



CLEVE HILL SOLAR PARK

ENVIRONMENTAL STATEMENT

VOLUME 1 - CHAPTERS

CHAPTER 8 - ECOLOGY

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CLEVE HILL
SOLAR PARK

8 ECOLOGY

8.1 Introduction

1. This chapter of the ES evaluates the effects of the proposed Cleve Hill Solar Park (the Development) on the ecological interests within and outside the ecology core study area (defined in section 8.2.2). The scope of the assessment has been determined through consultation and professional judgement.
2. The assessment specifically focuses on the effects arising from the construction, operation and decommissioning of the Development on The Swale, which is designated as a Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Ramsar site. The Swale Estuary is also a Marine Conservation Zone (MCZ). The Development site also encompasses part of, and development activity is proposed in proximity to, the South Bank of the Swale Local Nature Reserve (LNR). The Swale National Nature Reserve (NNR) is located c. 1.4 km to the north at its closest point, and does not fully overlie the other Swale designations.
3. This chapter is supported by Figures 8.1–8.5 provided in Volume II A:
 - Figure 8.1: Phase 1 Survey Area and Habitat Areas (2018);
 - Figure 8.2a-j: Phase 1 Survey Area and Habitat Area (a - j);
 - Figure 8.3: Location of Statutory and Non-Statutory Designated Sites;
 - Figure 8.4a: Designated Sites and Bat Species Zone of Influence Search Buffers;
 - Figure 8.4b: Protected Species Zone of Influence Search Buffers: Badgers and Great Crested Newts; and
 - Figure 8.5: Protected Species Location of Results.
4. This chapter is also supported by the following technical appendices, provided in Volume III.
 - Technical Appendix A8.1a: *Extended Phase 1 Habitat Survey*, which provides full methods and results of the surveys and desk study undertaken (2015);
 - Technical Appendix A8.1b: *Updated Extended Phase 1 Habitat Survey*, which provides full methods and results of the surveys and desk study undertaken (2018);
 - Technical Appendix A8.2a: *Amphibian Survey*, which provides full methods and results of the amphibian survey undertaken (2015);
 - Technical Appendix A8.2b: *Habitat Suitability Index (HSI) Assessment and Environmental DNA Survey* which provides full methods and updated results to earlier amphibian surveys (2018);
 - Technical Appendix A8.3: *Badger Survey*, which provides full methods and results of the badger survey undertaken (2015);
 - Technical Appendix A8.4: *Invertebrate Survey*, which provides summary results of the invertebrate surveys undertaken (2015);
 - Technical Appendix A8.5: *Bat Survey*, which provides full methods and results of the bat survey undertaken (2015);
 - Technical Appendix A8.6: *Reptile Survey*, which provides full methods and results of the reptile survey undertaken (2015);
 - Technical Appendix A8.7: *Water Vole Survey*, which provides full methods and results of the reptile survey undertaken (2015);
 - Technical Appendix A8.8: Natural England Discretionary Advice Service response; and
 - Technical Appendix A8.9: Letter of No Impediment Request and Response from Natural England.
5. In addition, reference is made to:

- Technical Appendix A5.2: Landscape and Biodiversity Management Plan, which addresses recommendations to protect ecological resources and enhance biodiversity as set out in this chapter, Chapter 7: Landscape and Visual Impact Assessment, Chapter 9: Ornithology.

8.1.1 Development Parameters Assessed

6. The Rochdale Envelope parameters for the Development have been considered with respect to the ecological impact assessment, and worst-case values/scenarios for this are captured by the candidate design, as set out in Chapter 5: Development Description. This chapter reports the assessment of effects associated with the candidate design, therefore.
7. The northern access route option has been considered as the worst case option of the two access options included in the candidate design, as it is closest to areas of habitat management and parts of The Swale SPA/SSSI/Ramsar Site. The other alternatives set out in the candidate design will not affect the conclusions of this assessment.

8.1.2 Scope of Assessment

8. The potential ecological effects assessed in this chapter associated with the construction, operation and decommission of the Development include:
 - *Habitat loss/change*: sheltering/roosting/commuting/foraging areas used by protected or notable species may be developed for access tracks, solar panel infrastructure, other associated structures, and land management may change as a result of the Development (including mitigation/enhancement measures);
 - *Disturbance*: protected or notable species may be displaced from an area they would otherwise use for foraging, commuting, sheltering or roosting because of works activities during construction or decommissioning, or by the presence of solar panels and associated maintenance activities during operation; and
 - *Criminal offences*: Potential disturbance or harm to nationally or European protected species, even when significant adverse ecological effects are unlikely, which could potentially lead to commission of criminal offence(s).

8.1.3 Scoping Responses and Consultation

9. Consultation has been carried out to date with the Planning Inspectorate, Kent County Council, Swale Borough Council, Canterbury City Council, the Environment Agency, Kent Wildlife Trust and Natural England in order to agree the necessary scope of work and assessment. The Scoping Opinion of the Planning Inspectorate and consultee responses are summarised in Table 8.1a. Further consultation responses were received following the S42 consultation, with these summarised in Table 8.1b (note that full responses and the Developer's comments are provided in the Consultation Report, provided along with the DCO application).
10. In addition, the response provided by Natural England through their Discretionary Advice Service (DAS) is provided in Technical Appendix A8.8.

Table 8.1a Consultation Responses

Consultee	Response	Action
Natural England	<p>Ecological Aspects of an Environmental Statement</p> <p>Natural England advises that the assessment needs to follow Guidelines for Ecological Impact Assessment (EcIA) that have been developed by the Chartered Institute of Ecology and Environmental Management (CIEEM).</p> <p>Internationally and Nationally Designated Sites</p> <p>The ES should thoroughly assess the potential/likelihood for the proposal to significantly affect European/International designated sites. Natural England welcome that a shadow HRA assessment has been proposed. NE have identified the following sites of conservation interest: The Swale SSSI, SPA and Ramsar site The Swale Estuary MCZ</p> <p>The Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within these sites and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects.</p> <p>Regionally and Locally Important Sites</p> <p>The EIA will need to consider any impacts upon local wildlife sites. Local Sites are identified by the local wildlife trust, or a local forum established for the purposes of identifying and selecting local sites. They are of county importance for wildlife. The Environmental Statement should therefore include an assessment of the likely impacts on the wildlife interests of such sites. The assessment should include proposals for mitigation of any impacts and if appropriate, compensation measures. Contact the local wildlife trust, or local sites body in this area for further information.</p> <p>Protected Species</p> <p>The ES should assess the impact of all phases of the proposal on protected species (including, for example, great crested newts, reptiles, birds, water voles, badgers and bats). Records of protected species should be sought from appropriate local biological record centres, nature conservation organisations, groups and individuals; and consideration should be given to the wider context of the site for example in terms of habitat linkages and protected species populations in the wider area, to assist in the impact assessment.</p> <p>The area likely to be affected by the proposal should be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of the ES.</p> <p>Natural England notes that a number of protected species surveys have already been carried out to inform the EIA. We have adopted standing advice for protected species which includes links to guidance on survey and mitigation.</p> <p>Habitats and Species of Principal Importance</p> <p>The ES should thoroughly assess the impact of the proposals on habitats and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under the requirements of S41 of the Natural Environment and Rural Communities (NERC) Act 2006.</p>	<p>The assessment reported in section 8.5 of this chapter follows EcIA methods,</p> <p>Potential effects on designated sites form the focus of this assessment. The Report to Inform the Appropriate Assessment (RIAA) is provided as DCO Document Reference 5.2.</p> <p>Features of special interest are identified in section 8.3 and assessed in section 8.5.</p> <p>Regionally and locally important sites are identified in section 8.3 and considered as appropriate in section 8.5.</p> <p>A protected species data request has been submitted to relevant bodies, with responses received from Kent & Medway Biological Records Centre (KMBRC) and Kent Wildlife Trust (KWT) on Local Wildlife Sites (LWS's), protected and priority species (see section 8.3 and Technical Appendix A8.1b for details).</p> <p>Survey findings are presented in Technical Appendices 8.1 to 8.7.</p> <p>A protected species data request has been submitted to relevant bodies, with responses received from KMBRC and KWT on LWS's,</p>

Consultee	Response	Action
	<p>Natural England notes that a Phase 1 habitat survey has been carried out for the site, in order to identify any important habitats present. In addition, ornithological and invertebrate surveys have been carried out. The Environmental Statement should include details of:</p> <p>Any historical data for the site affected by the proposal (e.g. from previous surveys);</p> <p>Additional surveys carried out as part of this proposal;</p> <p>The habitats and species present;</p> <p>The status of these habitats and species (e.g. whether priority species or habitat);</p> <p>The direct and indirect effects of the development upon those habitats and species; and</p> <p>Full details of any mitigation or compensation that might be required.</p> <p>The development should seek if possible to avoid adverse impact on sensitive areas for wildlife within the site, and if possible provide opportunities for overall wildlife gain. Solar arrays offer opportunities for enhancements through the management of the grassland between the panels.</p> <p>Sowing a seed mix to benefit invertebrates, including bumblebees, would be valuable in this location. In addition, the presence of ditches within the development site offers the opportunity to enhance the water vole population of the site.</p>	<p>protected and priority species.</p> <p>Survey findings are presented in Technical Appendices 8.1 to 8.7.</p> <p>Features of special interest are identified in section 8.3 and assessed in section 8.5.</p> <p>Mitigation is presented in section 8.6 and in the Outline Landscape and Biodiversity Management Plan (Outline LBMP; Technical Appendix A5.2).</p> <p>Detailed mitigation and enhancement prescriptions are presented in section 8.6 and in the Outline LBMP (see Technical Appendix A5.2)</p> <p>The Bumblebee Conservation Trust has been contacted with an advisory response received on the 23rd January 2018, with further consultation on the 1st October 2018.</p>
<p>Kent County Council</p>	<p>Ecology</p> <p>A good understanding of its ecological interest has been demonstrated. The results of the surveys and detailed mitigation strategies will need to be submitted to enable the determining authority to fully assess the impact associated with the proposed development.</p> <p>The site has been identified as being a functionally linked habitat for the adjacent designated sites. As detailed within the Scoping Report, a Habitat Regulations Assessment will have to be carried out to assess whether the proposed development will have a 'Likely Significant Effect' on the adjacent designated sites.</p>	<p>The RIAA is provided as DCO Document Reference 5.2, with enhancement highlighted within section 8.6 and the Outline LBMP (see Technical Appendix A5.2).</p>
<p>Environment Agency</p>	<p>Biodiversity</p> <p>The approach outlined in chapter 6 of the Environmental Impact Assessment Scoping Report for ecology is generally acceptable. Below are further comments on specific elements:</p> <p>Otters</p> <p>Otter records are found within the county. An ecological management plan for the site will need to include otters as a target species for surveys that we expect will take place on a regular basis during the life of the site.</p>	<p>Monitoring is not proposed of species where effects are not anticipated.</p> <p>Licensing requirements are detailed within section</p>

Consultee	Response	Action
	<p>Licensing Water vole are found onsite, there is no mention of the need for licenses for some activities that have the potential to affect this species. Consideration should be given to licensing for activities that have the potential to affect this species and the dates licenced activities can take place.</p> <p>Habitat enhancement A future managed realignment of this coastline, will require the removal of water vole and therefore no habitat enhancement measures are requested for this priority species. Water voles should not be harmed, but no habitat enhancement for this species is requested.</p>	<p>8.6 and the Outline LBMP (Technical Appendix A5.2).</p> <p>Mitigation with respect to water voles is detailed within section 8.6 and the Outline LBMP (Technical Appendix A5.2).</p>
Canterbury City Council	<p>Ecology Survey results and mitigation strategies and an HRA to be submitted, in conjunction with an FRA in order to support the application and enable the city council to fully assess the impact of the proposed development on ecology and biodiversity on the Canterbury district.</p>	<p>The RIAA is provided as DCO Document Reference 5.2, and the Flood Risk Assessment (FRA) is provided in Technical Appendix A10.1.</p>
Graveney with Goodnestone Parish Council	<p>....the parish council would expect to provide input on areas including but not limited to:</p> <ol style="list-style-type: none"> 1. Suitability of the project as a whole for the local population - human, fauna and flora. 	<p>Flora and fauna are considered within this chapter. Effects on humans are considered separately, principally within Chapters 7, 12, 13, 14, 17 and 18.</p>

Table 8.1b: S42 Consultation Responses

Consultee	Summary of Response	Action
Seasalter Chalet Association	<p>Concern about the general impact on birds and wildlife, nothing specific</p>	<p>Ecological impacts and mitigation are detailed within this ES chapter, with ornithological impacts and mitigation addressed in <i>Ornithology</i> ES Chapter 9.</p>
Environment Agency	<p>There are concerns over the creation of habitat that could benefit riparian mammals, where this could provide a conflict between this opportunity and the long term use of the site as an area of compensatory habitat for the delivery of the MEASS.</p>	<p>Benefits to water voles will be proposed in order to support a NE licence application, with no specific benefits for water voles proposed beyond this requirement.</p>
Canterbury City Council	<p>Relevant policies from the Development Plan are missing from the list contained in section 8.4.1 of Chapter 8. Canterbury City Council endorse the views of KCC on this matter.</p>	<p>Policies relevant to carrying out the assessment are included in the technical ES chapters. Policies relevant to planning are included in the Chapter 6: Legislative and Planning Policy Context chapter of the ES.</p>
CPRE	<p>Raised concerns regarding:</p> <ul style="list-style-type: none"> - The efficacy of mitigation; - The proximity to designated areas; - The reversibility of the scheme on decommissioning; - The surveys carried out; 	<p>The mitigation proposed within the Outline LBMP and referred to in this chapter have been assessed as adequate. Net gains in either area of habitat created or quality of habitat will provide an increased holding capacity for a range of species throughout the trophic chain.</p>

Consultee	Summary of Response	Action
	<ul style="list-style-type: none"> - The management of sheep on the operational solar park; and - How to assess impacts given the scale of the Development. 	<p>Protected areas have been avoided. No direct impacts are predicted and indirect impacts are proposed to be mitigated where required.</p> <p>All effects are reversible, and on removal of the solar PV infrastructure and reversion of the site to arable farmland, the ecology of the site is expected to revert to the baseline. Where vegetation proposed as part of the Development remains, this will be an enhancement relative to the baseline.</p> <p>There will be gaps between the solar panel strings and 'corridors' of connecting natural habitats in areas of the site that are not currently represented by this habitat (i.e. monocrop or bare soil). During the peak botanical growth season and invertebrate activity period of spring/summer/autumn, sunlight will fall between the solar PV array tables to provide habitat for invertebrate species occupying a range of ecosystem niches.</p> <p>When the sun is in the south, which happens at all times of year, solar radiation will land directly on the ground between the solar PV array tables.</p> <p>A suite of ecology surveys has been completed. The Phase 1 habitat survey was updated in spring 2018 and was not reported in the PEIR, but is included as technical appendices to the Ecology chapter in the ES.</p> <p>There will be extensive open strips of grazing land suitable for grazing livestock that will be available between the arrays and to the margins of the solar panel layout. These grazing areas will be available on a rotational basis for livestock. Further information is provided within the Landscape and Biodiversity Management Plan, Technical Appendix A5.2 to the ES.</p> <p>Temporary fencing will be used in areas where livestock graze. The livestock will be actively managed. Further information is provided within the Landscape and Biodiversity Management Plan, Technical Appendix A5.2 to the ES.</p> <p>The assessment follows industry good practice that is applicable at all scales of development.</p>
Kent County Council	<p>Raised concerns over panel layout shading and impacts on vegetation growth limiting suitable habitat for species, and that grassland buffers will be very narrow along existing ditches.</p>	<p>Areas beneath the solar panel locations currently exist as either bare soil or monocrop. New, more varied habitats will develop in response to the more varied light environment provided by the solar panels (ES Technical Appendix A5.3 Microclimate and Vegetation Desk Study). Growth between the solar panels will benefit shade tolerant species post construction.</p> <p>The ditch border areas appeared to be very narrow on plan because the site is so large. Actually, the design presented in the PEIR had those grassland buffers with a width of between 5 and 8 m on either side of each ditch, typically, which would not be shaded to a large extent from adjacent solar PV modules. The separation of solar PV modules from ditch-tops has been</p>

Consultee	Summary of Response	Action
		increased on the main north-south ditches crossing the site, however, to a minimum of 15 m either side of the ditch. Including the width of the ditch, this means a separation between panels of typically 30 to 35 m, which represents a substantial increase in grassland relative to the current baseline, which typically includes approximately 2 m either side of ditches.
Natural England	Acknowledges that protected species (bats, GCN and water vole) are present on site, and will work with the applicant to ensure suitable mitigation is incorporated on the Development site and to ensure that protected species licencing requirements are met.	To address protected species licencing requirements, Letters of No Impediment (LoNI) will be sought from NE. Natural England will be consulted on the Outline LBMP (Technical Appendix A5.2) on an ongoing basis through its implementation, as part of the Habitat Management Steering Group.
Environment Agency	<p>Chapter 8 of the PEIR, May 2018, reports that riparian mammals, including otters and water voles, could benefit from enhancement work that will be delivered as part of project. While we generally support this activity and understand that there may be need for it as a result of the loss of habitat that supports designated features of the SPA, we are, as previously indicated, concerned about the conflict that exists between this opportunity and the long term use of the site as an area of compensatory habitat for the delivery of the MEASS.</p> <p>Given that the area will become intertidal habitat and so unsuitable for water voles, we do not want any enhancement work, specifically for the benefit of water voles, to be delivered by the developer that will increase use of the site by this species. This is because they will need to be removed when the managed realignment project is delivered. Such work would be if the site was to be used as a translocation site or as a water vole hotel.</p>	<p>Benefits to water voles will be proposed in order to support a NE licence application, with no specific benefits for water voles proposed beyond this requirement.</p> <p>There are no proposals for use of the site as a translocation site or a water vole hotel, unless needed for NE licencing purposes.</p>
Faversham Town Council	Raised concerns about the light environment beneath the panels and the habitat for raptors to hunt in. Opined that the solar park would lead to a large gap in wildflower species.	<p>The vegetation under the panels is expected to be as described in the ES, Technical Appendix A5.3.</p> <p>Ornithology effects are assessed in Chapter 9 of the ES.</p> <p>All areas of the site proposed for solar panels are currently arable fields, not habitats hosting wildflower species.</p>
Graveney with Goodnestone Parish Council	<p>The Parish Council shares the concerns raised by the Kent Wildlife Trust on several points.</p> <p>Expressed concern at the loss of the opportunity for habitat and landscape enhancement that this site provides, in the form of the Environment Agency's managed realignment of the flood defences.</p>	The panels will be located away from aquatic habitats. In summary, the baseline arable fields extend to typically 2 m from the ditches, and the increase of typically 13 m of grassland either side of the main ditches represents a substantial increase in long-term habitat enhancement. Other enhancement prescriptions have been proposed, with further information provided within the Landscape and Biodiversity

Consultee	Summary of Response	Action
		<p>Management Plan, Technical Appendix A5.2 to the ES.</p> <p>The comment refers to the Environment Agency's Medway Estuary And Swale Strategy (MEASS), which has suggested a possible re-alignment of the coastal defences some decades in the future. This is a high level strategy currently out for consultation, and is not considered as part of the future baseline. Were it to occur, it would have substantial detrimental effects as well, such as the loss of the Saxon Shore Way and other footpaths, the loss of productive land and the loss of freshwater habitat. That strategy will be subject to environmental assessment as and when it becomes a firm plan. Further information on the scenarios for the MEASS are provided within ES Chapter 10: Hydrology.</p>
	<p>Underlying all these concerns are the unprecedented size, and unusual layout and density of the solar panel arrays, which mean that conclusions on wildlife impact drawn from much smaller solar power installations of traditional layout and design elsewhere may not be transferable to the CHSP proposals. We also assert that the ecology surveys undertaken by CHSP are out of date and that the water vole survey is incomplete.</p>	<p>The Extended Phase 1 Habitat Survey was updated in early 2018 and great crested newt habitat suitability index (HSI) assessments and eDNA survey updated in spring 2018, and the reports, provided as Technical Appendix A8.1b and A8.2b to this chapter, confirm that the site remains suitable for all the species previously identified during earlier studies and the habitats remain largely unchanged. As a result, no further surveys beyond those above have been undertaken to support the DCO application, with the requirement for further surveys to support NE licencing recognised at the post planning stage. The assessments have been based on professional and technical guidance, professional judgement and experience, drawn from knowledge of the behaviour of the species and habitats involved and from experience of a wide range of development types, not only ground-mounted solar schemes. The approach to the assessment is applicable and considered by professional bodies (CIEEM) to be effective at all scales of development, and whether specific precedent is available or not.</p>
<p>GREAT Graveney</p>	<p>We also assert that the ecology surveys undertaken by CHSP are out of date and that the water vole survey is incomplete.</p>	<p>HSI assessments and eDNA surveys were carried out in 2018 for great Crested newts and the Extended Phase 1 Habitat survey were completed to update previous surveys. The updated Phase 1 identified no significant changes from the previous surveys, and hence we would expect a similar distribution of protected and priority species. The surveys are therefore considered up to date.</p> <p>The water vole survey identified the distribution within the ecology core study area sufficiently to inform the EIA and the identification of suitable mitigation measures. Further surveys will be required to support applications to Natural England for relevant licences.</p>
	<p>In Mitigation (8.9.12, 8.9.4.2) it states: <i>"Habitats will not subsequently be allowed to</i></p>	<p>The statements made in the PEIR related to potential habitat changes following cessation of</p>

Consultee	Summary of Response	Action
	<p><i>develop and offer biodiversity where habitats are currently subject to agricultural management. Thus this avoids attracting protected and priority species into these areas and allowing the expansion to their range within the development".</i> Can the developers explain exactly what the criteria is for this proposal?</p>	<p>agriculture but before the installation of solar PV modules, which could lead to temporary improvements in habitats for valued species and then adverse effects on individuals of those species during installation of the solar PV modules. This approach has been addressed in the Outline LBMP (Technical Appendix A5.2), which sets out that following cessation of arable farming, the fields to be used for solar PV modules will be seeded with grass and wildflower, and any sward will be managed to limit potential interim benefit for valued species, prior to installation of the solar PV modules.</p> <p>An Ecological Clerk of Works (ECoW) will be engaged to ensure that there are no conflicts between the timing of habitat development and impacts on protected or priority species, with the role of the ECoW referenced in the Outline CEMP (Technical Appendix A5.4).</p>
Kent Wildlife Trust	<p>Table 8.2 of section 8.4.5 includes "Sites designated as...LWS's, or equivalents that may be designated according to criteria at the local authority level" for sites of 'local' importance. Table 8.7 of section 8.7 states for Abbey Fields Local Wildlife Site that "The site is designated as a LWS according to criteria at the local authority level." Despite the name, all Local Wildlife Sites in Kent are designated by the Kent Nature Partnership based upon criteria developed at a County level. There are no 'local authority level' criteria so all qualify as Regionally important.</p>	<p>Criteria for selecting LWS level of importance follows that found in DEFRA's document; <i>Making Space for Nature: A review of England's Wildlife Sites and Ecological Network. DEFRA 2010</i>. This states: ' <i>This is the primary designation in this (Tier 2) category. LWS are non-statutory sites identified by Local Wildlife Site partnerships, which are often led by local authorities and partnered by a range of local interests. Government policy is to provide protection to LWS through the planning system.</i>'</p>
	<p>Paragraph 104 of Chapter 8 states "...there is a network of ditches that flow from south to north into the South Bank of the Swale LNR and beyond that through a non-return valve into The Swale SSSI/SPA, MCZ and Ramsar designated sites." This implies an incorrect understanding of the boundaries of the designated sites. The SSSI/SPA/Ramsar boundary with the development site is the same as the LNR, I.E. it includes the sea wall and borrowdyke/reedbed on the landward side of the sea wall. This has implications for the assessment of impacts, as it states in Paragraph 107 that "Direct disturbance to designated sites from dust arising from construction activities is not anticipated to be higher than the baseline, with sea defences and wall providing a physical barrier to impacts from this source on the Swale SSSI/SPA/MCZ and Ramsar."</p>	<p>Further explanation is provided in section 8.5.1 of the ES.</p>
	<p>The ditch network of the site would qualify as Local Wildlife Site under Criteria MA2 "...any waterway or connected waterway complex where in total more than 2,000 linear metres of habitat is known to hold water voles during summer. Justification – these areas are core habitats in the county and provide local source populations." The wider area is also identified as a key area for</p>	<p>The importance/sensitivity of this feature is addressed within section 8.3.4. The ditch network within the ecology core study area meets criterion MA2 for selecting LWSs and is assessed as if it were an LWS. LWSs are attributed local importance.</p>

Consultee	Summary of Response	Action
	Water Voles nationally ³ . As such, the Importance/Sensitivity of the feature should be considered at least Regional.	
	Culverts have the potential to fragment the ditch network, and therefore should be (1) minimised in number and size and (2) designed so as to reduce fragmentation as much as possible.	Culvert upgrades will be completed at existing crossing locations where possible to minimise the number of culverts required. Where new culverts are required, these will be designed to ensure that ditch network connectivity is maintained and habitat fragmentation for water voles is avoided.
	We note that "...the site offers foraging and commuting habitat used by at least nine species of bat'. That's 50% of UK species and easily qualifies it for Local Wildlife Site status (BA4 "Regular feeding and foraging sites for an assemblage of 4 species or more"). As such the Importance/Sensitivity of this feature should be considered Regional.	The importance/sensitivity of this feature is addressed within the Ecology ES Chapter, section 8.3.4. Bats forage within the site principally along the ditch network, and this feature meets criterion BA4 for selecting LWSs. The ditch network within the ecology core study area meets the criteria for selecting LWSs and is assessed as if it were an LWS. LWSs are attributed local importance.
	The Reptile Mitigation Strategy set out in Paragraph 211 of Chapter 8 does not represent best practice. Given that the survey followed a presence/absence (rather than a Relative Population Assessment) methodology trapping should proceed on a 'Minimum days plus number of searches with no captures' approach before trapping is completed. Additionally, it is not stated what the basis is for the belief that "...sufficient carrying capacity is available for reptiles without the need to provide additional habitat improvements." It is generally believed that populations expand to fill, and are then limited by, the carrying capacity of their habitats. Unless there is reason to believe the situation is different in this case, some degree of habitat enhancement will be required before reptiles are translocated.	With design changes following the production of the PEIR, reptile mitigation requirements have been reviewed and revised and are detailed within the Outline LBMP (Technical Appendix A5.2). There are extensive reptile habitats within the ecology core study area, with limited baseline reptile habitat requiring removal at the construction phase. Embedded mitigation, as detailed within the Outline LBMP Technical Appendix A5.2 will offset any initial losses of habitat suitable for reptiles by providing improved habitats and an overall net gain in habitats of value to species such as reptiles.
Swale Friends of the Earth	It should be demonstrated that there is no net negative impact on local wildlife and biodiversity, which is Swale FoE's primary concern.	This Ecology ES Chapter provides quantifiable figures for the 'Net positive gain' in habitat, in section 8.5.3.
	The land proposed to be used for the solar park is currently used for arable farming. We agree with the conclusions in the PEIR that there is likely to be a net benefit for wildlife from taking this out of production because of the cessation of chemical inputs (pesticides, nitrate fertiliser). The invertebrate survey noted low levels of invertebrates on the arable fields, probably due to chemical use. There is also chemical run-off into ditches and water and the soil quality is poor on the development area because of years of intensive farming and monocrops. We agree with the conclusions of the PEIR that the change of land-use from arable farming will have knock-on benefits to invertebrates and	No response required.

Consultee	Summary of Response	Action
	other species that rely on them (birds, amphibians, etc), which we welcome.	
	We do have concerns, however, about the proposed design of the solar panels and the impact of using a flatter, east-west orientation. We acknowledge that this gives a more steady generation profile throughout the day, with economic and reliability benefits, but we are concerned that the impact of this design on the biodiversity beneath the panels hasn't been fully researched and is not presented in enough detail in the PEIR.	Solar panels and impacts of shading on vegetation have been addressed within Appendix A5.3 Microclimate & Vegetation Desk-Based Study and section 8.5.3 of this chapter. The light environment will be different to that found between panels on a south-facing design, but it is expected that vegetation will grow.
	In the Ecology section of the PEIR when discussing riparian mammals, paragraph 157 with regard to brown hares doesn't make sense – there may be an error in wording. Similarly, paragraph 166 under Chapter 8.9.1 is unclear and we would welcome clarification.	Effects on brown hare have been assessed and re-phrased in section 8.5.9 of this Chapter. The statements made in para 166 of the PEIR related to potential habitat changes following cessation of agriculture but before the installation of solar PV modules, which could lead to temporary improvements in habitats for valued species and then adverse effects on individuals of those species during installation of the solar PV modules. This approach has been addressed in the Outline LBMP (Technical Appendix A5.2), which sets out that following cessation of arable farming, the fields to be used for solar PV modules will be seeded with grass and wildflower, and any sward will be managed to limit potential interim benefit for valued species, prior to installation of the solar PV modules.
Swale Green Party	It is very evident that the land under consideration already provides excellent permanent and temporary habitat for a wide variety of bird, reptile, insect and assorted other grass and marshland species. Indeed, much of the adjacent land comprises the Swale Special Protection Area [SPA] and Ramsar site. The opportunities for mitigation of any habitat losses are extremely limited given the planned extensive use of a rare coastal environment.	These species are present principally along the field margins and in the drainage ditches. These areas will be expanded with the Development, relative to the baseline. Embedded mitigation is detailed within the Outline LBMP, ES Technical Appendix A5.2.
The Faversham Society	Construction of roads and excavation of ditches, the creation of culverts, clearing of the ground by removing plants and topsoil and installation of equipment would result in the whole site being unavailable as nesting habitat for ground-nesting birds nor as a feeding /foraging habitat for birds, bats and other animals and insects over a long period.	Land of value to wildlife will be retained and where assessed to be required, mitigation has been proposed to ensure that there are net gains for wildlife, as detailed within the Outline LBMP, Technical Appendix A5.2. Mitigation for disturbance to wildlife is considered within section 8.6. Construction would not occur across the whole site at one time, and would be phased, as detailed within the Chapter 5: Development Description. Given the size of the site, this will leave large areas undisturbed at any one time.
	The bat surveys carried out between June and September 2015 demonstrate that the site functions as a foraging and commuting habitat for bats. Nine species are present including soprano pipistrelles, common pipistrelles, noctules and Daubenton's bats.	Bats are active between dusk and dawn, principally during the summer months, when construction activity will be restricted to working hours of 0700 to 1900 (see Chapter 5: Development Description), which avoids disturbance impacts on foraging or commuting

Consultee	Summary of Response	Action
	<p>Bat activity extends over the whole site and they use the open areas as well as just along the drainage ditches. It is likely that the disturbance during construction would deter bats, and the time taken for any new vegetation to establish may make the area unsuitable as a foraging habitat for several years after installation. This is because the new vegetation is likely to take up to three years to establish.</p>	<p>bats. Important foraging and commuting habitat for bats will be maintained along with habitat connectivity outwith the Site. Strong linear habitat features of interest to foraging and commuting bats are proposed as part of embedded mitigation, with increased areas of bat foraging habitat and bat roosting opportunities to be created. Commuting routes, including open areas, will remain unrestricted by the Development. Embedded mitigation is detailed within the Outline LBMP, ES Technical Appendix A5.2.</p>
	<p>Although the site is largely used for arable at present, 172 species of invertebrate were found in the surveys carried out in July 2015. Of these, over 30 species were either locally significant or of national significance including species of beetle, bugs, flies, bees and plant hoppers. One variety of fly is nationally rare and eleven insects are nationally scarce. The clearing of parts of the site to install the spine road and install the panels is likely to have a detrimental impact on the insect population which in turn feeds birds and bats. Re-establishment of vegetation on the site will take several years, so that cover and food plants for insects will be absent.</p>	<p>Embedded mitigation to provide net gains in habitat of value to invertebrates is proposed. The retention of existing habitats of value to a range of protected and priority species is proposed, with limited habitat clearance of track and spine road crossings not impacting the favourable conservation status of wildlife at any trophic level. Habitat gains for protected and priority species are quantified within the Ecology ES Chapter 8, and embedded mitigation detailed within the Outline LBMP, ES Technical Appendix A5.2.</p>
	<p>The proposed changes to vegetation may improve the appearance of the area. However, they are not considered to constitute adequate compensation for the loss of a major area of marshland which contributes to and is functionally linked to the Swale estuary wildlife designations.</p>	<p>The solar panel build area will be within regularly disturbed arable fields that are not managed as grazing land, and which offers negligible value to biodiversity (refer to ES Chapter 5 Development Design and ES Chapter 8 Ecology). The site will continue to provide ecological benefits for a range of protected and priority species, whilst providing additional benefits through 'embedded mitigation' to provide either no net loss or net gains in habitat of value to invertebrates, reptiles, bats, water voles, and a range of other species, which would not otherwise be available in the absence of the Development.</p>

8.2 Assessment Methodology and Guidance

8.2.1 Legislation, Policy and Guidance

11. The following legislation, policy and guidance documents are relevant to this chapter:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna ("the Habitats Directive");
- The Conservation of Habitats and Species Regulations 2017 ("the Habitat Regulations");
- Wildlife and Countryside Act 1981 (as amended);
- Marine and Coastal Access Act, 2009;
- Natural Environment and Rural Communities Act (NERC) 2006;
- National Planning Policy Framework (2018);
- UK Post-2010 Biodiversity Framework, which supersedes and subsumes the UK Biodiversity Action Plan (UK BAP);

- Kent [Local] Biodiversity Acton Plan (LBAP);
 - Canterbury District Local Plan (2017);
 - Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal 2016¹; and
 - Natural England guidance on solar parks².
12. Other guidance that is specific to important ecological features or assessment methods have been used, and referenced, where appropriate.
13. The Legislative and Planning Policy Context is set out in ES Chapter 6.

8.2.2 Study Area

14. The ecology core study area is defined as shown in Figures 8.3 and 8.4.
15. Following consultation with Natural England, statutory and non-statutory designated sites search areas were defined within a 5 km buffer surrounding the ecology core study area as being appropriate for the identification of “likely significant effects” as required by the EIA Regulations. Following confirmation from Natural England, protected and priority species records were sought within 2 km of the ecology core study area (with the exception of bats at 5 km). The ecology core study area and buffer zones are shown in Figures 8.3 and 8.4.
16. Habitat and species surveys were confined to within the ecology core study area and its immediate vicinity. Signs of species such as badger were searched up to 30 m from the ecology core study area, where accessible, with an assessment and survey of waterbodies for amphibians up to 500 m from the ecology core study area. Waterbodies within a 500 m buffer of the ecology core study area are shown in Figure 8.4.
17. A search of designated sites and protected species did not extend beyond the distances stated above. Individuals from meta-populations found beyond these distances are either not typically associated with the ecology core study areas habitats or are unlikely to be significantly impacted by the Development. Designated sites and the features for which they have been designated are isolated by distance from ecological effects beyond 5 km from the Development site.

8.2.3 Baseline Survey Methodology

18. The baseline survey methodologies are described within relevant guidance and referenced in sections 8.2.3.1 to 8.2.3.10.

8.2.3.1 Desk Study

19. Existing information about designated sites and records of legally protected and notable habitats and species was sought from various sources. Information about species and habitats within 2 km of the core survey area was sought. Information about statutory and non-statutory designated sites (excluding Special Protection Areas (SPA) which are addressed separately in Chapter 9: Ornithology) was sought from within 5 km of the core survey area. The following resources and data providers were consulted:
- Kent & Medway Biological Records Centre (KMBRC);
 - National Biodiversity Network (NBN);
 - Kent Bat Group;
 - Kent Reptile and Amphibian Group (KRAG);
 - Kent Mammal Group;

¹ Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*. IEEM, Winchester.

² Natural England (2011) *Natural England Technical Information Note TIN101 Solar parks: maximising environmental benefits*.

- Kent Field Club;
- The Bumblebee Conservation Trust;
- Kent Wildlife Trust; and
- Multi-Agency Geographic Information for the Countryside³.

20. The desk study assessment area and ecology core study area buffers are illustrated in Figure 8.4.

8.2.3.2 Extended Phase 1 Habitat Survey (2015)

21. An Extended Phase 1 Habitat Survey of the ecology core study area was undertaken on the 3rd and 4th of August 2015. The aim of the survey was to identify the broad type, quality and extent of habitats present within the ecology core study area and to identify the potential for these habitats to support protected and/or otherwise notable species. The survey was conducted according to the standard Phase 1 Habitat survey methodology⁴ and in accordance with best practice; any evidence of protected and/or otherwise notable species were recorded. Following this survey, additional reptile, amphibian, badger, invertebrate and bat surveys were undertaken. Further details can be found in Technical Appendix A8.1a.

8.2.3.3 Updated Extended Phase 1 Habitat Survey (2018)

22. An updated Extended Phase 1 Habitat survey of the ecology core study area was undertaken on the 15th and 16th February 2018 following the standard survey methodology as cited in section 8.2.3.2. The aim of the survey was to identify the broad type, quality and extent of habitats present within the ecology core study area and to identify the potential for these habitats to support protected and/or otherwise notable species, and to evaluate habitat changes (if any) from the 2015 survey.

23. An assessment was made as to whether further updated surveys would be required for protected species. It was concluded within the Updated Extended Phase 1 Habitat survey report that the status of protected or priority species is likely to remain broadly unchanged, because factors including habitat types have remained unchanged since the previous surveys were undertaken. Further surveys will be needed for Natural England licencing only (in the season prior to construction), and there is no need to update all protected or priority species surveys for the purposes of this ES. Guidance on licencing requirements for individual species is included within the Outline LBMP, Technical Appendix A5.2.

24. Results of the Updated Phase 1 Habitat Survey were found to be broadly in line with those detailed in Technical Appendix A8.1a. Further details can be found in Technical Appendix A8.1b.

8.2.3.4 Amphibian Survey

25. In March 2015 the Habitat Suitability Index (HSI)⁵ was calculated for seven waterbodies within 500 metres (m) of the ecology core study area, as well as for the drainage ditches within the ecology core study area. Although there were two other waterbodies within 500 m of the ecology core study area, landowner access was not granted for these and were scoped out of further studies in 2015, and access was granted to these ponds in 2018 (as described in Technical Appendix A8.2b).

³ Multi-Agency Geographic Information for the Countryside [Online] Available at: www.magic.gov.uk [Accessed 28th March 2018]

⁴ JNCC (2010) *Handbook for Phase 1 habitat survey - a technique for environmental audit*.

⁵ ARG UK (2010). *ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index*. Amphibian and Reptile Groups of the United Kingdom.

26. Four ponds within 500 m of the ecology core study area, as well as the network of drainage ditches on the ecology core study area, were considered suitable for great crested newt (GCN).
27. In order to estimate population size class, on the four waterbodies and drainage ditches considered suitable for GCN, a suite of six surveys were conducted. The surveys were undertaken between April and June 2015, with three of the surveys undertaken in the optimal mid-April to mid-May time period⁶. The survey used three survey methods out of:
- Bottle trapping;
 - Torching;
 - Egg searching; and
 - Netting.

28. Full details are provided in Technical Appendix A8.2a.

8.2.3.5 Great Crested Newt Habitat and eDNA survey

29. In April 2018, a HSI was calculated for each of eight waterbodies within 500 m of the ecology core study area. Within 500 m of the ecology core study area, one other water body was scoped out due to its large size, whilst landowner access was not granted for another water body (water body 8) and was scoped out of further studies. This water body was not included in the 2015 GCN surveys. Other waterbodies in the vicinity of this water body were found not to contain GCN. Water body 8 is c. 360 m from any proposed construction activity, and c. 1,300 m from the only major earthworks proposed (at the electrical compound), and no significant effects would be anticipated at these distances.
30. Water bodies within 500 m of the ecology core study area, as well as the network of drainage ditches on the ecology core study area, were considered suitable for GCN.
31. As an update to the 2015 great crested newt surveys, eDNA samples were taken from each of the water bodies following standard collection and analysis guidelines to determine whether GCN were still present or were now absent.⁷

32. Full details are provided in Technical Appendix A8.2b.

8.2.3.6 Badger Survey

33. Two surveys were undertaken in May 2014. The survey was conducted following standard methodology⁸. The survey involved walking the entire ecology core study area paying particular attention to areas of woodland/tree line edge, scrub edge, hedgerows, ditch network and field margins where setts and other signs of badger activity are commonly found. The ecology core study area was also re-checked for signs of badger activity during the Phase 1 Habitat Survey in August 2015. Full details are provided in Technical Appendix A8.3.

8.2.3.7 Preliminary Aquatic and Terrestrial Invertebrate Surveys

34. The ecology core study area was visited on three occasions: 2nd August, 8th September and 10th September 2015. Invertebrates were located and collected using sweep net, beating tray and a stout trowel, as well as through visual inspections of plants and water-dipping in the drainage ditches using a pond net. The surveys sought to identify whether the ecology core study area supports protected and priority invertebrate species, such as

⁶ <https://www.gov.uk/guidance/great-crested-newts-surveys-and-mitigation-for-development-projects#when-to-survey>

⁷ Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. *Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA*. Freshwater Habitats Trust, Oxford.

⁸ Harris S, Cresswell P and Jefferies D (1989) *Surveying Badgers*. Mammal Society.

Species of Principal Importance in England, as defined within Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

35. Invertebrates included in other conservation categories were also considered, including the IUCN Red Data Book species of invertebrates.

36. Full details are provided in Technical Appendix A8.4.

8.2.3.8 Bat Survey

37. Three bat activity survey visits were undertaken between June and September 2015, with one visit comprising both dusk and pre-dawn surveys. Each survey visit comprised three transects designed to include potential flight paths and foraging areas within the ecology core study area. Six SM2BAT+ static detectors were also left in-situ for at least four nights in June/July, August and September 2015. Bat surveys were designed with reference to the Natural England and Bat Conservation Trust guidelines⁹ relevant at the time of the surveys.

38. Full details are provided in Technical Appendix A8.5.

8.2.3.9 Reptile Survey

39. A suite of seven surveys were conducted during September and October 2015, following the standard best practice guidelines^{10,11}. A total of 413 artificial refugia were placed within the ecology core study area during early September 2015, after a period of ten days to allow the refugia to settle, survey visits were conducted on seven separate occasions, in suitable weather conditions.

40. The population size of reptiles was then estimated based on standard methodology⁶. This classifies population size based on the maximum number of adults seen by observation and/or under refugia (placed at a density of up to 10 per hectare) in one day.

41. Full details are provided in Technical Appendix A8.6.

8.2.3.10 Water vole Survey

42. Water vole surveys were undertaken from 8th to 11th September 2015. The survey methodology used was in accordance with standard guidelines¹² This consisted of identifying the extent and distribution of water vole activity through targeted searches of the banks of the network of ditches for field signs indicating recent activity (*e.g.*, feeding stations, latrines, footprints) as well as signs of past and potentially present activity (*e.g.*, burrows). Latrines are recognised as good indicators of territorial behaviour, which in turn generally correlate with water vole breeding activity.

43. Full details are provided in Technical Appendix A8.7.

8.2.4 Assessment Methodology and Assessment Criteria

44. The approach taken to assessment methodology follows the Chartered Institute of Ecology and Environmental Management (CIEEM) guidance for Ecological Impact Assessment (EcIA)¹³ which sets out a recommended process for assessment through the following stages:

- Identification and characterisation of ecological effects from all phases of the Development;

⁹ Hundt, L. (2012). *Bat Surveys – Good Practice Guidelines*. London: Bat Conservation Trust (2nd Ed)

¹⁰ Froglife (1999). *Froglife Advice Sheet 10: reptile survey*. Froglife, London.

¹¹ Gent T and Gibson S (2003). *Herpetofauna Workers Manual*. JNCC, Peterborough.

¹² Strachan R and Moorhouse T (2011). *Water Vole Conservation Handbook, 3rd Edition*. Wildlife Conservation Research Unit (WildCRU), Oxford University.

¹³ CIEEM, 2016. *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*. Chartered Institute of Ecology and Environmental Management, Winchester.

- Incorporation of measures to mitigate identified effects;
- Assessment of significance of residual effects following mitigation;
- Identification of appropriate compensation to offset significant residual effects; and
- Identification of opportunities for ecological enhancement.

8.2.5 Determining Importance

45. Habitats and species of nature conservation importance at local, national and international level are identified through policy and legislation, providing a focus for biodiversity conservation in the UK. These elements provide a starting point for the identification of Important Ecological Features (IEFs) requiring consideration in EcIA, enabling demonstration of compliance with policy objectives and statutory requirements for biodiversity. Expert judgment is also required for the identification of IEFs, particularly where these may not be included in conservation lists, designated sites or features, or highlighted in nature conservation policy.
46. In accordance with CIEEM guidance, the importance of an ecological feature is considered within a defined geographical context, as outlined in Table 8.2. Only ecological features with at least local importance are considered as IEFs requiring assessment for potential significant effects.

Table 8.2 Geographical Context of IEFs

Level of Importance/Sensitivity	Example Definitions
Very High (International)	An internationally designated site (<i>e.g.</i> , a Special Area of Conservation (SAC)) or a site meeting criteria for international designations. This includes candidate SAC's Species in internationally important numbers (>1 % of biogeographic populations). SAC qualifying species connected to a SAC.
High (National)	A nationally designated site SSSI, or an NNR, or a site meeting criteria for national designation. Species present in nationally important numbers (>1 % UK population). Cited species that are connected to a nationally designated site. Large areas of priority habitats listed on Annex I of the Habitats Directive and smaller areas of such habitats that are essential to maintain the viability of that ecological resource.
Medium (Regional)	Species present in regionally important numbers (>1 % Kent population). Sites designated as Local Nature Reserves (LNRs), or equivalents.
Low (Local)	Sites designated as LWSs, or equivalents that may be designated according to criteria at the local authority level. Other species of conservation interest, <i>e.g.</i> , UKBAP/LBAP species that contribute to the local community. Sites with ecological value but falling below criteria for selection as an LWS. Areas of semi-natural woodland smaller than 0.25 ha. Areas of habitat or species considered to appreciably enrich the ecological resource within the local context.
Negligible (Less than Local)	Usually widespread and common habitats and species. Receptors falling below local value are not considered in detail in the assessment process unless they have policy implications for the Development, <i>e.g.</i> , legally protected species.

8.2.6 Characterising Ecological Effects

47. The assessment describes the relevant characteristics required to understand the ecological effects and to determine their significance. This may include the following:
- Beneficial (positive) or adverse (negative) effect: these will be determined according to whether the change is in accordance with nature conservation objectives and policy. A positive effect is a change that improves the quality of the environment or feature and may include halting or slowing an existing decline in the quality of the environment or feature. A negative effect is a change that reduces the quality of the environment or feature;
 - Extent: the spatial or geographical area over which the effect may occur;
 - Duration: this is defined in relation to changes in ecological characteristics within human timeframes. Effects may be described as short, medium, long-term, permanent or temporary;
 - Frequency and timing: this will take into account the number of times an activity will occur in a defined time period that may influence the resulting effect. The timing and frequency of an activity or change may result in an effect if it coincides with seasonal ecological elements (such as the bird breeding season); and
 - Reversibility: an irreversible effect is one from which recovery is not possible within a reasonable timescale, or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.
48. These characteristics combine to form a qualitative description of effect magnitude, referring to size, amount, intensity and volume, as summarised in Table 8.3.

Table 8.3 Effect Magnitude Criteria

Effect Magnitude	Description
High	These are changes that will almost always have an adverse effect on the integrity or conservation status of an ecological feature. They are usually long-term and often permanent/irreversible.
Medium	These are adverse changes that may in some circumstances be considered to effect the integrity or conservation status of an ecological feature. They may be long-term but are potentially reversible.
Low	These are adverse changes that do not usually change the integrity or conservation status of an ecological feature. They are often short-term and/or reversible.
Negligible	There is no perceptible change in the ecological feature. As an example, less than 1 % of a population or area will be affected.

49. In assessing the character of an ecological effect, the behavioural sensitivity and the potential for recovery (where the effect may be temporary and adverse) needs to be considered in respect of each potentially affected population. The judgement takes account of information available on the responses of fauna to various stimuli (*e.g.* predators, noise and disturbance by humans). It should be noted that behavioural sensitivity can differ between similar species and between different populations of the same species. Thus, the behavioural responses of fauna are likely to vary with both the nature and context of the stimulus and the experience of the individual species. Behavioural sensitivity also depends on the activity of the species; for example, a species is likely to be less tolerant of disturbance whilst breeding than at other times, but tolerance is likely to increase as the breeding cycle progresses.

8.2.7 Determining Significance

50. For the purposes of EcIA, a significant effect is defined as an effect that either supports or undermines biodiversity conservation objectives for IEFs or for biodiversity in general. Conservation objectives may be specific, broad or wide-ranging; therefore effects can be considered as significant at a wide range of scales from International to Local. Significant effects encompass those effects on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species, including their distribution and abundance.
51. Where identified, significant effects will be qualified with reference to an appropriate geographic scale. It is important to note that the scale of the significance of an effect may not be the same as the geographic context in which the feature is considered important. This will enable consistency in scale when determining appropriate mitigation or compensation solutions. For defined sites or ecosystems, significant effects encompass effects on the structure and function of such systems. For designated sites, it is necessary to assess whether or not an effect will adversely affect the integrity of the designated site (and is therefore significant); if a likely significant effect is predicted to a Natura 2000 site, a Habitat Regulations Assessment (HRA) is required.
52. For habitats and species, consideration of conservation status is required to determine whether or not an effect on a habitat or species is likely to be significant. For species, conservation status is determined by the sum of influences which may affect a species' abundance and distribution within a given geographical area. When assessing potential effects on conservation status, the known or likely background trends and variations in status are taken into account.
53. Within this assessment, the significance of the potential effect on each identified IEF is determined by considering both the nature conservation importance of each feature and the degree to which it may be affected (the effect magnitude) by the Development.

8.2.8 Cumulative Effects

54. Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Within EcIA, cumulative effects are particularly important as many ecological features are exposed to background levels of threat or pressure and therefore may be close to reaching critical thresholds where further effect could cause irreversible decline. It is recognised that different actions can cause cumulative effects:
 - Additive/incremental: multiple activities/projects may give rise to a significant effect due to their proximity in time and space. These may be additive or synergistic; and,
 - Associated/connected: associated developments may include different aspects of the project which may be authorised under different consent processes, these will be included as part of the cumulative assessment.
55. In addition to operational developments, projects considered within the cumulative assessment include the following types of future development within the potential zone of influence:
 - Developments for which consent has been applied for and which are waiting determination;
 - Projects granted consent but which have not yet been implemented or have been started but are not yet complete;
 - Developments refused permission but which are subject to appeal and the appeal is undetermined; and,
 - Proposed projects that will be implemented by a public body but for which no consent is needed from a competent authority.

8.2.9 Mitigation and Residual Effects

56. Following the assessment of effects, attempts are made to avoid and mitigate significant adverse ecological effects. Taking into consideration the Development's mitigation, assessment of the residual effects is undertaken to determine their significance on ecological features. If significant residual effects are identified, these should be considered against the relevant legislation and policy in determining the application.

8.3 Baseline Conditions

8.3.1 Desk Study

57. Kent and Medway Biological Records Centre (KMBRC) provided data search records on the 5th February 2018, whilst responses from Kent Reptile and Amphibian Group (KRAG) were also received on the 7th February 2018. Non-statutory designated site information was received by Kent Wildlife Trust on 12th March 2018. Kent Bat Group, Kent Mammal Group, Kent Wildlife Trust, Kent Naturalist Club and The Bumblebee Conservation Trust provide their species records direct to KMBRC.

58. There are 12 statutory designated sites for nature conservation within 5 km of the ecology core study area, three of those sites are directly adjacent or very close to the boundaries of the ecology core study area to the west, north and east, with one of the designated sites holding a multiple designation.

59. Four non-statutory designated sites for nature conservation were recorded within 5 km of the ecology core study area boundary, with the nearest being Uplees Lake and Marsh (reference: SW 44) Local Wildlife Site (LWS) at 1.2 km to the west north west. A summary of information on the statutory and non-statutory designated sites can be found in Table 8.4.

60. The results of the desk study search of protected and priority species can be found as a summary in section 8.3.1 of this chapter.

8.3.1.1 Designated Sites

61. Table 8.4 provides a summary of statutory designated sites of ecological value and within 5 km of the ecological core study area, with non-statutory designated sites up to 2 km of the ecological core study area also included.

Table 8.4 Statutory and Non-Statutory Designated Sites within 5 km of the Ecology core study area

Site Name	Status	Distance and Direction from ecology core study area	Description
Statutory Designated Sites			
The Swale	Ramsar/SSSI/SPA	Adjacent to the north, east and west	Complex of estuarine habitats (mudflats, saltmarsh and grazing marsh) supporting internationally notable assemblages of invertebrates, higher plants, and birds.
South Bank of the Swale	LNR	Adjacent to the north and west	
The Swale Estuary	MCZ	Approximately 10 m to the west, and 70 m to the north	Designated as a Marine Conservation Zone in January 2016, the site is considered to be highly biodiverse and is known to be an important spawning and nursery ground for various fish species. The Swale Estuary consists of important

Site Name	Status	Distance and Direction from ecology core study area	Description
			habitats such as sand and sediments.
Oare Marshes	LNR	300 m to the west	Traditional grazing marsh in Kent with reedbed and saltmarsh dissected by freshwater and brackish dykes. Internationally important reserve for migratory, overwintering and breeding wetland birds. The saltmarsh supports a unique set of plants tolerant of the salty conditions including golden samphire, sea lavender, sea purslane, sea clover and thrift. Freshwater dykes contain frogbit, reedmace and water plantain. Common seals are often seen in the Swale Estuary.
The Swale	NNR	1.4 km to the north	Coast and grazing marsh habitats on the Isle of Sheppey, supporting significant populations of waterbirds.
Seasalter Levels	LNR	1.5 km to the east	Part of the North Kent coast freshwater grazing marsh, it is also a valuable wetland site for wintering and migratory wildfowl and wading birds, including wigeon, teal, redshank and lapwing.
Foxes Cross Bottom	LNR	3.5 km to the east	A mosaic of neutral grassland with scrub, native broadleaved woodland and other valuable habitats such as ponds, wet ditches and hedgerows. In the summer many warblers and nightingales nest in the scrub.
Ellenden Wood	SSSI	3.6 km to the east	Coincident with part of the Blean Complex SAC, notified for its ancient woodland habitat supporting diverse flora, invertebrate and breeding bird community.
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 <i>Carpinus betuli</i> .
Elmley	NNR	4.3 km to the north west	Wide expanse of grazing marsh, divided by ditches and frequent shallow surface flooding which that home to large numbers of wintering wildfowl and breeding waders.
Blean Woods	NNR	4.4 km to the south-east	Part of the largest ancient woodland in southern Britain, supporting diverse flora, invertebrate and bird populations.

Site Name	Status	Distance and Direction from ecology core study area	Description
Church Woods, Blean	SSSI	4.4 km to the south-east	Coincident with part of the Blean Complex SAC, notified for its ancient woodland habitat supporting diverse flora, invertebrate and breeding bird community.
Non-Statutory Designated Sites			
SW 44 Uplees Lake and Marsh	LWS	1.2 km WNW	Several ponds are surrounded by willow carr, scrub and grassland. The site supports a good bird fauna.
SW48 Abbey Fields, Faversham	LWS	1.2 km SW	Designated as a site of SSSI quality, supporting scrubland bird species and has records of four breeding KRDB3 (Kent Red Data Book) species include nightingale, reed warbler, yellow hammer and house sparrow. The site also supports a high diversity of invertebrates, water voles and reptiles (common lizards, grass snakes and slow worms).
SW24 Graveney Dykes and Pasture	LWS	1.6 km SE	It is designated for its dykes within the grazing marsh. Additional habitats include reed beds, acid grassland, semi-improved grazed pasture and hay meadows. A small orchard is also situated to the south-west and several small plantation woodlands.
SW01 Bysing Wood and Oare Gravel Pits	LWS	2.6 km SW	Bysing Wood is designated for its ancient woodland. A small area of high forest stands to the south-west with mature oak and sweet chestnut. Other habitats include scrub, open water and wetland habitats. Oare Gravel Pits is a former industrial workings and disused gravel pits which now supports a diversity of bird fauna, bats and invertebrates. An old canal runs through the northern part of the site and sycamore woodland and mature ash surrounds the former gunpowder manufacturing site.

8.3.1.2 European and Nationally Protected Species

62. The desk study returned 16 species records for national and European protected species within 2 km of the ecology core study area boundary, with nine of these species records for bats found within 5 km. Where multiple records were found for each species, the nearest and most recent records are provided. With consideration to the typical lifespan of protected species individuals, only records from the year 2000 and later are included.

The total number of individual protected species was 3,010. A summary of protected species records is included in Table 8.5.

Table 8.5 Protected species within 2 km (5 km for bats) of the Ecology core study area

Species/Taxa	Status	Number of records
Great crested newt	European Protected Species	144 individuals
Bats	European Protected Species	Nine species, 576 individuals
Water vole	Nationally Protected Species	2,114 individuals
Reptiles	Nationally Protected Species	Four species, 169 individuals
Badger	Nationally Protected Species	6 individual
Least Lettuce	Nationally Protected Species	1 individual

63. A full list of protected species is included within Technical Appendix A8.1b.

8.3.1.3 Priority Species

64. The desk study returned 2,330 records of Natural Environment and Rural Communities (NERC) Act 2006 Species of Principal Importance in England (SPIE), Kent Biodiversity Action Plan (KBAP) and other priority species within 2 km of the ecology core study area boundary. The desk study also returned 29 records within 5 km for priority bat species. Where multiple records were found for each species, the nearest and most recent records are provided. A full list of priority species will be included in the final ES.

8.3.1.4 Priority Habitats

65. The desk study returned 21 records of Natural Environment and Rural Communities (NERC) Act 2006 Habitats of Principal Importance in England (HPIE), Kent Biodiversity Action Plan (KBAP) and other priority habitats within 2 km of the ecology core study area boundary, which included Ancient Woodland, and Traditional Orchard. None of these habitats are represented within the ecology core study area. The Standing Open Water KBAP was identified within the ecology core study area.

8.3.2 Baseline Surveys

66. A summary of the results of habitat and protected species surveys are provided within the following sections. Full results of the surveys are found in Technical Appendix A8.1 to A8.7, with the location of results found in Figures 8.1 to 8.5.

8.3.2.1 Extended Phase 1 Habitat Survey (2015)

67. The study area was largely dominated by large arable fields. Intersecting the fields are an extensive network of drainage ditches with associated rough grassland margins along their length. Other habitats included a small reedbed in the south where a ditch widens out and areas of bare ground used for agricultural machines.

68. A variety of other habitats were found adjacent to the ecology core study area boundary such as extensive reedbed along the northern boundary and houses, hedgerows, and lines of trees along the southern boundary. Much of the eastern boundary of the ecology core study area was adjoined by coastal grazing marsh comprising the Swale SSSI habitat.

69. Full results are shown in Technical Appendix A8.1a.

8.3.2.2 Extended Phase 1 Habitat Survey (2018)

70. A revisit of the ecology core study area to complete an Updated Extended Phase 1 Habitat survey found habitats to be present comparable to those found in 2015.

71. A summary of the habitats recorded and their conservation value is provided in Table 8.6 and the Phase 1 Habitat Survey map can be seen in Figures 8.2a-j.

Table 8.6 Extent, Conservation Status and Value of Phase 1 Habitats

Phase 1 Habitat	Area (ha)	Length (m)	Value	Rationale
Cultivated/disturbed land – arable	238.12	-	Negligible	Excludes field margins. Large area of negligible value habitat
Bare ground (between cultivation - as arable)	111.84	-	Negligible	Large area of negligible ecological value habitat
Semi-improved neutral grassland	22.28	-	Moderate	KBAP Habitat Action Plan – Lowland meadow. Connected field margin habitat. Does not meet the requirements for an LWS under criteria set out ¹⁴ .
Running water (Ditch Network)	6.38	-	Moderate	Parts of this habitat have a functional link to South Bank of the Swale LNR, and support protected species. The ditch network supports protected species (including water vole and bats) in numbers and distribution that qualify this habitat for LWS designation within the ecology core study area under criteria MA2 and BA415, and therefore qualifies this habitat as being of Low (Local) Importance.
Improved grassland	4.24	-	Negligible	Non-priority habitat
Swamp	2.90	-	Low	Homogeneous habitat dominated by common reed
Other tall herb and fern – ruderal	1.47	-	Low	Commonly occurring habitat supporting commonly occurring fauna
Buildings	0.79	-	Negligible	Non priority

¹⁴ Kent Wildlife Trust (2015). Local Wildlife Sites in Kent: Criteria for Selection and Delineation. Version 1.5. Available at: https://www.kentwildlifetrust.org.uk/sites/default/files/2018-07/Local_Wildlife_Sites_in_Kent-Selection%26Delineation_v1.5_Oct2015.pdf [accessed on 23/10/2018]

¹⁵ Kent Wildlife Trust (2015). Local Wildlife Sites in Kent: Criteria for Selection and Delineation. Version 1.5. Available at: https://www.kentwildlifetrust.org.uk/sites/default/files/2018-07/Local_Wildlife_Sites_in_Kent-Selection%26Delineation_v1.5_Oct2015.pdf [accessed on 23/10/2018]

Phase 1 Habitat	Area (ha)	Length (m)	Value	Rationale
Standing water	0.19	-	Moderate	KBAP Habitat, albeit <0.01% of the Kent total area of standing water ¹⁶
Marsh/marshy grassland	0.14	-	Low	Small area, but with value to a range of protected and priority species
Scrub - dense/continuous	0.13	-	Negligible	Small area of non-connected habitat
Defunct hedge - species-poor	0.08	-	Negligible	NERC Act – Priority Habitat. Small area of non-connected habitat
Cultivated/disturbed land - amenity grassland	0.08	-	Negligible	Small area of low ecological value habitat
Coniferous Parkland/scattered trees	0.02	-	Negligible	Small area of low ecological value habitat

72. Full results are shown in Technical Appendix A8.1b.

8.3.2.3 Amphibian Survey

73. GCN were observed within 3 waterbodies outside the ecology core study area boundary, with peak count reaching 10 individuals, meaning only a small population was present in ponds within 500 m of the ecology core study area.

74. Marsh frog, an invasive non-native species under Schedule 9 of the Wildlife and Countryside Act, was recorded in the drainage ditches within the ecology core study area. It is illegal for them to be released into the wild.

75. Full results are shown in Technical Appendix A8.2a.

8.3.2.4 Great Crested Newt Habitat and eDNA survey

76. The results of the eDNA survey to identify the current distribution of great crested newts identified four waterbodies outside the ecology core study area that registered as positive for the presence of GCN. This included two waterbodies that in the previous amphibian survey (see Appendix 8.2a) did not record GCN presence. Pond 2 was found to be absent of GCN when surveyed previously, whilst Pond 7 was found to be dry at the time of survey.

77. Full results are shown in Technical Appendix A8.2b.

8.3.2.5 Badger Survey

78. During the survey visits, no setts were observed within or were visible adjacent to the ecology core study area. No signs of badgers such as runs were observed from within the ecology core study area or immediately outside the ecology core study area. During the Phase 1 Habitat survey undertaken in 2015, no signs of badger were observed.

79. Full results are shown in Technical Appendix A8.3.

¹⁶ Kent Biodiversity Action Plan Steering Group (1997). Kent Biodiversity Action Plan. Available at: [file:///C:/Users/DanielH/Downloads/Kent Biodiversity Action Plan%20\(1\).pdf](file:///C:/Users/DanielH/Downloads/Kent_Biodiversity_Action_Plan%20(1).pdf) [accessed on 18/10/2018]

8.3.2.6 Invertebrate Survey

80. A total of 172 invertebrate species were found during the survey, which was considered to be a relatively low number for a study area of this size. This was attributed to domination of intensely farmed land within the ecology core study area.
81. No endangered invertebrates were recorded within the ecology core study area, with one nationally rare species (a large grey horsefly) and ten nationally scarce species recorded.
82. Full results are recorded in Technical Appendix A8.4.
83. Water flows through the ditch system within the ecology core study area from a south to north direction, with egress into the Swale through a 1-way valve: however, the SSSI citation¹⁷ refers to the ditch water having higher salinity levels closer to the coastline. The aquatic habitats found within the South Bank of the Swale LNR designation are therefore expected to have a higher salinity and would be expected to support a different invertebrate species assemblage to that found in ditches within the southern sections of the ecology core study area.
84. Furthermore, no species associated with the Swale SSSI/Ramsar designations were identified during the invertebrate survey, with higher salinity habitats found in these designations likely to provide a partition in invertebrate species composition between the ditches within the ecology core study area, (which is expected to have a lower salinity level) and those found within these designations.

8.3.2.7 Bat Survey

85. From the results of both the activity surveys and the static detectors, it is concluded that the ecology core study area offered foraging and commuting habitat used by at least nine species of bat. This includes high numbers of common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) and moderate numbers of noctule (*Nyctalus noctula*) and serotine bat (*Eptesicus serotinus*). Low numbers of Myotis bats (considered most likely to be Daubenton's bat (*Myotis daubentonii*), Leisler's bat (*Nyctalus leisleri*), brown long-eared bat (*Plecotus auritus*) and Nathusius' pipistrelle (*Pipistrellus nathusii*) were also recorded.
86. Key areas utilised for foraging and commuting within the ecology core study area comprised the ditch network, the sea wall zone and cattle grazed pastures adjacent to the north of the ecology core study area, and along the tree lines adjacent to the south of the ecology core study area. Activity recorded within the arable fields was limited. No habitat suitable to support roosting bats was recorded within the ecology core study area; however, from the results, it was considered that overall the ecology core study area provided an important foraging resource within the wider study area, utilised by bats commuting into the ecology core study area from roosting locations elsewhere.
87. Full results are provided in Technical Appendix A8.5.

8.3.2.8 Reptile Survey

88. Survey visits identified that the ecology core study area supported two species of widespread reptile, namely common lizard and grass snake. The maximum adult count for common lizard was eight recorded on the 25th September 2015 and the maximum adult count for grass snake was zero, although a juvenile grass snake was recorded on two separate occasions namely on the 23rd September 2015 and the 9th October 2015. Furthermore, an adult grass snake was observed during the badger survey in May 2014 and a juvenile grass snake was seen during the Phase 1 Habitat Survey in August 2015.

¹⁷ Natural England (1990). Citation for The Swale SSSI. Available at: <https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1003678.pdf> [accessed on 23/10/2018]

89. Based on published guidance¹⁸, the ecology core study area was considered to support a good population of common lizard and, based on the presence of a juvenile, a low population of grass snake.

90. Full results are provided in Technical Appendix A8.6.

8.3.2.9 Water Vole Survey

91. In total 22 ditches were surveyed for water vole from within the ecology core study area. Generally, current water vole activity was abundant and widespread within suitable habitat within the ecology core study area. Of these ditches, water vole activity was recorded in 10 ditches.

92. Full results are provided in Technical Appendix A8.7.

8.3.3 Future Baseline

93. Assuming a lag between the baseline studies and the commencement of Development construction, it is necessary to consider possible changes to baseline conditions during this time. No substantial habitat modifications or changes that could influence ecological interest at the ecology core study area are foreseen, and an Updated Phase 1 Habitat Survey (Technical Appendix A8.1b) confirmed negligible habitat changes since the baseline surveys of 2015.

94. The baseline results, as summarised in sections 8.3.2.1 - 8.3.2.9, are considered typical of the area surrounding the Development and historical KMBRC records suggest little change in protected and notable species composition between 2015 and 2018.

95. It is possible that in future, unexpected protected species that are not currently represented within the ecology core study area may occur within it as one-off or regular events; for example, otter that have been recorded within 13 km of the Development¹⁹ or badger that have been recorded at 1.8 km from the Development. Mitigation, such as mammal gates within the perimeter fencing will be proposed to accommodate such unpredictable occurrences.

8.3.4 Important Ecological Features (IEFs)

96. The following nearby statutory designated sites are considered to be the most important IEFs based on professional judgement.

97. The Swale SSSI/SPA/MCZ, and Ramsar (adjacent to the north, east and west) is designated for comprising the largest remaining areas of freshwater grazing marsh in Kent and the estuarine habitats found on the north Kent coast. The habitats comprise chiefly mudflats, saltmarsh, and freshwater grazing marsh, the latter being intersected by extensive dykes and fleets. The area is particularly notable for the internationally important numbers of wintering and passage wildfowl and waders, and there are also important breeding populations of a number of bird species (more detail on this is provided in Chapter 9, Ornithology, of this ES, and the RIAA in DCO Document Reference 5.2). Associated with the various constituent habitats of the ecology core study area are outstanding assemblages of plants and invertebrates. The ecology core study area does not however support any flora or non-bird fauna associated with these designated sites.

98. The SW48 Abbey Fields, Faversham LWS, qualifies at the local level based on the criteria for selecting LWS level of importance provided by DEFRA²⁰, which states: '*This is the primary designation in this (Tier 2) category. LWS are non-statutory sites identified by Local Wildlife Site partnerships, which are often led by local authorities and partnered by*

¹⁸ Froglife (1999) *Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation*. Froglife Advice Sheet 10. Froglife, Halesworth.

¹⁹ Environment Agency Scoping Response – 9th January 2018

²⁰ Making Space for Nature: A review of England's Wildlife Sites and Ecological Network. DEFRA 2010.

a range of local interests. Government policy is to provide protection to LWS through the planning system.'

99. The habitats within the ecology core study area were reviewed against the criteria for designation as a Local Wildlife Site identified by the Kent Wildlife Trust²¹. The ditch network meets criterion MA2, on the basis of having 2 km or more of connected waterway complex holding water voles. The ditch network was also identified as being used by high or moderate numbers of 4 species of bat, and hence meets the criterion BA4. No other elements of the ecology core study area were identified as meeting any LWS selection criteria. As a result, the ditch network within the ecology core study area has been assessed as if it were a Local Wildlife Site.
100. Following the criteria in Table 8.2 in the context of the baseline information, Table 8.7 presents the IEFs that have been identified.

Table 8.7 Important Ecological Features

IEF	Importance/ Sensitivity	Rationale
The Swale SSSI/SPA/Ramsar/MCZ	International	As a multiple designated site up to the international level, and functionally linked to the ecology core study area, The Swale SSSI/SPA/Ramsar qualifies as Very High (International) Importance.
South Bank of the Swale LNR	Regional	As a local statutory designated site of regional importance and functionally linked to the ecology core study area, South Bank of the Swale LNR qualifies at Medium (Regional) Importance.
Oare Marshes LNR	Regional	As a local statutory designated site of regional importance, Oare Marshes LNR qualifies as Medium (Regional) Importance.
SW48 Abbey Fields, Faversham	Local	The Site is designated as a LWS according to criteria at the local level. The site contains other species of conservation interest, such as KBAP species that qualify as a low (Local) Importance.
Ecology Core Study Area – Ditch Network	Local	The ditch network supports protected species (including water vole and bats) in numbers and distribution that qualify this habitat for LWS designation within the ecology core study area under criteria MA2 and BA4 ²² , and therefore qualifies this habitat as being of Low (Local) Importance.
Habitat – Standing Water	Local	Habitats of ecological value (KBAP Habitat Action Plan), as set out in Table 8.6.
Habitat - Neutral grassland - semi-improved	Local	Habitats of ecological value (KBAP Habitat Action Plan – Lowland meadow), as set out in Table 8.6.
Invertebrates	Local	As invertebrates are a qualifying species group of the South Bank of the Swale LNR, but changes affecting invertebrates will occur away from the LNR, invertebrates within the ecology core study area qualify at Local Importance.

²¹ Kent Wildlife Trust (2015). Local Wildlife Sites in Kent: Criteria for Selection and Delineation. Version 1.5. Available at: https://www.kentwildlifetrust.org.uk/sites/default/files/2018-07/Local_Wildlife_Sites_in_Kent-Selection%26Delineation_v1.5_Oct2015.pdf [accessed on 23/10/2018]

²² Kent Wildlife Trust (2015). Local Wildlife Sites in Kent: Criteria for Selection and Delineation. Version 1.5. Available at: https://www.kentwildlifetrust.org.uk/sites/default/files/2018-07/Local_Wildlife_Sites_in_Kent-Selection%26Delineation_v1.5_Oct2015.pdf [accessed on 23/10/2018]

IEF	Importance/ Sensitivity	Rationale
Great crested newt	Local	A European protected species under the Conservation of Habitats and Species Regulations, 2017, found in habitats functionally linked to the ecology core study area, and important at the local policy level. The species qualifies at Low (Local) Importance.
Water vole	Local	As a nationally protected species under the Wildlife and Countryside Act 1981 (as amended), it is found in ditch habitat in the ecology core study area and within functionally linked habitats around it, and is therefore important at the local level. This species qualifies as Low (Local) Importance.
Bats	Local	A European protected species under the Conservation of Habitats and Species Regulations, 2017, found in the ecology core study area and habitats functionally linked to the ecology core study area, and important at the local policy level. The species qualifies at Low (Local) Importance.
Reptiles	Local	As nationally protected species under the Wildlife and Countryside Act 1981 (as amended), and found important as a qualifying feature of SW48 Abbey Fields, Faversham LWS. This species qualifies as Low (Local) Importance.
Other Species	Local	This includes brown hare, which is a species found in the ecology core study area and within the wider landscape, and qualify as Low (local) Importance.

101. Features not included in the above table are considered to be of less than Local value and so are scoped out of further assessment.

8.4 Development Design Mitigation

102. The measures set out below will be implemented as part of the Development and thus constitute mitigation 'embedded' in the design of the Development. As such, any assessment of effects presented in section 8.5 assumes the implementation of the embedded mitigation. A summary of embedded mitigation includes:

- New coastal grazing marsh habitats incorporating wildflowers;
- New native species hedgerow planting;
- Areas of shelterbelt, which will incorporate tree planting; and
- Native scrub buffer planting areas.

103. These embedded mitigation measures are set out in detail within the Landscape and Biodiversity Management Plan provided in Technical Appendix A5.2.

104. As set out in Chapter 5: Development Description, the deer fences that will encompass the areas in which Development infrastructure is to be located will incorporate mammal gates at regular intervals to avoid the fence acting as a barrier to movement through the Development site.

8.5 Assessment of Potential Effects

105. The ecological assessments for the identified IEFs are presented separately in the following sections.

106. As a point of generality, the area in the northeast of the ecology core study area to be managed for the benefit of geese and other waders covers an area of c. 56 ha (see ES

Chapter 9: Ornithology), may not be optimal for IEF species based on the creation of fertile grassland conditions, and therefore has not been attributed as a benefit in the IEF in the assessments in this section.

8.5.1 Designated Sites - Potential Ecology Effects

107. This section considers the non-avian ecological features of the Swale Estuary MCZ, Swale SSSI and Ramsar site, South Bank of the Swale LNR, Oare Marshes LNR and SW48 Abbey Fields, Faversham LWS; the ornithological features of these sites are addressed separately in Chapter 9: Ornithology.
108. The qualifying and notified features (excluding avian) of the Swale SSSI/Ramsar and Swale Estuary MCZ include, principally, coastal habitats, with maritime botanical and invertebrate interest. The ecology core study area does not support, or have the potential to support, these features and the Development activity will not directly encroach the boundaries of the Swale SSSI and Swale Estuary MCZ. Furthermore, the majority of habitats within the ecology core study area are extremely unlikely to contribute indirectly to the conservation status of these features or the integrity of the designations due to the lack of comparable habitat types or qualifying species.
109. The Swale Estuary MCZ, Swale SSSI and South Bank of the Swale LNR sites are located adjacent to the north, east and west of the ecology core study area and are thus functionally connected and potentially within the range of potential construction and decommissioning effects. Oare Marshes LNR and SW48 Abbey Fields, Faversham LWS are not adjacent, but are within the zone of influence of the ecology core study area.
110. There will be no direct effect of habitat changes on the designated sites, as no construction, operational or decommissioning phase activity will take place in these areas that isn't already undertaken under the existing baseline.

8.5.1.1 Habitat changes – indirect effects

111. Indirect effects on the designated sites outside the ecology core study area include:
- The cessation of inputs of agricultural chemicals to the environment; and
 - The creation of habitats within the ecology core study area that could affect the designated areas.

Agricultural Chemical Input Cessation

112. Currently, the habitats within the ecology core study area are mostly managed for agricultural use, with either bare ground (at the time of survey) or arable planting. The agricultural management activities in the ecology core study area in the baseline scenario include applications of nitrate fertiliser and pesticides, with ploughing and tilling of active agricultural land throughout the ecology core study area and close to sensitive receptors, such as The Swale SSSI/SPA/MCZ and Ramsar, the South Bank of the Swale LNR and the network of ditches. It is expected that inputs of both nitrate fertiliser and pesticides from arable farming activities will halt prior to construction activity and throughout the operational life of the solar park. The hydrological effects of the Development are described in Chapter 10: Hydrology, Hydrogeology, Flood Risk and Ground Conditions, with water quality reported as likely to be improved relative to the baseline, with the cessation of large scale fertiliser and pesticide applications to arable land.
113. In the baseline scenario, good practice arable farming methods reduced the likelihood of effects on sensitive receptors, which included maintaining field margin buffers and storing nitrate fertiliser carefully to reduce diffuse chemical inputs to aquatic habitats. However, there are still likely to be residual baseline inputs of both fertiliser and pesticide to sensitive receptors such as ditches that will continue (but decline over time) after the cessation of arable farming.

114. For an effect on the designated sites, there needs to be a source, pathway and receptor present.
115. Within the ecology core study area, there is a network of ditches that flow from south to north into the South Bank of the Swale LNR, The Swale SSSI/SPA and Ramsar designated sites and beyond that through a non-return valve into the estuarine side of the sea defence, and the Swale MCZ. This aquatic connectivity provides an ongoing pathway for pesticide, herbicide and fertiliser inputs (source) to enter sensitive habitats and designated sites (receptor). During construction and on completion of the Development, there will no longer be chemical inputs where solar panels replace arable farming. As the solar park will be operational over decades, it is expected that these effects will decline in the absence of additional source inputs. Where there is a decline in these inputs, there is a reduction in effect on the pathway and subsequently the receptor, with both plants and animals found in these habitats less likely to be subject to stress. Where habitats are no longer subjected to the stresses of these inputs, recovery and changes in both the composition and abundance of plants and animals is expected, which would benefit biodiversity in the longer term. With no new additional pesticide application, it is expected that any remaining pesticide residues within the ecology core study area will biodegrade in time.
116. The effect of ceasing the inputs of agricultural chemicals will be a beneficial effect on the adjacent designated sites, of low magnitude, in accordance with Table 8.3, as it is not expected that it would have affected the integrity of the designated areas or the conservation status of their qualifying species. It will also act locally, at the point where these designations extend to the landward side of the sea defences, and thus will not affect the majority of the area covered by the designations. The effect is not expected to discernibly impact the Oare Marshes LNR or the SW48 Abbey Fields, Faversham, LWS. The beneficial effect on the ditch network in the ecology core study area is predicted to be of medium magnitude, as the ditch network is the immediate, unintended recipient of the chemical inputs from agriculture that would be ceased, and such chemical change could beneficially affect the integrity of the site. Given the above, combined with the level of importance of the various designated areas, this is assessed as being a long-term, beneficial effect as follows:
- The Swale SSSI/SPA/Ramsar/MCZ: International importance, **Moderate** effect, not significant in terms of the EIA Regulations;
 - South Bank of the Swale LNR: Regional importance, **Minor** effect, not significant in terms of the EIA Regulations;
 - Oare Marshes LNR: no effect;
 - SW48 Abbey Fields, Faversham, LWS: no effect; and
 - Ecology Core Study Area – Ditch Network (LWS equivalent): Local importance, **Minor** effect, not significant in terms of the EIA Regulations.

Habitat Creation

117. Technical Appendix A5.2 sets out measures for the creation and management of new habitats. These are principally:
- New coastal grazing marsh habitats incorporating wildflowers to replace arable farming, principally around and between the solar PV modules (c. 48 ha). The land immediately above the ditch banks will be managed as grassland, with an area between 8 and 15 m wide separating the ditch banks from the nearest solar PV modules (c. 26.7 ha). Across the site, this provides a large area of grassland, substantially increased relative to the baseline in which arable farming was carried out up to 2 m from the ditch bank tops. Underneath the solar PV modules there will be less light, and a different growth environment, as described in Technical Appendix A5.3: Microclimate and Vegetation Desk Study. Although likely to be better grassland habitat than the baseline arable farmland, given the

- lower light environment, and as a conservative approach to assessment, this area has not been included in calculations of new important habitat;
- Areas of lowland meadow will be created within the east (focussed on land parcels Y and Z) and within the west of the ecology core study area, which will be outside of the solar PV fields, and will be managed to provide wildflower rich habitat. The area of this habitat amounts to c. 32.4 ha;
 - New native species hedgerow planting, which will link to offsite habitat along the south of the ecology core study area and amounting to c. 3.6 km;
 - Areas of shelterbelt, which will incorporate tree planting. This will be incorporated as landscape screening between the site and residential properties to the south and east of the core study area, which amounts to c. 3.1 ha; and
 - Native scrub buffer planting areas, which will be incorporated around the electrical compound. Other scrub planting will be incorporated in discrete areas outside of solar PV fields throughout the ecology core study area, which will amount in total to c. 4.2 ha.
118. The inclusion of newly created habitats within parts of the ecology core study area will attract biodiversity, relative to the baseline, that may act in a synergistic effect to provide habitat and biodiversity benefits to the adjacent South Bank of the Swale LNR and indirectly The Swale SSSI/SPA/MCZ/NNR, and Ramsar. Where terrestrial habitat connectivity is available, these benefits are also inferred on the Oare Marshes LNR and SW48 Abbey Fields, Faversham LWS. In addition, the new grassland will help to fix residual nitrate fertiliser inputs and limit the potential for these to enter the ditches, adding to the beneficial effect described above, of ceasing chemical inputs to the soil.
119. The creation of new habitats will therefore provide a long-term, reversible (if land management reverts to the baseline situation following decommissioning) and beneficial effect on biodiversity within the ecology core study area. The effect on adjacent designated sites is likely to have a similar effect but be of low magnitude, in accordance with Table 8.3, as it is not expected to affect the integrity of the designated areas or the conservation status of their qualifying features. It will also act locally, at the point where these designations extend to the landward side of the sea defences, and thus will not affect the majority of the area covered by the designations. The effect is not expected to discernibly impact the Oare Marshes LNR or the SW48 Abbey Fields, Faversham, LWS. The beneficial effect on the ditch network in the ecology core study area may be of medium magnitude, as the ditch network is immediately adjacent to these newly created habitats and could beneficially affect the integrity of the site.
120. Given the above, combined with the level of importance of the various designated areas, habitat creation within the ecology core study area is assessed as being a long-term, beneficial effect as follows:
- The Swale SSSI/SPA/Ramsar/MCZ: International importance, **Moderate** effect, not significant in terms of the EIA Regulations;
 - South Bank of the Swale LNR: Regional importance, **Minor** effect, not significant in terms of the EIA Regulations;
 - Oare Marshes LNR: no effect;
 - SW48 Abbey Fields, Faversham, LWS: no effect; and
 - Ecology Core Study Area – Ditch Network (LWS equivalent): Local importance, **Minor** effect, not significant in terms of the EIA Regulations.

8.5.1.2 Construction/decommissioning effects on designated sites

121. During the construction phase, there is the potential for effects on the ecology core study area habitats and, indirectly, on off-site designated habitats, from site traffic and activity during the installation of the solar panels and infrastructure, and construction of the electrical compound and upgrading of ditch crossings. This activity is of a temporary

- nature and is expected to last for 24 months in duration, though much less in any one location except the electrical compound.
122. The potential effects of dust are considered in Chapter 16, Air Quality, of the ES, and mitigation is proposed in Technical Appendix A5.4: Outline Construction Environment Management Plan (CEMP). The magnitude of potential dust effects is negligible, in accordance with Table 8.3, and therefore the effect of construction dust on the designations and ditch habitats is assessed as **negligible**.
123. The Outline CEMP also includes measures to reduce the risk of accidental spills leading to chemical inputs to sensitive receptors (ditches and designated sites). This will include the use of interceptor ditches, bunding, and best practice measures to isolate potential input sources such as oil leaks, dust emissions and other contaminated runoff. The magnitude of potential effect on the designations is negligible, in accordance with Table 8.3, and therefore the effect of construction chemical spills on the designations is assessed as **negligible**. The magnitude of potential effect on the ecology core study area ditch network is negligible, in accordance with Table 8.3, and therefore the effect of construction chemical spills on the ditch network is assessed as **negligible**.
124. The upgrading of ditch crossings and construction of the electrical compound is required as part of the Development, and is set out in Chapter 5: Development Description. The methods to be used for implementing these are set out in the Outline CEMP, which would minimise risks of siltation, loss of habitat and loss of connectivity along the ditch corridors. Any effects would be adverse, but highly localised and short-term, and would not lead to discernible effects on the designated sites. The magnitude of the potential effect on designations is negligible, in accordance with Table 8.3, and therefore the effect of upgrading of ditch crossings on the designations is assessed as **negligible**. The magnitude of the potential adverse effect on the ecology core study area ditch network is low, in accordance with Table 8.3, and therefore the effect of upgrading of ditch crossings on the ditch network is assessed as **Minor**, and not significant in terms of the EIA Regulations.

8.5.2 Habitats – Standing Water

125. Potentially significant effects on Standing Water are limited to changes to their habitat, as assessed below.

8.5.2.1 Changes to Standing Water Habitat

126. There are no changes to the Standing Water habitats within the ecology core study area. This represents a long-term, neutral change of negligible magnitude, in accordance with Table 8.3. Noting that Standing Water is a Local importance IEF in Table 8.7, the effects on this habitat are assessed as being **negligible**, and not significant in terms of the EIA Regulations, based on the approach set out in section 8.2.7.

8.5.3 Habitats – Semi-improved Neutral Grassland

127. Potentially significant effects on Semi-improved Neutral Grassland are limited to changes to the habitat, as assessed below.

8.5.3.1 Changes to Semi-improved Neutral Grassland Habitat

128. The grassland within the ecology core study area offers quality habitat that support IEF species and will mostly be retained as part of the Development. Additionally, there will be an increase in this habitat type and area of value to IEF species following construction of the Development by the creation of new habitats through the Outline LBMP set out in Technical Appendix A5.2.

129. The loss of important habitat includes:
- Spine road and access track construction, leading to the loss of c. 0.065 ha of grassland; and
 - Electrical compound construction, leading to the loss of c. 0.3 ha of grassland.
130. The creation of important habitat includes:
- New buffer grassland, adjacent to the ditch network throughout the site, c. 26.7 ha;
 - Lowland meadow, in fields Y and Z, c. 14 ha; and
 - Grassland/scrub on the slopes of the bund around the electrical compound, c. 1.48 ha (of which it is assumed that approximately 50% will be grassland).
131. New grassland will be created under the solar PV modules, which is expected to be similar to that found under hedges (see Technical Appendix A5.3), which covers an area of c. 175 ha. Although likely to be better grassland habitat than the baseline arable farmland, given the lower light environment, and as a conservative approach to assessment, this area has not been included in calculations of new important habitat.
132. Taking into account the above, the net change in this habitat is an increase of c. 41 ha, which represents a long-term, beneficial change of medium magnitude, in accordance with Table 8.3. Noting that semi-improved neutral grassland is a Local importance IEF in Table 8.7, these beneficial effects on invertebrates' habitat are assessed as being **minor**, and not significant in terms of the EIA Regulations, based on the approach set out in section 8.2.7.

8.5.4 Invertebrates – Potential Ecology Effects

133. Potentially significant effects on invertebrates are limited to changes to their habitat, as assessed below.

8.5.4.1 Changes to habitat important for invertebrates

134. The majority c. 350 ha of the habitats within the ecology core study area are either bare ground or arable, which provides negligible value to invertebrates. Other habitats of greater value to invertebrates are found within the ecology core study area, however they are commonly occurring habitats in the wider landscape and therefore the on-site features are likely to support more commonly occurring invertebrates. An invertebrate survey subsequently found an overall low diversity of invertebrate species, with a small number of notable species present (see Technical Appendix A8.4). The ditch systems, adjacent riparian habitat and grassland within the ecology core study area offer better quality habitat for invertebrates and will mostly be retained as part of the Development. Additionally, there will be an increase in both habitat types and area of value to invertebrates following construction of the Development by the creation of new habitats through the Outline LBMP set out in Technical Appendix A5.2.
135. The loss of important habitat includes:
- Spine road and access track construction, leading to the loss of c. 0.13 ha of grassland and riparian ditch habitat; and
 - Electrical compound construction, leading to the loss of c. 0.46 ha of grassland and riparian ditch habitat.
136. The creation of important habitat includes:
- New ditch habitat, along the north side of the electrical compound, c. 0.15 ha;
 - New buffer grassland, adjacent to the ditches throughout the site, c. 26.7 ha;
 - Lowland meadow, in fields Y and Z, c. 14 ha; and
 - Scrub/grassland on the slopes of the bund around the electrical compound, c. 1.48 ha.

137. New grassland will be created under/between the solar PV modules. Habitat underneath the solar PV modules is expected to be similar to that found under hedgerows (see Technical Appendix A5.3), and covers an area of c. 180 ha. Although likely to be better habitat for invertebrates than the baseline arable farmland, given the lower light environment, and as a conservative approach to assessment, this area has not been included in calculations of new important invertebrate habitat.
138. Taking into account the above, the net change in habitat important for invertebrates is an increase of c. 41 ha, which represents a long-term, beneficial change of medium magnitude, in accordance with Table 8.3. Noting that invertebrates are a Local importance IEF in Table 8.7, these beneficial effects on invertebrates' habitat are assessed as being **minor**, and not significant in terms of the EIA Regulations, based on the approach set out in section 8.2.7.
139. Prior to the construction phase, there will be a cessation of agricultural management practices within the ecology core study area that the solar panels will be constructed in, which will include cessation of the application of pesticides within this area. This is likely to provide a long-term beneficial effect for invertebrates during the operational phase of the Development. Given that the pesticide application directly targeted invertebrates, its cessation is expected to be a local effect of high magnitude, in accordance with Table 8.3. Noting that invertebrates are a Local importance IEF in Table 8.7, but because they are a qualifying species group of the South Bank of the Swale LNR, the beneficial effects on invertebrates are assessed as being **Moderate**, and **Significant** in terms of the EIA Regulations, based on the approach set out in section 8.2.7.

8.5.4.2 Construction/decommissioning effects on habitats of importance to invertebrates

140. Where new culvert crossings are installed or existing culverts are replaced/upgraded, and where the 11 kV undergrounded electricity cable crosses ditch habitats (as detailed in ES Chapter 5: Development Description), terrestrial and aquatic habitats of importance to invertebrates will be affected. These will occur only within very limited parts of the ecology core study area, and effects will be of a temporary nature. Measures set out in the Outline CEMP, in Technical Appendix A5.4, when implemented under the CEMP, will reduce to negligible the risk of silt disturbance in ditches (pathways) and sensitive receptors (invertebrates). This includes the use of temporary dams and over pumping (where required), to reduce silt disturbance to invertebrate habitats within ditches.
141. Physical disturbance of habitats and soil compaction by vehicles using access routes close to the existing substation, or between fields, may impact invertebrates using these terrestrial habitats during the construction and decommissioning phases. These locations are the main access route onto the ecology core study area or between fields, and it is expected that disturbance to terrestrial habitats is likely to occur during construction and decommissioning.
142. Disturbance to invertebrates is likely to be an adverse effect of a temporary nature and of a negligible magnitude, in accordance with Table 8.3. Construction disturbance effects on invertebrates is expected to be **negligible**, therefore.

8.5.4.3 Indirect effects

143. During the operational phase, there is the potential that egg laying aquatic invertebrates may lay eggs on the solar panels that due to reflection they mistake for aquatic habitat, which can lead to a reduction in recruitment. However, 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 bottom edge of the panels themselves will be raised above ground level (circa 1.2 m to 4.0 m agl – detailed in Table 5.1a of 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 anticipated that the majority of egg laying invertebrates will not lay their eggs on the solar panels. The impacts on these features are therefore considered to be temporary (the operating lifespan of the development), is of a long-term nature, but likely to be of a negligible magnitude of effect in accordance with Table 8.3. Noting that invertebrates are a Local importance IEF in Table 8.7, the adverse effects of solar panels on egg laying invertebrates are assessed as being **negligible**.

144. During the construction and decommissioning phases, there is the potential that dust and other air pollutants may impact water quality within aquatic habitats and plants and flora in terrestrial habitats within the ecology core study area via dust and emissions from construction vehicles, the undergrounding of an 11 kV electricity cable, the building of access roads and the substation. The impacts on invertebrates is considered to be mainly temporary, of a short-term nature, and likely to be of a negligible magnitude, in accordance with Table 8.3. Noting that invertebrates are a Local importance IEF in Table 8.7, the adverse effects of dust and air pollutants on invertebrates are assessed as being **negligible**.
145. In addition, mitigation measures to minimise dust creation are set out in ES Chapter 16: Air Quality.

8.5.5 Great Crested Newts – Potential Ecology Effects

8.5.5.1 Change of habitat important for GCN

146. The importance of terrestrial habitats to GCN is dependent on the proximity of GCN populations found in aquatic habitats to the terrestrial habitats. The further a GCN's aquatic population is from terrestrial habitats of value, the less likely that habitat will be used and the less important it is to that GCN population.
147. The current distribution of GCN within aquatic habitats through an eDNA survey of aquatic habitats has been determined (see Technical Appendix A8.2b). Aquatic habitat for GCN was identified within 500 m of the ecology core study area, at ponds 2, 4 and 7, as shown in Technical Appendix A8.2a.
148. Within 500 m of ponds identified to have GCN present, baseline habitats include the existing Cleve Hill Substation, Crown Cottages and associated buildings, access roads, bare ground and arable habitats, and small areas of standing water, tall ruderal, amenity grassland and semi-improved neutral grassland. These areas are of negligible value to GCN, except for amenity grassland, which is of low value, and the standing water, tall ruderal and semi-improved neutral grassland, which are of moderate value.
149. During construction, the arable habitat and bare ground will be disturbed, principally for the construction of the electrical compound. In addition, roads with metalled surfaces will be constructed within the location of the existing stone track, leading to the electrical compound. These will have negligible effect on GCN, because of the negligible value of the habitat. Trenching and then backfilling will be required for cable installation between the existing Cleve Hill substation and Pond 2 and up to the location of the new substation, which will route through managed amenity grassland and represents a temporary disturbance, with habitats reinstated on completion. There will be one new crossing of a watercourse, to the west of the existing Cleve Hill Substation, and a small loss of field margin habitat as a result. This will be an adverse effect of low magnitude, in accordance with Table 8.3, during the construction phase. Combined with the Local importance of GCN as an IEF, this leads to an adverse effect on GCN locally that is temporary and assessed as **negligible**, and not significant in terms of the EIA Regulations.
150. Once operational, the slopes of the bund will comprise of scrub habitat of c 1.48 ha, and will represent valuable habitat for foraging and sheltering GCN. Additional riparian habitat will be created to the north of the electrical compound, grassland will be created adjacent

to ditch banks, lowland meadow, grazing marsh and hedgerow that amounts to c. 35 ha of terrestrial habitat of value to GCN within 500 m of aquatic habitat known to support GCN. This will be a beneficial effect of low magnitude, in accordance with Table 8.3, during the operational phase. Combined with the Local importance of GCN as an IEF, this leads to a beneficial effect on GCN that is long-term and assessed as **negligible**, and not significant in terms of the EIA Regulations.

8.5.5.2 *Indirect Effects*

151. During the construction phase, with implementation of the Outline CEMP provided in Technical Appendix A5.4 via the CEMP approved under the requirements of the DCO, there is negligible potential that dust and other air pollutants may discernibly impact on water quality of waterbodies within or outside the ecology core study area, and no effect is anticipated.

8.5.5.3 *Direct/Criminal Offences*

152. GCN and their habitats are fully protected under the Conservation of Habitats and Species Regulations 2017. Terrestrial habitats of value to GCN are found within the ecology core study area and within 500 m of aquatic habitat known to contain GCN (ponds 2, 4 and 7 as shown in Technical Appendix A8.2a). Measures to ensure no criminal offences occur in relation to GCN are set out in the Outline LBMP (Technical Appendix A5.2).
153. GCN are a nocturnally active species when moving through terrestrial habitats, and prefer sheltering in suitable terrestrial habitat during the day. As the access track and much of the electrical compound footprint are found within habitat of negligible value to foraging or sheltering GCN, it is unlikely that disturbance to GCN from ecology core study area activities will take place during the day. It is therefore expected that with daytime activities and deliveries during the construction phase, GCN will not be affected. This will be an adverse effect of negligible magnitude, in accordance with Table 8.3, during the construction phase. Combined with the Local importance of GCN as an IEF, this leads to an adverse effect on GCN that is short-term and assessed as **negligible**, and not significant in terms of the EIA Regulations.

8.5.6 **Water Vole – Potential Ecology Effects**

8.5.6.1 *Change of habitat important for water vole*

154. Prior to the construction phase, there will be a cessation of agricultural management practices within the ecology core study area, which will include an end to the application of nitrate fertiliser and pesticides within this area (with the possible exception of the Arable Reversion Habitat Management Area (AR HMA) – see details within ES Chapter 9: Ornithology). This is likely to provide a long-term beneficial effect for water vole during the operational phase of the development, with recovery and improvements in biodiversity within sensitive ditch receptor habitats as set out in section 8.5.1, above.
155. Much of the ditch network used by water voles within the ecology core study area will remain unchanged, physically. A length of ditch within the footprint of the new substation amounting to 355 m was found to be unsuitable for water voles during the Phase 1 Habitat Survey in 2018 (see Technical Appendix A8.1b), and no water voles signs were identified within this section of ditch during water vole surveys (see Technical Appendix A8.7). For hydrological purposes, this length of ditch will likely require a permanent diversion, such that there will be no net loss of ditch channel.
156. However, the construction of a spine road and other access tracks is likely to lead to the loss of small sections of riparian ditch habitat and sections of the ditch network that may be important to foraging and burrowing water voles within the ecology core study area where there is a requirement to insert new culverts. These habitat losses represent less

- than 1% of the ditch network within the ecology core study area, or a maximum of c. 235 m length of ditch.
157. Based on the ditch section of c. 355 m to be removed from the location of the electrical compound, which offers unsuitable habitat for water voles, it is anticipated that the new c. 355 m replacement length of diverted ditch will provide a net gain in riparian ditch habitat suitable for water voles of c. 120 m. Additionally, the 'mammal friendly' culvert designs will ensure that the aquatic ditch habitat connectivity will likely increase within the Development, which will lead to an increase/improvement in aquatic connectivity links for water voles across the Development site.
158. As water voles are found throughout the ecology core study area and are a mobile species, and there will be no net loss of suitable water vole habitat, it is anticipated there will be a negligible magnitude of effect, in accordance with Table 8.3. Combined with the Local importance of water vole as an IEF, this leads to a neutral overall effect on water vole that is long-term and assessed as **negligible**, and not significant in terms of the EIA Regulations.

8.5.6.2 Disturbance to terrestrial habitats of value to water vole

159. The Outline CEMP (Technical Appendix A5.4) includes a watercourse crossing inventory, detailing existing culverted crossings that it is assumed will be upgraded, and new crossings that will be required. The Outline CEMP details measures that are intended to be employed in accordance with the approved CEMP to minimise disturbance to water quality and the ditch network, however, these works have the potential to disturb burrowing or foraging water voles and temporarily sever the ditch network in isolated locations, covering approximately 0.5% of these habitats within the ecology core study area. This is anticipated to be a negligible magnitude of adverse effect, in accordance with Table 8.3, as less than 1% of the habitat would be affected, and only temporarily. Combined with the Local importance of water vole as an IEF, this leads to an overall adverse effect on water vole that is short-term, reversible and assessed as **negligible**, and not significant in terms of the EIA Regulations.

8.5.6.3 Indirect Effects

160. During the construction phase, with implementation of the Outline CEMP provided in Technical Appendix A5.4 via an approved CEMP, there is negligible potential that dust and other pollutants may discernibly impact on water quality of waterbodies within the ecology core study area, and no effect is anticipated.
161. During construction, noise and vibration from piling and other construction plant and construction traffic, and the presence of humans, may lead to disturbance to water voles, particularly since the only disturbance the water voles may have become habituated to from the baseline, is sporadic and localised agricultural activity. The disturbance is likely to be localised to specific parts of the study area in which activity is occurring at any one time, and will cease on completion of construction activities. As such, this adverse effect is likely to be local, short-term, and of low magnitude, in accordance with Table 8.3. Combined with the Local importance of water vole as an IEF, this leads to an overall adverse effect on water vole that is short-term, reversible and assessed as **negligible**, and not significant in terms of the EIA Regulations.

8.5.6.4 Criminal Offences

162. Water vole and their habitats are fully protected under the Wildlife and Countryside Act 1981 (as amended). Riparian and aquatic habitat of value to water vole, and water voles themselves are found within the ecology core study area. Measures to ensure no criminal offences occur in relation to water vole are set out in the Outline LBMP (Technical Appendix A5.2).

8.5.7 Bats – Potential Ecology Effects

8.5.7.1 Change of habitat important for bats

163. Within the ecology core study area, the habitat important for bats comprises the ditch network, mature hedgerow and boundary habitats and semi-improved neutral grassland.
164. During the construction phase, approximately 0.21% of these habitats will be lost to facilitate the new electrical compound, spine road and access track crossings. As such, this adverse effect is likely to be local, short-term, and of negligible magnitude, in accordance with Table 8.3. Combined with the Local importance of bats as an IEF, this leads to an overall adverse effect on bats that is short-term, reversible and assessed as **negligible**, and not significant in terms of the EIA Regulations.
165. During the operational phase, the creation of grassland habitats, scrub and widened ditch-side grassland corridors will increase the habitat important for bats. This beneficial effect is likely to be local, long-term, and of medium magnitude, in accordance with Table 8.3. Combined with the Local importance of bats as an IEF, this leads to an overall beneficial effect on bat habitat that is assessed as being **minor**, and not significant in terms of the EIA Regulations.

8.5.7.2 Disturbance to terrestrial habitats of value to bats

166. Effects from compound lighting has the potential to effect bats commuting to and from foraging areas during the construction phase, whilst security lighting has the potential to affect roosting bats outside the ecology core study area or foraging/commuting bats within the ecology core study area during the operational phase of the Development. Some bat species are more sensitive to lighting, and as the ecology core study area is currently largely undeveloped, artificial lighting is minimal. The compound lighting is of a temporary nature and used only during the construction and decommissioning phases. Security lighting during the operational phase will be manually operated and on PIR sensors and will not be on continuously, and given the rural nature of the site, it is unlikely that the security lighting would be often triggered. It will be available for the lifetime of the Development.
167. The spine road will be used during the construction phase to bring materials and equipment in, and very occasionally for maintenance purposes during the operational phase. This activity will predominantly take place during daylight hours during the times of year when bats are active and is therefore not expected to cause disturbance to foraging or commuting bats.
168. Effects to bats of lighting and vehicular disturbance during the construction, operational and decommissioning phases are likely to be of a permanent, but localised and occasional nature. This is likely to represent a low magnitude of effect, in accordance with Table 8.3. Combined with the Local importance of bats as an IEF, this leads to an overall adverse effect on bats that is long-term and assessed as **negligible**, and not significant in terms of the EIA Regulations.

8.5.7.3 Indirect Effects

169. As noted in section 8.5.1, the absence of chemical inputs from agriculture is likely to lead to an improvement in water quality in the ditch network across the ecology core study area. Aquatic habitats that have better water quality have been found to have a higher macro-invertebrate diversity²³, which is important for foraging bats that are all insectivorous in the UK. This is likely to represent a low magnitude of effect, in accordance with Table 8.3. Combined with the Local importance of bats as an IEF, this leads to an

²³ Wright, J.F., Sutcliffe, D.W. & Furse, M.T. (2000) *Assessing the Biological Quality of Fresh Waters. RIVPACS and other techniques*. Freshwater Biological Association

overall beneficial effect on bats that is long-term and assessed as **negligible**, and not significant in terms of the EIA Regulations.

8.5.7.4 Criminal Offences

170. All species of bats and their roosts are fully protected under the Conservation of Habitats and Species Regulations 2017. There are no bat roosts within the ecology core study area. Measures to ensure no criminal offences occur in relation to bats are set out in the Outline LBMP (Technical Appendix A5.2).

8.5.8 Reptiles – Potential Ecology Effects

171. The ecology core study area currently supports a good population of reptiles, with individual reptiles found within grassland field margins and riparian habitat throughout the ecology core study area – an area of suitable habitat estimated to be c. 25 ha. These habitats are mostly comprised of semi-improved neutral grassland. Potential effects on reptiles include:

- Loss of field margin and ditch border habitat through construction of the spine road, with ditch crossings, and the electrical compound;
- Creation of extended field margin and wider grassland habitat to replace arable land use, both at the wider field margins (8 – 15 m either side of each ditch) and under the solar PV modules, in Fields Y and Z and on the bund slopes of the electrical compound;
- Disturbance during construction; and
- Indirect effects of dust creation.

8.5.8.1 Change of habitat important for reptiles

172. The majority c. 350 ha of the habitats within the ecology core study area are either bare ground or arable, which provides negligible value to reptiles. Other habitats of greater value to reptiles are found within the ecology core study area. A reptile survey found good habitats for supporting reptiles, with common lizard and grass snake present in the core study area (see Technical Appendix A8.6). The ditch systems, adjacent riparian habitat and grassland within the ecology core study area offer better quality habitat for reptiles and will mostly be retained as part of the Development. Additionally, there will be an increase in both habitat types and area of value to reptiles following construction of the Development by the creation of new habitats through the Outline LBMP set out in Technical Appendix A5.2.

173. The loss of important habitat includes:

- Spine road and access track construction, leading to the loss of c. 0.13 ha of grassland and riparian ditch habitat; and
- Electrical compound construction, leading to the loss of c. 0.46 ha of grassland and riparian ditch habitat.

174. The creation of important habitat includes:

- New ditch habitat, along the north side of the electrical compound, c. 0.15 ha;
- New buffer grassland, adjacent to the ditches throughout the site, c. 27 ha;
- Lowland meadow, in fields Y and Z, c. 14 ha; and
- Scrub/grassland on the slopes of the bund around the electrical compound, c. 1.48 ha.

175. New grassland will be created under/between the solar PV modules, which is expected to be similar to that found under hedges (see Technical Appendix A5.3), which covers an area of c. 48 ha. Although likely to be better habitat for reptiles than the baseline arable farmland, given the lower light environment, and as a conservative approach to assessment, this area has not been included in calculations of new important habitat.

176. Taking into account the above, the net change in habitat important for reptiles is an increase of c. 42 ha, which represents a beneficial effect across the ecology core study area of a medium to high magnitude, in accordance with Table 8.3. Combined with the Local importance of reptiles as an IEF, this leads to an overall beneficial effect on reptiles that is long-term and assessed as **minor**, and not significant in terms of the EIA Regulations, based on the approach set out in section 8.2.7.

8.5.8.2 Disturbance to terrestrial habitats of value to reptiles

177. During construction, vehicle movements, noise and vibration from piling and other construction plant and construction traffic and the presence of humans, may lead to disturbance to reptiles. The disturbance is likely to be localised to specific parts of the study area in which activity is occurring at any one time, and will cease on completion of construction activities. As such, this adverse effect is likely to be local, short-term, and of low magnitude, in accordance with Table 8.3. Combined with the Local importance of reptiles as an IEF, this leads to an overall adverse effect on reptiles that is short-term, and assessed as **negligible**, and not significant in terms of the EIA Regulations.

8.5.8.3 Indirect Effects

178. During the construction phase, with implementation of the Outline CEMP provided in Technical Appendix A5.4 via an approved CEMP, there is negligible potential for dust and other pollutants to discernibly impact on reptile habitat within the ecology core study area, and no effect is anticipated.

8.5.8.4 Criminal Offences

179. Reptiles are a legally protected from killing and injury under Schedule 5 of the Wildlife and Countryside Act, 1981 (as amended). Measures to ensure no criminal offences occur in relation to GCN are set out in the Outline LBMP (Technical Appendix A5.2).

8.5.9 Other Mammals – Potential Ecology Effects

180. As noted above, the main changes to habitats important to non-avian ecology across the site are:

- The cessation of agricultural chemical inputs leading to an improvement in water quality and ditch habitats;
- The creation of new grassland habitats across the site, with the main areas being extended field margin and wider grassland habitat to replace arable land use, both at the wider field margins (8 – 15 m either side of each ditch), under the solar PV modules, in Fields Y and Z and on the bund slopes of the electrical compound;
- A small loss of field margin and ditch habitat during construction of the spine road and electrical compound, and associated ditch crossings; and
- The creation of a new section of ditch to the north of the electrical compound.

181. Other potential effects include disturbance during the construction phase.

8.5.9.1 Habitat Changes

182. The proposed changes to habitats across the site will lead to improvements in the ditch habitat, which is the most important habitat of non-avian ecology in the baseline scenario. Habitat suitable for foraging otter is found within the ecology core study area, and is functionally linked to similar habitats outside of it. Otters have been recorded within the wider landscape, (as reported by the Environment Agency). Improvements in ditch habitat quality and connectivity within the ecology core study area will be of benefit to otter and other riparian mammals. As set out in Chapter 5: Development Description, the fencing around the solar PV modules will include features to allow small mammals

(including badger, hare and otter) to pass through, to minimise barriers to their passage around the site.

183. Brown hare was recorded within the ecology core study area and within arable field habitat. The change from arable field habitat to solar PV modules has the potential to provide areas of shelter from the elements for hares and other mammals that would not otherwise be available within the ecology core study area in the absence of the Development. The buffer grassland alongside the ditch network, the Habitat Management Area and creation of grassland habitats in Fields Y and Z will ensure the provision of open stretches of habitat that are preferred by brown hare is maintained.
184. Overall, the effects of habitat change on other mammals is beneficial, with the site having the potential to become attractive to species not currently present, including otter. These effects would occur across the ecology core study area and are of medium magnitude, in accordance with Table 8.3. Combined with the Local importance of other mammals as an IEF, this leads to an overall beneficial effect on other mammals that is long-term, and assessed as **minor**, and not significant in terms of the EIA Regulations.

8.5.9.2 Disturbance during construction

185. During construction, vehicle movements, noise and vibration from piling and other construction plant and construction traffic and the presence of humans, may lead to disturbance to other mammals. The disturbance is likely to be localised to specific parts of the study area in which activity is occurring at any one time, and will cease on completion of construction activities. As such, this adverse effect is likely to be local, short-term, and of low magnitude, in accordance with Table 8.3. Combined with the Local importance of other mammals as an IEF, this leads to an overall adverse effect on other mammals that is short-term, and assessed as **negligible**, and not significant in terms of the EIA Regulations.

8.5.9.3 Indirect Effects

186. During the construction phase, with implementation of the Outline CEMP provided in Technical Appendix A5.4 via an approved CEMP, there is negligible potential for dust and other pollutants to discernibly impact on other mammals within the ecology core study area, and no effect is anticipated.

8.6 Mitigation Measures and Residual Effects

187. This section describes measures which seek to avoid, or reduce to an acceptable level, potential negative effects on features of nature conservation interest which may arise during the construction, operation or decommissioning of the Development.
188. There is a clear distinction between measures designed to mitigate or compensate and those designed to enhance ecological features or habitats, but all three are addressed in this section. Mitigation aims to avoid or reduce effects on features of nature conservation interest, particularly (but not exclusively) where adverse significant ecological effects have been predicted. Where mitigation cannot reduce effects to acceptable levels, or where additional measures are considered inappropriate, compensation and enhancement will be incorporated into the Development during either the construction or operational phases to ensure that there is no net loss (compensation), or preferably a net gain (enhancement), in the ecological value of specific features or of the overall Development. This approach is consistent with paragraphs 174 - 177 of the National Planning Policy Framework (NPPF) which sets out aims for biodiversity conservation and enhancement.
189. No significant adverse ecological effects are predicted, and mitigation measures are not required for them; however, measures are proposed to further reduce the magnitude of potential adverse effects, contribute to local BAP targets, and fulfil commitments under

- the auspices of the NPPF. These measures are over and above the embedded mitigation measures set out in the Outline LBMP, Technical Appendix A5.2.
190. The Outline CEMP (Technical Appendix A5.4) includes provision for an Ecological Clerk of Works (ECoW) to oversee implementation of mitigation measures.
191. To minimise any potential adverse effects of disturbance to, or loss of, IEF habitat and IEF species, such as the ditch system and adjacent riparian habitats, and semi-improved neutral grassland, under the Outline CEMP, the following measures will be implemented:
- Prior to and during the construction phase, the ECoW will provide contractor briefings to ensure as far as practicable that impacts from construction activities are minimised; and
 - Use of measures such as temporary fencing and signing of retained IEF habitats and areas of importance to IEF species where at potential risk from construction activity, including the use of covers over, or escape ramps to allow egress from, excavations.
192. To minimise the potential adverse effects to IEF species from their presence within construction areas where the growth of new habitats prior to the start of the construction phase is required, under the Outline CEMP, the following measures will be implemented:
- Use habitat management measures, such as mowing or grazing of grassland habitats within the solar PV fields, such that the grassland maintains a short sward and does not encourage the colonisation of this habitat by IEF species from neighbouring extant habitat; and
 - The timing and requirement for habitat management within each field is to be confirmed by the ECoW following site observations during the construction phase.
193. Following implementation of the mitigation measures set out above:
- The magnitude of the adverse effects will be reduced, but the magnitude category will remain assessed as prior to the mitigation; and
 - The magnitude of beneficial effects will be increased, but the magnitude category will remain as assessed prior to mitigation.
194. Given the assessment of magnitude remains as set out in section 8.5, the conclusions on significance for residual effects also remain as per section 8.5.

8.7 Assessment of Cumulative Effects

195. The purpose of a cumulative effect assessment is to identify effects that might not be significant on their own, but become significant when considered in combination with effects from other developments.
196. This section considers the potential effects of the Development in combination with other developments that were not part of the baseline situation.
197. There are two aspects of cumulative effect to consider:
- The cumulative effect of two or more developments on an individual animal or home range/territory; and
 - The cumulative effect of a number of developments within a region on the local/regional population of a species or the distribution of a habitat.
198. Proposed developments such as housing, industrial or commercial premises lying within a 10 km radius of the ecology core study area with which the Development has the potential to interact and give rise to cumulative effects on ecology resources within a 10 km radius of the Development ecology core study area are shown in Table 2.2 of Chapter 2: Environmental Impact Assessment. A 10 km radius is considered sufficient to include as the *zone of influence* for the range of important ecological features most likely

to be subject to cumulative effects from this and other developments. All identified cumulative developments within 5 km of the ecology core study area are on the outskirts of Faversham, with the nearest being adjacent to Oare Creek, just over 1 km from the ecology core study area.

199. No significant residual adverse effects were identified on any IEFs for the Development. A net gain in ecologically important habitats has been predicted, which would not therefore contribute to significant adverse cumulative effects when considered in combination with other nearby developments.
200. Overall, it is considered that the integrity of designated sites and the conservation status of habitats and species will remain unaffected by the Development when considered in combination with other developments that are not part of the current baseline, and that there will be no significant adverse cumulative effects.

8.8 Summary of Residual Effects

201. Table 8.8 summarises the predicted effects of the Development on the ecology resources.

Table 8.8 Summary of Effects

Important Ecological Feature	Value/ sensitivity	Characterisation of Unmitigated Effect	Significance	Mitigation/ Compensation/ Enhancement	Residual Significance
CONSTRUCTION (AND DECOMMISSIONING), AND OPERATION					
The Swale SSSI/SPA/RA MSAR	International	Construction: Indirect, adverse, temporary, negligible. Operation: Indirect, beneficial, long-term, moderate.	Not significant.	N/a	Not significant.
South Bank of the Swale LNR	Regional	Construction: Indirect, adverse, temporary, negligible. Operation: Indirect, beneficial, long-term, minor.	Not significant.	N/a	Not significant.
Oare Marshes LNR	Regional	No effect.	Not significant.	N/a	Not significant.
SW48 Abbey Fields LWS	Local	No effect.	Not significant.	N/a	Not significant.
Ecology Core Study Area – Ditch Network (LWS equivalent)	Local	Construction: Indirect, adverse, temporary, minor. Operation: Indirect, beneficial, long-term, minor.	Not significant.	ECoW supervision	Not significant.
Habitat – standing water	Local	No effect.	Not significant.	ECoW supervision	Not significant.

Important Ecological Feature	Value/ sensitivity	Characterisation of Unmitigated Effect	Significance	Mitigation/ Compensation/ Enhancement	Residual Significance
Habitat – neutral grassland – semi-improved	Local	Construction: Indirect, adverse, temporary, minor. Operation: Indirect, beneficial, long-term, minor.	Not significant.	ECoW supervision	Not significant.
Invertebrates	Regional	All phases: Direct, beneficial, long-term, Moderate.	Significant (beneficial)	ECoW supervision	Significant (beneficial)
Great Crested Newt	Local	All phases: Beneficial/adverse, long-term, negligible.	Not Significant.	ECoW supervision	Not significant.
Water vole	Local	Construction: Indirect, adverse, temporary, negligible. Operation: Indirect, neutral, long-term, negligible.	Not Significant.	ECoW supervision	Not significant.
Bats (all species)	Local	Construction: Indirect, adverse, temporary, negligible. Operation: Indirect, beneficial, long-term, minor.	Not Significant.	ECoW supervision	Not significant.
Reptiles	Local	Construction: Indirect, adverse, temporary, negligible. Operation: Indirect, beneficial, long-term, minor.	Not Significant.	ECoW supervision	Not significant.
Other species	Local	Construction: Indirect, adverse, temporary, negligible. Operation: Indirect, beneficial, long-term, minor.	Not Significant.	ECoW supervision	Not significant.

202. Overall, the conservation status of IEF species, habitats and designated sites is maintained or improved, and there is a net gain in the biodiversity value of the site.
203. The embedded mitigation that is proposed as part of the Development will provide a net conservation gain for biodiversity, with the conservation status of IEF species, habitats and designated sites maintained or improved. Where potential IEFs are not currently represented within the ecological core study area, the embedded mitigation within the

Development provides the opportunity for these currently absent protected or priority habitats or species to colonise the ecological core study area, and thus through the operational phase of the Development may become identified as future IEFs.

8.9 Statement of Significance

204. No adverse ecological effects are assessed as significant.
205. Significant beneficial effects are assessed in relation to invertebrates, because of the cessation of the application of pesticides and because invertebrates are a qualifying species group of the South Bank of the Swale LNR.
206. The main non-significant effect is in relation to the increase in grassland habitats replacing arable farmland, and the resulting associated gain in biodiversity.