally linked to the SPA for any of the assemblage breeding birds, you should consider whether the PDA is necessary for the ecological or behavioural functioning of the species, as opposed to supporting species that are typical of grazing marsh habitat but also widespread and common. Based on the summary information presented, my initial view is that the PDA may be functionally linked to the SPA for marsh harrier, as part of the breeding bird assemblage. This is because, although a breeding marsh harrier territory was confirmed only in 2014, the flight activity surveys show that the PDA is regularly used for foraging. Therefore, the PDA could be important for the ecological functioning of the marsh harrier component of the breeding bird assemblage, by providing important foraging habitat. However, the SPA populations of other typical grazing marsh species present within the PDA, for example reed bunting, are probably not dependant on the PDA for their ecological functioning, and therefore, are not functionally linked.

Potential for solar panels to act as an ecological sink to Ramsar invertebrates

There has been some research[2] that has demonstrated that insects that lay their eggs in water mistake solar panels for water bodies and try and lay their eggs on them. This can then impact their reproductive biology. The paper goes on to suggest that using white strips to break up the panel can reduce their attractiveness to insects.

The Swale Ramsar site was designated for its wetland plant and invertebrate communities. The citation mentions one species that lays its eggs in water and is attracted to horizontally polarised light: the dolichopodid fly *Campsicnemus majus*.

The Non-Avian Ecology Report states that a relatively low number of invertebrates were recorded for the size of site. Therefore, the risk to polarotactic insects may be low. However, my view is that the potential risk to the wetland invertebrate community should be considered in the HRA.

Protected landscape

The PDA is within 5km of the Kent Downs AONB. Therefore, if there are any sight lines from the AONB to the PDA, I would expect these viewpoints to be included in a Landscape and Visual Impact Assessment. However, unless any impacts on the AONB were assessed as significant, Natural England would not give bespoke landscape advice at the examination stage.

[2] Horvath et al. 2010. Reducing the maladaptive attractiveness of solar panels to polarotactic insects. Conservation Biology 24 (6) pp. 1644 - 1653

At the meeting on 14 December, Arcus asked for guidance to inform the landscape assessment. The following is Natural England's general advice on the scope of EIAs:

Landscape and visual impacts
Natural England would wish to see details of local landscape character areas mapped at a scale appropriate to the development site as well as any relevant management plans or strategies pertaining to the area. The EIA should include assessments of visual effects on the surrounding area and landscape together with any physical effects of the development, such as changes in topography.

The EIA should include a full assessment of the potential impacts of the development on local landscape character using landscape assessment methodologies[3]. We encourage the use of Landscape Character Assessment (LCA), based on the good practice guidelines produced jointly by the Landscape Institute and Institute of Environmental Assessment in 2013. LCA provides a sound basis for guiding, informing and understanding the ability of any location to accommodate change and to make positive proposals for conserving, enhancing or regenerating character, as detailed proposals are developed.

Natural England supports the publication *Guidelines for Landscape and Visual Impact Assessment*, produced by the Landscape Institute and the Institute of Environmental Assessment and Management in 2013 (3rd edition). The methodology set out is almost universally used for landscape and visual impact assessment.

In order to foster high quality development that respects, maintains, or enhances, local landscape character and distinctiveness, Natural England encourages all new development to consider the character and distinctiveness of the area, with the siting and design of the proposed development reflecting local characteristics. The EIA process should detail any layout alternatives together with justification of the selected option in terms of landscape impact and benefit.

The assessment should also include the cumulative effect of the development with other relevant existing or proposed developments in the area. In this context Natural England advises that the cumulative impact assessment should include other proposals currently at Scoping stage. Due to the overlapping timescale of their progress through the planning system, cumulative impact of the proposed development with those proposals currently at Scoping stage would be likely to be a material consideration at the time of determination of the planning application.

The assessment should refer to the relevant National Character Areas[4] which can be found on our website. Links for Landscape Character Assessment at a local level are also available on the same page.

Protected Species

This proposal, as presented, has the potential to affect species protected under European or UK legislation. The Non-avian Ecology Report confirms the presence of a small population of great crested newts, foraging and commuting bats, reptiles and water voles. Natural England has produced Standing Advice which is available on its website. Whilst this advice is primarily designed to assist local planning authorities better understand the information required when assessing the impact of developments upon protected species, it also contains a wealth of information to help applicants ensure that their applications comply with good practice guidelines and contribute to sustainable development. Please refer to this Standing Advice for further information on what information the authority may require in terms of survey and mitigation proposals.

Further information can also be obtained from The Institute of Ecology and Environmental

[3] https://www.gov.uk/guidance/landscape-and-seascape-character-assessments
[4] http://www.naturalengland.org.uk/publications/nca/default.aspx

Management, The Bat Conservation Trust and Biodiversity Planning Toolkit.

Biodiversity enhancements

Guidance on enhancements has been produced by the BRE Solar Centre[5]. In particular, solar arrays offer opportunities for enhancements through the management of the grassland between the panels. As discussed at our meeting on 14 December, the sowing of a seed mix to benefit invertebrates, including bumblebees, would be valuable in this location. In addition, the presence of ditches within the PDA offers the opportunity to enhance the water vole population of the site.

This letter concludes Natural England's Initial Advice within the Quotation and Agreement dated 17 November 2016.

As the Discretionary Advice Service is a new service, we would appreciate your feedback to help shape this service. We have attached a feedback form to this letter and would welcome any comments you might have about our service.

☒ 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 completeness of, nor will any express or implied warranty be given for, the advice. This exclusion does not extend to any fraudulent misrepresentation made by or on behalf of Natural England.

Yours sincerely

Alison Giacomelli
Sussex and Kent Area Team

Cc commercialservices@naturalengland.org.uk

[5] https://www.bre.co.uk/filelibrary/pdf/Brochures/NSC-Biodiversity-Guidance.pdf

Annex 1
European Protected Species

A licence is required in order to carry out any works that involve certain activities such as capturing the animals, disturbance, or damaging or destroying their resting or breeding places. Note that damage or destruction of a breeding site or resting place is an absolute offence and unless the offences can be avoided (e.g. by timing the works appropriately), it should be licensed. In the first instance it is for the developer to decide whether a species licence will be needed. The developer may need to engage specialist advice in making this decision. A licence may be needed to carry out mitigation work as well as for impacts directly connected with a development. Further information can be found in Natural England's 'How to get a licence' publication.

If the application requires planning permission, it is for the local planning authority to consider whether the permission would offend against Article 12(1) of the Habitats Directive, and if so, whether the application would be likely to receive a licence. This should be based on the advice Natural England provides at formal consultation on the likely impacts on favourable conservation status and Natural England's guidance on how the three tests (no alternative solutions, imperative reasons of overriding public interest and maintenance of favourable conservation status) are applied when considering licence applications.

Natural England's pre-submission Screening Service can screen application drafts prior to formal submission, whether or not the relevant planning permission is already in place. Screening will help applicants by making an assessment of whether the draft application is likely to meet licensing requirements, and, if necessary, provide specific guidance on how to address any shortfalls. The advice should help developers and ecological consultants to better manage the risks or costs they may face in having to wait until the formal submission stage after planning permission is secured, or in responding to requests for further information following an initial formal application.

The service will be available for new applications, resubmissions or modifications – depending on customer requirements. More information can be found on Natural England's website.

Annex 2

The Swale SPA

The HRA of the Cleve Hill Solar Farm should consider the potential impacts of the project against the published Conservation Objectives[6] for The Swale. Supplementary advice on the Conservation Objectives is also available[7], and should be used in conjunction with the advice in this letter.

Information on The Swale is also found on the standard data form[8] on JNCC's website. Where there is a discrepancy between the features listed on the standard data form and the citation, the latter is the document to assess the project against. This approach has been tested through the NSIP examination of the Richborough Connection Project.

At the meeting on 14 December, Arcus requested advice on the HRA requirements with reference to the SPA citation, particularly in regard to the breeding and wintering assemblages.

Non-breeding assemblage

The Swale citation and Conservation Objectives list one of the qualifying features as the 'waterbird assemblage'. All 'waterbirds' (as defined by the Ramsar convention) form part of the assemblage. It is the assemblage as a whole that is the feature to be assessed within the HRA, with reference to the Conservation Objectives.

The integrity of the assemblage (for both breeding and non-breeding) is generally recognised as a product of both abundance and diversity. However, as it is impractical to list all the waterbird species and assess each one individually, it is generally recognised that some constituent species contribute more towards the integrity of the overall assemblage than others, and the assessment should therefore, focus on these.

Recognising this, and as a tool to assist with assessing the ecological impacts of any plan/project on the waterbird assemblage feature, it is useful to identify the 'main component species'. These are:

(i) Those present in nationally important numbers and
(ii) Migratory species present in internationally important numbers (which may also be qualifying features on their own right – although this is not always the case) and
(iii) Those that occur in the assemblage in numbers >2000 individuals and
(iv) Named component species otherwise listed on SPA citation

For (ii) where qualifying features are assessed individually, there is no requirement to repeat for the assemblage assessment. However, the possibility that any effects could have a cumulative effect with any effects for other component species, that might then accumulate to be significant for the assemblage as a whole, should be explored in the HRA.

The Swale citation states that it qualifies under Article 4.2 of the Birds Directive as it regularly supports over 20,000 waterfowl, with an average peak count of 57,600 birds recorded in the five winter period 1986/7 to 1990/1. It states that this total includes 17 species in internationally or nationally important numbers, but does not name them.

In this situation, and as a matter of best practice, the most recent data from BTO's Wetland Bird Survey (WeBS) should be considered to augment the information provided in the citation. Looking at the most recent (five year peak mean 2010/11 – 2014/15) WeBS counts for the Swale estuary[9], the

[6] http://publications.naturalengland.org.uk/publication/5745862701481984?category=6528471664689152
[7] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9012011&SiteName=swale&countyCode=&responsiblePerson=
[8] http://jncc.defra.gov.uk/pdf/SPA/UK9012011.pdf
[9] Frost, T.M., *et. al.* 2016. *Waterbirds in the UK 2014/15: The Wetland Bird Survey*. BTO/RSPB/JNCC. Thetford. http://www.bto.org/volunteer-surveys/webs/publications/webs-annual-report

following 20 species currently occur in internationally (*) or nationally important numbers (criteria i and ii, above):

European white-fronted goose	Dark-bellied brent goose
Shelduck	Wigeon
Teal	Pintail
Shoveler	Little egret
Oystercatcher	Avocet
Golden plover	Grey plover
Lapwing	Sanderling
Dunlin	Ruff
Black-tailed godwit*	Bar-tailed godwit
Green sandpiper	Greenshank

In addition, knot is found in numbers greater than 2000 (criterion iii).

The current five year peak mean for curlew on the Swale estuary is 1137 (2010/11- 2014/15), which is below the threshold for national importance. However, the previous five year peak mean was 1413 (2009/10 – 2013/14) which was above the threshold for national importance. Taking into account the poor conservation status of this species and the likelihood that curlew will use functionally linked land for feeding purposes, I advise treating curlew as a 'main component species' within the assemblage.

This produces a total of 22 main component species.

Breeding bird assemblage

The identification of main component species for the breeding assemblage is slightly different to that for wintering. The main component species are:

(i) those bird species 'characteristic' of the particular SPA bird habitat; and
(ii) 'named components' listed on the SPA citation.

The Swale citation names certain species in the 'typical assemblage of breeding species' for grazing marsh, some of which are widespread and common (criterion ii). These are:

Shelduck	Mallard	Moorhen
Coot	Lapwing	Redshank
Reed warbler	Reed bunting	

In terms of the species characteristic of the particular habitat (criterion i), in this case, grazing marsh, the starting point should be the scoring species for the lowland damp grassland SSSI bird assemblage features[10]. This includes breeding ducks, waders, yellow wagtail, marsh harrier and others.

As noted above for the non-breeding assemblage, the integrity of an assemblage is taken to be a product of both abundance and diversity. In turn, the diversity of the assemblage depends on the species richness, abundance and the relative 'importance' (an assessment of the conservation status of each assemblage component). Each component makes a different contribution to the diversity of the assemblage, and changes to some components may be considered to affect diversity more than others. Negative changes to small numbers of relatively important assemblage

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[10] Drewitt, A.L., Whitehead, S. and Cohen, S. 2015. *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 17 Birds.* Joint Nature Conservation Committee, Peterborough. http://jncc.defra.gov.uk/pdf/SSSI_Chptr17_Birds2015June.pdf

components may have a similar overall effect to negative changes in larger numbers of less important components.

The Swale Ramsar site

JNCC have published Information Sheets on Ramsar wetlands on their website[11]. The Swale qualifies under Ramsar criterion 2 its vulnerable, endangered, or threatened plant and invertebrate communities; under criterion 5 for its assemblage of over 20,000 waterbirds, and under criterion 6 as it supports 1% of the population of a number of named waterbird species.

Natural England has not produced Conservation Advice packages, including Conservation Objectives, for Ramsar sites. This is because it is considered that the Conservation Advice packages for the overlapping European Marine Site will be, in most cases, sufficient to support the management of Ramsar interests.

The Ramsar Information Sheet for The Swale lists the qualifying species/populations under Ramsar criterion 6 (in section 14). Impacts on these species should form part of the HRA.

The Ramsar Information Sheet also lists noteworthy fauna (in section 20), which make up part of the assemblage of waterbirds. However, as Natural England considers that the Conservation Objectives for SPAs cover the management of Ramsar interests, and the SPA and Ramsar site were designated at the same time under the same criterion, I recommend only carrying out one assemblage assessment, on the species named under the SPA advice above.

In terms of the wetland plant and invertebrate communities, potential impacts on the habitats which support them are covered in the supplementary advice on conservation objectives[12] for The Swale SPA. Examples of the species which make up the plant and invertebrate communities are found in the noteworthy flora and fauna sections of the Ramsar Information Sheet.

[11] http://jncc.defra.gov.uk/pdf/RIS/UK11071.pdf

[12] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9012011&SiteNameDisplay=The+Swale+SPA

APPENDIX 2 - THE SWALE SPA CITATION

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

The Swale extensions (Kent)

The Swale Special Protection Area is a wetland of international importance, comprising intertidal mudflats, shellbeaches, saltmarshes and extensive grazing marshes. It provides habitats for important assemblages of wintering waterfowl, and also supports notable breeding bird populations.

The proposed extensions to the Swale SPA include areas of intertidal mudflats and grazing marshes adjacent to the existing site and within The Swale Site of Special Scientific Interest. These areas are integral components of the complex of estuarine habitats composing the Swale.

The Swale qualifies under Article 4.2 of the EC Birds Directive as a wetland of international importance by virtue of regularly supporting over 20,000 waterfowl, with an average peak count of 57,600 birds recorded in the five winter period 1986/87 to 1990/91. This total includes internationally or nationally important wintering populations of seventeen species of migratory waterfowl. Of these, two occur in significant numbers within the proposed extensions: dark-bellied brent geese *Branta bernicla bernicla* and dunlin *Calidris alpina*. In the five winter period 1986/87 to 1990/91, the average peak counts for the Swale as a whole were 2,850 dark-bellied brent geese (1.6% of the world population, 3.1% of the British wintering population) and 13,000 dunlin (3% of the British wintering population). The mudflats of the proposed extensions have, in recent years, supported over 400 dark-bellied brent geese and 900 dunlin.

The mudflats of the proposed extensions support smaller numbers of several other species of wintering migratory waterfowl, including oystercatcher *Haematopus ostralegus*, ringed plover *Charadrius hiaticula*, grey plover *Pluvialis squatarola*, curlew *Numenius arquata* and redshank *Tringa totanus*. These species are present in internationally or nationally important numbers within the Swale as a whole.

The Swale also qualifies under Article 4.2 by virtue of regularly supporting diverse assemblages of the wintering and breeding migratory waterfowl of lowland wet grassland and other estuarine habitats.

The grazing marshes of the proposed extensions support an assemblage of wintering species typical of the grazing marshes elsewhere within the Swale, including shelduck *Tadorna tadorna*, wigeon *Anas penelope*, teal *Anas crecca* and curlew *Numenius arquata*. These species are present in internationally or nationally important numbers within the Swale as a whole.

The grazing marshes also support a typical assemblage of breeding species, including shelduck *Tadorna tadorna*, mallard *Anas platyrhynchos*, moorhen *Gallinula chloropus*, coot *Fulica atra*, lapwing *Vanellus vanellus*, redshank *Tringa totanus*, reed warbler

Acrocephalus scirpaceus and reed bunting *Emberiza schoeniclus*. Some of these species have restricted distributions in Britain because of habitat loss and degradation.

The grazing marshes of the proposed extensions also regularly support wintering, and occasionally breeding, short-eared owl *Asio flammeus* (a species listed under Annex 1 of the EC Birds Directive).

During severe winter weather elsewhere, the Swale, including those areas within the proposed extensions, can assume even greater national and international importance as a cold weather refuge. 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.

The Swale SPA, including the proposed extensions, is part of the larger Thames estuary and contributes to its overall regional significance for birds in a European context.

SPA citation
LDS March 1993

APPENDIX 3 - THE SWALE STANDARD DATA FORM 2016

NATURA 2000 – STANDARD DATA FORM

Special Protection Areas under the EC Birds Directive.

Each Natura 2000 site in the United Kingdom has its own Standard Data Form containing site-specific information. The data form for this site has been generated from the Natura 2000 Database submitted to the European Commission on the following date:

22/12/2015

The information provided here, follows the officially agreed site information format for Natura 2000 sites, as set out in the Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 (2011/484/EU).

The Standard Data Forms are generated automatically for all of the UK's Natura 2000 sites using the European Environment Agency's Natura 2000 software. The structure and format of these forms is exactly as produced by the EEA's Natura 2000 software (except for the addition of this coversheet and the end notes). The content matches exactly the data submitted to the European Commission.

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

Further technical documentation may be found here
http://bd.eionet.europa.eu/activities/Natura_2000/reference_portal

As part of the December 2015 submission, several sections of the UK's previously published Standard Data Forms have been updated. For details of the approach taken by the UK in this submission please refer to the following document:
http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

More general information on Special Protection Areas (SPAs) in the United Kingdom is available from the SPA home page on the JNCC website. This webpage also provides links to Standard Data Forms for all SPAs in the UK.

Date form generated by the Joint Nature Conservation Committee
25 January 2016.

NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),
Proposed Sites for Community Importance (pSCI),
Sites of Community Importance (SCI) and
for Special Areas of Conservation (SAC)

SITE **UK9012011**

SITENAME **The Swale**

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1. SITE IDENTIFICATION

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1.1 Type	1.2 Site code
A	UK9012011

1.3 Site name

The Swale

1.4 First Compilation date	1.5 Update date
1982-08	2015-12

1.6 Respondent:

Name/Organisation:	Joint Nature Conservation Committee
Address:	Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY
Email:	

1.7 Site indication and designation / classification dates

Date site classified as SPA:	1982-08
National legal reference of SPA designation	Regulations 12A and 13-15 of the Conservation Habitats and Species Regulations 2010, (http://www.legislation.gov.uk/uksi/2010/490/contents/made) as amended by The Conservation of Habitats and Species (Amendment) Regulations 2011 (http://www.legislation.gov.uk/uksi/2011/625/contents/made).

2. SITE LOCATION

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2.1 Site-centre location [decimal degrees]:

Longitude	Latitude
0.839166667	51.36083333

2.2 Area [ha]:

6509.88

2.3 Marine area [%]

44.5

2.4 Sitelength [km]:

0.0

2.5 Administrative region code and name

NUTS level 2 code	Region Name
UKJ4	Kent

2.6 Biogeographical Region(s)

Atlantic (100.0 %)

3. ECOLOGICAL INFORMATION

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3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Iso.	Glo.
B	A052	Anas crecca			w	2969	2969	i		G	B		C	
B	A051	Anas strepera			w	86	86	i		G	C		C	
B	A675	Branta bernicla bernicla			w	1961	1961	i		G	C		C	
B	A672	Calidris alpina alpina			w	12394	12394	i		G	B		C	
B	A137	Charadrius hiaticula			w	269	269	i		G	C		C	
B	A130	Haematopus ostralegus			w	3731	3731	i	P	G	C		C	
B	A160	Numenius arquata			w	1622	1622	i		G	C		C	
B	A141	Pluvialis squatarola			w	2021	2021	i	P	G	B		C	

B	A162	Tringa totanus			w	1640	1640	i		G	C		C

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

3.3 Other important species of flora and fauna (optional)

Species					Population in the site				Motivation					
Group	CODE	Scientific Name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C|R|V|P	IV	V	A	B	C	D
B	BBA	Breeding bird assemblage												X
B	WATR	Waterfowl assemblage			65588	65588	i						X	

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see reference portal)
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories: IV, V:** Annex Species (Habitats Directive), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

4. SITE DESCRIPTION

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4.1 General site character

Habitat class	% Cover
N03	5.0
N15	47.0
N06	2.0
N23	6.0
N02	39.0
N05	1.0

Total Habitat Cover	100

Other Site Characteristics

2 Terrestrial: Geomorphology and landscape: coastal,floodplain 3 Marine: Geology: sand,clay,shingle,mud 4 Marine: Geomorphology: estuary,intertidal sediments (including sandflat/mudflat),shingle bar,subtidal sediments (including sandbank/mudbank)

4.2 Quality and importance

ARTICLE 4.2 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: Branta bernicla bernicla (Western Siberia/Western Europe) 0.7% of the population 5 year peak mean 1991/92-1995/96 Calidris alpina alpina (Northern Siberia/Europe/Western Africa) 2.3% of the population in Great Britain 5 year peak mean 1991/92-1995/96 Tringa totanus (Eastern Atlantic - wintering) 0.9% of the population 5 year peak mean 1991/92-1995/96 ARTICLE 4.2 QUALIFICATION (79/409/EEC): AN INTERNATIONALLY IMPORTANT ASSEMBLAGE OF BIRDS Over winter the area regularly supports: 65588 waterfowl (5 year peak mean 1991/92-1995/96) Including: Branta bernicla bernicla , Anas strepera , Anas crecca , Haematopus ostralegus , Charadrius hiaticula , Pluvialis squatarola , Calidris alpina alpina , Numenius arquata , Tringa totanus

4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i|o|b]
H	M02		B
H	M01		B
H	G01		I
H	F02		I
H	I01		B

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i|o|b]
H	A06		I
H	A02		I
H	D05		I
H	A04		I

Rank: H = high, M = medium, L = low
Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,
T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions
i = inside, o = outside, b = both

4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): http://publications.naturalengland.org.uk/category/6490068894089216

http://publications.naturalengland.org.uk/category/3212324
http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

5. SITE PROTECTION STATUS (optional)

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5.1 Designation types at national and regional level:

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
UK01	16.1	UK04	100.0		

6. SITE MANAGEMENT

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6.1 Body(ies) responsible for the site management:

Organisation:	Natural England
Address:	
Email:	

6.2 Management Plan(s):

An actual management plan does exist:

- [ ] Yes
- [ ] No, but in preparation
- [X] No

6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

EXPLANATION OF CODES USED IN THE NATURA 2000 STANDARD DATA FORMS

The codes in the table below are also explained in the official European Union guidelines for the Standard Data Form. The relevant page is shown in the table below.

1.1 Site type

CODE	DESCRIPTION	PAGE NO
A	Designated Special Protection Area	53
B	SAC (includes candidates Special Areas of Conservation, Sites of Community Importance and designated SAC)	53
C	SAC area the same as SPA. Note in the UK Natura 2000 submission this is only used for Gibraltar	53

3.1 Habitat representativity

CODE	DESCRIPTION	PAGE NO
A	Excellent	57
B	Good	57
C	Significant	57
D	Non-significant presence	57

3.1 Habitat code

CODE	DESCRIPTION	PAGE NO
1110	Sandbanks which are slightly covered by sea water all the time	57
1130	Estuaries	57
1140	Mudflats and sandflats not covered by seawater at low tide	57
1150	Coastal lagoons	57
1160	Large shallow inlets and bays	57
1170	Reefs	57
1180	Submarine structures made by leaking gases	57
1210	Annual vegetation of drift lines	57
1220	Perennial vegetation of stony banks	57
1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	57
1310	Salicornia and other annuals colonizing mud and sand	57
1320	Spartina swards (Spartinion maritimae)	57
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	57
1340	Inland salt meadows	57
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	57
2110	Embryonic shifting dunes	57
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	57
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	57
2140	Decalcified fixed dunes with Empetrum nigrum	57
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	57
2160	Dunes with Hippopha□ rhamnoides	57
2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	57
2190	Humid dune slacks	57
21A0	Machairs (* in Ireland)	57
2250	Coastal dunes with Juniperus spp.	57
2330	Inland dunes with open Corynephorus and Agrostis grasslands	57
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	57
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	57
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	57
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	57

CODE	DESCRIPTION	PAGE NO
3160	Natural dystrophic lakes and ponds	57
3170	Mediterranean temporary ponds	57
3180	Turloughs	57
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	57
4010	Northern Atlantic wet heaths with Erica tetralix	57
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	57
4030	European dry heaths	57
4040	Dry Atlantic coastal heaths with Erica vagans	57
4060	Alpine and Boreal heaths	57
4080	Sub-Arctic Salix spp. scrub	57
5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	57
5130	Juniperus communis formations on heaths or calcareous grasslands	57
6130	Calaminarian grasslands of the Violetalia calaminariae	57
6150	Siliceous alpine and boreal grasslands	57
6170	Alpine and subalpine calcareous grasslands	57
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)	57
6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	57
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	57
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	57
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	57
6520	Mountain hay meadows	57
7110	Active raised bogs	57
7120	Degraded raised bogs still capable of natural regeneration	57
7130	Blanket bogs (* if active bog)	57
7140	Transition mires and quaking bogs	57
7150	Depressions on peat substrates of the Rhynchosporion	57
7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	57
7220	Petrifying springs with tufa formation (Cratoneurion)	57
7230	Alkaline fens	57
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	57
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	57
8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)	57
8210	Calcareous rocky slopes with chasmophytic vegetation	57
8220	Siliceous rocky slopes with chasmophytic vegetation	57
8240	Limestone pavements	57
8310	Caves not open to the public	57
8330	Submerged or partially submerged sea caves	57
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)	57
9130	Asperulo-Fagetum beech forests	57
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	57
9180	Tilio-Acerion forests of slopes, screes and ravines	57
9190	Old acidophilous oak woods with Quercus robur on sandy plains	57
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	57
91C0	Caledonian forest	57
91D0	Bog woodland	57
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	57
91J0	Taxus baccata woods of the British Isles	57

3.1 Relative surface

CODE	DESCRIPTION	PAGE NO
A	15%-100%	58
B	2%-15%	58
C	< 2%	58

3.1 Conservation status habitat

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	59
B	Good conservation	59
C	Average or reduced conservation	59

3.1 Global grade habitat

CODE	DESCRIPTION	PAGE NO
A	Excellent value	59
B	Good value	59
C	Significant value	59

3.2 Population (abbreviated to 'Pop.' in data form)

CODE	DESCRIPTION	PAGE NO
A	15%-100%	62
B	2%-15%	62
C	< 2%	62
D	Non-significant population	62

3.2 Conservation status species (abbreviated to 'Con.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent conservation	63
B	Good conservation	63
C	Average or reduced conservation	63

3.2 Isolation (abbreviated to 'Iso.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Population (almost) Isolated	63
B	Population not-isolated, but on margins of area of distribution	63
C	Population not-isolated within extended distribution range	63

3.2 Global Grade (abbreviated to 'Glo.' Or 'G.' in data form)

CODE	DESCRIPTION	PAGE NO
A	Excellent value	63
B	Good value	63
C	Significant value	63

3.3 Assemblages types

CODE	DESCRIPTION	PAGE NO
WATR	Non breeding waterfowl assemblage	UK specific code
SBA	Breeding seabird assemblage	UK specific code
BBA	Breeding bird assemblage (applies only to sites classified pre 2000)	UK specific code

4.1 Habitat class code

CODE	DESCRIPTION	PAGE NO
N01	Marine areas, Sea inlets	65
N02	Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins)	65
N03	Salt marshes, Salt pastures, Salt steppes	65
N04	Coastal sand dunes, Sand beaches, Machair	65
N05	Shingle, Sea cliffs, Islets	65
N06	Inland water bodies (Standing water, Running water)	65
N07	Bogs, Marshes, Water fringed vegetation, Fens	65
N08	Heath, Scrub, Maquis and Garrigue, Phygrana	65
N09	Dry grassland, Steppes	65
N10	Humid grassland, Mesophile grassland	65
N11	Alpine and sub-Alpine grassland	65
N14	Improved grassland	65
N15	Other arable land	65
N16	Broad-leaved deciduous woodland	65
N17	Coniferous woodland	65
N19	Mixed woodland	65
N21	Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas)	65
N22	Inland rocks, Screes, Sands, Permanent Snow and ice	65
N23	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites)	65
N25	Grassland and scrub habitats (general)	65
N26	Woodland habitats (general)	65

4.3 Threats code

CODE	DESCRIPTION	PAGE NO
A01	Cultivation	65
A02	Modification of cultivation practices	65
A03	Mowing / cutting of grassland	65
A04	Grazing	65
A05	Livestock farming and animal breeding (without grazing)	65
A06	Annual and perennial non-timber crops	65
A07	Use of biocides, hormones and chemicals	65
A08	Fertilisation	65
A10	Restructuring agricultural land holding	65
A11	Agriculture activities not referred to above	65
B01	Forest planting on open ground	65
B02	Forest and Plantation management & use	65
B03	Forest exploitation without replanting or natural regrowth	65
B04	Use of biocides, hormones and chemicals (forestry)	65
B06	Grazing in forests/ woodland	65
B07	Forestry activities not referred to above	65
C01	Mining and quarrying	65
C02	Exploration and extraction of oil or gas	65
C03	Renewable abiotic energy use	65
D01	Roads, paths and railroads	65
D02	Utility and service lines	65
D03	Shipping lanes, ports, marine constructions	65
D04	Airports, flightpaths	65
D05	Improved access to site	65
E01	Urbanised areas, human habitation	65
E02	Industrial or commercial areas	65

CODE	DESCRIPTION	PAGE NO
E03	Discharges	65
E04	Structures, buildings in the landscape	65
E06	Other urbanisation, industrial and similar activities	65
F01	Marine and Freshwater Aquaculture	65
F02	Fishing and harvesting aquatic ressources	65
F03	Hunting and collection of wild animals (terrestrial), including damage caused by game (excessive density), and taking/removal of terrestrial animals (including collection of insects, reptiles, amphibians, birds of prey, etc., trapping, poisoning, poaching, predator control, accidental capture (e.g. due to fishing gear), etc.)	65
F04	Taking / Removal of terrestrial plants, general	65
F05	Illegal taking/ removal of marine fauna	65
F06	Hunting, fishing or collecting activities not referred to above	65
G01	Outdoor sports and leisure activities, recreational activities	65
G02	Sport and leisure structures	65
G03	Interpretative centres	65
G04	Military use and civil unrest	65
G05	Other human intrusions and disturbances	65
H01	Pollution to surface waters (limnic & terrestrial, marine & brackish)	65
H02	Pollution to groundwater (point sources and diffuse sources)	65
H03	Marine water pollution	65
H04	Air pollution, air-borne pollutants	65
H05	Soil pollution and solid waste (excluding discharges)	65
H06	Excess energy	65
H07	Other forms of pollution	65
I01	Invasive non-native species	65
I02	Problematic native species	65
I03	Introduced genetic material, GMO	65
J01	Fire and fire suppression	65
J02	Human induced changes in hydraulic conditions	65
J03	Other ecosystem modifications	65
K01	Abiotic (slow) natural processes	65
K02	Biocenotic evolution, succession	65
K03	Interspecific faunal relations	65
K04	Interspecific floral relations	65
K05	Reduced fecundity/ genetic depression	65
L05	Collapse of terrain, landslide	65
L07	Storm, cyclone	65
L08	Inundation (natural processes)	65
L10	Other natural catastrophes	65
M01	Changes in abiotic conditions	65
M02	Changes in biotic conditions	65
U	Unknown threat or pressure	65
XO	Threats and pressures from outside the Member State	65

5.1 Designation type codes

CODE	DESCRIPTION	PAGE NO
UK00	No Protection Status	67
UK01	National Nature Reserve	67
UK02	Marine Nature Reserve	67
UK04	Site of Special Scientific Interest (UK)	67

APPENDIX 4 - THE SWALE SPA CONSERVATION OBJECTIVES

European Site Conservation Objectives for The Swale Special Protection Area Site Code: UK9012011

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)

A149 *Calidris alpina alpina*; Dunlin (Non-breeding)

Breeding bird assemblage

Waterbird 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 Regulation 35 Conservation Advice document for the EMS. For further details about this please visit the Natural England website at: http://www.naturalengland.org.uk/ourwork/marine/protectandmanage/mpa/europeansites.aspx or contact Natural England's enquiry service at enquiries@naturalengland.org.uk or by phone on 0845 600 3078.

Explanatory Notes: European Site Conservation Objectives

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

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

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

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

APPENDIX 5 - THE SWALE RAMSAR INFORMATION SHEET (RIS)

Information Sheet on Ramsar Wetlands (RIS)

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

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.

2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.

3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

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

FOR OFFICE USE ONLY.

DD MM YY

Designation date | Site Reference Number

Joint Nature Conservation Committee
Monkstone House
City Road
Peterborough
Cambridgeshire PE1 1JY
UK
Telephone/Fax: +44 (0)1733 – 562 626 / +44 (0)1733 – 555 948
Email: RIS@JNCC.gov.uk

2. Date this sheet was completed/updated:

Designated: 31 August 1982

3. Country:

UK (England)

4. Name of the Ramsar site:

The Swale

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

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

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

a) Site boundary and area:

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

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

7. Map of site included:

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

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

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

b) Describe briefly the type of boundary delineation applied:

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

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

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

8. Geographical coordinates (latitude/longitude):

51 21 39 N 00 50 21 E

9. General location:

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

Nearest town/city: Faversham

On the north Kent of coast within the greater Thames estuary.

Administrative region: Kent

10. Elevation (average and/or max. & min.) (metres): 11. Area (hectares): 6514.71

Min. -1
Max. 5
Mean 2

12. General overview of the site:

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

A complex of brackish and freshwater, 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.

13. Ramsar Criteria:

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

2, 5, 6

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

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

Ramsar criterion 2

The site supports nationally scarce plants and at least seven British Red data book invertebrates.

Ramsar criterion 5

Assemblages of international importance:

Species with peak counts in winter:
77501 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:

Common redshank , *Tringa totanus totanus*,	1712 individuals, representing an average of 1.4% of the GB population (5 year peak mean 1998/9-2002/3)

Species with peak counts in winter:

Dark-bellied brent goose, *Branta bernicla bernicla*,	1633 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3)
Grey plover , *Pluvialis squatarola*, E Atlantic/W Africa -wintering	2098 individuals, representing an average of 3.9% of the GB population (5 year peak mean 1998/9-2002/3)

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

Species with peak counts in spring/autumn:

Ringed plover , *Charadrius hiaticula*, Europe/Northwest Africa	917 individuals, representing an average of 1.2% of the population (5 year peak mean 1998/9-2002/3)

Species with peak counts in winter:

Eurasian wigeon , *Anas penelope*, NW Europe	15296 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3)
Northern pintail , *Anas acuta*, NW Europe	763 individuals, representing an average of 1.2% of the population (5 year peak mean 1998/9-2002/3)
Northern shoveler , *Anas clypeata*, NW & C Europe	483 individuals, representing an average of 1.2% of the population (5 year peak mean 1998/9-2002/3)
Black-tailed godwit , *Limosa limosa islandica*, Iceland/W Europe	1504 individuals, representing an average of 4.2% of the population (5 year peak mean 1998/9-2002/3)

Contemporary data and information on waterbird trends at this site and their regional (sub-national) and national contexts can be found in the Wetland Bird Survey report, which is updated annually. See www.bto.org/survey/webs/webs-alerts-index.htm.
Details of bird species occuring at levels of National importance are given in Section 22

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

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

a) biogeographic region:

Atlantic

b) biogeographic regionalisation scheme (include reference citation):

Council Directive 92/43/EEC

16. Physical features of the site:

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

Soil & geology	alluvium, clay, mud, sand, shingle
Geomorphology and landscape	coastal, floodplain, shingle bar, subtidal sediments (including sandbank/mudbank), intertidal sediments (including sandflat/mudflat), estuary
Nutrient status	eutrophic
pH	no information
Salinity	brackish / mixosaline, fresh, saline / euhaline
Soil	no information
Water permanence	usually permanent, usually seasonal / intermittent
Summary of main climatic features	Annual averages (Greenwich, 1971–2000) (www.metoffice.com/climate/uk/averages/19712000/sites/greenwich.html) Max. daily temperature: 14.8° C Min. daily temperature: 7.2° C Days of air frost: 29.1 Rainfall: 583.6 mm Hrs. of sunshine: 1461.0

General description of the Physical Features:

The Swale is an estuarine area that separates the Isle of Sheppey from the Kent mainland. To the west it adjoins the Medway Estuary. It is a complex of brackish and freshwater, floodplain grazing marsh with ditches, and intertidal saltmarshes and mudflats. The intertidal flats are extensive, especially in the east of the site. Locally there are large mussel *Mytilus edulis* beds formed on harder areas of substrate. There is much diversity both in the salinity of the dykes (which range from fresh to strongly brackish) and in the topography of the fields.

17. Physical features of the catchment area:

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

The Swale is an estuarine area that separates the Isle of Sheppey from the Kent mainland. To the west it adjoins the Medway Estuary. It is a complex of brackish and freshwater, floodplain grazing marsh with ditches, and intertidal saltmarshes and mudflats. The intertidal flats are extensive, especially in the east of the site.

18. Hydrological values:

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

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

19. Wetland types:

Human-made wetland, Marine/coastal wetland

Code	Name	% Area
4	Seasonally flooded agricultural land	47.7
G	Tidal flats	38
H	Salt marshes	5.8
Other	Other	5.7
N	Rivers / streams / creeks: seasonal / intermittent	1.8
E	Sand / shingle shores (including dune systems)	1

20. General ecological features:

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

The intertidal flats are of fine, silty sediment. The saltmarsh is species rich, for example containing all southern species of *Puccinellia* and most *Salicornia* species. 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*.

Ecosystem services

21. Noteworthy flora:

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

Nationally important species occurring on the site.

Higher Plants.

The site holds several nationally scarce plants, including: *Chenopodium chenopodioides, Peucedanum officinale, Bupleurum tenuissimum, Spartina maritima, Inula crithmoides, Carex divisa, Trifolium squamosum, Hordeum marinum*.

22. Noteworthy fauna:

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

Birds

Species currently occurring at levels of national importance:

Species regularly supported during the breeding season:

Mediterranean gull , *Larus melanocephalus*, Europe	13 apparently occupied nests, representing an average of 12% of the GB population (Seabird 2000 Census)

Black-headed gull , *Larus ridibundus*, N & C Europe	3835 apparently occupied nests, representing an average of 2.9% of the GB population (Seabird 2000 Census)
Little tern , *Sterna albifrons albifrons*, W Europe	20 apparently occupied nests, representing an average of 1% of the GB population (Seabird 2000 Census)
Species with peak counts in spring/autumn:	
Little egret , *Egretta garzetta*, West Mediterranean	29 individuals, representing an average of 1.7% of the GB population (5 year peak mean 1998/9-2002/3)
Whimbrel , *Numenius phaeopus*, Europe/Western Africa	98 individuals, representing an average of 3.2% of the GB population (5 year peak mean 1998/9-2002/3 - spring peak)
Eurasian curlew , *Numenius arquata arquata*, N. a. arquata Europe (breeding)	1779 individuals, representing an average of 1.2% of the GB population (5 year peak mean 1998/9-2002/3)
Spotted redshank , *Tringa erythropus*, Europe/W Africa	60 individuals, representing an average of 44.1% of the GB population (5 year peak mean 1998/9-2002/3)
Common greenshank , *Tringa nebularia*, Europe/W Africa	49 individuals, representing an average of 8.2% of the GB population (5 year peak mean 1998/9-2002/3)
Species with peak counts in winter:	
Little grebe , *Tachybaptus ruficollis ruficollis*, Europe to E Urals, NW Africa	147 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9-2002/3)
Greater white-fronted goose , *Anser albifrons albifrons*, NW Europe	973 individuals, representing an average of 16.8% of the GB population (5 year peak mean for 1996/7-2000/01)
Common shelduck , *Tadorna tadorna*, NW Europe	2437 individuals, representing an average of 3.1% of the GB population (5 year peak mean 1998/9-2002/3)
Eurasian teal , *Anas crecca*, NW Europe	3610 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9-2002/3)
Eurasian oystercatcher , *Haematopus ostralegus ostralegus*, Europe & NW Africa -wintering	4609 individuals, representing an average of 1.4% of the GB population (5 year peak mean 1998/9-2002/3)
Pied avocet , *Recurvirostra avosetta*, Europe/Northwest Africa	380 individuals, representing an average of 11.1% of the GB population (5 year peak mean 1998/9-2002/3)
European golden plover , *Pluvialis apricaria apricaria*, P. a. altifrons Iceland & Faroes/E Atlantic	7522 individuals, representing an average of 3% of the GB population (5 year peak mean 1998/9-2002/3)
Northern lapwing , *Vanellus vanellus*, Europe - breeding	15129 individuals, representing an average of 1% of the GB population (5 year peak mean 1998/9-2002/3)
Red knot , *Calidris canutus islandica*, W & Southern Africa (wintering)	3004 individuals, representing an average of 1% of the GB population (5 year peak mean 1998/9-2002/3)

Dunlin , *Calidris alpina alpina*, W Siberia/W Europe	9017 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3)
Ruff , *Philomachus pugnax*, Europe/W Africa	53 individuals, representing an average of 7.5% of the GB population (5 year peak mean 1998/9-2002/3)

Species Information

Nationally important species occurring on the site.

Invertebrates.

Bagous cylindrus, Erioptera bivittata, Lejops vittata, Peocilobothris ducalis, Philonthus punctus, Micronecta minutissima, Malchius vulneratus, Campsicnemus majus, Elachiptera rufifrons, Myopites eximia.

23. Social and cultural values:

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

Aesthetic
Archaeological/historical site
Environmental education/ interpretation
Fisheries production
Livestock grazing
Non-consumptive recreation
Scientific research
Sport fishing
Sport hunting
Tourism
Traditional cultural
Transportation/navigation

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

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

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

Ownership category	On-site	Off-site

Non-governmental organisation (NGO)	+	
Local authority, municipality etc.	+	
National/Crown Estate	+	
Private	+	

25. Current land (including water) use:

Activity	On-site	Off-site
Nature conservation	+	
Tourism	+	
Recreation	+	
Current scientific research	+	
Fishing: commercial	+	
Fishing: recreational/sport	+	
Marine/saltwater aquaculture	+	
Gathering of shellfish	+	
Bait collection	+	
Arable agriculture (unspecified)		+
Livestock watering hole/pond	+	
Grazing (unspecified)	+	
Hay meadows	+	
Hunting: commercial	+	
Hunting: recreational/sport	+	
Industrial water supply		+
Industry		+
Sewage treatment/disposal		+
Harbour/port	+	+
Flood control	+	
Transport route	+	
Non-urbanised settlements	+	

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

Explanation of reporting category:

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

NA = Not Applicable because no factors have been reported.

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

For category 2 factors only. What measures have been taken / are planned / regulatory processes invoked, to mitigate the effect of these factors?
Is the site subject to adverse ecological change? NO

27. Conservation measures taken:

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

Conservation measure	On-site	Off-site
Site/ Area of Special Scientific Interest (SSSI/ASSI)	+	
National Nature Reserve (NNR)	+	
Special Protection Area (SPA)	+	
Land owned by a non-governmental organisation for nature conservation	+	
Management agreement	+	
Site management statement/plan implemented	+	
Environmentally Sensitive Area (ESA)	+	+

b) Describe any other current management practices:

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

28. Conservation measures proposed but not yet implemented:

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

No information available

29. Current scientific research and facilities:

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

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.
Hydrological monitoring of the grazing marsh.
MNCR Littoral and Sublittoral survey.

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

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

Swale NNR and Elmley NNR (both RSPB and Elmley Conservation Trust) all provide viewing facilities.

31. Current recreation and tourism:

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

Activities, Facilities provided and Seasonality.

Yachting, jet-skiing and water-skiing mostly in the summer, bird watching throughout the year and angling and wildfowling during their legally permitted seasons. Disturbance from these activities is a current issue but it is addressed through negotiation relating to activities consented within the SSSI and information dissemination. There is no clear evidence of damage from any of these activities.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept. of Agriculture/Dept. of Environment, etc.

Head, Natura 2000 and Ramsar Team, Department for Environment, Food and Rural Affairs, European Wildlife Division, Zone 1/07, Temple Quay House, 2 The Square, Temple Quay, Bristol, BS1 6EB

33. Management authority:

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

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

34. Bibliographical references:

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

Site-relevant references

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APPENDIX 6 - BASELINE SURVEY COUNTS (DARK-BELLIED BRENT GOOSE, LAPWING, GOLDEN PLOVER)

Appendix 6

Baseline field counts of foraging dark-bellied brent goose in intertidal (blue), grazing marsh at east end (green) and grazing marsh/reedbed coastal sectors (grey)

N.B. totals may not add up to the sum of field counts, as double-counting of flocks that moved during the survey will have been accounted for.

	Field Number			1	2	3	4	5	6	7	8	9	36	48	61	29	30	31	32	33	34	35	10	11	12	13	14	15	16	17	37
	Field Area (ha)			29.3	21.5	17.9	18.7	28.9	23.0	20.9	16.2	16.7	18.6	14.4	20.1	3.6	6.1	3.1	1.8	3.9	4.2	6.0	3.9	3.6	4.2	6.6	7.3	3.8	4.5	3.6	4.8
SEASON	DATE	TIDE	SURVEY																												
SEASON 1 - WINTER 13/14	09/01/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/01/2014	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/01/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/02/2014	LT	WBS	0	0	0	0	0	16	800	0	0	0	0		200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/02/2014	LT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/02/2014	HT	WBS	6	0	0	0	0	0	0	0	0	0	0		120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/03/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/03/2014	LT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/03/2014	LT	WBS	0	0	2	2	0	17	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 2 - WINTER 14/15	08/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/10/2014	HT	PBS (East)	0	0	0	0	0	400	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/10/2014	LT	PBS (East)	0	0	0	0	3500	0	0	60	0	0	0		0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0
	17/10/2014	LT	PBS (West)	0	2	49	280	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/10/2014	HT	PBS (East)	0	0	0	0	1	0	0	24	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/11/2014	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/11/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/11/2014	HT	WBS	0	0	0	0	130	0	1	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/12/2014	HT	WBS	0	0	0	0	5	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/12/2014	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/12/2014	LT	WBS	1	0	0	12	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/01/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2015	LT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/01/2015	HT	WBS (East)	0	0	0	7	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	18/02/2015	HT	WBS (West)	0	0	0	1	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24/02/2015	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	25/02/2015	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	26/02/2015	LT	WBS	0	80	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 3 - WINTER 15/16	30/09/2015	HT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/10/2015	LT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	28/10/2015	HT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	29/10/2015	LT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2015	LT	LT INT	0	0	203	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2015	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24/11/2015	HT	HT INT	0	5	135	1	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24/11/2015	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/12/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Field Number			1	2	3	4	5	6	7	8	9	36	48	61	29	30	31	32	33	34	35	10	11	12	13	14	15	16	17	37
	Field Area (ha)			29.3	21.5	17.9	18.7	28.9	23.0	20.9	16.2	16.7	18.6	14.4	20.1	3.6	6.1	3.1	1.8	3.9	4.2	6.0	3.9	3.6	4.2	6.6	7.3	3.8	4.5	3.6	4.8
SEASON	DATE	TIDE	SURVEY																												
	14/12/2015	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/12/2015	LT	LT INT	0	50	248	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/12/2015	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	HT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/12/2015	HT	HT INT	0	0	0	74	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/12/2015	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/01/2016	HT	HT INT	0	0	0	0	0	6	0	520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/01/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2016	HT	HT INT	2	5	0	0	0	11	7	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/02/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	HT	HT INT	0	0	0	0	105	0	0	0	270	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	LT	LT INT	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	HT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	04/02/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/02/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/02/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/03/2016	HT	HT INT	0	0	0	0	207	0	74	240	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	LT	LT INT	0	0	0	0	0	121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	HT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/03/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/04/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 4 - Winter 2017/18	26/09/2017	HT	WWO	0	0	0	1	0	600	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/09/2017	LT	WWO	0	0	0	0	0	220	706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/10/2017	HT	WWO	0	0	0	0	0	0	785	2	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/10/2017	LT	WWO	0	0	0	0	320	860	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	30/10/2017	LT	WWO	0	0	0	0	6	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	31/10/2017	HT	WWO	0	0	0	0	0	0	0	165	620	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/11/2017	HT	WWO	0	0	0	0	155	75	0	0	590	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/11/2017	LT	WWO	23	57	0	0	3	157	244	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/11/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2017	LT	WWO	0	22	0	6	205	397	167	98	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/12/2017	LT	WWO	0	16	0	0	46	216	0	39	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Field Number			1	2	3	4	5	6	7	8	9	36	48	61	29	30	31	32	33	34	35	10	11	12	13	14	15	16	17	37
	Field Area (ha)			29.3	21.5	17.9	18.7	28.9	23.0	20.9	16.2	16.7	18.6	14.4	20.1	3.6	6.1	3.1	1.8	3.9	4.2	6.0	3.9	3.6	4.2	6.6	7.3	3.8	4.5	3.6	4.8
SEASON	DATE	TIDE	SURVEY																												
	20/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	28/12/2017	LT	WWO	1	2	0	0	0	0	0	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/01/2018	LT	WWO	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/01/2018	HT	WWO	0	0	0	19	0	0	0	600	0	0	0	0	0	560	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/01/2018	LT	WWO	0	0	0	1	5	17	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	30/01/2018	HT	WWO	0	0	0	0	1	5	0	0	24	0	0	0	414	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/02/2018	LT	WWO	0	0	0	26	0	36	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/02/2018	HT	WWO	0	0	0	0	0	9	23	21	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/02/2018	LT	WWO	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	26/02/2018	HT	WWO	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/03/2018	HT	WWO	14	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/03/2018	LT	WWO	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/03/2018	HT	WWO	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/03/2018	LT	WWO	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/04/2018	LT	WWO	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/04/2018	HT	WWO	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Baseline field counts of foraging dark-bellied brent goose in arable count sectors (yellow)

N.B. totals may not add up to the sum of field counts, as double-counting of flocks that moved during the survey will have been accounted for.

	Field Number			18	19	20	21	22	23	24	25	26	27	28	38	39	40	41	42	43	44	45	46	47	49	50	51	52	53	54	55	56	57	58	59	60	TOTAL	ARABLE
	Field Area (ha)			10.1	14.2	17.1	9.9	6.0	14.7	8.8	11.9	7.6	8.3	13.7	10.7	10.7	18.9	10.2	8.1	14.3	19.6	6.8	8.2	4.8	6.5	14.9	24.9	26.1	22.1	9.4	12.2	8.4	3.4	7.7	3.0	16.4		
SEASON	DATE	TIDE	SURVEY																																			
SEASON 1 - WINTER 13/14	09/01/2014	LT	WBS	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3011	3011
	13/01/2014	HT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2000	2000
	15/01/2014	HT	WBS	0	0	0	0	0	0	0	0	0	2500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2500	2500
	07/02/2014	LT	WBS	0	0	0	0	0	0	0	0	0	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1150	134
	10/02/2014	LT	WBS (Farm)	0	0	0	0	0	0	50	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350	350
	12/02/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	826	700
	05/03/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/03/2014	LT	WBS (Farm)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	10/03/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0
SEASON 2 - WINTER 14/15	08/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400	0
	09/10/2014	HT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	16/10/2014	LT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3916	0
	17/10/2014	LT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	22/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0
	23/10/2014	HT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	12/11/2014	HT	WBS (Farm)	0	0	0	0	0	0	0	2000	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3400	3400
	13/11/2014	LT	WBS	0	0	0	1000	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1006	1006
	21/11/2014	HT	WBS	0	0	0	0	150	0	650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	931	800
	09/12/2014	HT	WBS	0	0	0	0	0	0	0	430	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	449	444
	10/12/2014	HT	WBS (Farm)	0	0	0	0	0	0	4	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	504	504
	17/12/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0
	14/01/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2015	LT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/01/2015	HT	WBS (East)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	908	900
	18/02/2015	HT	WBS (West)	0	0	0	0	0	0	900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	24/02/2015	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	25/02/2015	HT	WBS (Farm)	0	0	0	0	0	0	0	0	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	150
	26/02/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	980	900
SEASON 3 - WINTER 15/16	30/09/2015	HT	PASS WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/10/2015	LT	PASS WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	28/10/2015	HT	PASS WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	29/10/2015	LT	PASS WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2015	LT	LT INT	0	0	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	299	95
	23/11/2015	LT	LT WO	0	373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	373	373
	24/11/2015	HT	HT INT	0	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	396	250
	24/11/2015	HT	HT WO	3	290	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	293	293
	14/12/2015	HT	HT INT	0	0	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	300
	14/12/2015	HT	HT WO	0	270	340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	340	340
	15/12/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	306	0
	15/12/2015	LT	LT WO	0	220	0	0	0	0	0	0	0	0	0	0	390	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	390	390
	21/12/2015	LT	LT INT	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100

	Field Number			18	19	20	21	22	23	24	25	26	27	28	38	39	40	41	42	43	44	45	46	47	49	50	51	52	53	54	55	56	57	58	59	60	TOTAL	ARABLE
	Field Area (ha)			10.1	14.2	17.1	9.9	6.0	14.7	8.8	11.9	7.6	8.3	13.7	10.7	10.7	18.9	10.2	8.1	14.3	19.6	6.8	8.2	4.8	6.5	14.9	24.9	26.1	22.1	9.4	12.2	8.4	3.4	7.7	3.0	16.4		
SEASON	DATE	TIDE	SURVEY																																			
	21/12/2015	HT	NOC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/12/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	109	0
	22/12/2015	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT WO	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
	06/01/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	526	0
	06/01/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	NOC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0
	20/01/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/02/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	375	0
	03/02/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	03/02/2016	HT	NOC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	04/02/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/02/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/02/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/03/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	556	0
	02/03/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121	0
	02/03/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	HT	NOC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/03/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/04/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 4 - Winter 2017/18	26/09/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1201	0
	27/09/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	926	0
	12/10/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	833	0
	13/10/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1180	0
	30/10/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0
	31/10/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	785	0
	06/11/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	820	0
	07/11/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	493	0
	22/11/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	930	0
	06/12/2017	HT	WWO	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	07/12/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	332	0
	20/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	750	0
	28/12/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0
	12/01/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0
	16/01/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	619	600

	Field Number			18	19	20	21	22	23	24	25	26	27	28	38	39	40	41	42	43	44	45	46	47	49	50	51	52	53	54	55	56	57	58	59	60	TOTAL	ARABLE
	Field Area (ha)			10.1	14.2	17.1	9.9	6.0	14.7	8.8	11.9	7.6	8.3	13.7	10.7	10.7	18.9	10.2	8.1	14.3	19.6	6.8	8.2	4.8	6.5	14.9	24.9	26.1	22.1	9.4	12.2	8.4	3.4	7.7	3.0	16.4		
SEASON	DATE	TIDE	SURVEY																																			
	27/01/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0
	30/01/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400	0
	09/02/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0
	15/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105	0
	21/02/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0
	26/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
	01/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0
	06/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
	16/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	27/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
	06/04/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
	12/04/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Baseline field counts of foraging lapwing in intertidal (blue), grazing marsh at east end (green) and grazing marsh/reedbed coastal sectors (grey)

N.B. totals may not add up to the sum of field counts, as double-counting of flocks that moved during the survey will have been accounted for.

	Field Number			1	2	3	4	5	6	7	8	9	36	48	61	29	30	31	32	33	34	35	10	11	12	13	14	15	16	17	37
	Field Area (ha)			29.3	21.5	17.9	18.7	28.9	23.0	20.9	16.2	16.7	18.6	14.4	20.1	3.6	6.1	3.1	1.8	3.9	4.2	6.0	3.9	3.6	4.2	6.6	7.3	3.8	4.5	3.6	4.8
SEASON	DATE	TIDE	SURVEY																												
SEASON 1 - WINTER 13/14	09/01/2014	LT	WBS	70	1	0	0	180	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/01/2014	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/01/2014	HT	WBS	400	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/02/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/02/2014	LT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/02/2014	HT	WBS	0	0	0	0	0	0	0	0	0	1	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/03/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/03/2014	LT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/03/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 2 - WINTER 14/15	08/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/10/2014	HT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/10/2014	LT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/10/2014	LT	PBS (West)	25	0	6	12	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/10/2014	HT	PBS (West)	0	0	0	16	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/10/2014	HT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/11/2014	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/11/2014	LT	WBS	350	150	70	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/11/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/12/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/12/2014	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/12/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/01/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2015	LT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/01/2015	HT	WBS (East)	0	0	0	1	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	18/02/2015	HT	WBS (West)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24/02/2015	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	25/02/2015	HT	WBS (Farm)											0		0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	26/02/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 3 - WINTER 15/16	30/09/2015	HT	PASS WO										0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0
	01/10/2015	LT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	28/10/2015	HT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	29/10/2015	LT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2015	LT	LT INT	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2015	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24/11/2015	HT	HT INT	19	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24/11/2015	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/12/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/12/2015	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/12/2015	LT	LT INT	0	5	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/12/2015	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Field Number			1	2	3	4	5	6	7	8	9	36	48	61	29	30	31	32	33	34	35	10	11	12	13	14	15	16	17	37
	Field Area (ha)			29.3	21.5	17.9	18.7	28.9	23.0	20.9	16.2	16.7	18.6	14.4	20.1	3.6	6.1	3.1	1.8	3.9	4.2	6.0	3.9	3.6	4.2	6.6	7.3	3.8	4.5	3.6	4.8
SEASON	DATE	TIDE	SURVEY																												
	21/12/2015	LT	LT INT	0	0	0	0	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	HT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/12/2015	HT	HT INT	9	0	0	70	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/12/2015	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT INT	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/01/2016	HT	HT INT	10	0	0	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/01/2016	HT	HT WO										0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT WO										0	0	0	0	85	0	0	0	0	50	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	NOC	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	6	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2016	HT	HT WO										0	0	0	0	10	30	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/02/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	4	0	32	200	0	200	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	HT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	04/02/2016	HT	HT WO										0	0	0	0	150	0	150	0	0	0	0	0	0	0	0	0	0	0	0
	16/02/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/02/2016	HT	HT WO										0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/03/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	HT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/03/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/04/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 4 - Winter 2017/18	26/09/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/09/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/10/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/10/2017	LT	WWO	0	0	0	4	6	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	30/10/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	31/10/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/11/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	07/11/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
	22/11/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2017	LT	WWO	0	3	0	0	1	10	0	0	0	0	0	0	4	108	0	37	0	0	12	0	0	0	0	0	0	0	0	0
	06/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/12/2017	LT	WWO	0	0	0	0	0	3	0	0	0	0	0	0	3	2	0	16	0	0	0	0	0	0	0	0	0	0	0	0
	20/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	20	6	3	6	0	67	0	0	0	0	0	0	0	0	0
	28/12/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	35	0	0	0	0	0	0	0	0	0
	12/01/2018	LT	WWO	0	0	0	0	200	0	0	0	0	0	0	0	0	0	0	170	0	0	0	0	0	0	0	0	0	0	0	0

	Field Number			1	2	3	4	5	6	7	8	9	36	48	61	29	30	31	32	33	34	35	10	11	12	13	14	15	16	17	37
	Field Area (ha)			29.3	21.5	17.9	18.7	28.9	23.0	20.9	16.2	16.7	18.6	14.4	20.1	3.6	6.1	3.1	1.8	3.9	4.2	6.0	3.9	3.6	4.2	6.6	7.3	3.8	4.5	3.6	4.8
SEASON	DATE	TIDE	SURVEY																												
	16/01/2018	HT	WWO	0	0	0	60	0	0	0	0	0	0	0	0	0	290	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/01/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0	70	180	0	0	0	0	0	0	0	0	0
	30/01/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/02/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	10	0	0	0	0	0	0	0	0	0
	15/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/02/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	26/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/04/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/04/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Baseline field counts of foraging lapwing in arable count sectors (yellow)

N.B. totals may not add up to the sum of field counts, as double-counting of flocks that moved during the survey will have been accounted for.

	Field Number			18	19	20	21	22	23	24	25	26	27	28	38	39	40	41	42	43	44	45	46	47	49	50	51	52	53	54	55	56	57	58	59	60	TOTAL	ARABLE
	Field Area (ha)			10.1	14.2	17.1	9.9	6.0	14.7	8.8	11.9	7.6	8.3	13.7	10.7	10.7	18.9	10.2	8.1	14.3	19.6	6.8	8.2	4.8	6.5	14.9	24.9	26.1	22.1	9.4	12.2	8.4	3.4	7.7	3.0	16.4		
SEASON	DATE	TIDE	SURVEY																																			
SEASON 1 - WINTER 13/14	09/01/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	180	0	0	0	0	0	0	0	0	0	0	431	180
	13/01/2014	HT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	2	0	0	0	0	0	8	8
	15/01/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400	0
	07/02/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/02/2014	LT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/02/2014	HT	WBS	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	30
	05/03/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/03/2014	LT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	6	6
	10/03/2014	LT	WBS	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5
SEASON 2 - WINTER 14/15	08/10/2014	HT	PBS (West)	300	180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	600
	09/10/2014	HT	PBS (East)	0	0	0	0	0	0	0	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	16/10/2014	LT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	0
	17/10/2014	LT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	22/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	170	154
	23/10/2014	HT	PBS (East)	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	12/11/2014	HT	WBS (Farm)	400	0	0	0	0	0	0	0	0	0	313	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	713	713
	13/11/2014	LT	WBS	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	660	90
	21/11/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/12/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/12/2014	HT	WBS (Farm)	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9
	17/12/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/01/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	300
	20/01/2015	LT	WBS (Farm)	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	128	128
	21/01/2015	HT	WBS (East)	0	0	0	0	0	0	0	42	27	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	91
	18/02/2015	HT	WBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	24/02/2015	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	25/02/2015	HT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	220	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	223	221
	26/02/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
SEASON 3 - WINTER 15/16	30/09/2015	HT	PASS WO	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	20
	01/10/2015	LT	PASS WO	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
	28/10/2015	HT	PASS WO	0	0	225	310	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	390	390
	29/10/2015	LT	PASS WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
	23/11/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	23/11/2015	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93	0	220	0	290	0	55	240	0	0	898	898
	24/11/2015	HT	HT INT	119	0	0	62	320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	461	451
	24/11/2015	HT	HT WO	300	40	0	120	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	18	0	0	0	0	0	484	484
	14/12/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/12/2015	HT	HT WO	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	35
	15/12/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0
	15/12/2015	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	0

	Field Number			18	19	20	21	22	23	24	25	26	27	28	38	39	40	41	42	43	44	45	46	47	49	50	51	52	53	54	55	56	57	58	59	60	TOTAL	ARABLE
	Field Area (ha)			10.1	14.2	17.1	9.9	6.0	14.7	8.8	11.9	7.6	8.3	13.7	10.7	10.7	18.9	10.2	8.1	14.3	19.6	6.8	8.2	4.8	6.5	14.9	24.9	26.1	22.1	9.4	12.2	8.4	3.4	7.7	3.0	16.4		
SEASON	DATE	TIDE	SURVEY																																			
	21/12/2015	HT	NOC	5	10	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	30	30
	21/12/2015	LT	LT WO	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	45
	22/12/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	81	1
	22/12/2015	HT	HT WO	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	5	5
	05/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	05/01/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/01/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	262	2
	06/01/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
	19/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	86	38
	19/01/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	115	85	150	130	0	0	0	0	0	567	432
	19/01/2016	LT	NOC	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	16	32	16	100	2	40	8	0	10	0	3	228	228
	20/01/2016	HT	HT INT	2	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	14
	20/01/2016	HT	HT WO	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	131	131	30	110	0	45	155	0	0	646	606
	02/02/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	437	1
	03/02/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	0	0	0	0	0	600	300
	03/02/2016	HT	NOC	0	2	30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	4	7	2	13	3	0	0	0	10	0	0	72	72
	04/02/2016	HT	HT WO	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	308	8
	16/02/2016	LT	LT WO	0	0	0	0	0	0	0	0	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	154	0	0	0	0	185	0	0	414	414
	17/02/2016	HT	HT WO	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	12	0	0	78	75
	01/03/2016	HT	HT INT	180	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	189	189
	02/03/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	HT	NOC	0	0	1	0	0	1	4	0	12	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
	03/03/2016	HT	HT WO	0	0	0	0	0	0	0	0	125	125	0	0	0	0	0	0	26	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	277	277
	20/04/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	HT	HT WO	0	0	0	0	0	2	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	7	7
	21/04/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 4 - Winter 2017/18	26/09/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/09/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
	12/10/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/10/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	0
	30/10/2017	LT	WWO	0	0	0	0	0	0	0	10	4	14	7	0	0	0	0	0	3	35	30	6	12	0	0	0	0	2	87	0	0	0	0	0	0	136	130
	31/10/2017	HT	WWO	0	0	0	0	0	0	0	0	6	20	8	0	0	0	0	0	0	49	19	14	9	0	0	0	0	0	37	55	0	0	0	0	0	219	217
	06/11/2017	HT	WWO	0	0	0	0	0	0	65	30	5	19	5	0	0	0	0	0	90	18	69	19	0	0	0	0	0	0	39	0	0	0	0	0	0	364	359
	07/11/2017	LT	WWO	0	0	0	0	0	0	0	38	5	19	24	0	0	0	0	0	3	52	24	38	29	0	0	0	0	0	0	0	0	22	0	0	0	257	254
	22/11/2017	HT	WWO	30	300	0	0	0	0	0	78	4	13	27	0	100	0	0	0	0	26	58	30	18	0	0	0	0	0	0	0	0	0	0	0	0	684	684
	23/11/2017	LT	WWO	160	85	0	0	0	0	7	44	7	13	19	0	0	0	0	0	0	88	55	14	15	0	0	0	0	0	67	0	0	0	0	0	0	749	574
	06/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/12/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0
	20/12/2017	HT	WWO	0	0	1	0	0	0	0	87	6	2	11	0	0	0	0	0	0	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	293	191
	28/12/2017	LT	WWO	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	53	0	155	2	0	0	0	0	0	0	0	0	0	0	0	0	105	451	316
	12/01/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	371	1
	16/01/2018	HT	WWO	430	0	0	0	0	0	0	115	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	935	585

	Field Number			18	19	20	21	22	23	24	25	26	27	28	38	39	40	41	42	43	44	45	46	47	49	50	51	52	53	54	55	56	57	58	59	60	TOTAL	ARABLE
	Field Area (ha)			10.1	14.2	17.1	9.9	6.0	14.7	8.8	11.9	7.6	8.3	13.7	10.7	10.7	18.9	10.2	8.1	14.3	19.6	6.8	8.2	4.8	6.5	14.9	24.9	26.1	22.1	9.4	12.2	8.4	3.4	7.7	3.0	16.4		
SEASON	DATE	TIDE	SURVEY																																			
	27/01/2018	LT	WWO	165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	460	165
	30/01/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	0
	09/02/2018	LT	WWO	0	0	5	0	0	0	0	0	0	0	35	0	0	0	0	0	0	0	270	0	0	0	0	1	0	0	0	0	0	0	0	0	0	361	311
	15/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/02/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
	26/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	16/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	06/04/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/04/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Baseline field counts of foraging golden plover in intertidal (blue), grazing marsh at east end (green) and grazing marsh/reedbed coastal sectors (grey)

N.B. totals may not add up to the sum of field counts, as double-counting of flocks that moved during the survey will have been accounted for.

	Field Number			1	2	3	4	5	6	7	8	9	36	48	61	29	30	31	32	33	34	35	10	11	12	13	14	15	16	17	37
	Field Area (ha)			29.3	21.5	17.9	18.7	28.9	23.0	20.9	16.2	16.7	18.6	14.4	20.1	3.6	6.1	3.1	1.8	3.9	4.2	6.0	3.9	3.6	4.2	6.6	7.3	3.8	4.5	3.6	4.8
SEASON	DATE	TIDE	SURVEY																												
SEASON 1 - WINTER 13/14	09/01/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/01/2014	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/01/2014	HT	WBS	0	2	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/02/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/02/2014	LT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/02/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/03/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/03/2014	LT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/03/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 2 - WINTER 14/15	08/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/10/2014	HT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/10/2014	LT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/10/2014	LT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/10/2014	HT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/11/2014	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/11/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/11/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/12/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/12/2014	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/12/2014	LT	WBS	1	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/01/2015	LT	WBS	1	2	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2015	LT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/01/2015	HT	WBS (East)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	18/02/2015	HT	WBS (West)	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24/02/2015	HT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	25/02/2015	HT	WBS (Farm)											0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	26/02/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 3 - WINTER 15/16	30/09/2015	HT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/10/2015	LT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	28/10/2015	HT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	29/10/2015	LT	PASS WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2015	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24/11/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24/11/2015	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/12/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/12/2015	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/12/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/12/2015	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Field Number			1	2	3	4	5	6	7	8	9	36	48	61	29	30	31	32	33	34	35	10	11	12	13	14	15	16	17	37
	Field Area (ha)			29.3	21.5	17.9	18.7	28.9	23.0	20.9	16.2	16.7	18.6	14.4	20.1	3.6	6.1	3.1	1.8	3.9	4.2	6.0	3.9	3.6	4.2	6.6	7.3	3.8	4.5	3.6	4.8
SEASON	DATE	TIDE	SURVEY																												
	21/12/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	HT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/12/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/12/2015	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/01/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/01/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT WO										0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/01/2016	HT	HT WO										0	0	0	0	0	0	95	0	0	0	0	0	0	0	0	0	0	0	0
	02/02/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	250	0	250	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	HT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	04/02/2016	HT	HT WO										0	0	0	0	210	0	600	0	0	0	0	0	0	0	0	0	0	0	0
	16/02/2016	LT	LT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/02/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/03/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	490	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	LT	LT WO										0	0	0	410	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	02/03/2016	HT	NOC													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/03/2016	HT	HT WO										0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/04/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	HT	HT WO										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 4 - Winter 2017/18	26/09/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/09/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/10/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/10/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	30/10/2017	LT	WWO	0	0	0	0	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	31/10/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/11/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/11/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/11/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/12/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	200	0	0	0	0	0	0	0	0	0
	28/12/2017	LT	WWO	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/01/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0

	Field Number			1	2	3	4	5	6	7	8	9	36	48	61	29	30	31	32	33	34	35	10	11	12	13	14	15	16	17	37
	Field Area (ha)			29.3	21.5	17.9	18.7	28.9	23.0	20.9	16.2	16.7	18.6	14.4	20.1	3.6	6.1	3.1	1.8	3.9	4.2	6.0	3.9	3.6	4.2	6.6	7.3	3.8	4.5	3.6	4.8
SEASON	DATE	TIDE	SURVEY																												
	16/01/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/01/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	330	0	0	0	0	0	0	0	0	0
	30/01/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/02/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	250	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/02/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	26/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	0
	06/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	27/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/04/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/04/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Baseline field counts of foraging golden plover in arable count sectors (yellow)

N.B. totals may not add up to the sum of field counts, as double-counting of flocks that moved during the survey will have been accounted for.

	Field Number			18	19	20	21	22	23	24	25	26	27	28	38	39	40	41	42	43	44	45	46	47	49	50	51	52	53	54	55	56	57	58	59	60	TOTAL	ARABLE
	Field Area (ha)			10.1	14.2	17.1	9.9	6.0	14.7	8.8	11.9	7.6	8.3	13.7	10.7	10.7	18.9	10.2	8.1	14.3	19.6	6.8	8.2	4.8	6.5	14.9	24.9	26.1	22.1	9.4	12.2	8.4	3.4	7.7	3.0	16.4		
SEASON	DATE	TIDE	SURVEY																																			
SEASON 1 - WINTER 13/14	09/01/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/01/2014	HT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/01/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	07/02/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/02/2014	LT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/02/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/03/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/03/2014	LT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/03/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 2 - WINTER 14/15	08/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/10/2014	HT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	16/10/2014	LT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/10/2014	LT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	22/10/2014	HT	PBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/10/2014	HT	PBS (East)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	12/11/2014	HT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/11/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/11/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/12/2014	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10/12/2014	HT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17/12/2014	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	14/01/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
	20/01/2015	LT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/01/2015	HT	WBS (East)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	18/02/2015	HT	WBS (West)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	24/02/2015	HT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	25/02/2015	HT	WBS (Farm)	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40
	26/02/2015	LT	WBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 3 - WINTER 15/16	30/09/2015	HT	PASS WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/10/2015	LT	PASS WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	28/10/2015	HT	PASS WO	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5
	29/10/2015	LT	PASS WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	23/11/2015	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0	0	29	29
	24/11/2015	HT	HT INT	0	0	0	0	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	150
	24/11/2015	HT	HT WO	0	0	70	270	270	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	285	285
	14/12/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	14/12/2015	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/12/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15/12/2015	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/12/2015	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Field Number			18	19	20	21	22	23	24	25	26	27	28	38	39	40	41	42	43	44	45	46	47	49	50	51	52	53	54	55	56	57	58	59	60	TOTAL	ARABLE
	Field Area (ha)			10.1	14.2	17.1	9.9	6.0	14.7	8.8	11.9	7.6	8.3	13.7	10.7	10.7	18.9	10.2	8.1	14.3	19.6	6.8	8.2	4.8	6.5	14.9	24.9	26.1	22.1	9.4	12.2	8.4	3.4	7.7	3.0	16.4		
SEASON	DATE	TIDE	SURVEY																																			
	21/12/2015	HT	NOC	0	30	23	10	10	0	0	0	0	0	0	0	20	20	0	0	0	0	0	0	0	0	8	46	0	0	0	0	0	0	0	0	0	167	167
	21/12/2015	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/12/2015	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22/12/2015	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	05/01/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/01/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/01/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	19/01/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130	0	0	0	0	0	1	0	0	134	131
	19/01/2016	LT	NOC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	3	22	32	20	1	4	0	0	1	0	0	89	89
	20/01/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	14	14
	20/01/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	204	15	75	0	0	10	0	0	399	304
	02/02/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	03/02/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0
	03/02/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0	0	0	0	440	90
	03/02/2016	HT	NOC	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	15	0	0	0	0	0	35	35
	04/02/2016	HT	HT WO	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	812	2
	16/02/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	70	0	0	0	0	0	100	100
	17/02/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	456	0	54	0	0	513	513
	01/03/2016	HT	HT INT	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	3
	02/03/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	490	0
	02/03/2016	LT	LT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	410	0
	02/03/2016	HT	NOC	0	0	5	2	100	50	0	0	0	1	100	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	260	260
	03/03/2016	HT	HT WO	0	0	0	0	0	0	0	0	400	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	830	800
	20/04/2016	HT	HT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	HT	HT WO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/04/2016	LT	LT INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEASON 4 - Winter 2017/18	26/09/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0
	27/09/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/10/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13/10/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	30/10/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0
	31/10/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360	0	0	140	110	0	0	0	0	0	0	0	0	0	0	0	610	610
	06/11/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/11/2017	LT	WWO	0	0	0	0	0	0	0	0	0	43	28	0	0	0	0	0	0	190	0	40	80	0	0	0	0	0	0	0	0	0	0	0	0	381	381
	22/11/2017	HT	WWO	0	0	0	0	0	0	0	150	50	0	0	0	0	0	0	0	0	0	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	276	276
	23/11/2017	LT	WWO	0	0	0	0	0	0	0	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	148	144
	06/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	07/12/2017	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0
	20/12/2017	HT	WWO	0	0	0	0	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	525	225
	28/12/2017	LT	WWO	0	0	0	0	0	0	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	43
	12/01/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0
	16/01/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Field Number			18	19	20	21	22	23	24	25	26	27	28	38	39	40	41	42	43	44	45	46	47	49	50	51	52	53	54	55	56	57	58	59	60	TOTAL	ARABLE
	Field Area (ha)			10.1	14.2	17.1	9.9	6.0	14.7	8.8	11.9	7.6	8.3	13.7	10.7	10.7	18.9	10.2	8.1	14.3	19.6	6.8	8.2	4.8	6.5	14.9	24.9	26.1	22.1	9.4	12.2	8.4	3.4	7.7	3.0	16.4		
SEASON	DATE	TIDE	SURVEY																																			
	27/01/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	330	0
	30/01/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	09/02/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	460	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	910	460
	15/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	21/02/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	26/02/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	01/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
	06/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16/03/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0
	27/03/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	06/04/2018	LT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12/04/2018	HT	WWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 7 – SCREENING MATRICES

Report to Inform and Appropriate Assessment

Appendix 7: Screening Matrices

This Appendix summarises the potential effects of the proposed Cleve Hill Solar Park upon European Sites which are considered within the Report to Inform and Appropriate Assessment (DCO Document Reference 5.2).

The European sites included within the screening assessment are:

- The Swale SPA;
- The Swale Ramsar;
- Thanet Coast & Sandwich Bay SPA;
- Thanet Coast & Sandwich Bay Ramsar;
- Outer Thames Estuary SPA; and
- Blean Complex SAC.

Effects considered within the screening matrices:

Designation	Effects described in submission information	Presented in screening matrices as
The Swale SPA	• Noise and visual disturbance during construction and decommissioning; • Noise and visual disturbance during operation; • Loss/change of habitats; • Fragmentation of habitats; • Hydrological changes; • Deposition of dust; • Collision (birds); and • Disturbance through changes in recreational access.	• Noise, visual and lighting disturbance; • Loss/change of habitats; • Fragmentation of habitats; • Hydrological changes; • Deposition of dust; • Collision of birds; and • Recreational access disturbance.
	In combination: (all of the above are considered in combination at the screening stage) • Noise and visual disturbance during construction and decommissioning; • Noise and visual disturbance during operation; • Loss/change of habitats; • Fragmentation of habitats; • Hydrological changes; • Deposition of dust; • Collision (birds); and • Disturbance through changes in recreational access.	In combination: • Noise, visual and lighting disturbance; • Loss/change of habitats; • Fragmentation of habitats; • Hydrological changes; • Deposition of dust; • Collision of birds; and • Recreational access disturbance.

Designation	Effects described in submission information	Presented in screening matrices as
The Swale Ramsar	• Noise and visual disturbance during construction and decommissioning; • Noise and visual disturbance during operation; • Loss/change of habitats; • Fragmentation of habitats; • Hydrological changes; • Deposition of dust; • Collision (birds); and • Disturbance through changes in recreational access; and • Attraction of egg-laying invertebrates.	• Noise, visual and lighting disturbance; • Loss/change of habitats; • Fragmentation of habitats; • Hydrological changes; • Deposition of dust; • Collision of birds; and • Recreational access disturbance; and • Attraction of egg-laying invertebrates.
	In combination: (all of the above are considered in combination at the screening stage) • Noise and visual disturbance during construction and decommissioning; • Noise and visual disturbance during operation; • Loss/change of habitats; • Fragmentation of habitats; • Hydrological changes; • Deposition of dust; • Collision (birds); • Disturbance through changes in recreational access; and • Attraction of egg-laying invertebrates.	In combination: • Noise, visual and lighting disturbance; • Loss/change of habitats; • Fragmentation of habitats; • Hydrological changes; • Deposition of dust; • Collision of birds; and • Recreational access disturbance; and • Attraction of egg-laying invertebrates.

Designation	Effects described in submission information	Presented in screening matrices as
Thanet Coast & Sandwich Bay SPA	• Loss/change of habitats. [RIAA paragraph 38, page 9]	Screened out – no LSE
	In combination: Not applicable	Screened out – no LSE
Thanet Coast & Sandwich Bay Ramsar	• Loss/change of habitats. [RIAA paragraph 38, page 9]	Screened out – no LSE
	In combination: Not applicable	Screened out – no LSE
Outer Thames Estuary SPA	No pathway for impact [RIAA paragraph 39, page 9]	Screened out – no LSE
	In combination: Not applicable	Screened out – no LSE
Blean Complex SAC	No pathway for impact [RIAA paragraph 40, page 9]	Screened out – no LSE
	In combination: Not applicable	Screened out – no LSE

STAGE 1: SCREENING MATRICES

Matrix Key:

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

C = construction
O = operation
D = decommissioning

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

HRA Screening Matrix 1: The Swale SPA

Name of European site and designation: The Swale Special Protection Area

EU Code: UK9012011

Distance to CHSP: 0 km

European site features	**Likely effects of CHSP (alone and in-combination)**																							
Effect	*Noise, visual and lighting disturbance*			*Loss/change of habitats*			*Fragmentation of habitats*			*Hydrological changes*			*Deposition of dust*			*Collision of birds*			*Recreational access disturbance*			*In-combination*		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Dark-bellied brent goose (non-breeding)	✓a	×c	✓a	✓d	✓d		×f	×f		✓g	×h	✓g	✓i		✓i		×j			×k		✓l	✓l	✓l
Dunlin (non-breeding)	✓a	×c	✓a	×d	×d		×f	×f		✓g	×h	✓g	✓i		✓i		×j			×k		✓l	✓l	✓l
Breeding bird assemblage	✓b	×c	✓b	✓e	✓e		×f	×f		✓g	×h	✓g	✓i		✓i		×j			×k		✓l	✓l	✓l
Wintering assemblage	✓a	×c	✓a	✓d	✓d		×f	×f		✓g	×h	✓g	✓i		✓i		×j			×k		✓l	✓l	✓l

Evidence supporting conclusions:

a. In the absence of mitigation, construction and decommissioning activities in the local landscape have the potential to cause noise and visual disturbance to wintering birds, affecting their foraging or roosting behaviour, resulting in reduced survival or productivity of individuals. [Section 5.2.5.1, paragraphs 63 to 68 of the RIAA]. Natural England agree that there is a likely significant effect as a result of construction/decommissioning disturbance to wintering birds, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

b. In the absence of mitigation, construction and decommissioning activities in the local landscape have the potential to cause noise and visual disturbance to breeding birds, affecting their nesting and foraging behaviour, resulting in reduced survival or productivity of individuals. [Section 5.2.5.1, paragraphs 63 to 68 of the RIAA]. Natural England agree that there is a

likely significant effect as a result of construction/decommissioning disturbance to breeding birds, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

c. Operational activities within the site will be of lower magnitude that the baseline farming activities. No areas of the site will be continuously lit, with security (PIR) and manually operated emergency lighting at transformers within the solar PV arrays. Operational disturbance to birds will be negligible. [Section 5.2.5.2, paragraphs 69 to 73 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of operational disturbance, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

d. The loss/change of habitats occurs in the construction phase and applies throughout the operational phase. Decommissioning is assumed to return the land to its pre-development state and is therefore not relevant. LSEs can be excluded for dunlin and the majority of the wintering bird assemblage, with the exception of brent goose, lapwing and golden plover. These three species forage/roost on the arable land within which the solar PV arrays will be located and therefore LSEs cannot be excluded in the absence of mitigation. [Section 5.2.5.3, paragraphs 74 to 80 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of habitat loss/change on dunlin and wintering assemblage features with the exception of brent goose, golden plover and lapwing, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

e. The loss/change of habitats occurs in the construction phase and applies throughout the operational phase. Decommissioning is assumed to return the land to its pre-development state and is therefore not relevant. LSEs can be excluded for the majority of the breeding bird assemblage (because the arable land within the site is not functionally linked to the SPA for those species), with the exception of marsh harrier. Marsh harriers forage around the arable fields within which the solar PV arrays will be located and therefore LSEs cannot be excluded in the absence of mitigation. [Section 5.2.5.3, paragraphs 81 to 83 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of habitat loss/change on the breeding bird assemblage features with the exception of marsh harrier, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

f. The fragmentation of habitats potentially occurs in the construction phase and applies throughout the operational phase. Large areas of open habitat between arrays permits passage of birds through the landscape and the development does not prevent use of surrounding habitats. [Section 5.2.5.4, paragraphs 84 to 86 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of habitat fragmentation, as set out in Table 3 of the RIAA (Paragraph 2.7 of Relevant Representation RR-827).

g. In the absence of embedded mitigation set out in the Outline Construction Environmental Management Plan (Outline CEMP (dDCO Requirement 11), Technical Appendix A5.4 of the ES with similar measures applicable to a future Decommissioning Plan (dDCO Requirement 17), there is an extremely low possibility of a catastrophic pollution event that adversely affects the water environment connected to the SPA. [Section 5.2.5.5, paragraphs 87 to 88 of the RIAA]. Natural England agree that there is a likely significant effect as a result of hydrological impacts during construction/decommissioning, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

h. The hydrological assessment predicts a long-term positive effect of the development due to reduction of inputs of fertiliser and pesticides to the local agricultural landscape, therefore LSEs can be discounted for the operational phase. [Section 5.2.5.5, paragraphs 89 to 90 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of hydrological changes during operation, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

i. In the absence of embedded mitigation set out in the Outline Construction Environmental Management Plan (Outline CEMP (dDCO Requirement 11), Technical Appendix A5.4 of the ES with similar measures applicable to a future Decommissioning Plan (dDCO Requirement 17)), there is a low risk of dust soiling from earthworks and track-out that could adversely affect the habitats of the SPA. [Section 5.2.5.6, paragraphs 91 to 92 of the RIAA]. Natural England agree that there is a likely significant effect as a result of dust production during construction/decommissioning, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

j. There is an absence of any evidence to indicate that there is a significant risk of collision of birds with solar panels or fences in the agricultural landscape. [Section 5.2.5.7, paragraphs 93 to 96 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of collision, as set out in Table 3 of the RIAA (Paragraph 2.7 of Relevant Representation RR-827).

k. LSEs are excluded because there is not predicted to be any notable change in the recreational access on footpaths within and adjacent to the SPA. [Section 5.2.5.8, paragraphs 97 to 99 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of changes in recreational disturbance, as set out in Table 3 of the RIAA (Paragraph 2.7 of Relevant Representation RR-827).

I. Potential for in-combination effects with other developments within 10 km of the Development site or within 2 km of The Swale SPA during construction, operation or decommissioning and potential for in-combination effects with the Environment Agency's Medway Estuary and Swale Strategy (MEASS). [Section 6, paragraph 108 of the RIAA; Page 9-74 Section 9.2.8 of ES chapter 9: Ornithology].

HRA Screening Matrix 2: The Swale Ramsar Site

Name of European site and designation: The Swale Ramsar Site

EU Code: UK11071

Distance to CHSP: 0 km

European site features	**Likely effects of CHSP (alone and in-combination)**																										
Effect	*Noise, visual and lighting disturbance*			*Loss/change of habitats*			*Fragmentation of habitats*			*Hydrological changes*			*Deposition of dust*			*Collision of birds*			*Recreational access disturbance*			*Attraction of egg-laying invertebrates*			*In-combination*		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Ramsar Criterion 2: Nationally scarce plants																											
Ramsar Criterion 2: At least seven British Red Data Book invertebrate species										✓g	×h	✓g	✓i		✓i								×l				
Ramsar Criterion 5: Winter waterfowl assemblage of international importance	✓a	×c	✓a	✓d	✓d		×f	×f		✓g	×h	✓g	✓i		✓i		×j			×k					✓m	✓m	✓m
Ramsar Criterion 6: Species/populations at level of international importance in spring/autumn: Redshank	✓a	×c	✓a	×d	×d		×f		× k	✓g	×h	✓g	✓i		✓i		×j			×k					✓m	✓m	✓m
Ramsar Criterion 6: Species/populations at level of international importance in winter: Dark-bellied brent goose	✓b	×c	✓b	✓e	✓e		×f		× k	✓g	×h	✓g	✓i		✓i		×j			×k					✓m	✓m	✓m
Ramsar Criterion 6: Species/populations at level of international importance in winter: Grey plover	✓a	×c	✓a	✓d	✓d		×f		× k	✓g	×h	✓g	✓i		✓i		×j			×k					✓m	✓m	✓m

Evidence supporting conclusions:

a. In the absence of mitigation, construction and decommissioning activities in the local landscape have the potential to cause noise and visual disturbance to wintering birds, affecting their foraging or roosting behaviour, resulting in reduced survival or productivity of individuals. [Section 5.2.5.1, paragraphs 63 to 68 of the RIAA]. Natural England agree that there is a likely significant effect as a result of construction/decommissioning disturbance to wintering birds, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

b. In the absence of mitigation, construction and decommissioning activities in the local landscape have the potential to cause noise and visual disturbance to breeding birds, affecting their nesting and foraging behaviour, resulting in reduced survival or productivity of individuals. [Section 5.2.5.1, paragraphs 63 to 68 of the RIAA]. Natural England agree that there is a likely significant effect as a result of construction/decommissioning disturbance to breeding birds, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

c. Operational activities within the site will be of lower magnitude that the baseline farming activities. No areas of the site will be continuously lit, with security (PIR) and manually operated emergency lighting at transformers within the solar PV arrays. Operational disturbance to birds will be negligible. [Section 5.2.5.2, paragraphs 69 to 73 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of operational disturbance, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

d. The loss/change of habitats occurs in the construction phase and applies throughout the operational phase. Decommissioning is assumed to return the land to its pre-development state and is therefore not relevant. LSEs can be excluded for dunlin and the majority of the wintering bird assemblage, with the exception of brent goose, lapwing and golden plover. These three species forage/roost on the arable land within which the solar PV arrays will be located and therefore LSEs cannot be excluded in the absence of mitigation. [Section 5.2.5.3, paragraphs 74 to 80 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of habitat loss/change on dunlin and wintering assemblage features with the exception of brent goose, golden plover and lapwing, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

e. The loss/change of habitats occurs in the construction phase and applies throughout the operational phase. Decommissioning is assumed to return the land to its pre-development state and is therefore not relevant. LSEs can be excluded for the majority of the breeding bird assemblage (because the arable land within the site is not functionally

linked to the SPA for those species), with the exception of marsh harrier. Marsh harriers forage around the arable fields within which the solar PV arrays will be located and therefore LSEs cannot be excluded in the absence of mitigation. [Section 5.2.5.3, paragraphs 81 to 83 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of habitat loss/change on the breeding bird assemblage features with the exception of marsh harrier, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

f. The fragmentation of habitats potentially occurs in the construction phase and applies throughout the operational phase. Large areas of open habitat between arrays permits passage of birds through the landscape and the development does not prevent use of surrounding habitats. [Section 5.2.5.4, paragraphs 84 to 86 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of habitat fragmentation, as set out in Table 3 of the RIAA (Paragraph 2.7 of Relevant Representation RR-827).

g. In the absence of embedded mitigation set out in the Outline Construction Environmental Management Plan (Outline CEMP (dDCO Requirement 11), Technical Appendix A5.4 of the ES with similar measures applicable to a future Decommissioning Plan (dDCO Requirement 17)), there is an extremely low possibility of a catastrophic pollution event that adversely affects the water environment connected to the SPA/Ramsar site. [Section 5.2.5.5, paragraphs 87 to 88 of the RIAA]. Natural England agree that there is a likely significant effect as a result of hydrological impacts during construction/decommissioning, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

h. The hydrological assessment predicts a long-term positive effect of the development due to reduction of inputs of fertiliser and pesticides to the local agricultural landscape, therefore LSEs can be discounted for the operational phase. [Section 5.2.5.5, paragraphs 89 to 90 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of hydrological changes during operation, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

i. In the absence of embedded mitigation set out in the Outline Construction Environmental Management Plan (Outline CEMP (dDCO Requirement 11), Technical Appendix A5.4 of the ES with similar measures applicable to a future Decommissioning Plan (dDCO Requirement 17)), there is a low risk of dust soiling from earthworks and track-out that could adversely affect the habitats of the SPA/Ramsar site. [Section 5.2.5.6, paragraphs 91 to 92 of the RIAA]. Natural England agree that there is a likely significant effect as a result of dust production during construction/decommissioning, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

j. There is an absence of any evidence to indicate that there is a significant risk of collision of birds with solar panels or fences in the agricultural landscape. [Section 5.2.5.7, paragraphs 93 to 96 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of collision, as set out in Table 3 of the RIAA (Paragraph 2.7 of Relevant Representation RR-827).

k. LSEs are excluded because there is not predicted to be any notable change in the recreational access on footpaths within and adjacent to the SPA. [Section 5.2.5.8, paragraphs 97 to 99 of the RIAA]. Natural England agree that there will be no likely significant effects as a result of changes in recreational disturbance, as set out in Table 3 of the RIAA (Paragraph 2.7 of Relevant Representation RR-827).

l. LSEs are excluded because most of the species cited are either saltmarsh specialists or associated with flowering plants (galls) or emergent vegetation (leaf miners). The majority of the ditch habitats that the Corixidae and Dolichopodidae species are likely to be found in are separated from the solar panel areas by a distance of least 15 m; the ditch habitats/marshland/saltmarsh/pools/mudflats within the Ramsar Wetland designation are the main focus for invertebrates, so those species mentioned are less likely to be impacted by solar panels and more likely to be distant from the solar PV area. Invertebrates are unlikely to fly at heights where the solar panels are [Section 5.2.5.9, paragraphs 102 to 104 of the RIAA]. Natural England agree that there will be no likely significant effects on Ramsar invertebrates, as set out in Table 3 of the RIAA (Paragraph 2.7 of Natural England Relevant Representation RR-827).

m. Potential for in-combination effects with other developments within 10 km of the Development site or within 2 km of The Swale SPA during construction, operation or decommissioning and potential for in-combination effects with the Environment Agency's Medway Estuary and Swale Strategy (MEASS). [Section 6, paragraph 108 of the RIAA; Page 9-74 Section 9.2.8 of ES chapter 9: Ornithology].

HRA Screening Matrix 3: Thanet Coast & Sandwich Bay SPA

Name of European site and designation: Thanet Coast & Sandwich Bay Special Protection Area			
EU Code: UK9012071			
Distance to CHSP: 7.8 km			
European site features	**Likely effects of CHSP (alone and in-combination*)**		
Effect	*Habitat loss/change*		
Stage of Development	*C*	*O*	*D*
Golden plover (non-breeding)	**×a**	**×a**	
Turnstone (non-breeding)	**×a**	**×a**	
Little tern (breeding)	**×b**	**×b**	

**** no additional in-combination effects were identified at the screening stage of the HRA***

Evidence supporting conclusions:

a. At a distance of nearly 8 km away, numbers of turnstones from the SPA are unlikely to range regularly as far as the Development site (where turnstones are already present within The Swale SPA) and would not make any use of the habitats within the Development site. Wintering golden plover originating from the Thanet Coast & Sandwich Bay SPA could occasionally range as far as the Development site and use the arable habitats. However, the most recent WeBS 5-year peak-mean count of golden plover for the Thanet Coast is only 34 birds. They are extremely unlikely to visit the Development site in numbers or frequency at which there would be any likely significant effects. [Section 5.1, paragraph 38 of the RIAA]. Natural England's view is that Thanet Coast & Sandwich Bay SPA can be ruled out as being potentially affected (REP2-096, section 2.1).

b. There is no impact pathway for effects on breeding little terns associated with the Thanet Coast & Sandwich Bay SPA, because they make no use of the Development site. [Section 5.1, paragraph 38 of the RIAA]. Natural England's view is that Thanet Coast & Sandwich Bay SPA can be ruled out as being potentially affected (REP2-096, section 2.1).

HRA Screening Matrix 4: Thanet Coast & Sandwich Bay Ramsar

Name of European site and designation: Outer Thames Estuary Special Protection Area			
EU Code: UK11070			
Distance to CHSP: 7.8 km			
European site features	**Likely effects of CHSP (alone and in-combination*)**		
Effect	*Habitat loss/change*		
Stage of Development	*C*	*O*	*D*
Ramsar Criterion 2: Species/populations at level of international importance in winter: turnstone (non-breeding)	**×a**	**×a**	
Ramsar Criterion 2: 15 British Red Data Book invertebrate species			

**** no additional in-combination effects were identified at the screening stage of the HRA***

Evidence supporting conclusions:

a. At a distance of nearly 8 km away, numbers of turnstones from the SPA are unlikely to range regularly as far as the Development site (where turnstones are already present within The Swale SPA) and would not make any use of the habitats within the Development site. Natural England's view is that Thanet Coast & Sandwich Bay SPA can be ruled out as being potentially affected (REP2-096, section 2.1).

HRA Screening Matrix 4: Outer Thames Estuary SPA

Name of European site and designation: Outer Thames Estuary Special Protection Area			
EU Code: UK9020309			
Distance to CHSP: 1.6 km			
European site features	**Likely effects of CHSP (alone and in-combination*)**		
Effect	*All potential effects*		
Stage of Development	*C*	*O*	*D*
Red-throated diver (non-breeding)	**×a**	**×a**	**×a**
Common tern (foraging in breeding season)	**×a**	**×a**	**×a**
Little tern (foraging in breeding season)	**×a**	**×a**	**×a**

**** no additional in-combination effects were identified at the screening stage of the HRA***

Evidence supporting conclusions:

a. There is no impact pathway for effects on the habitats or qualifying interest features of the Outer Thames Estuary SPA. [Section 5.1, paragraph 40 of the RIAA]. Natural England's view is that the Outer Thames Estuary SPA can be ruled out as being potentially affected (REP2-096, section 2.1).

HRA Screening Matrix 5: Blean Complex SAC

Name of European site and designation: Blean Complex Special Area of Conservation			
EU Code: UK0013697			
Distance to CHSP: 3.6 km			
European site features	**Likely effects of CHSP (alone and in-combination*)**		
Effect	*All potential effects*		
Stage of Development	*C*	*O*	*D*
H9160. Sub-Atlantic and medio-European oak or oak-hornbeam forests of Carpinion betuli*; Oak-hornbeam forests*	**×a**	**×a**	**×a**

**** no additional in-combination effects were identified at the screening stage of the HRA***

Evidence supporting conclusions:

a. There is no impact pathway for effects on the habitats or qualifying interest features of the Blean Complex SAC. [Section 5.1, paragraph 41 of the RIAA]. Natural England's view is that the Blean Complex SAC can be ruled out as being potentially affected (REP2-096, section 2.1).

APPENDIX 8 – INTEGRITY MATRICES

Report to Inform an Appropriate Assessment

Appendix 8: Integrity Matrices for Cleve Hill Solar Park

STAGE 2: EFFECTS ON INTEGRITY

Likely significant effects have been identified for the following sites:

- The Swale Special Protection Area
- The Swale Ramsar Wetland Site

These sites have been subject to further assessment in order to establish if the NSIP could have an adverse effect on their integrity. Evidence for the conclusions reached on integrity is detailed within the footnotes to the matrices below.

Matrix Key

✓ **=** Adverse effect on integrity **cannot** be excluded
× **=** Adverse effect on integrity **can** be excluded

C = construction
O = operation
D = decommissioning

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

HRA Integrity Matrix 1: The Swale SPA

Name of European site and designation: The Swale Special Protected Area															
EU Code: UK9012011															
Distance to NSIP: 0km															
European site features	**Adverse effects on integrity**														
Effect	*Noise, visual and lighting disturbance*			*Loss/change of habitats*			*Hydrological changes*			*Deposition of dust*			*In-combination effects*		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Dark-bellied brent goose (non-breeding)	×ab		×d	×e	×e		×h		×h	×i		×i	×j	×j	×j
Dunlin (non-breeding)	×b		×d				×h		×h	×i		×i	×j	×j	×j
Breeding bird assemblage	×c		×d	×f	×f		×h		×h	×i		×i	×j	×j	×j
Wintering assemblage	×ab		×d	×g	×g		×h		×h	×i		×i	×j	×j	×j

Evidence supporting conclusions

a. Dark bellied-brent geese, lapwing and golden plover frequently use the arable fields of the proposed development, so could be affected by noise and visual disturbance [Section 6.1.1.5 paragraph 161 of the RIAA]. The construction of the

development will take place over two to three seasons, and by a field-by-field basis. This means that large areas of the development site will free of development and disturbance at any one time. Additionally, development of the Arable Reversion Habitat Management Area (AR HMA) will occur prior to the first winter of construction, as set out in the outline Landscape and Biodiversity Management Plan (LBMP (dDCO Requirement 5), Technical Appendix A5.2 of the ES) and will provide some resource to the geese and wintering waders. There is considered to be a sufficient extent of disturbance-free habitat during the first winter season to accommodate foraging birds. Approximately half of the AR HMA will be fully established and disturbance free during the second or third winter seasons providing suitable resources and disturbance-free land for the geese and to a lesser extent, lapwing and golden plover [Section 6.1.1.5 paragraph 162-165 of the RIAA]. The resulting temporary loss of foraging resources is not likely to cause reduction in survival/productivity. There will be no long-term adverse effects of noise or visual disturbance on the integrity of the SPA as a consequence of impacts to dark-bellied brent geese lapwing or golden plover [Section 6.1.1.5 paragraph 166-170 of the RIAA]. Natural England's view is that subject to implementation of the measures described in the outline LBMP, construction disturbance and displacement alone, are not likely to lead to an adverse effect on wintering geese [AS-050].

b. Guidance and available evidence suggest that noise disturbance causes adverse impacts to birds in estuarine habitats over a threshold of 70dB (L_{Amax}). A threshold value of 55dB (L_{Amax}) has been set as a level below which it is considered birds would not be disturbed to any material effect in intertidal habitats. Between levels of 55 dB LAmax and 70dB LAmax, birds in intertidal habitats would be expected to become alert and possibly reduce feeding efficiency but not move away (i.e. moderate disturbance effects), such that it is unlikely to result in detrimental effects that reduce their ability to survive or reproduce and would not affect their distribution [Section 6.1.1 paragraph 125 of the RIAA]. Applying worst case predictions suggests that the noise levels at the closest part of the SPA could exceed 65dB [Section 6.1.1.1 paragraphs 129-136 of the RIAA], but won't exceed 70dB in intertidal habitats. This means that flight responses by birds (moderate-high disturbance effect) are unlikely to occur in intertidal habitats. Birds in a wider area could receive levels exceeding 55dB during piling activity; but, mitigation measures set out in the outline SPA Construction Noise Management Plan (dDCO Requirement 13) (e.g. using a single piling rig with acoustic screening) will be used, in addition to the screening effect of the sea wall, to minimise the noise exceeding 55dB reaching the SPA [Section 6.1.1.1 paragraph 133-139 of the RIAA]. The worst-case scenario location (a distance of 80m from the SPA) for construction piling will only affect small areas, totalling 0.16% of the SPA, at any one time; but, the majority of piling activity will be at a greater distance from the SPA. Birds within the 0.16% of the SPA are expected to remain and habituate to the level

of noise [Section 6.1.1.1 paragraph 134-136 of the RIAA]. The eastern grazing marsh will experience noise levels exceeding 65dB up to 55 m and exceeding 70 dB up to 35 m into the SPA, but this area was not found to be an important resource for wintering birds that form the SPA assemblage [Section 6.1.1.3 paragraph 152-154 of the RIAA]. There will be no long-term adverse effects of noise or visual disturbance on the integrity of the SPA as a consequence of impacts to wintering birds. Natural England agrees that the updated SPA CNMP [REP3-008] contains sufficient measures to mitigate disturbance to wintering birds within the SPA, and in particular, Castle Coote, secured through the dDCO. Therefore, NE can advise that when a formal appropriate assessment is undertaken, the evidence before the Secretary of State is sufficient to support a conclusion of no adverse effect on the integrity of the SPA [AS-050].

c. Guidance and available evidence suggest that noise disturbance causes adverse impacts to breeding birds over a threshold of 65dB (L_{Amax}) [Section 6.1.1.1 paragraph 126 of the RIAA]. Applying worse case predictions suggests that the noise levels at the closest part of the SPA could exceed 65dB causing moderate levels of disturbance. The grazing marsh to the north and west provides breeding habitat for a number of species. As set out in the outline SPA Construction Noise Management Plan (dDCO Requirement 13), activities that create noise which exceeds 65dB in the SPA coastal grazing marsh/reedbed will be avoided during the breeding season resulting in no adverse impacts to breeding birds in that location. The eastern grazing marsh will experience noise levels exceeding 65dB up to 55 m and exceeding 70 dB up to 35 m into the SPA, and visual disturbance of moving vehicles along the access road; but the breeding bird survey did not conclude that this area of the SPA is of importance to breeding birds that form the SPA assemblage [Section 6.1.1.3 paragraph 152-154 of the RIAA]. Localised disturbance to breeding marsh harrier may occur as a consequence of construction; however, there is substantial open habitat available to marsh harrier that will remain disturbance free and provide sufficient resources [Section 6.1.1.5 paragraph 157-159 of the RIAA]. There will be no long-term adverse effects of noise or visual disturbance on the integrity of the SPA as a consequence of impacts to the breeding bird assemblage species. Natural England is satisfied that the CNMP and BBPP contain clear and sufficient measures to avoid an adverse effect on the features of The Swale Special Protection Area (SPA) and Ramsar site from construction disturbance [AS-050].

d. The noise levels during decommissioning will be lower and will occur over a shorter time period than the noise levels during construction, which was deemed as having no adverse impacts on the integrity of the SPA (**a-c**), so there will be no long-term adverse effects on the integrity of the SPA during decommissioning as a consequence of the implementation of embedded noise mitigation measures and methods to avoid disturbance [Section 6.1.1.1 paragraph

142 of the RIAA], as controlled through a future Decommissioning Plan (dDCO Requirement 17). Natural England's agreement at (a), (b) and (c) regarding construction noise impacts is applicable to decommissioning.

e. A managed mitigation area of 56 hectares (AR HMA) was identified and agreed in principle by Natural England to remain undeveloped in order to provide foraging and sheltering opportunities for the bird species associated with the SPA. The area was being utilised by 55% of the observed dark-bellied brent geese during the baseline surveys which suggests that it is in a suitable location capable of supporting birds associated with the SPA. The management aims and prescriptions of the AR HMA are set out in the outline LBMP (dDCO Requirement 5). Management will convert the arable land into permanent pasture which is known to support high densities of dark-bellied brent geese, and is a preferred feeding habitat of lapwings and golden plovers. The AR HMA will be created prior to the first winter of construction, and will provide high quality managed refuge habitat to mitigate for the loss of a larger, but lower quality, area. The number of bird-days (peak mean counts of the species per day multiplied the number of days in their active season) was calculated for dark-bellied brent geese (101,940) to determine how much foraging resource is required from the site. The 56 ha HMA (providing 50.1 ha functionally available land) meets the necessary requirements of this species; consequently, the proposed development will not result in a net loss of resources for dark-bellied brent geese [Section 6.1.2.1 paragraphs 173-199 of the RIAA], so there will be no adverse impacts on the integrity of the SPA. Natural England is satisfied that the AR HMA is sufficient to avoid an adverse effect on the integrity of the SPA/Ramsar for brent geese [AS-050].

f. The change in land use may result in a reduction in the area of land available to foraging marsh harriers, but habitat enhancement areas for marsh harriers have been identified, as set out in the Grazing March Grassland Management Plan in the outline LBMP (dDCO Requirement 5), which will provide a net increase in suitable foraging habitat compared to baseline conditions. The proposed development will not result in a net loss of resources for the bird species associated with the SPA and it is predicted that marsh harriers will forage between and around the solar PV arrays in the meadow habitats created [Section 6.1.2.7 paragraphs 210-214 of the RIAA], so there will be no adverse impacts on the integrity of the SPA. Natural England's view is that there will be no adverse impact on integrity of the Swale SPA, regardless of whether or not marsh harrier are displaced from the grassland between the solar PV arrays [AS-050].

g. The solar PV development area on arable land provides functionally linked habitat to the SPA for golden plover and lapwing which are important component species of the SPA wintering bird assemblage. A managed mitigation area of 56 hectares (AR HMA) was identified and agreed in principle by Natural England to remain undeveloped in order to provide foraging and sheltering opportunities for the bird species associated with the SPA. The management aims and

prescriptions of the AR HMA are set out in the outline LBMP (dDCO Requirement 5). Management will convert the arable land into permanent pasture which is known to be a preferred feeding habitat of lapwings and golden plovers. The AR HMA will be created prior to the first winter of construction, and will provide high quality managed refuge habitat to mitigate for the loss of a larger, but lower quality, area. The number of bird-days (peak mean counts of the species per day multiplied the number of days in their active season) was calculated for lapwing (56,023) and golden plover (28,802) to determine how much foraging resource is required from the site. A size of 56 hectares meets the necessary requirements of these species; consequently, the proposed development will not result in a net loss of resources for lapwing and golden plover [Section 6.1.2.1 paragraphs 173-184 and 200-206 of the RIAA], so there will be no adverse impacts on its integrity. Natural England is satisfied that an adverse effect on the integrity of the SPA/Ramsar for lapwings and golden plovers will be avoided [AS-050].

h. Potential impacts on the water environment are only considered to be possible through a catastrophic failure of fuel- or concrete-carrying vehicles leading to a pollution event occurring close to a drainage ditch directly connected to the European Site. Buffer zones of at least 5 metres and 8 metres have been included within the design of the development between the solar PV array infrastructure and non-IDB drainage ditches and IDB drainage ditches respectively. However, the buffer zones in the majority of the site have been increased to 15 metres to include grassland habitat enhancements around most of the site. This reduces the potential for chemicals off-spilled by fuel or concrete carrying vehicles to pollute the drainage ditches which may be hydrologically connected to the SPA. As set out in the outline Construction Environmental Management Plan (CEMP) (dDCO Requirement 11), additional measures are in place; including: the presence of spill kits, speed limits for vehicles, and the maintenance of vehicles, which also contribute to minimising the likelihood of pollution entering the ditch. There will be no adverse effects on the integrity of the SPA as a consequence of hydrological changes [Section 6.1.3 paragraphs 215-219 of the RIAA]. Natural England is content that the CEMP [REP3-006] contains sufficient mitigation to avoid an adverse effect on integrity from construction impacts, including water quality [AS-050].

i. A variety of mitigation measures that are set out in the outline CEMP (dDCO Requirement 11) and proven to reduce the potential for adverse dust effects, will be implemented throughout construction and decommissioning to control the impact of dust on the neighbouring SPA. There will be no adverse effects on the integrity of the SPA as a consequence of the deposition of dust [Section 6.1.4 paragraphs 220-223 of the RIAA]. Natural England is content that the CEMP [REP3-

006] contains sufficient mitigation to avoid an adverse effect on integrity from construction impacts, including dust emissions [AS-050].

j. The planning documents of in-combination projects were examined to extract information regarding the residual effects of the proposed development on The Swale SPA [Section 6.2: Table 7 of the RIAA, page 49], as well as in combination with the Environment Agency's Medway Estuary and Swale Strategy (MEASS). The contribution of each project in-combination with the CHSP Development was found to be non-existent or negligible, negligible with appropriate mitigation, or positive. No in-combination effects have been identified that would elevate the magnitude of the effects of the development to a level that would be significant [Section 6.2.1 paragraph 231 of the RIAA].

HRA Integrity Matrix 2: The Swale Ramsar Site

Name of European site and designation: The Swale Ramsar Site															
EU Code: UK11071															
Distance to NSIP: 0km															
European site features	**Adverse effects on integrity**														
Effect	*Noise, visual and lighting disturbance*			*Loss/change of habitats*			*Hydrological changes*			*Deposition of dust*			*In-combination effects*		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Ramsar Criterion 5: Winter waterfowl assemblage of international importance	✖ab		✖c	✖d	✖d		✖f		✖f	✖g		✖g	✖h	✖h	✖h
Ramsar Criterion 6: Species/populations at level of international importance in spring/autumn: Redshank	✖b		✖c				✖f		✖f	✖g		✖g	✖h	✖h	✖h
Ramsar Criterion 6: Species/populations at level of international importance in	✖ab		✖c	✖e	✖e		✖f		✖f	✖g		✖g	✖h	✖h	✖h

winter: Dark-bellied brent goose															
Ramsar Criterion 6: Species/populations at level of international importance in winter: Grey plover	✕b		✕c				✕f		✕f	✕g		✕g	✕h	✕h	✕h
Ramsar Criterion 2: At least seven British Red Data Book invertebrate species							✕f		✕f	✕g		✕g			

Evidence supporting conclusions

a. Dark bellied-brent geese, lapwing and golden plover frequently use the arable fields of the proposed development, so could be affected by noise and visual disturbance [Section 6.1.1.5 paragraph 161 of the RIAA]. The construction of the development will take place over two to three seasons, and by a field-by-field basis. This means that large areas of the development site will free of development and disturbance at any one time. Additionally, development of the Arable Reversion Habitat Management Area (AR HMA) will occur prior to the first winter of construction, as set out in the outline Landscape and Biodiversity Management Plan (LBMP (dDCO Requirement 5), Technical Appendix A5.2 of the ES), and will provide some resource to the geese and wintering waders. There is considered to be a sufficient extent of disturbance-free habitat during the first winter season to accommodate foraging birds. Approximately half of the AR HMA will be fully established and disturbance free during the second or third winter seasons providing suitable resources and disturbance-free land for the geese and to a lesser extent, lapwing and golden plover [Section 6.1.1.5 paragraph 162-165 of the RIAA]. The resulting temporary loss of foraging resources is not likely to cause reduction in survival/productivity. There will be no long-term adverse effects of noise or visual disturbance on the integrity of the European Site as a consequence

of impacts to dark-bellied brent geese lapwing or golden plover [Section 6.1.1.5 paragraph 166-170 of the RIAA]. Natural England's view is that subject to implementation of the measures described in the outline LBMP, construction disturbance and displacement alone, are not likely to lead to an adverse effect on wintering geese, lapwing and golden plover [AS-050].

b. Guidance and available evidence suggest that noise disturbance causes adverse impacts to birds in estuarine habitats over a threshold of 70dB (L_{Amax}). A threshold value of 55dB (L_{Amax}) has been set as a level below which it is considered birds would not be disturbed to any material effect in intertidal habitats. Between levels of 55 dB LAmax and 70dB LAmax, birds in intertidal habitats would be expected to become alert and possibly reduce feeding efficiency but not move away (i.e. moderate disturbance effects), such that it is unlikely to result in detrimental effects that reduce their ability to survive or reproduce and would not affect their distribution [Section 6.1.1 paragraph 125 of the RIAA]. Applying worst case predictions suggests that the noise levels at the closest part of the European Site could exceed 65dB [Section 6.1.1.1 paragraph 129-136 of the RIAA], but won't exceed 70dB in intertidal habitats. This means that flight responses by birds (moderate-high disturbance effect) are unlikely to occur in intertidal habitats. Birds in a wider area could receive levels exceeding 55dB during piling activity; but, mitigation measures set out in the outline SPA Construction Noise Management Plan (dDCO Requirement 13) (e.g. using a single piling rig with acoustic screening) will be used, in addition to the screening effect of the sea wall, to minimise the noise exceeding 55dB reaching the European Site [Section 6.1.1.1 paragraph 133-139 of the RIAA]. The worst-case scenario location (a distance of 80m from the European Site) for construction piling will only affect small areas, totalling 0.16% of the European Site, at any one time; but, the majority of piling activity will be at a greater distance from the European Site. Birds within the 0.16% of the European Site are expected to remain and habituate to the level of noise [Section 6.1.1.1 paragraph 134-136 of the RIAA]. The eastern grazing marsh will experience noise levels exceeding 65dB up to 55 m and exceeding 70 dB up to 35 m into the European Site, but this area was not found to be an important resource for wintering birds that form the European Site assemblage [Section 6.1.1.3 paragraph 152-154 of the RIAA]. There will be no long-term adverse effects of noise or visual disturbance on the integrity of the European Site as a consequence of impacts to wintering birds. Natural England agrees that the updated SPA CNMP [REP3-008] contains sufficient measures to mitigate disturbance to wintering birds within the SPA, and in particular, Castle Coote, secured through the dDCO. Therefore, NE can advise that when a formal appropriate assessment is undertaken, the evidence before the Secretary of State is sufficient to support a conclusion of no adverse effect on the integrity of the SPA [AS-050].

c. The noise levels during decommissioning will be lower and will occur over a shorter time period than the noise levels during construction, which was deemed as having no adverse impacts on the integrity of the European Site (**a-b**), so there will be no long-term adverse effects on the integrity of the European Site during decommissioning as a consequence of the implementation of embedded noise mitigation measures and methods to avoid disturbance [Section 6.1.1.1 paragraph 142 of the RIAA], as controlled through a future Decommissioning Plan (dDCO Requirement 17). Natural England's agreement at (a) and (b) regarding construction noise impacts is applicable to decommissioning.

d. The solar PV development area on arable land provides functionally linked habitat to the European Site for golden plover and lapwing which are important component species of the European Site wintering bird assemblage. A managed mitigation area of 56 hectares (AR HMA) was identified and agreed in principle by Natural England to remain undeveloped in order to provide foraging and sheltering opportunities for the bird species associated with the European Site. The management aims and prescriptions of the AR HMA are set out in the outline LBMP (dDCO Requirement 5). Management will convert the arable land into permanent pasture which is known to be a preferred feeding habitat of lapwings and golden plovers. The AR HMA will be created prior to the first winter of construction, and will provide high quality managed refuge habitat to mitigate for the loss of a larger, but lower quality, area. The number of bird-days (peak mean counts of the species per day multiplied the number of days in their active season) was calculated for lapwing (56,023) and golden plover (28,802) to determine how much foraging resource is required from the site. A size of 56 hectares meets the necessary requirements of these species; consequently, the proposed development will not result in a net loss of resources for lapwing and golden plover [Section 6.1.2.1 paragraphs 184 and 200-206 of the RIAA], so there will be no adverse impacts on the integrity of the European Site. Natural England is satisfied that an adverse effect on the integrity of the SPA/Ramsar for lapwings and golden plovers will be avoided [AS-050].

e. A managed mitigation area of 56 hectares (AR HMA) was identified and agreed in principle by Natural England to remain undeveloped in order to provide foraging and sheltering opportunities for the bird species associated with the European Site. The area was being utilised by 55% of the observed dark-bellied brent geese during the baseline surveys which suggests that it is in a suitable location capable of supporting birds associated with the European Site. The management aims and prescriptions of the AR HMA are set out in the outline LBMP (dDCO Requirement 5). Management will convert the arable land into permanent pasture which is known to support high densities of dark-bellied brent geese, and is a preferred feeding habitat of lapwings and golden plovers. The AR HMA will be created prior to the first winter of construction, and will provide high quality managed refuge habitat to mitigate for the loss of a larger, but lower quality,

area. The number of bird-days (peak mean counts of the species per day multiplied the number of days in their active season) was calculated for dark-bellied brent geese (101,940) to determine how much foraging resource is required from the site. The 56 hectare HMA (providing 50.1 ha functionally available land) meets the necessary requirements of this species; consequently, the proposed development will not result in a net loss of resources for dark-bellied brent geese [Section 6.1.2.1 paragraphs 173-199 of the RIAA], so there will be no adverse impacts on the integrity of the European Site. Natural England is satisfied that the AR HMA is sufficient to avoid an adverse effect on the integrity of the SPA/Ramsar for brent geese [AS-050].

f. Potential impacts on the water environment are only considered to be possible through a catastrophic failure of fuel- or concrete-carrying vehicles leading to a pollution event occurring close to a drainage ditch directly connected to the European Site. Buffer zones of at least 5 metres and 8 metres have been included within the design of the development between the solar PV array infrastructure and non-IDB drainage ditches and IDB drainage ditches respectively. However, the buffer zones in the majority of the site have been increased to 15 metres to include grassland habitat enhancements around most of the site. This reduces the potential for chemicals off-spilled by fuel or concrete carrying vehicles to pollute the drainage ditches which may be hydrologically connected to the European Site. As set out in the outline Construction Environmental Management Plan (CEMP) (dDCO Requirement 11), additional measures are in place; including: the presence of spill kits, speed limits for vehicles, and the maintenance of vehicles, which also contribute to minimising the likelihood of pollution entering the ditch. There will be no adverse effects on the integrity of the European Site as a consequence of hydrological changes [Section 6.1.3 paragraphs 215-219 of the RIAA]. Natural England is content that the CEMP [REP3-006] contains sufficient mitigation to avoid an adverse effect on integrity from construction impacts, including water quality [AS-050].

g. A variety of mitigation measures that are set out in the outline CEMP (dDCO Requirement 11) and proven to reduce the potential for adverse dust effects, will be implemented throughout construction and decommissioning to control the impact of dust on the neighbouring European Site. There will be no adverse effects on the integrity of the European Site as a consequence of the deposition of dust [Section 6.1.4 paragraphs 220-223 of the RIAA]. Natural England is content that the CEMP [REP3-006] contains sufficient mitigation to avoid an adverse effect on integrity from construction impacts, including dust emissions [AS-050].

h. The planning documents of in-combination projects were examined to extract information regarding the residual effects of the proposed development on The Swale Ramsar Site [Section 6.2: Table 7 of the RIAA, page 49], as well as in

combination with the Environment Agency's Medway Estuary and Swale Strategy (MEASS). The contribution of each project in-combination with the CHSP Development was found to be non-existent or negligible, negligible with appropriate mitigation, or positive. No in-combination effects have been identified that would elevate the magnitude of the effects of the development to a level that would be significant [Section 6.2.1 paragraph 231 of the RIAA]. Natural England agrees with the wording of Requirement 17 which addresses the requirement for a time limit on the consent to avoid in-combination effects with the MEASS [AS-050]. There are no adverse effect on integrity from in-combination impacts, including with the MEASS.