SUNNICA ENERGY FARM

EN010106

Volume 6

6.2 Appendix 8M: Habitats Regulations Assessment: Report to Inform an Appropriate Assessment

APFP Regulation 5(2)(g)

Planning Act 2008

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

~~22 November 2022~~13 January 2023

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Planning Act 2008

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

Sunnica Energy Farm

Appendix 8M: Habitats Regulations Assessment: Report to Inform an Appropriate Assessment

Regulation Reference:	Regulation 5(2)(g)
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Rev 00	18 November 2021	Application Version
Rev 01	22 November 2022	Submitted at Deadline 3
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Some of the information within this document has been redacted to protect sensitive details about the nesting sites of stone curlew.

Executive summary

Abbreviations and capitalised terms are defined in the Glossary, Chapter 0 of this Environmental Statement **[APP-032]**.

This Report to Inform an Appropriate Assessment (RIAA) has been prepared on behalf of Sunnica Ltd (the Applicant).

The Applicant is seeking development consent for the construction, operation, maintenance and decommissioning of a new solar farm (hereafter referred to as the Scheme), comprising ground mounted solar photovoltaic (PV) panel arrays to generate electricity energy from the sun and to combine these with a Battery Energy Storage System (BESS).

Electricity will be generated at Sunnica West Site A and B, near Chippenham and Snailwell in Cambridgeshire, at Sunnica East Site A, near Isleham in Cambridgeshire and Suffolk, and Sunnica East Site B, near Worlington and Freckenham in Suffolk.

The Habitats Regulations Assessment (HRA) has been carried out with reference to the general EC guidance on HRA (Ref 4), general guidance on HRA published by the UK government in July 2019 (Ref 5) and Planning Inspectorate (PINS) Advice Note Ten (Ref 6).

The following European Sites are considered within this assessment:

a. Fenland SAC;
b. Chippenham Fen Ramsar;
c. Breckland SPA
d. Wicken Fen SAC;
e. Rex Graham Reserve SAC;
f. Breckland SAC; and
g. Devil's Dyke SAC.

Paragraph 4.9 of PINS Advice Note Ten (Ref 6), as well as guidance from the Department for Business, Energy and Industrial Strategy, requires an evaluation of the potential for the Scheme to need other consents which could also necessitate HRA by different competent authorities, and a statement as to whether the Order limits overlap with devolved administrations or other European Economic Area (EEA) States (Ref 10). It is confirmed that neither the Order land, nor its effects, overlap with areas of devolved administrations or with those of other EEA States. It also the case that no parallel consents are required for the Scheme which would require additional Habitats Regulations Assessments to be carried out.

Stage 1 of the assessment examines the Likely Significant Effects of the Scheme. For the purposes of the decommissioning period Likely Significant Effects are the same as those arising in the construction period and are therefore, not screened separately. Within each development phase, each potential impact pathway is considered separately, covering all European Sites to which that impact pathway applies.

The potential source-receptor pathways by which the Scheme could impact the qualifying features of each European Site during construction are summarised as follows:

a. Habitat loss and/or degradation – loss of, or degradation to, designated habitats.
b. Physical displacement of Stone Curlew – loss of nesting and foraging habitat within the Scheme used by Stone Curlew occurring outside the designated site boundary.
c. Noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary from the construction workforce and operations..
d. Non-physical disturbance – indirect light-pollution on sensitive habitats and species.
e. Habitat contamination – soil and groundwater contamination from surface water pollution, resulting in pollution of surface water entering watercourses hydrologically linked to SAC habitats, and dust deposition resulting in smothering of sensitive SAC/Ramsar habitats.
f. Physical disturbance of groundwater – disruption or changes to baseflows and inflows of groundwater to and from designated sites.

The potential source-receptor pathways by which the Scheme could impact the qualifying features of each European Site during operation are:

a. Noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary.
b. Non-physical disturbance – indirect light-pollution on sensitive habitats and species.
c. Physical displacement of aquatic invertebrates – attraction of aquatic invertebrates associated with designated sites to solar panels.

In order to inform fully the appropriate assessment process, a number of surrounding plans and projects have been consulted to determine likely significant effects that could arise from the Scheme in combination with these other plans and projects.

Following the screening for likely significant effects in Stage 1, the following pathways exist for which likely significant effects could not be dismissed, either alone or in combination with other schemes:

a. Fenland SAC: Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants
b. Chippenham Fen Ramsar site: Habitat loss and/or degradation – degradation to designated habitats and habitats supporting designated fauna through airborne pollutants and dust deposition
c. Breckland SPA:
   - physical displacement of Stone Curlew from functionally linked land – loss of nesting and foraging habitat within the Scheme used by species occurring outside the designated site boundary; and
   - construction noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary during construction

The following measures identified in this appropriate assessment would need to be implemented during construction and decommissioning in order to ensure no adverse effects on integrity:

a. A CEMP and DEMP containing mitigation measures for construction dust on Fenland SAC/Chippenham Fen Ramsar and construction disturbance to Stone Curlew associated with Breckland SPA and its implementation; and
b. The delivery of habitat to offset the changes in and potential loss of breeding habitat for Stone Curlew.

Following the implementation of the mitigation noted above it is concluded at Stage 2 that the Scheme would have no adverse effect on the integrity of any European sites alone or in combination with other projects and plans.

There are no residual effects that would constitute an adverse effect on the integrity of European Sites either alone or in combination with other plans or projects.

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1 Introduction

1.1 Overview

1.1.1 This Report to Inform an Appropriate Assessment (RIAA) has been prepared on behalf of Sunnica Ltd (the Applicant).

1.1.2 The Applicant is seeking development consent for the construction, operation (including maintenance) and decommissioning of a new solar farm (hereafter referred to as the Scheme), comprising ground mounted solar photovoltaic (PV) panel arrays, a Battery Energy Storage System (BESS) and supporting infrastructure. Refer to **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]** for full details of the proposal.

1.1.3 A DCO is required for the Scheme as it falls within the definition and thresholds for a Nationally Significant Infrastructure Project (a NSIP) under Sections 14(1)(a) and 15(2) of the PA 2008.

1.1.4 The scope and extent of this RIAA has been determined by a combination of professional judgement, the scoping opinions collated by the Planning Inspectorate (PINS) on behalf of the Secretary of State (SoS), Section 42 responses to the Preliminary Environmental Information Report (PEI Report) (including draft HRA documentation made available at statutory consultation), and ongoing engagement with Natural England, Suffolk Wildlife Trust (SWT), Bedfordshire, Cambridgeshire and Northamptonshire Wildlife Trust (BCNWT), and the Royal Society for the Protection of Birds (RSPB). Regard has also been given to the Planning Inspectorate's (PINS) Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects, Version 8 (November 2017).

1.1.5 This document has been updated in Examination in response to questions of the ExA as explained below

FWQ number	Cross reference to the updated paragraphs
1.2.17	Paragraph 1.2.9
1.2.18	No need for change to HRA
1.2.19	Tables 4-1 and 4-2 updated
1.2.20	Table 4-1 updated
1.2.21	Annex C, Matrix C2
1.2.22	Annex C, Matrix C2
1.2.23	Annex C, Matrix C3
1.2.24, 1.2.25	No need for change to HRA

1.2.26	Section 5.
1.2.27	Paragraph 5.4.14
1.2.28	Table 3-2
1.2.30	Annex C, Matrix C2
1.2.31	Annex C, Matrix C3
1.2.32	The requirement for additional information is being discussed with Natural England, but the Applicant does not consider it necessary to provide updates to this report.
1.2.33	Tables 4-1 and 4-2

1.2 The Scheme

1.2.1 The detailed Scheme description and parameters for the Scheme design are set out in **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]** and have been taken into account in undertaking this assessment. A summary is presented below.

1.2.2 Sunnica Energy Farm (the Scheme) is a new solar farm proposal that would deliver electricity to the national electricity transmission network. The Scheme will use ground mounted PV panel arrays to generate electricity energy from the sun and combine these with a BESS. The BESSs would consist of a compound and battery array to allow for the storage, importation, and exportation of energy to the National Grid.

1.2.3 Electricity will be generated at Sunnica West Site A and B, near Chippenham and Snailwell in Cambridgeshire, at Sunnica East Site A, near Isleham in Cambridgeshire and Suffolk, and Sunnica East Site B, near Worlington and Freckenham in Suffolk. All locations will comprise ground mounted solar PV panel arrays, supporting electrical infrastructure and, potentially, BESSs.

1.2.4 The BESSs will consist of a compound and battery array to allow for the importation, storage, and exportation of energy to the National Grid. The BESS will be located together in three centralised areas:

a. Sunnica East Site A – located within Works Area E33;

b. Sunnica East Site B – located within Works Area E18; and

c. Sunnica West Site A – located within Works Area W17.

1.2.5 The batteries will be housed within containers, each with maximum dimensions of 17m by 5m in plan and a maximum 6m of height. The precise number of individual battery storage containers will depend upon the level of power capacity and duration of energy storage that the Scheme will require.

1.2.6 Supporting electrical infrastructure will include on-site substations on Sunnica East Site A and B and Sunnica West Site A, and on-site cabling between the different electrical elements across the Scheme. The generating equipment of the Scheme will be fenced and protected via security measures such as CCTV and lighting. Inside the fenced areas, in addition to the generating equipment there will be internal access tracks, landscaping and habitat management, and drainage. It is not proposed for any area to be continuously lit.

1.2.7 The Scheme will have two main access points: one on Sunnica West Site A and one on Sunnica East Site B (see **Figure 3-13: Sunnica East Site A and B Access** and **Figure 3-14: Sunnica West A and B Access** of this Environmental Statement **[APP-152 and APP-153]**). All small vehicles will access at these locations and staff will be distributed to the other Sites (~~Sunnica West Site B and~~ Sunnica East Site A) via minibus, or similar. The main access on Sunnica West Site A will be via the Chippenham junction of the A11, to the north of junction 38 of the A14. Sunnica East Site B will be accessed via the A11 and B1085. A number of secondary access points have been provided to access the individual land parcels. Access arrangements to each of the Sites are expected to remain consistent through construction, operation, and any decommissioning activity. However, within Sunnica East Site B Access A, H and I will not be utilised during operation and a junction off Golf Links Road, Access J, will be provided (see **Figure 3-13: Sunnica East Site A and B Access** and **Figure 3-14: Sunnica West A and B Access** of this Environmental Statement **[APP-152 and APP-153]**).

1.2.8 The Scheme will be connected to the existing Burwell National Grid Substation, using cables buried underground, of 400~~132~~kV capacity. The cables will run between Sunnica East Site A, Sunnica East Site B and Sunnica West Site A (Grid Connection Route A), and then from Sunnica West A to ~~Sunnica West Site B and on to~~ the existing Burwell National Grid Substation (Grid Connection Route B) (see **Figure 1-1: Scheme Location** of this Environmental Statement **[APP-129]**). Details of the cable route, dimensions of the cables, the depth and method of burial, and numbers of joints required can be found in **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]**.

~~1.2.9 An extension to the Burwell National Grid substation will be required, including a transformer compound. The Burwell Substation Extension dimensions will be a 43 m by 76 m footprint and 12 m in height, with an associated laydown area of 43 m by 30 m. The substation extension compound will have a footprint of 66 m by 699 m in plan and will be 12 m in height. The area identified for the Burwell National Grid Substation Extension is within agricultural fields, located to the north of the existing substation~~

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~~1.2.10~~1.2.9 During the operational phase, activity within the Scheme will be minimal and will be restricted principally to vegetation management, equipment maintenance and servicing, replacement of any components that fail, and monitoring. Along the cable route, operational activity will consist of routine inspections (schedule to be determined) and any reactive maintenance such as where a cable has been damaged. It is anticipated that there will be up to 17 permanent staff onsite during the operational phase during a single shift, with staff working on a three shift pattern. There will also be a requirement for additional staff to attend the Sites

when required for maintenance and cleaning activities. Based on an occupancy of 1.5 persons per car as outlined in **Chapter 13: Transport and Access** of this Environmental Statement **[APP-045]**, it is expected that there will be approximately 11 vehicles travelling to the Sites on a daily basis.

~~1.2.11~~1.2.10 A Framework Operational Environmental Management Plan (OEMP) has been prepared (**Appendix 16F** of this Environmental Statement **[REP2-030]**).

~~1.2.12~~1.2.11 The Scheme qualifies as a NSIP and will require a DCO from the SoS for Business, Energy and Industrial Strategy, due to its generating capacity exceeding 50 megawatts (MW).

1.3 Legislative Context

1.3.1 As part of the assessment of a development, it is necessary to consider whether the Scheme is likely to have a significant effect on areas that have been internationally designated for nature conservation purposes (i.e. European Sites). European sites are protected under the Conservation of Habitats and Species Regulations 2017 (as amended; relevant to England and Wales) (Ref 1). The UK left the EU on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2020 ("the Withdrawal Act"). However, the most recent amendments to the Habitats Regulations – the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Ref 2) – make it clear that the need for Habitats Regulations Assessment (HRA) continues to apply. Whilst those 2019 Regulations make changes to the Habitats regime and terminology; much of the impact of those changes does not yet have a practical effect, particularly the introduction of the term 'national site network', given the short passage of time since the end of the transition period. As such, this document continues to use the term 'European sites' to refer to all Natura 2000 sites potentially affected by the Scheme.

1.3.2 Over the years, the phrase 'Habitats Regulations Assessment' has come into wide currency to describe the overall process set out in the 2017 Regulations, from the screening for Likely Significant Effects through to identification of imperative reasons of overriding public interest (IROPI). This has arisen in order to distinguish the overall process from the individual stage of Appropriate Assessment. Throughout this Report the term HRA is used for the overall process and restricts the use of Appropriate Assessment to the specific stage of that name.

1.3.3 One of the aims of the 2017 Regulations is to "maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest" (Article 2(2)). This aim therefore relates to habitats and species, not the European Sites themselves, although the European Sites have a role in delivering favourable conservation status. The 2017 Regulations also apply the precautionary principle to European Sites.

1.3.4 Although Ramsar sites are not specifically covered by the Regulations, paragraph 176 of the National Planning Policy Framework (NPPF) in England extends Ramsar sites the same level of protection as Special Protection Areas (SPAs) and Special Areas for Conservation (SACs). As such, any reference to the European Sites below should be considered to also include Ramsar sites (Ref 3).

1.3.5 Should it be found that significant effects are likely, an Appropriate Assessment should then be carried out in order to further assess those effects. **Plate 1-1** sets out the legislative basis for an Appropriate Assessment. Consent may only be given for a proposed development if, following assessment, it is established that it will not adversely affect the integrity of the designated site.

1.3.6 If adverse effects are identified following the application of mitigation and conclusion of the Appropriate Assessment, alternatives should be considered to avoid those effects. However, where no alternative solution exists and so an adverse effect remains, a further assessment should be made of whether the development is required for IROPI. Alongside the IROPI test, compensatory measures will be required in order to maintain the overall European Site status and offset the harm.

Conservation of Habitats and Species Regulations 2017 (as amended)

Regulation 63 of the 2017 Regulations states that:

"A competent authority, before deciding to … give any consent for a plan or project which is likely to have a significant effect on a European site … must make an appropriate assessment of the implications for the plan or project in view of that site's conservation objectives… The competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site."

Plate 1-1: The legislative basis for Appropriate Assessment

2 Method

2.1 Approach

2.1.1 The HRA has been carried out with reference to the general EC guidance on HRA (Ref 4), general guidance on HRA published by the UK government in July 2019 (Ref 5) and Planning Inspectorate (PINS) Advice Note 10 (Ref 6).

2.1.2 Although the UK has departed the EU, this HRA nonetheless takes account of relevant EU case law (for instance, the Holohan (Ref 7) and People over Wind (Ref 8) cases, discussed below) as a precaution.

2.1.3 **Plate 2-1** below outlines the stages of HRA according to PINS Advice Note Ten (Ref 6). Note that while **Plate 2-1** shows all the stages of the HRA process, this document only discusses Stages 1 and 2 in further detail (see below).

2.1.4 Whilst the HRA decisions must be taken by the competent authority (the Secretary of State, informed by the recommendations of the appointed Examining Authority), the information needed to undertake the necessary assessments must be provided by the Applicant. The information needed for the competent authority to establish whether there are any Likely Significant Effects (LSEs) from the Scheme and to assist in carrying out its Appropriate Assessment, is therefore provided in this Report.

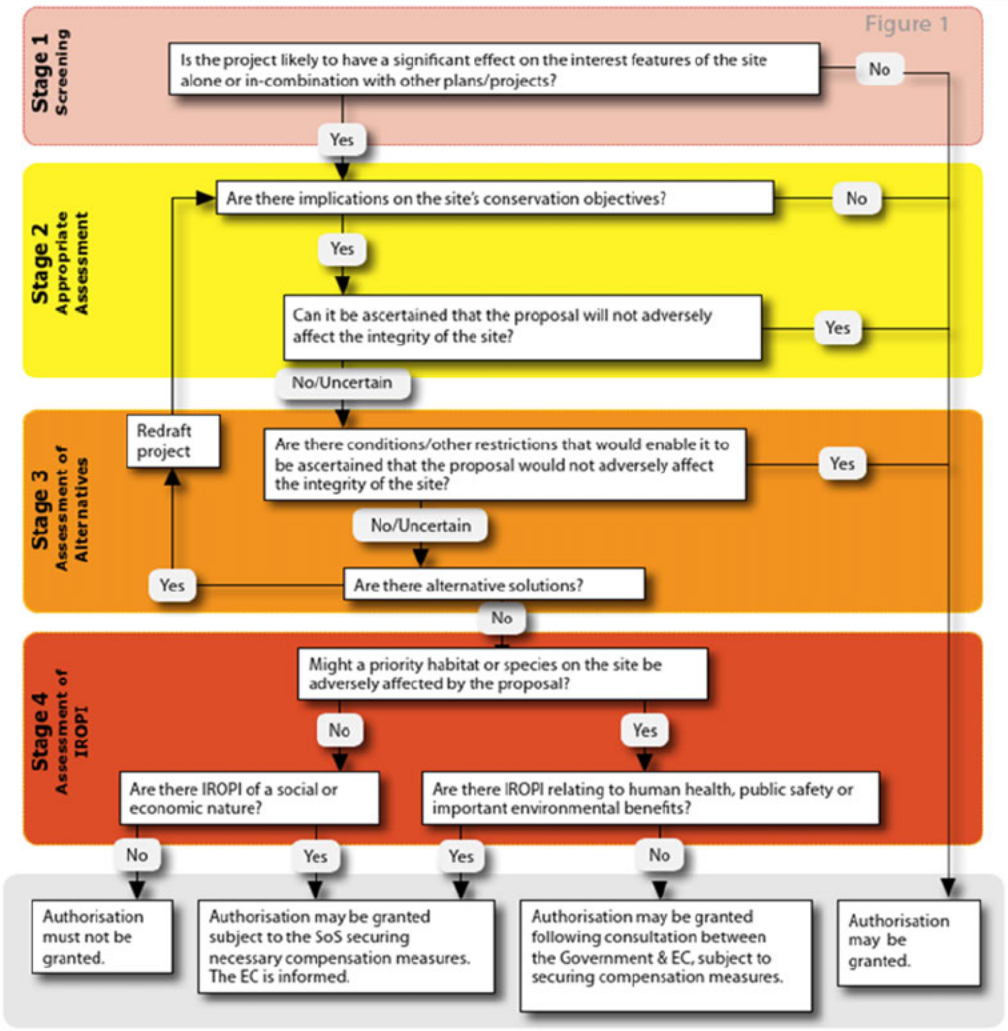

Plate 2-1: Four Stage Approach to Habitats Regulations Assessments of Projects.

2.2 HRA Stage 1: Screening for Likely Significant Effects

2.2.1 The objective of the LSE test is to 'screen out' those aspects of a project and / or the European sites that can, without any detailed appraisal, be said to be unlikely to result in significant adverse effects upon European sites, usually because there is no mechanism for an adverse interaction (i.e. a pathway) with European sites. The remaining aspects are then taken forward to Appropriate Assessment. The assessment must consider the potential for effects 'in combination' with other plans and projects.

2.2.2 This report has been prepared having regard to all relevant case law relating to the 2017 Regulations, the Habitats Directive and Birds Directive. This includes the ruling by the Court of Justice of the European Union (CJEU) in the case of People Over Wind, Peter Sweetman v Coillte Teoranta (C-323/17) (Ref 8).

2.2.3 This case held that; "*it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site*" (Paragraph 40). This establishes that 'mitigation measures' which avoid or reduce harmful effects of a project to European Sites (including pathways to those sites) cannot be taken into account at the screening stage, but they can be taken into account in an Appropriate Assessment. This report therefore takes this approach.

2.2.4 In 2018 the Holohan ruling (Ref 7) was handed down by the European Court of Justice. Among other provisions paragraph 40 of the ruling states that '*Article 6(3) of the Habitats Directive must be interpreted as meaning that an 'appropriate assessment' must, on the one hand, catalogue the entirety of habitat types and species for which a site is protected, and, on the other, identify and examine both the implications of the proposed project for the species present on that site, and for which that site has not been listed, and the implications for habitat types and species to be found outside the boundaries of that site, provided that those implications are liable to affect the conservation objectives of the site'* [emphasis added].

2.2.5 Also in 2018, the judgement from the European Court of Justice in the 'Cooperatie Mobilisation for the Environment and Vereniging Leefmilieu (Dutch Nitrogen)' ruling (Ref 9), stated that according to previous case law: *"it is only when it is sufficiently certain that a measure will make an effective contribution to avoiding harm to the integrity of the site concerned, by guaranteeing beyond all reasonable doubt that the plan or project at issue will not adversely affect the integrity of that site, that such a measure may be taken into consideration in the 'appropriate assessment' within the meaning of Article 6(3) of the Habitats Directive".*

2.2.6 This HRA will therefore only consider the existence of preventative measures if the expected benefits of those measures are certain at the time of the assessment.

2.3 HRA Stage 2: Appropriate Assessment

2.3.1 As established by case law, appropriate assessment is not a technical term; it simply means whatever further assessment is necessary to confirm whether there would be adverse effects on the integrity of any European sites that have not been dismissed at screening. Since it is not a technical term, and levels of analysis are likely to vary from site to site and impact pathway to impact pathway, it has no specific methodology except that it essentially involves repeating the analysis for the likely significant effects stage, but to a greater level of detail where possible and necessary.

2.3.2 A given appropriate assessment may be very technically detailed or it may contain little additional technical analysis beyond that undertaken at screening. However, one of the key considerations during appropriate assessment is

whether there is available mitigation (i.e. measures that are not part of standard design but which are included specifically to protect the European sites in question) that would entirely address the potential effect on integrity (in other words, disruption of the coherent structure and function of the European site(s)).

2.3.3 In evaluating effects on site integrity, we have relied on professional judgement, based, where necessary, on previous studies, as well as the results of previous stakeholder consultation regarding development impacts on the European sites.

2.4 Consultation

2.4.1 Consultation undertaken to date with Natural England (the relevant Statutory Nature Conservation Body (SNCB) in England) in relation to ecology and nature conservation is outlined in the Consultation Report **[APP-026]** submitted with the DCO application.

2.4.2 Table 2-1~~Table 2-1~~ outlines the matters raised to date and how these have been addressed in relation to Ecology and Nature Conservation up to the date of submission of the Application. The Scheme has incorporated Natural England's requirements as detailed below, but agreement with Natural England on the conclusions from this HRA report is ongoing and has continued through the Examination process.

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Table 2-1: Consultation with SNCB

Consultee	Main matter raised	How has the concern been addressed and location of response.
Natural England	Appropriate assessment needs to be undertaken in respect of any plan or project which is likely to have a significant effect on a European site.	This Habitats Regulations Report accompanies the DCO application.
Natural England	We are satisfied that section 8.4.2 and **Table 8-1** of the Scoping Report has scoped in the relevant nature conservation sites for detailed consideration through the EIA.	These sites have been considered in the EcIA.
Natural England	Chippenham Fen - The ES will need to carefully assess potential direct and indirect impacts to the notified and qualifying features of this site, particularly through any changes in local hydrology and water quality.	The EcIA has considered potential direct and indirect impacts on Chippenham Fen, including changes to hydrology and water quality. See Section 8.9 of the **Ecology and Nature Conservation** and **Chapter 9: Flood Risk, Drainage and Water Resources** of this Environmental Statement **[APP-041]**.
Natural England	Assessment of impacts to functionally linked land for Breckland SPA birds.	The Ecology and Nature Conservation chapter of the ES and Habitats Regulation Assessment (HRA) has considered impacts on the Breckland SPA and functionally linked habitat. Section 3 for baseline conditions of this report and Section 8.6 and 8.9 of the Ecology and Nature Conservation chapter **[APP-040]**.

Consultee	Main matter raised	How has the concern been addressed and location of response.
Natural England	Notes the proposal to prepare an HRA Screening Report in accordance with the requirements of the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) and that this will be provided with the DCO application.	This Habitats Regulations Report accompanies the DCO application.
Natural England	We note that the submitted PEIR suggests that none of the stone curlew found within or in close proximity to the application site are part of the Breckland SPA population. Based on the evidence at the time, this was also the position that Natural England previously took. However, the RSPB have collected more recent evidence as part of a current bird ringing project on the application site. This has demonstrated that five of the birds within the application site have travelled between the application site and Breckland SPA. Natural England always provides advice based on the most up to date evidence available and, following a review of this new information, Natural England are of the view that the new information is robust and that the birds on the application site are likely to be part of the Breckland SPA population. We consider, therefore, that the loss in nesting density created by the loss of five nesting pairs on the application site is of likely significant effect to the SPA population. In addition to the loss of these nests, there is also an extensive loss of Stone-curlew foraging habitat to consider, as a result of this application. Please note that birds that nest outside the SPA but that still form part of the SPA population are regarded the same as the birds that nest within the SPA, both in the context of evaluating effects to the SPA but also in terms of the assessment against the Conservation of Habitats and Species Regulations 2017.	The Applicant acknowledges the updated advice from Natural England and has continued to engage with Natural England following the conclusion of the statutory consultation to develop appropriate mitigation. A Habitat's Regulations Assessment: Report to Inform Appropriate Assessment (this report) has been submitted with the DCO. The Applicant has removed parcels E07, E11 and E23 from solar development to set the Scheme back from known stone curlew habitats. These parcels will now form part of a wider network of ecological mitigation areas. This increases the area set aside for stone curlews to 108ha. Further details are provided in Chapter 8 of this Environmental Statement **[APP-040]** and in **Appendix 10I Outline Landscape and Ecology Management Plan [EN010106/APP/6.2]**.

Consultee	Main matter raised	How has the concern been addressed and location of response.
Natural England	In our view there is currently insufficient detail on both the proposed location of the application around Fenland Special Area of Conservation (SAC) and Chippenham Fen National Nature Reserve and Ramsar site and on potential effects to the site. Due to this lack of detail, it has been difficult to assess whether there is a likely significant effect to these sites due to this application and we expect a much greater level of detail to be included at the next stage of the process. Taking this into account, these sites should all be screened in for further assessment in Table 8.	The Applicant has provided further information about the Scheme boundary as part of its DCO application. Further details can be found in the **Land Plans [REP2-003]**. The Applicant has continued to engage with Natural England following the conclusion of the statutory consultation and has included assessment of the Fenland Special Area of Conservation (SAC) and the Chippenham Fen National Nature Reserve and Ramsar site. Further details are provided in **Chapter 8** of this Environmental Statement **[APP-040]**.
Natural England	Natural England advises that each nesting pair requires 16ha, so that in this case a minimum of 80ha of semi-natural heath should be created and maintained in perpetuity for Stone-curlew. This land needs to adhere to the following criteria: Not more than 1.5km of any residential settlements, infrastructure or major roads; Not within 500m of any buildings or smaller roads ie. access roads; Not within 400m of any PRoW, other permissive path or area used for recreation; Position away from forested areas or dense hedgerows. Soil type: stony free-draining soils are required on rendzinas, brown calcareous earths, brown sands, brown calcareous sands, argillic brown earths and paleoargillic brown earths Nutrient levels: low phosphorus (< 15 mg/l ideally < 10 mg/l) soil nutrient levels are required, or would need to be developed, in order to achieve semi-natural grass land, characteristic of Breckland and suitable for Stone-curlew.	The Applicant welcomes this advice from Natural England and has continued to refine its proposals in consultation with Natural England. The design changes proposed by the Applicant include removing parcels E07, E11 and E23 from solar development to set the Scheme back from known stone curlew habitats. These parcels will now form part of a wider network of ecological mitigation areas. This increases the area set aside for stone curlews to 108 ha. The Applicant has had regard to Natural England's advice regarding the character of the proposed stone curlew habitats. This is discussed and the rationale is set out in Section 5.3.6 of this document. Further details are provided in **Chapter 8** of this Environmental Statement **[APP-040]** and in the **Outline Landscape and Ecology Management Plan [EN010106/APP/6.2]**.

Consultee	Main matter raised	How has the concern been addressed and location of response.
	Stone-curlew generally nest in open fields with dry soil, with areas of dry, bare, stony ground or low vegetation, and habitat creation has to be managed to achieve this. Factors associated with site location are those which would need to be considered when electing land for mitigation. Factors associated with habitat features are considered to be those which can be actively managed to improve habitat suitability.	
Natural England	Chippenham Fen RAMSAR site is notable for its wetland invertebrate assemblage yet the submitted documents do not look in detail or make reference to any published research regarding the potential for operational impacts on the adjacent European Site. For example, there is no evidence that consideration been given to Natural England's Evidence Research (2017) which discusses the potential for aquatic invertebrates to confuse reflected polarised light from the panels for water. Although the conclusions of this paper advised that the effect of solar panels on aquatic invertebrates was as yet unestablished, it is nevertheless still a concern and therefore should not be ruled out from further assessment. Likewise, research is still undecided about whether wetland birds are significantly affected by solar panels i.e. they mistake them for water and therefore waste energy or injure themselves by mistaking panels for water bodies. Given this application is next to a Ramsar site, this should also be given further coverage at the next stage.	The Applicant has considered the impact of the Scheme on the Chippenham Fen RAMSAR and considers that the Scheme will have no adverse impact. The Applicant has also considered Natural England's Evidence Research (2017) in preparing its Scheme proposals. Based upon this assessment, wetland invertebrates are not expected to adversely affected. Further details can be found in **Chapter 8** of this Environmental Statement **[APP-040]** and in **Appendix 10l Outline Landscape and Ecology Management Plan [EN010106/APP/6.2]**.

3 Baseline Evidence Gathering

3.1 Overview

3.1.1 There is no guidance that dictates the general physical scope of an HRA. Therefore, in considering the physical scope of the assessment, this Report has

been guided primarily by identified impact pathways (called the source-pathway-receptor model).

3.1.2 Briefly defined, impact pathways are routes by which the implementation of a project can lead to an effect upon a European designated site. For some impact pathways (notably air pollution) there is guidance that sets out distance-based zones required for assessment. For others, a professional judgment must be made based on the best available guidance and evidence.

3.2 Designated Sites Scoped into HRA

3.2.1 Guidance published by the Environment Agency (Ref 10) recommends that for large power generation developments greater than 50 MW, a radius of search of 15 km should be used when identifying relevant European designated sites which may be affected by the development. The Environmental Statement has considered a distance of 10 km as appropriate based on likely impacts during construction, operation, and decommissioning of a solar farm which does not have stack emissions, compared with other large power generation developments, such as coal and gas fired power stations. Irrespective of this, there are no additional European Sites within 15km of the Scheme as compared to those within 10km.

3.2.2 The following European Sites present within 10 km of the Scheme boundary and considered within this assessment are:

a. Fenland SAC;
b. Chippenham Fen Ramsar site;
c. Breckland SPA;
d. Wicken Fen Ramsar site;
e. Rex Graham Reserve SAC;
f. Breckland SAC; and
g. Devil's Dyke SAC.

3.2.3 Fenland SAC is composed of three individual sites: Wicken Fen, Woodwalton Fen, and Chippenham Fen, with the latter being adjacent to the Order land. Chippenham Fen is also designated as a Ramsar site.

3.2.4 There are no other international nature conservation designations within a 10 km radius of the Scheme boundary and no additional SACs designated for highly mobile species, such as bats, within 30 km of the Scheme.

3.2.5 Paragraph 4.9 of PINS Advice Note Ten (Ref 6), as well as guidance from the Department for Business, Energy and Industrial Strategy, requires an evaluation of the potential for the Scheme to need other consents which could also necessitate Habitats Regulations Assessment by different competent authorities, and a statement as to whether the Order Limits overlap with devolved administrations or other European Economic Area (EEA) States (Ref 11). It is confirmed that neither the Order land, nor its effects, overlap with areas of devolved administrations or with those of other EEA States. It is also the case that

no parallel consents are required for the Scheme which would require additional Habitats Regulations Assessment to be carried out.

3.2.6 A summary of the qualifying features for each of the European Sites and their distance from the Scheme is summarised in Table 3-1~~Table 3-1~~ below.

3.2.7 The conservation objectives for each relevant European Site are summarised in Table 3-2~~Table 3-2~~.

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Table 3-1: European Sites Scoped into HRA Screening

Site	Approx. distance from Site (nearest location)	Summary of Primary Reasons for Site Selection	Summary of Qualifying Features
Fenland SAC	Directly adjacent to the north of the ~~Sunnica West Site B~~Grid Connection Route B.	Fenland SAC is composed of three individual sites: Wicken Fen, Woodwalton Fen, and Chippenham Fen. Each of these sites hold areas of calcareous fens, with a long and well-documented history of regular management. Some areas have been dug for peat extraction with drainage ditches being currently manged for water levels control particularly in the summer. The three sites that comprise the Fenland SAC are located within the Fens National Character Area in Cambridgeshire, but they are located some 43.5 km apart. They all overlie peat soils of varying depth and all are primarily calcareous fen with areas of grassland and woodland. There is a full range from species-poor Great Fen-sedge *Cladium mariscus*-dominated fen to species-rich fen with a lower proportion of great fen-sedge and containing such species as Black Bog-rush (*Schoenus nigricans*), Tormentil (*Potentilla erecta*) and Meadow Thistle (*Cirsium dissectum*). There are good transitions to the tall herb-rich East Anglian type of Purple Moor-grass *Molinia caerulea* – meadow thistle fen meadow and rush pastures, all set within a mosaic of reedbeds and wet pastures. This SAC has a high number of notable species including macroinvertebrates and plants.	Annex I habitats that are a primary reason for selection of this site: a. Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) b. Calcareous fens with Great Fen-sedge (*Cladium mariscus*) and species of the (*Caricion davallianae)* Annex II species present as a qualifying feature, but not a primary reason for site selection: a. Spined Loach (*Cobitis taenia*) b. Great Crested Newt (*Triturus cristatus*)
Chippenham Fen Ramsar	Directly adjacent to the north of the ~~Sunnica West Site~~Grid Connection Route B.	A spring-fed calcareous basin mire with a long history of management. The site is notable for its ecological diversity, from characteristic sedge fen to fen meadow, chalk grassland, Alnus/Salix carr and ancient woodland (ash, oak and birch) (*Fraxinus*, *Quercus*, *Betula*). More than 300 species of flowering plants have been recorded, including very rare, regionally rare or local species, as have several rare invertebrates (moths). A notable assemblage of breeding birds includes Common Snipe (*Gallinago gallinago*), Eurasian Woodcock (*Scolopax rusticola*), Common Nightingale (*Luscinia megarhynchos*), warblers (species of *Acrocephalus*), and Common Grasshopper Warbler (*Locustella naevia*). Scrub is periodically removed, and the fen meadows are mown.	The site is designated for: a. Ramsar criterion 1 – a spring-fed calcareous basin mire with a long history of management, which is partly reflected in the diversity of present-day vegetation. . Ramsar criterion 2 - The invertebrate fauna is very rich, partly due to its transitional position between Fenland and Breckland. The species list is very long, including many rare and scarce

Site	Approx. distance from Site (nearest location)	Summary of Primary Reasons for Site Selection	Summary of Qualifying Features
		The site is comprised of drier areas of old planted woodland and wetter areas resulting from historic peat digging dominated by tall fen communities with Common Reed (*Phragmites australis*), Hemp Agrimony (*Eupatorium cannabinum*), Meadowsweet (*Filipendula ulmaria*) and extensive beds of Great Fen-sedge (*Cladium mariscus*) which are cut and sold for thatching. The fen meadow communities are less wet and have an abundance of grasses.	invertebrates characteristic of ancient fenland sites in Britain. a. Ramsar criterion 3 - The site supports diverse vegetation types, rare and scarce plants. The site is the stronghold of Cambridge milk parsley (*Selinum carvifolia*). b. The breeding bird assemblage is also listed under 'noteworthy fauna'. Breeding birds include *Gallinago gallinago, Scolopax rusticola, Luscinia megarhynchos, Locustella naevia* and *Acrocephalus* species.
Breckland SPA	1.4 km north east of the Sunnica East Site B.	The Breckland of Norfolk and Suffolk lies in the heart of East Anglia on largely sandy soils of glacial origin. In the nineteenth century the area was termed a sandy waste, with small patches of arable cultivation that were soon abandoned. The continental climate, with low rainfall and free-draining soils, has led to the development of dry heath and grassland communities. Much of Breckland has been planted with conifers throughout the twentieth century, and in part of the site, arable farming is the predominant land use. The remnants of dry heath and grassland which have survived these recent changes support heathland breeding birds, where grazing by rabbits and sheep is sufficiently intensive to create short turf and open ground. These breeding birds have also adapted to live in forestry and arable habitats. Woodlark (*Lullula arborea*) and Nightjar (*Caprimulgus europaeus*) breed in clear-fell and open heath areas, whilst Stone Curlews (*Burhinus oedicnemus*) establish nests on open ground provided by arable cultivation in the spring, as well as on Breckland grass-heath.	The site qualifies under article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season: a. Stone Curlew (*Burhinus oedicnemus*) 115 pairs – breeding 5 year mean (1994 – 98) 60.1% GB b. Nightjar (*Caprimulgus europaeus*) 415 males – breeding Count as at 1998 12.2% GB c. Woodlark (*Lullula arborea*) 430 pairs – breeding Count as at 1997 28.7% GB
Wicken Fen Ramsar	Approximately 2.1 km north west of Grid Connection Route B and approximately 2.6km north west of the	The site is characterised by a mosaic of vegetation with all stages of succession represented. This is due to extensive peat cutting and differing systems of crop exploitation with areas subject to frequent cutting with a higher species diversity. This results in a very high biodiversity, including rare fenland plants and	The site is designated for: a. Ramsar criterion 1 - One of the most outstanding and representative remnants of the East Anglian peat fens. The area is one

Site	Approx. distance from Site (nearest location)	Summary of Primary Reasons for Site Selection	Summary of Qualifying Features
	Burwell National Grid Substation ~~Extension~~	invertebrates. The site also supports large numbers of wintering birds including mallard (*Anas* platyrhynchos), teal (*Anas crecca*), wigeon (*Mareca penelope*), shoveler (*Spatula clypeata*), pochards (*Aythya ferina*) and tufted duck (*Aythya fuligula*). The site acts as a flood catchment area, thus the water level is regulated, and it includes dikes and abandoned clay pits. Vegetation includes various types of rushes, sedges, and marsh orchids with corresponding insect associations. Noteworthy flora includes the presence of a few nationally important higher plant species: *Viola persicifolia*, Fibrous tussock-sedge (*Carex appropinquata*), Marsh Pea *Lathyrus palustris*, *Myriophyllum verticillatum*, *Oenanthe fluviatilis*, *Peucedanum palustre*, *Potamogeton coloratus*, Flat-stalked-pondweed (*Potamogeton friesii*), *Potamogeton praelongus*. The GB Red Book considers the vascular plant Fen Ragwort (*Senecio paludosus*) as Critically Endangered; while *Myriophyllum verticillatum* and *Peucedanum palustre* are considered Vulnerable.	of the few which has not been drained. Traditional management has created a mosaic of habitats from open water to sedge and litter fields. b. Ramsar criterion 2 - The site supports one endangered species of Red Data Book plant, the fen violet *Viola persicifolia*, which survives at only two other sites in Britain. It also contains eight nationally scarce plants and 121 Red Data Book invertebrates.
Rex Graham Reserve SAC	Approximately 3.0km north east of the Sunnica East Site B.	This site hosts the priority habitat type "orchid rich sites". This is a disused chalk pit with developing dry grassland characterised by False Oat-grass (*Arrhenatherum elatius*). The site has been selected as it supports the largest population of Military Orchid (*Orchis militaris*) in the UK, comprising more than 95% of the current total population.	Annex I habitats that are a primary reason for selection of this site: a. Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)
Breckland SAC	Approximately 3.1km east of the Sunnica East Site B.	Inland dunes with open Corynephorus and Agrostis grasslands for which this is the only known outstanding locality in the United Kingdom, which is considered to be rare as its total extent in the United Kingdom is estimated to be less than 1000 hectares. Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation for which this is considered to be one of the best areas in the United Kingdom. European dry heaths for which this is considered to be one of the best areas in the United Kingdom. Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) for which this is considered to be one of the best areas in the United Kingdom. Alluvial forests with	Annex I habitats that are a primary reason for selection of this site: a. Inland dunes with open *Corynephorus* and *Agrostis* grasslands b. Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation c. European dry heaths

Site	Approx. distance from Site (nearest location)	Summary of Primary Reasons for Site Selection	Summary of Qualifying Features
		Alder (Alnus glutinosa) and Ash (Fraxinus excelsior) (Alno-Padion, Alnion incanae, Salicion albae) for which the area is considered to support a significant presence. Great Crested Newt (Triturus cristatus) for which the area is considered to support a significant presence.	d. Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are: a. alluvial forests with Alder and Ash (Alno-Padion, Alnion incanae, Salicion albae) Annex II species present as a qualifying feature, but not a primary reason for site selection is: a. Great Crested Newt
Devil's Dyke SAC	Approximately 4.5km south west of the Burwell National Grid Substation ~~Extension~~	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) for which this site is considered to be one of the best areas in the United Kingdom.	Annex I habitats that are a primary reason for selection of this site are: a. semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

Table 3-2: Conservation Objectives for Relevant European Sites

Site	Conservation Objectives	Threats / Pressures to Site Integrity	Current Conservation Status and Condition
Fenland SAC	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring: a. The extent and distribution of qualifying natural habitats and habitats of qualifying species b. The structure and function (including typical species) of qualifying natural habitats c. The structure and function of the habitats of qualifying species d. The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely e. The populations of qualifying species, and, f. The distribution of qualifying species within the site.	The following threats / pressures to the site integrity of Fenland SAC have been identified in Natural England's Site Improvement Plan: a. Water pollution b. Hydrological changes c. Air Pollution: impact of atmospheric nitrogen deposition	The current condition of Fenland SAC (Chippenham Fen component site) and Chippenham Fen Ramsar, is 90.3% in a favourable condition and consequently 9.7% is in unfavourable and recovering condition.
Chippenham Fen Ramsar	There are no specific conservation objectives for the Ramsar site but those set out for Fenland SAC are considered relevant.	The threats / pressures to the Ramsar site are considered the same as for Fenland SAC.	As provided for Fenland SAC.
Breckland SPA	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; a. The extent and distribution of the habitats of the qualifying features	The following threats / pressures to the site integrity of Breckland SPA have been identified in Natural England's Site Improvement Plan: a. Lack of ground disturbance b. Undergrazing c. Forestry and woodland management	The Breckland SPA consists of two component SSSIs. Breckland Farmland SSSI is 100% in favourable condition and Breckland Forest SSSI is 0.09%% in favourable condition and 99.91% in Unfavourable, but recovering condtion.

Site	Conservation Objectives	Threats / Pressures to Site Integrity	Current Conservation Status and Condition
	b. The structure and function of the habitats of the qualifying features c. The supporting processes on which the habitats of the qualifying features rely d. The population of each of the qualifying features, and, e. The distribution of the qualifying features within the site	d. Water pollution e. Changes in species distributions f. Stone Curlew monitoring and intervention g. Planning permission: general h. Air Pollution: impact of atmospheric nitrogen deposition i. Public access/disturbance j. Climate change k. Inappropriate scrub control l. Inappropriate management practices m. Habitat fragmentation n. Inappropriate weed control o. Inappropriate pest control p. Inappropriate cutting/mowing	
Wicken Fen Ramsar	There are no specific conservation objectives for the Ramsar site but those set out for Fenland SAC are considered relevant.	The threats / pressures to the Ramsar site are considered the same as for Fenland SAC.	The current condition of Wicken Fen Ramsar, is 46.97% in a favourable condition and 53.03% in unfavourable and recovering condition.
Rex Graham Reserve SAC	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring: a. The extent and distribution of qualifying natural habitats . The structure and function (including typical species) of qualifying natural habitats, and *a.* The supporting processes on which qualifying natural habitats	The following threats / pressures to the site integrity of the Rex Graham Reserve SAC have been identified in Natural England's Site Improvement Plan: a. Changes in species distributions b. Air pollution: impact of atmospheric nitrogen deposition c. Habitat fragmentation d. Deer e. Invasive species f. Public access/disturbance	The current condition of Rex Graham SAC, is 100% in a favourable condition.

Site	Conservation Objectives	Threats / Pressures to Site Integrity	Current Conservation Status and Condition
Breckland SAC	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring: a. The extent and distribution of qualifying natural habitats and habitats of qualifying species . The structure and function (including typical species) of qualifying natural habitats a. The structure and function of the habitats of qualifying species b. The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely c. The populations of qualifying species, and, d. The distribution of qualifying species within the site.	The following threats / pressures to the site integrity of Breckland SPA have been identified in Natural England's Site Improvement Plan: a. Lack of ground disturbance b. Undergrazing c. Forestry and woodland management d. Water pollution e. Changes in species distribution s f. Stone curlew monitoring and intervention g. Planning permission: general h. Air pollution: impact of atmospheric nitrogen deposition i. Public access/disturbance j. Climate change k. Inappropriate scrub control l. Inappropriate management practices m. Habitat fragmentation n. Inappropriate weed control o. Inappropriate pest control p. Inappropriate cutting/mowing	Breckland SAC consists of 19 component SSSIs. Most of these sites (and Annex 1 habitats) are in Favourable or Unfavourable, but recovering condition. Notable exceptions are Weather and Horn Heaths, Eriswell SSSI, East Wretham Heath SSSI and Deadman's Grave, Icklingham SSSI, which support Annex 1 habitats that are in Unfavourable and declining condition.
Devil's Dyke SAC	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring: a. The extent and distribution of qualifying natural habitats	The following threats / pressures to the site integrity of Devil's Dyke SAC have been identified in Natural England's Site Improvement Plan: a. Inappropriate scrub control b. Air pollution: impact of atmospheric nitrogen deposition	The current condition of Devil's Dyke SAC, is 49.57% in a favourable condition and 50.43% in Unfavourable but recovering condition.

Site	Conservation Objectives	Threats / Pressures to Site Integrity	Current Conservation Status and Condition
	b. The structure and function (including typical species) of qualifying natural habitats, and c. The supporting processes on which qualifying natural habitats rely		

3.3 Existing On-Site Baseline Conditions

3.3.1 Extensive ecological surveys have been undertaken of the Order land and appropriate zones of influence. The results of these surveys are presented in **Appendix 8A-8K** of this Environmental Statement **[APP-077 to APP-090]**. Data relevant to this assessment are summarised below.

Aquatic Ecology

Sunnica East Site A and B

3.3.2 Aquatic features within Sunnica East include the Lee Brook (WFD) Surface Water Body (GB105033043020) Kennett – Lee Brook), a series of connected ditches in close proximity to the River Lark and two ponds and a ditch within Sunnica East Site A. No additional ponds or ditches are present in Sunnica East Site B.

3.3.3 Records of protected fish species exist in the Lee Brook including Brown/Sea Trout (*Salmo trutta*), Bullhead (*Cottus gobio*) and Brook Lamprey (*Lampetra planeri*).

3.3.4 WFD classification of Fish in 2015 was assessed as Poor status within the Kennett – Lee Brook (Ref 11). Reasons for not achieving good status include groundwater abstraction, land drainage, barriers – ecological discontinuity and Invasive Non-Native Species (INNS), specifically North American signal crayfish (*Pacifastacus leniusculus*) in the Lee Brook approximately 40 m from the Sunnica East Site A.

3.3.5 There is no current WFD classification provided by the EA for macroinvertebrates at Kennett-Lee brook. Eleven macroinvertebrate taxa were recorded in 2018 EA surveys at Kennet-Lee Brook; however, no taxa were classified as notable or protected (Ref 12).

3.3.6 Macrophytes are currently assessed as Moderate within the Kennett – Lee Brook. Reasons for not achieving good status include groundwater abstraction, poor soil management, land drainage, and surface water abstraction (Ref 12).

3.3.7 The watercourses in Sunnica East Site A and B are not in hydrological or ecological connection to any European sites.

Sunnica West Site A and Part of Grid Connection Route B to the North

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3.3.8 Aquatic features within the Sunnica West Site include a number of agricultural ditches (Sunnica West Site A), the River Snail and two ditches connected to Chippenham Park SSSI (~~Sunnica West Site~~adjacent part of Grid Connection Route B).

3.3.9 The River Snail is a heavily modified Main River and is currently classified by the Environment Agency as having 'Moderate' ecological potential. The waterbody fails to meet 'Good' ecological potential due to physical modifications and sewage discharges (Ref 12). The River Snail flows ~~along the western boundary of Sunnica West Site B~~through Grid Connection Route B.

3.3.10 A notable macroinvertebrate species, the caddisfly *Limnephilus nigriceps*, was recorded in River Snail in 2012. One RDB species classed as Vulnerable; Water Violet (*Hottonia palustris*), was recorded in Chippenham Fen in 2009, approximately 1 km from the Order limits ~~Sunnica West Site B boundary~~.

Grid Connection Route A and B ~~*and Burwell National Grid Substation Extension*~~

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3.3.11 Burwell Lode runs adjacent to Wicken Fen Ramsar and Fenland SAC, connecting into the European Site through Wicken Lode, approximately 3 km downstream of Grid Connection Route B. The cable route corridor also passes over Catchwater Drain north-east of Burwell. The watercourse is an artificial drainage channel that joins Burwell Lode further downstream. None of the other watercourses impacted by the Scheme are considered to have hydrological or ecological connections to any European Site.

3.3.12 Burwell Lode is a heavily modified 'Main River' and is currently classed by the Environment Agency as having 'Moderate' ecological potential. The waterbody fails to meet 'Good' ecological potential due to physical modifications, sewage discharges, poor livestock management, poor nutrient management, transport drainage and atmospheric deposition of mercury and its compounds (Ref 12).

3.3.13 Grid Connection Route B crosses Burwell Lode north of Burwell, through arable land and this section is navigable by boat. There are public footpaths along both bank tops and riparian vegetation comprises reeds, grasses and scrub. The channel is relatively wide (approximately 12 m) and deep. Macrophytes and overhanging vegetation would provide suitable habitat for fish and macroinvertebrates.

3.3.14 Spined Loach was recorded in Burwell Lode in 2014.

3.3.15 Several invasive plant species have been recorded by the Environment Agency (Ref 12) in watercourses close or within the Order land including:

a. Nuttall's Waterweed (*Elodea nuttallii*), Burwell Lode 2017
b. Canadian Waterweed (*Elodea canadensis*), Wicken Fen, 2010
c. Nuttall's Waterweed, Wicken Fen, 2012
d. New Zealand Pigmyweed (*Crassula helmsii*), Wicken Fen, 2013

3.3.16 Freshwater shrimps, either *Crangonyx pseudogracilis* or *Crangonyx floridanus* or both, have been recorded in both Catchwater Drain in 2009 and Burwell Lode in 2015 by the Environment Agency. *Crangonyx pseudogracilis* is a long-established non-native species, whereas *Crangonyx floridanus* is a highly invasive non-native species, which has only recently been recorded in the UK.

3.3.17 Zebra mussel (*Dreissena polymorpha)*, demon shrimp (*Dikerogammarus haemobaphes)*, the shrimp (*Gammarus tigrinus)* and amphipod (*Chelicorophium curvispinum)* were also recorded in Burwell Lode, approximately 4.5 km downstream of Grid Connection Route B.

Terrestrial Ecology and European Site special features

3.3.18 Baseline ecology surveys have been carried out to inform the Environmental Statement. Those surveys relevant to the cited features noted in Table 3-2~~Table 3-2~~ for European Sites are outlined below.

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Great Crested Newt

3.3.19 No records of Great Crested Newt were returned from the data search, within 2 km of the Order land and communication with Natural England reserve managers at Chippenham Fen suggest that Great Crested Newt is not present within Chippenham Fen. The closest record of Great Crested Newt to the Order land was 2.1 km from the Burwell National Grid Substation ~~Extension,~~ in 2013.

3.3.20 Habitat Suitability Indices (HSIs) were undertaken for 15 waterbodies and watercourses within the Order land and an adjacent 500m buffer. None of these waterbodies are hydrologically connected to the Breckland SAC. In summary, of the 15 waterbodies surveyed using HSI methods:

a. none had 'excellent' suitability to support breeding Great Crested Newt
b. five had 'good' suitability to support breeding Great Crested Newt
c. none had 'average' suitability to support breeding Great Crested Newt
d. five had 'below average' to support breeding Great Crested Newt
e. five had 'poor' to support breeding Great Crested Newt

3.3.21 One waterbody in Sunnica West Site A was surveyed for Great Crested Newt using traditional methods with four survey visits undertaken in May 2020. Great Crested Newt was not recorded.

3.3.22 Water samples were taken from nine waterbodies for subsequent analysis of Great Crested Newt eDNA by the ADAS Laboratory in Helsby.

3.3.23 The results of the Great Crested Newt eDNA survey identified positive eDNA samples for Great Crested Newt from a single waterbody in Worlington, approximately 250m north-west of the Sunnica East Site B (**Appendix 8E** of this Environmental Statement **[APP-081]**). Great Crested Newt was not recorded closer to the Order land than this waterbody and no other records of Great Crested Newt were returned from within 2km of the Order land. There are no functional links between Great Crested Newt populations associated with either the Fenland SAC or Breckland SAC and the Scheme.

Avifauna

3.3.24 Breeding bird surveys were undertaken of the Order land and appropriate buffers in 2019 and the only SPA bird species present was Stone Curlew. This species was the focus of surveys in 2019, 2020 and 2021. Details of the surveys and results are provided in **Appendix 8H** of this Environmental Statement **[APP-083]**).

Stone Curlew

3.3.25 Information pertaining to Stone Curlew usage of the Order land and a 500 m buffer from the Order limits (collectively referred to as the 'Study Area') are detailed the **Appendix 8H** of this Environmental Statement **[APP-083]**. This is summarised below and in Table 3-3~~Table 3-3~~**.** Field references are provided to aid interpretation and follow those shown on the Parameter Plans *(*see **Figure 3-1: Sunnica East Site A and B Parameter Plan** and **Figure 3-2: Sunnica West A and B Parameter Plan** of this Environmental Statement **[APP-135 and APP-136]***).*

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3.3.26 In 2019, up to three pairs or territories of Stone Curlew were recorded within the Order land:

a. [redacted]

b. [redacted]

3.3.27 [redacted]

3.3.28 No other Stone Curlew territories were recorded within 500 m of the Order land in 2019.

3.3.29 In 2020, up to five pairs of Stone Curlew were recorded within the Order land during the course of the surveys:

c. [redacted]

d. [redacted].

3.3.30 No other Stone -curlew territories were recorded within 500 m of the Order limits in 2020.

3.3.31 In 2021, up to three pairs of Stone-curlew were recorded within the Order limits:

a. [redacted]

3.3.32 A further two pairs (Pairs J and K) were recorded within 500 m of the Order limits in 2021.

3.3.33 It was concluded that in 2019 the breeding population of Stone Curlew present within the Order land was between 2-3 pairs, with a further pair breeding within 500m of the Order land. In 2020, the breeding population of Stone Curlew was between 1-4 pairs, with a further pair either non-breeding or breeding away from the Order land, as described in Table 3-3 below. In 2021, the breeding population of Stone-curlew was 2-3 pairs, with a further two pairs within 500m of the Order limits.

Table 3-3: Stone Curlew Survey Information

Survey Year	Pair Reference	Location within the Order land	Breeding Status	Nesting Site and/or breeding territory characteristics
2019	Pair A (1)	[redacted]	[redacted]	[redacted]
2019	Pair B (2)	[redacted]	[redacted]	[redacted]
2019	Pair C (3)	[redacted]	[redacted]	[redacted]
2019	Pair D (4)	[redacted]	[redacted]	[redacted]
2020	Pair E (1)	[redacted]	[redacted]	[redacted]

Survey Year	Pair Reference	Location within the Order land	Breeding Status	Nesting Site and/or breeding territory characteristics
2020	Pair F (2)	[redacted]	[redacted]	[redacted]
2020	Pair G (3)	[redacted]	[redacted]	[redacted]
2020	Pair H (4)	[redacted]	[redacted]	[redacted]
2020	Pair I (5)	[redacted]	[redacted]	[redacted]
2021	Pair J (1)	[redacted]	[redacted]	[redacted]
2021	Pair K (2)	[redacted]	[redacted]	[redacted]

Survey Year	Pair Reference	Location within the Order land	Breeding Status	Nesting Site and/or breeding territory characteristics
2021	Pair L (3)	[redacted]	[redacted]	[redacted]
2021	Pair M (4)	[redacted]	[redacted]	[redacted]
2021	Pair N (5)	[redacted]	[redacted]	[redacted]

3.3.34 The RSPB has also been monitoring Stone Curlew within the Order land and surrounding area since 2009. It should be noted that the RPSB do not necessarily consider these data to represent all active nests or pairs present in any given year, as survey and monitoring efforts are determined by co-operation with landowners over access, the availability of funding and reliance on volunteer surveyors. Review of these data support the results of AECOM surveys in 2019 and 2020, with comparable numbers and distribution.

3.3.35 In their response to the statutory consultation on the Preliminary Environmental Information Report, Natural England stated:

'We note that the submitted PEIR suggests that none of the stone curlew found within or in close proximity to the application site are part of the Breckland SPA population. Based on the evidence at the time, this was also the position that Natural England previously took, as evidence suggested that the Stone-curlew of Breckland SPA did not travel more than 3km from the SPA. However the RSPB have collected more recent evidence as part of a current bird ringing project on the application site. This project attaches individual colour rings to Stone-curlew chicks at the nest, to enable individuals to be tracked, and has demonstrated that five of the birds within the application site have travelled between the application site and Breckland SPA.

Natural England always provides advice based on the most up to date evidence available and, following a review of this new information, Natural England are of the view that the new information is robust and that the birds on the application site are likely to be part of the Breckland SPA population.'

3.3.36 In light of this new information, the approach taken forward is to consider the Stone Curlew population present within the Order land and surrounding area to be functionally linked to the Breckland SPA.

Other Annex 1 Bird Species

3.3.37 No Nightjar or Woodlark were recorded during any surveys of the Order land during 2019 and 2020, including targeted surveys using appropriate species-specific guidelines. A survey of the Order land for breeding birds in 2021 recorded a pair of Woodlark on and adjacent to Sunnica East Site B (**Appendix 8I** of this Environmental Statement **[APP-085]**). The pair were recorded on a single visit in June 2021, in habitat suitable for breeding, with the male recorded in full song. No evidence of Woodlark had been recorded in this location in the preceding surveys which commenced in March 2021, nor during the wintering bird surveys which also covered the months of February and March 2021. Suitable nesting habitat is present adjacent to Sunnica East Site B, notably plantation woodland with bracken understorey around the edges and hedgerows with tussocky grassland. These habitats are absent from within the Order limits in this location. However, there are suitable foraging areas for the species, including semi-improved dry grassland margins around the fields. It is considered that Sunnica East Site B could form part of a breeding territory for the species, but not nesting locations.

3.3.38 One pair of Woodlark represents 0.23% of the Breckland SPA population (cited population of 430 pairs) and given the distance to the designated site (1.5 km

from the nearest part of the Order limits and 3 km from the location of Woodlark within the Order limits) the Woodlark recorded are not considered to be a significant proportion of the SPA population and therefore not functionally important nor linked to the Breckland SPA population.

3.4 Atmospheric Pollution

3.4.1 This section sets out the baseline evidence gathering and the potential effect pathways from atmospheric pollution generated during construction, operational and decommissioning.

3.4.2 The main pollutants of concern for European sites are oxides of nitrogen (NOx), ammonia (NH_3) and sulphur dioxide (SO_2). These are summarised in Table 3-4~~Table 3-4~~. Ammonia can have a directly toxic effect upon vegetation, particularly at close distances to the source such as near road verges. NOx can also be toxic at very high concentrations (far above the annual average critical level). However, in particular, high levels of NOx and NH_3 are likely to increase the total nitrogen deposition to soils, potentially leading to deleterious knock-on effects in resident ecosystems. For example, an increase in the total nitrogen deposition from the atmosphere is widely known to enhance soil fertility and to lead to eutrophication. This often has adverse effects on the community composition and quality of semi-natural, nitrogen-limited terrestrial and aquatic habitats (Ref 13; Ref 14). The total nitrogen deposition resulting from a plan or project is therefore often assessed as the overarching parameter determining atmospheric pollution.

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Table 3-4: Main sources and effects of air pollutants on habitats and species

Pollutant	Source	Effects on habitats and species
Sulphur Dioxide (SO_2)	The main sources of SO_2 are electricity generation from coal and oil combustion, and industrial and domestic fuel combustion. However, total SO_2 emissions in the UK have decreased substantially since the 1980's. Another origin of sulphur dioxide is the shipping industry and high atmospheric concentrations of SO_2 have been documented in busy ports. In future years shipping is likely to become one of the most important contr butors to SO_2 emissions in the UK.	Wet and dry deposition of SO_2 acidifies soils and freshwater and may alter the composition of plant and animal communities. The magnitude of effects depends on levels of deposition, the buffering capacity of soils and the sensitivity of impacted species. However, SO_2 background levels have fallen considerably since the 1970s and are now not regarded a threat to plant communities. For example, decreases in Sulphur dioxide concentrations have been linked to returning lichen species and improved tree health in London.
Acid deposition	Leads to acidification of soils and freshwater via atmospheric deposition of SO_2, NOx, ammonia and hydrochloric acid. Acid deposition from rain has declined by 85% in the last 20 years, which most of this contributed by lower sulphate levels. Although future trends in sulphur (S) emissions and subsequent deposition	Gaseous precursors (e.g. SO_2) can cause direct damage to sensitive vegetation, such as lichen, upon deposition. Can affect habitats and species through both wet (acid rain) and dry deposition. The effects of acidification include lowering of soil pH, leaf chlorosis, reduced decomposition rates, and

Pollutant	Source	Effects on habitats and species
	to terrestrial and aquatic ecosystems will continue to decline, increased nitrogen (N) emissions may cancel out any gains produced by reduced S levels.	compromised reproduction in birds / plants. Not all sites are equally susceptible to acidification. This varies depending on soil type, bed rock geology, weathering rate and buffering capacity. For example, sites with an underlying geology of granite, gneiss and quartz rich rocks tend to be more susceptible.
Ammonia (NH_3)	Ammonia is a reactive, soluble a kaline gas that is released following decomposition and volatilisation of animal wastes. It is a naturally occurring trace gas, but ammonia concentrations are directly related to the distribution of livestock. Ammonia reacts with acid pollutants such as the products of SO_2 and NO_X emissions to produce a fine ammonium (NH_4+) - containing aerosol. Due to its significantly longer lifetime, NH_4+ may be transferred over long distances (and can therefore be a significant trans-boundary issue). While ammonia deposition may be estimated from its atmospheric concentration, the deposition rates are strongly influenced by meteorology and ecosystem type.	The negative effect of NH_4+ may occur via direct toxicity, when uptake exceeds detoxification capacity and via N accumulation. Its main adverse effect is eutrophication, leading to species assemblages that are dominated by fast-growing and tall species. For example, a shift in dominance from heath species (lichens, mosses) to grasses is often seen. As emissions mostly occur at ground level in the rural environment and NH_3 is rapidly deposited, some of the most acute problems of NH_3 deposition are for small relict nature reserves located in intensive agricultural landscapes.
Nitrogen oxides (NO_x)	Nitrogen oxides are mostly produced in combustion processes. Half of NO_X emissions in the UK derive from motor vehicles, one quarter from power stations, and the rest from other industrial and domestic combustion processes.	Direct toxicity effects of gaseous nitrates are likely to be important in areas close to the source (e.g. roadside verges). A critical level of NOx for all vegetation types has been set to 30 µg/m³. Deposition of nitrogen compounds (nitrates (-NO_3), nitrogen dioxide (NO_2) and nitric acid (HNO_3)) contributes to the total nitrogen deposition and may lead to both soil and freshwater acidification. In addition, NO_x contributes to the eutrophication of soils and water, altering the species composition of plant communities at the expense of sensitive species.
Nitrogen deposition	The pollutants that contr bute to the total nitrogen deposition derive mainly from oxidized (e.g. NO_X) or reduced (e.g. NH_3) nitrogen emissions (described separately above). While oxidized nitrogen mainly originates from major conurbations or highways, reduced nitrogen mostly derives from farming practices.	All plants require N compounds to grow, but too much overall N is regarded as the major driver of biodiversity change globally. Species-rich plant communities with high proportions of slow-growing perennial species and bryophytes are most at risk from N eutrophication. This is because many semi-natural plants cannot

Pollutant	Source	Effects on habitats and species
	The N pollutants together are a large contr butor to acidification (see above).	assimilate the surplus N as well as many graminoid (grass) species. N deposition can also increase the risk of damage from abiotic factors, e.g. drought and frost.
Ozone (O_3)	A secondary pollutant generated by photochemical reactions involving NOx, volatile organic compounds (VOCs) and sunlight. These precursors are mainly released by the combustion of fossil fuels (as descr bed above). Increasing anthropogenic emissions of ozone precursors in the UK have led to an increased number of days when ozone levels rise above 40 ppb ('episodes' or 'smog'). Reducing ozone pollution is believed to require action internationally to reduce levels of the precursors that form ozone.	Concentrations of O_3 above 40 ppb can be toxic to both humans and wildlife and can affect buildings. High O_3 concentrations are widely documented to cause damage to vegetation, including visible leaf damage, reduction in floral biomass, reduction in crop yield (e.g. cereal grains, tomato and potato), reduction in the number of flowers, decrease in forest production and altered species composition in semi-natural plant communities.

3.4.3 Sulphur dioxide emissions overwhelmingly derive from coal and oil power stations and industrial processes that require the combustion of coal and oil, as well as (particularly on a local scale) shipping (Ref 15).

3.4.4 The only pollutant likely to be associated with construction of the Scheme is NOx which will be primarily determined by the associated traffic movements (both relating to on-site and commuter traffic) and any diesel plant required for construction.

3.4.5 The Institute of Air Quality Management (IAQM) (Ref 16) states: "*Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur.*"

3.4.6 The Air Pollution Information System (APIS) forms the major source of information regarding the air quality impact pathway. It specifies a critical NOx concentration (critical level) for the protection of vegetation of 30 μgm^{-3}. In addition, ecological studies have determined 'critical loads'[1] of atmospheric nitrogen deposition (that is, NOx combined with ammonia NH_3). Air quality is considered further in **Chapter 14: Air Quality** and **Chapter 8: Ecology and Nature Conservation** of this Environmental Statement **[APP-040 and APP-046]**.

3.4.7 According to the Department for Transport's Guidance (Ref 17), beyond 200 m, the contribution of vehicle emissions from the roadside to local pollution levels is not significant (**Plate 3-1**). This is therefore the distance that has been used throughout this HRA to determine whether European sites are likely to be significantly affected by site traffic associated with the Scheme.

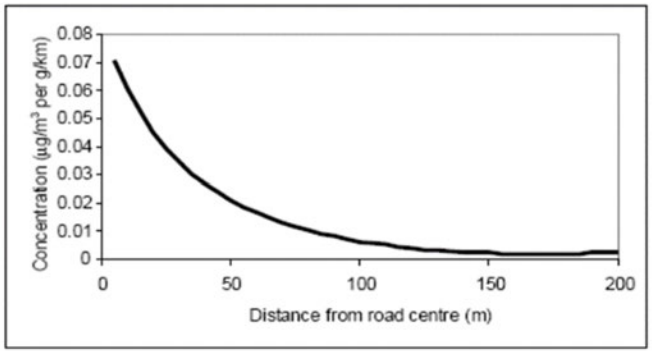

Plate 3-1: Traffic contribution to concentrations of pollutants at different distances from a road (Department for Transport, 2016)

3.4.8 An initial assessment of the traffic likely to be associated with the Scheme has been conducted. The greatest number of vehicle movements will occur in the construction phase of the development. A Transport Assessment (TA) has been undertaken to determine the effects of the construction phase on the transport network, which includes a description of current and future baseline conditions, calculates the construction traffic flows and the likely routes to be taken by site traffic and abnormal traffic loads. This is presented in the **Chapter 13: Transport and Access** of this Environmental Statement **[APP-045]** and **Appendix 13B** of this Environmental Statement **[EN010106/APP/6.2]**.

3.4.9 With reference to **Chapter 13: Transport and Access** of this Environmental Statement **[APP-045]** there are no European Sites within 200m of the Affected Road Network and the evidence suggests that emissions from site vehicles do not have a significant impact on local air quality. ~~Therefore, no pathways from the Scheme for impacts from nitrogen emissions exist.~~Following a request from Natural England modelling of air quality impacts where undertaken for construction traffic in relation to Devil's Dyke SAC, Breckland SAC and Rex Graham Reserve SAC. The modelling outputs are provided in Annex D~~ppendix XX~~.

3.5 Water Environment

3.5.1 This section sets out the baseline evidence gathering for the water environment. There are two factors that could impact the water environment of the European Sites: changes in water quality and changes in hydrology, i.e. amounts of water.

3.5.2 The quality of the water that feeds European Sites is an important determinant of the nature of their habitats and the species they support, and therefore integral to meeting a site's conservation objectives. Poor water quality can have a range of

environmental impacts. At high concentrations, toxic chemicals and heavy metals can result in the immediate death of aquatic life (both flora and fauna). At lower concentrations, negative impacts may be more subtle and could increase vulnerability to disease or change the behaviour of wildlife. These substances, especially polychlorinated biphenyls (PCBs), accumulate in minuscule organisms and then biomagnify as they are passed up the food chain. Furthermore, they are not easily biodegraded over time. Overall, there are two broad types of toxic compounds in aquatic environments, namely synthetic and non-synthetic substances, *i.e.* synthetic and naturally occurring respectively.

3.5.3 Toxic contamination may arise from synthetic toxic compounds, such as pesticides, PCBs and biocides. Some of these substances are endocrine disrupting chemicals, which have the capacity to mimic animal hormones, prevent their production or breakdown. As described above, many of the synthetic compounds tend to accumulate over time and are likely to be present in animal tissue or substrate for long periods of time. Another factor in determining the magnitude of water pollution is the amount of hydrological mixing that a site receives. Non-synthetic compounds, such as fuel oils and heavy metals, occur in the environment naturally at relatively low concentrations, but become toxic at higher concentrations.

3.5.4 Water quality is discussed further in the **Chapter 9: Flood Risk, Drainage and Water Resources** of this Environmental Statement **[APP-041]**. The assessments of water quality also inform the Water Framework Directive assessment (**Appendix 9B** of this Environmental Statement **[APP-094]**), which is included as part of the DCO submission.

3.5.5 Requirements for specific water levels are species- and life cycle-specific. A hydrological assessment of the construction and operation of the Scheme and an assessment of the hydrological connections between the Scheme and European Sites, in particular Fenland SAC and Chippenham Fen Ramsar, has been considered further within the **Chapter 9: Flood Risk, Drainage and Water Resources** of this Environmental Statement **[APP-041]**. This assessment concludes that there will be no significant effects on European Sites from construction, operation, including maintenance, and decommissioning of the Scheme. Where hydrological links between the Scheme and European Sites occur no impacts through surface water and groundwater are predicted. The cable trench for Grid Connection Route B, as for all cables, is anticipated to be above the watertable and will not affect groundwater flow. If groundwater were to reach the level of the trench, permeable backfill material will not impede groundwater flow across the trench, and the cable pipe itself is small compared to the extent of the aquifer. There will therefore be no significant impediment to groundwater flow.

3.5.6 The Scheme is upstream of the River Snail and its tributaries draining from Chippenham Fen and thus surface water impacts would not occur. Groundwater flow to Chippenham Fen will not be affected as all structures are above the Chalk aquifer water table. The method for the grid connection route crossing the River Snail, which is hydrologically connected to Fenland SAC and Chippenham Fen Ramsar and Burwell Lode, which is hydrologically connected to Fenland SAC and Wicken Fen Ramsar, would be via boring or tunnelling techniques. These

techniques were embedded early in the Scheme design, due to the status of River Snail as a Local Wildlife Site and the WFD main river status of Burwell Lode. This non-intrusive method will avoid impacts on the bed of the watercourse or the banks of the watercourse and avoid impact on surface water and groundwater. Thus, there will be no impacts on Europeans Sites or their component species, connected to these watercourses.

4 Stage 1 – Screening for Likely Significant Effects

4.1 Overview

4.1.1 This section examines the Likely Significant Effects of the Scheme. It is structured by development phase (i.e. first by the construction period, then by the operational period). For the purpose of the decommissioning period Likely Significant Effects are considered to be the same as those arising in the construction period and are therefore, not screened separately.

4.1.2 Within each development phase, each potential impact pathway is considered separately, covering all European Sites to which that impact pathway applies. Impact pathways are summarised in Annex A. Each European Site to which an impact pathway potentially applies is considered in Table 4-1~~Table 4-1~~ and Table 4-2~~Table 4-2~~. The analysis is summarised in the screening matrices in **Annexes B1** to **B7**. The impact pathways scoped in for assessment have been determined through responses from statutory consultees, the impact assessments presented in the Environmental Statement and professional judgement.

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4.2 Identification of Potential Construction Impacts

Source-Receptor Pathways Scoped In

4.2.1 The potential source-receptor pathways by which the Scheme could impact the qualifying features of each European Site during construction are summarised in Table 4-1~~Table 4-1~~, with potential likely significant effects identified. These are as follows:

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a. Habitat loss and/or degradation – loss of, or degradation to designated habitats.
b. Physical displacement of Stone Curlew – loss of nesting and foraging habitat within the Scheme used by Stone Curlew occurring outside the designated site boundary.
c. Noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary.
d. Non-physical disturbance – indirect light-pollution on sensitive habitats and species.
e. Habitat contamination – soil and groundwater contamination from surface water pollution, resulting in pollution of surface water entering watercourses hydrologically linked to SAC habitats, and dust deposition resulting in smothering of sensitive SAC/Ramsar habitats.
f. Physical disturbance of groundwater – disruption or changes to baseflows and inflows of groundwater to and from designated sites.

4.3 Identification of Potential Operational Impacts

Source-Receptor Pathways Scoped In

4.3.1 The potential source-receptor pathways by which the Scheme could impact the qualifying features of each European Site during operation are as follows:

a. Physical displacement of Stone Curlew – loss of nesting and foraging habitat within the Scheme used by Stone Curlew occurring outside the designated site boundary.

~~a.~~b. Noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary.

~~b.~~c. Non-physical disturbance – indirect light-pollution on sensitive habitats and species.

~~c.~~d. Physical displacement of aquatic invertebrates – attraction of aquatic invertebrates associated with designated sites to solar panels.

4.3.2 These pathways are considered in **Table 4-2**~~**Table 4-2**~~ below.

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Table 4-1: Summary of likely significant effects – Construction/Decommissioning

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
Fenland SAC				
Calcareous fens with Great Fen-sedge *Cladium mariscus* and species of the *Caricion davallianae*. (Calcium-rich fen dominated by Great Fen-sedge (saw sedge))*	Habitat loss and/or degradation	Chippenham Fen (component site of the SAC) is adjacent to ~~the northern boundary of Sunnica West Site B~~Grid Connection Route B. No direct habitat loss will occur within Chippenham Fen but the site could be affected during construction activities due to airborne pollutants from construction within 200m.	This effect can lead to habitat degradation and changes to the structure and function of plant communities by affecting key species.	Yes
	Habitat contamination	Contamination from surface water pollution; soil and groundwater contamination. Effects may result during construction activities from operating heavy machinery, increased traffic to the construction site and accidental spills in storage areas.	A number of tributaries drain Chippenham Fen into the River Snail, which~~-~~ is crossed by Grid Connection Route B~~runs along the western boundary of Sunnica West Site B~~, however Chippenham Fen is upstream of Grid Connection Route B~~Sunnica West Site B~~ and thus surface water impacts will not occur. With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]**, ~~the solar PV panels in Sunnica West Site B (adjacent to Chippenham Fen) will be mounted upon a steel structure with strut foundations. These are steel set in the ground similar to small piles. These strut foundations are to be approximately 2-3.5m in depth depending on ground conditions and installation method (e.g. ramming, ground screw). The installation of struts to a depth of up to 3.5m below ground does not constitute a significant risk due to the mobilisation of contaminants, creating a contaminant pathway or risking infiltration to the water table. Other small but permanent structures such as the battery compound and substation would be placed on a concrete slab approximately 0.2m thick, with some structures requiring excavation up to 1m and filling with a gravel base layer. The~~	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			~~ground level at Sunnica West Site B is approximately 12-15m AOD, with a water table depth at approximately 5-7m below ground level. All structures on Sunnica West Site B will be above the Chalk aquifer water table and would not affect groundwater flow to Chippenham Fen.~~ ~~T~~The installation of Grid Connection Route B ~~through the north of Sunnica West Site B~~ will require the cable to be set into trenches backfilled with gravel at a depth of approximately 2m and above the Chalk aquifer water table. The installation of cabling does not constitute a significant risk to the mobilisation of contaminants, creating a contaminant pathway or risking infiltration to the water table. Elsewhere on the Scheme piling up to a depth of 12m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.	
	Non-physical disturbance	Chippenham Fen (component site of the SAC) is adjacent to ~~B~~Grid Connection Route B~~the northern boundary of Sunnica West Site B~~. The site could be affected by indirect light pollution due to night-time activities during the construction phase.	None – With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]** construction working hours will be 7am until 7pm Monday to Saturday and during construction in the winter months, mobile lighting towers with a power output 8kVAs will be used. ~~The closest developable area within Sunnica West Site B is approximately 200m south of cited habitats within Chippenham Fen.~~ The southern boundary of the designated site consists of a buffer of semi-improved neutral grassland and broad-leaved woodland, with the calcareous fen to the north of this. Therefore, it is unlikely that indirect light pollution will significantly affect the integrity of cited habitats. The direction of required construction lighting (facing away from the designated site and into the Scheme) and existing boundary features (woodland/hedgerows) will also reduce the	No

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Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			potential for light spill on sensitive habitats from construction activities.	
	Groundwater disturbance	Chippenham Fen (component site of the SAC) is adjacent to BGrid Connection Route Bthe northern boundary of Sunnica West Site B. Intrusive works during construction could disrupt or change baseflows and inflows of groundwater to and from designated sites.	The ground level along Grid Connection Route B south of Chippenham Fen at Sunnica West Site B is approximately 12-15m AOD, with a water table depth at approximately 5-7m below ground level. All structures in Sunnica West Site Bworks along Grid Connection Route B (adjacent to Chippenham Fen) are anticipated to be above the chalk aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. Elsewhere on the Scheme piling up to a depth of 12m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the cha k aquifer that feeds the Fen.	No
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows)	Habitat loss and/or deterioration	Chippenham Fen (component site of the SAC) is adjacent to Grid Connection Route B. the northern boundary of Sunnica West Site B. No direct habitat loss will occur within Chippenham Fen but the site could be affected during construction activities due to airborne pollutants from construction within 200m.	This effect can lead to habitat degradation and changes to the structure and function of plant communities by affecting key species.	Yes
	Habitat contamination	Contamination from water pollution; soil and groundwater contamination and air pollution. Effects may result during construction activities from operating heavy machinery, increased traffic to the construction	A number of tributaries drain Chippenham Fen into the River Snail, which is crossed by Grid Connection Route Bruns along the western boundary of Sunnica West Site B, however Chippenham Fen is upstream of the Sunnica West Site BGrid Connection Route B and thus surface water impacts will not occur.	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
		site, accidental spills in storage areas.	With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]**, ~~the solar PV panels in Sunnica West Site B (adjacent to Chippenham Fen) will be mounted upon a steel structure with strut foundations. These are steel set in the ground similar to small piles. These strut foundations are to be approximately 2-3.5m in depth depending on ground conditions and installation method (e.g. ramming, ground screw). The installation of struts to a depth of up to 3.5m below ground is not considered to be a significant risk of mobilising contaminants, creating a contaminant pathway and risking infiltration to the water table. Other small but permanent structures such as the battery compound and substation would be placed on a concrete slab approximately 0.2m thick, with some structures requiring excavation up to 1m and filling with a gravel base layer. The ground level at Sunnica West Site B is approximately 12-15m AOD, with a water table depth at approximately 5-7m below ground level. All structures on Sunnica West Site B will be above the Chalk aquifer water table and would not affect groundwater flow to Chippenham Fen.~~ ~~T~~The installation of Grid Connection Route B ~~through the north of Sunnica West Site B~~ will require the cable to be set into trenches backfilled with gravel at a depth of approximately 2m and above the Chalk aquifer water table. The installation of cabling does not constitute a significant risk to the mobilisation of contaminants, creating a contaminant pathway or risking infiltration to the water table. Elsewhere on the Scheme piling up to a depth of 12m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.	

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
	Non-physical disturbance	Chippenham Fen (component site of the SAC) is adjacent to Grid Connection Route B~~the northern boundary of Sunnica West Site B~~. The site could be affected by indirect light pollution due to night-time activities during the construction phase.	None – With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]** construction working hours will be 7am until 7pm Monday to Saturday and during winter months, mobile lighting towers with a power output 8kVAs will be used during construction. ~~The closest developable area within Sunnica West Site B is approximately 200m south of cited habitats within Chippenham Fen.~~ The southern boundary of the designated site consists of a buffer of semi-improved neutral grassland and broad-leaved woodland, with the calcareous fen to the north of this. Therefore, it is unlikely that indirect light pollution will significantly affect the integrity of cited habitats. The direction of required construction lighting (facing away from the designated site and into the Scheme) and existing boundary features (woodland/hedgerows) will also reduce the potential for light spill on sensitive habitats from construction activities.	No
	Groundwater disturbance	Chippenham Fen (component site of the SAC) is adjacent to ~~the northern boundary of Sunnica West Site B~~Grid Connection Route B. Intrusive works during construction could disrupt or change baseflows and inflows of groundwater to and from designated sites.	The ground level along Grid Connection Route B south of Chippenham Fen~~at Sunnica West Site B~~ is approximately 12-15 m AOD, with a water table depth at approximately 5-7 m below ground level. All structures ~~in Sunnica West Site B~~works along Grid Connection Route B (adjacent to Chippenham Fen) are anticipated to be above the Chalk aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. Elsewhere on the Scheme piling up to a depth of 12 m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
Spined loach (*Cobitis taenia)*	Habitat contamination	Spined Loach is present in Wicken Fen but not present in either Chippenham Fen or Woodwalton Fen.	None – due to the absence of the species from Chippenham Fen and the distance between Wicken Fen and the Order land.	No
Great Crested Newt (*Triturus cristatus*)	Habitat loss and/or deterioration	This species is present at Woodwalton Fen which is located more than 5 km from the Order land. A new population of Great Crested Newt has been established in a few ponds at Wicken Fen. This site is located more than 2km from the Order land. Great Crested Newt is not known to be present at Chippenham Fen, which is immediately north of ~~Sunnica West Site B~~Grid Connection Route B.	None – due to the absence of the species from Chippenham Fen and the distance between Wicken Fen and Woodwalton Fen and the Order land.	No
	Disturbance	This species is present at Woodwalton Fen which is located more than 5km from the Order land. A new population of Great Crested Newt has been established in a few ponds at Wicken Fen. This site is located more than 2km from the Order land. Great Crested Newt is not known to be present at Chippenham Fen, which is immediately north of ~~Sunnica West Site B~~Grid Connection Route B.	None – due to the absence of the species from Chippenham Fen and the distance between Wicken Fen and Woodwalton Fen and the Order land.	No
Chippenham Fen Ramsar				

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
Ramsar Criterion 1[2]	Habitat loss and/or degradation	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. No direct habitat loss is anticipated but the site could be affected during construction activities due to dust deposition and increased air pollution during construction activities within 200m. This effect can lead to habitat degradation and changes to the structure and function of communities by affecting key species.	This effect can lead to habitat degradation and changes to the structure and function of plant communities by affecting key species.	Yes
	Habitat contamination	Contamination from water pollution; soil and groundwater contamination and air pollution. Effects may result during construction activities from operating heavy machinery, increased traffic to the construction site, accidental spills in storage areas.	A number of tributaries drain Chippenham Fen into the River Snail, which ~~runs along the western boundary of the Sunnica West Site~~is crossed by Grid Connection Route B, however Chippenham Fen is upstream of the Order land and thus surface water impacts will not occur. With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]**, ~~the solar PV panels in Sunnica West Site B (adjacent to Chippenham Fen) will be mounted upon a steel structure with strut foundations. These are steel set in the ground similar to small piles. These strut foundations are to be approximately 2-3.5m in depth depending on ground conditions and installation method (e.g. ramming, ground screw). The installation of struts to a depth of up to 3.5 m below ground is therefore not a significant risk of mobilising contaminants, and therefore would create a contaminant pathway and risking infiltration into the water table. Other small but permanent structures such as the battery compound and substation would be placed on a~~	No

[2] Ramsar Criterion 1 - A spring-fed calcareous basin mire with a long history of management, which is partly reflected in the diversity of present-day vegetation.

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			concrete slab approximately 0.2m thick, with some structures requiring excavation up to 1m and filling with a gravel base layer. The ground level at Sunnica West Site B is approximately 12-15 m AOD, with a water table depth at approximately 5-7 m below ground level. All structures on Sunnica West Site B will be above the Chalk aquifer water table and would not affect groundwater flow to Chippenham Fen. tThe installation of Grid Connection Route B through the north of Sunnica West Site B will require the cable to be set into trenches backfilled with gravel at a depth of approximately 2m and above the Chalk aquifer water table. The installation of cabling does not constitute a significant risk to the mobilisation of contaminants, creating a contaminant pathway or risking infiltration to the water table. Elsewhere on the Scheme piling up to a depth of 12m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.	
	Non-physical disturbance	Chippenham Fen is adjacent to the northern boundary of Sunnica West SiteGrid Connection Route B. The site could be affected by indirect light pollution due to night-time activities during the construction phase.	None – With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]** construction working hours will be 7am until 7pm Monday to Saturday and during construction in the winter months, mobile lighting towers with a power output 8kVAs will be used. The closest developable area within Sunnica West Site B is approximately 200m south of cited habitats within Chippenham Fen. The southern boundary of the designated site consists of a buffer of semi-improved neutral grassland and broad-leaved woodland, with the calcareous fen to the north of this. Therefore, it is unlikely that indirect light pollution will significantly affect the integrity of cited habitats. The direction of required construction lighting (facing away from the designated site and into the Scheme) and existing boundary features (woodland/hedgerows) will also reduce the	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			potential for light spill on sensitive habitats from construction activities.	
	Groundwater disturbance	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. Intrusive works during construction could disrupt or change baseflows and inflows of groundwater to and from designated sites.	The ground level along Grid Connection Route B south of Chippenham Fen ~~at Sunnica West Site B~~ is approximately 12-15m AOD, with a water table depth at approximately 5-7m below ground level. All ~~structures in Sunnica West Site~~works along Grid Connection Route B (adjacent to Chippenham Fen) are anticipated to be above the chalk aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. Elsewhere on the Scheme piling up to a depth of 12 m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.	No
Ramsar Criterion 2[3]	Habitat loss and/or degradation	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. No direct habitat loss is anticipated but the site could be affected during construction activities due to dust deposition and increased air pollution during construction activities. This effect can lead to habitat degradation and changes to communities' structure and function by affecting key species.	This effect can lead to habitat degradation and changes to the structure and function of plant communities by affecting key species.	Yes

[3] Ramsar criterion 2 - The invertebrate fauna is very rich, partly due to its transitional position between Fenland and Breckland. The species list is very long, including many rare and scarce invertebrates characteristic of ancient fenland sites in Britain.

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
	Habitat contamination	Contamination from water pollution; soil and groundwater contamination and air pollution. Effects may result during construction activities from operating heavy machinery, increased traffic to the construction site, accidental spills in storage areas.	A number of tributaries drain Chippenham Fen into the River Snail, which ~~runs along the western boundary of the Sunnica West Site~~is crossed by Grid Connection Route B, however Chippenham Fen is upstream of the Order land and thus surface water impacts will not occur. With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]**, ~~the solar PV panels in Sunnica West Site B (adjacent to Chippenham Fen) will be mounted upon a steel structure with strut foundations. These are steel set in the ground similar to small piles. These strut foundations are to be approximately 2-3.5m in depth depending on ground conditions and installation method (e.g. ramming, ground screw). The installation of struts to a depth of up to 3.5 m below ground is therefore not a significant risk of mobilising contaminants, and therefore would create a contaminant pathway and risking infiltration into the water table. Other small but permanent structures such as the battery compound and substation would be placed on a concrete slab approximately 0.2m thick, with some structures requiring excavation up to 1m and filling with a gravel base layer. The ground level at Sunnica West Site B is approximately 12-15 m AOD, with a water table depth at approximately 5-7 m below ground level. All structures on Sunnica West Site B will be above the Chalk aquifer water table and would not affect groundwater flow to Chippenham Fen. t~~The installation of Grid Connection Route B ~~through the north of Sunnica West Site B~~ will require the cable to be set into trenches backfilled with gravel at a depth of approximately 2m and above the Chalk aquifer water table. The installation of cabling does not constitute a significant risk to the mobilisation of contaminants, creating a contaminant pathway or risking infiltration to the water table. Elsewhere on the Scheme piling up to a depth of 12m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.	
	Non-physical disturbance	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. The site could be affected by indirect light pollution due to night-time activities during the construction phase.	None – With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]** construction working hours will be 7am until 7pm Monday to Saturday and during construction in the winter months, mobile lighting towers with a power output 8kVAs will be used. ~~The closest developable area within Sunnica West Site B is approximately 200m south of cited habitats within Chippenham Fen.~~ The southern boundary of the designated site consists of a buffer of semi-improved neutral grassland and broad-leaved woodland, with the calcareous fen to the north of this. Therefore, it is unlikely that indirect light pollution will significantly affect the integrity of cited habitats. The direction of required construction lighting (facing away from the designated site and into the Scheme) and existing boundary features (woodland/hedgerows) will also reduce the potential for light spill on sensitive habitats from construction activities. Construction lighting during hours of darkness will only occur during the winter months when the majority of invertebrates are in their larval stages and unlikely to be attracted as winged adults.	No
	Groundwater disturbance	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. Intrusive works during construction could disrupt or change baseflows and inflows of groundwater to and from designated sites.	The ground level along Grid Connection Route B south of Chippenham Fen ~~at Sunnica West Site B~~ is approximately 12-15m AOD, with a water table depth at approximately 5-7m below ground level. All ~~structures in Sunnica West Site~~works along Grid Connection Route B (adjacent to Chippenham Fen) are anticipated to be above the chalk aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. Elsewhere on the Scheme piling up to a depth of 12 m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica	No

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Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the cha k aquifer that feeds the Fen.	
Ramsar Criterion 3[4]	Habitat loss and/or degradation	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. No direct habitat loss is anticipated but the site could be affected during construction activities due to dust deposition and increased air pollution during construction activities within 200m. This effect can lead to habitat degradation and changes to the structure and function of communities by affecting key species.	This effect can lead to habitat degradation and changes to the structure and function of plant communities by affecting key species.	Yes
	Habitat contamination	Contamination from water pollution; soil and groundwater contamination and air pollution. Effects may result during construction activities from operating heavy machinery, increased traffic to the construction site, accidental spills in storage areas.	A number of tributaries drain Chippenham Fen into the River Snail, which ~~runs along the western boundary of the Sunnica West Site~~is crossed by Grid Connection Route B, however Chippenham Fen is upstream of the Order land and thus surface water impacts will not occur. With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]**, ~~the solar PV panels in Sunnica West Site B (adjacent to Chippenham Fen) will be mounted upon a steel structure with strut foundations. These are steel set in the ground similar to small piles. These strut foundations are to be approximately 2-3.5m in depth depending on ground conditions and installation method (e.g. ramming, ground screw). The installation of struts to a depth of up to 3.5 m below ground is therefore not a significant risk~~	No

[4] Ramsar criterion 3 - The site supports diverse vegetation types, rare and scarce plants. The site is the stronghold of Cambridge milk parsley (*Selinum carvifolia*).

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			~~of mobilising contaminants, and therefore would create a contaminant pathway and risking infiltration into the water table. Other small but permanent structures such as the battery compound and substation would be placed on a concrete slab approximately 0.2m thick, with some structures requiring excavation up to 1m and filling with a gravel base layer. The ground level at Sunnica West Site B is approximately 12-15 m AOD, with a water table depth at approximately 5-7 m below ground level. All structures on Sunnica West Site B will be above the Chalk aquifer water table and would not affect groundwater flow to Chippenham Fen. t~~The installation of Grid Connection Route B ~~through the north of Sunnica West Site B~~ will require the cable to be set into trenches backfilled with gravel at a depth of approximately 2m and above the Chalk aquifer water table. The installation of cabling does not constitute a significant risk to the mobilisation of contaminants, creating a contaminant pathway or risking infiltration to the water table. Elsewhere on the Scheme piling up to a depth of 12m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.	
	Non-physical disturbance	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. The site could be affected by indirect light pollution due to night-time activities during the construction phase.	None – With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]** construction working hours will be 7am until 7pm Monday to Saturday and during winter months, mobile lighting towers with a power output 8kVAs will be used during construction. ~~The closest developable area within Sunnica West Site B is approximately 200m south of the cited habitats within Chippenham Fen.~~ The southern boundary of the designated site consists of a buffer of semi-improved neutral grassland and broad-leaved woodland, with the calcareous fen to the north of this. Therefore, it is unlikely that indirect light pollution	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			will significantly affect the integrity of habitats used by invertebrates. The direction of required construction lighting (facing away from the designated site and into the Scheme) and existing boundary features (woodland/hedgerows) will also reduce the potential for light spill on sensitive habitats from construction activities.	
	Groundwater disturbance	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. Intrusive works during construction could disrupt or change baseflows and inflows of groundwater to and from designated sites, which impact habitats used by invertebrates.	The ground level along Grid Connection Route B south of Chippenham Fen is approximately 12-15m AOD, with a water table depth at approximately 5-7m below ground level. All works along Grid Connection Route B (adjacent to Chippenham Fen) are anticipated to be above the cha k aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. Elsewhere on the Scheme piling up to a depth of 12 m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.~~The ground level at Sunnica West Site B is approximately 12-15m AOD, with a water table depth at approximately 5-7m below ground level. All structures in Sunnica West Site B (adjacent to Chippenham Fen) are anticipated to be above the cha k aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. Elsewhere on the Scheme piling up to a depth of 12m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.~~	No

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Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
Noteworthy Fauna - Breeding Bird Assemblage[5]	Habitat loss and/or degradation	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. No direct habitat loss is anticipated but the site could be affected during construction activities due to dust deposition and increased air pollution during construction activities within 200m. This effect can lead to habitat degradation and changes to the structure and function of communities by affecting key species.	This effect can lead to habitat degradation and changes to the structure and function of plant communities by affecting key species.	Yes
	Habitat contamination	Contamination from water pollution; soil and groundwater contamination and air pollution. Effects may result during construction activities from operating heavy machinery, increased traffic to the construction site, accidental spills in storage areas.	A number of tributaries drain Chippenham Fen into the River Snail, which ~~runs along the western boundary of the Sunnica West Site~~is crossed by Grid Connection Route B, however Chippenham Fen is upstream of the Order land and thus surface water impacts will not occur. With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]**, ~~the solar PV panels in Sunnica West Site B (adjacent to Chippenham Fen) will be mounted upon a steel structure with strut foundations. These are steel set in the ground similar to small piles. These strut foundations are to be approximately 2-3.5m in depth depending on ground conditions and installation method (e.g. ramming, ground screw). The installation of struts to a depth of up to 3.5 m below ground is therefore not a significant risk of mobilising contaminants, and therefore would create a contaminant pathway and risking infiltration into the water table. Other small but permanent structures such as the battery compound and substation would be placed on a~~	No

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[5] The breeding bird assemblage is also listed under 'noteworthy fauna'. Breeding birds include *Gallinago gallinago*, *Scolopax rusticola*, *Luscinia megarhynchos, Locustella naevia* and *Acrocephalus* spp

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			concrete slab approximately 0.2m thick, with some structures requiring excavation up to 1m and filling with a gravel base layer. The ground level at Sunnica West Site B is approximately 12-15 m AOD, with a water table depth at approximately 5-7 m below ground level. All structures on Sunnica West Site B will be above the Chalk aquifer water table and would not affect groundwater flow to Chippenham Fen. tThe installation of Grid Connection Route B through the north of Sunnica West Site B will require the cable to be set into trenches backfilled with gravel at a depth of approximately 2m and above the Chalk aquifer water table. The installation of cabling does not constitute a significant risk to the mobilisation of contaminants, creating a contaminant pathway or risking infiltration to the water table. Elsewhere on the Scheme piling up to a depth of 12m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.	
	Noise and visual disturbance	Chippenham Fen is adjacent to the northern boundary of Sunnica West SiteGrid Connection Route B. The breeding bird assemblage associated with the site could be affected by construction related noise and visual movement of the workforce.	With reference to the **Appendix 11D** of this Environmental Statement **[APP-122]** and **Figures 11-2 and 11-3 [APP-234 and APP-235]** it is likely that predicted construction noise levels will not exceed 40 dB $L_{Aeq,T}$ for the majority of fen, with periphery habitats on the southern boundary of the site still only likely to be exposed to worse case levels of 50-55 dB $L_{Aeq,T}$. Chippenham Fen is notable for its fenland specialists such as Snipe *Gallinago*, Woodcock *Scolopax rusticola*, and Grasshopper Warbler *Locustella naevia*. Taking into account that construction activities will be approximately 200m from fenland habitats within Chippenham Fen supporting notable breeding birds, and with the southern boundary of the designated site consisting of a buffer of semi-improved neutral grassland and broad-leaved woodland there is no	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			pathway for noise and visual disturbance to the breeding bird assemblage associated with Chippenham Fen Ramsar.	
	Non-physical disturbance	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. The site could be affected by indirect light pollution due to night-time activities during the construction phase.	None – With reference to the **Chapter 3: Scheme Description** of this Environmental Statement **[REP2-022]** construction working hours will be 7am until 7pm Monday to Saturday and during winter months, mobile lighting towers with a power output 8kVAs will be used during construction. ~~The closest developable area within Sunnica West Site B is approximately 200m south of cited habitats within Chippenham Fen.~~ The southern boundary of the designated site consists of a buffer of semi-improved neutral grassland and broad-leaved woodland, with the calcareous fen to the north of this. Therefore, it is unlikely that indirect light pollution will significantly affect the integrity of habitats supporting rare and scarce plant species. The direction of lighting (facing away from the designated site) and existing boundary features (woodland/hedgerows) will also reduce the potential for light spill on sensitive habitats from construction activities.	No
	Groundwater disturbance	Chippenham Fen is adjacent to ~~the northern boundary of Sunnica West Site~~Grid Connection Route B. Intrusive works during construction could disrupt or change baseflows and inflows of groundwater to and from designated sites, which impact habitats supporting rare and scarce plant species.	The ground level along Grid Connection Route B south of Chippenham Fen is approximately 12-15m AOD, with a water table depth at approximately 5-7m below ground level. All works along Grid Connection Route B (adjacent to Chippenham Fen) are anticipated to be above the cha k aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. Elsewhere on the Scheme piling up to a depth of 12 m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.~~The ground level at Sunnica West Site B is approximately 12-15m AOD, with a water table depth at approximately 5-7m below ground level.~~	No

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Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			~~All structures in Sunnica West Site B (adjacent to Chippenham Fen) are anticipated to be above the chalk aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. Elsewhere on the Scheme piling up to a depth of 12m will be required at the BESS located within Sunnica East Site B and Sunnica West Site A and three onsite substations at Sunnica East sites A and B and Sunnica West Site A. The nearest piling location at this depth will be approximately 500 m from Chippenham Fen and will not interfere with the chalk aquifer that feeds the Fen.~~	
Breckland SPA				
Woodlark	Habitat loss and/or degradation	Construction activities have the potential to result in habitat degradation; however, this site is 1.4 km from the Order land.	Construction activities have the potential to result in habitat degradation; however, this site is 1.4 km from the Order land.	No
	Physical Displacement	Construction activities have the potential to displace birds nesting and foraging outside the designated site; however, this site is 1.4 km from the Order land and Woodlark recorded on Sunnica East Site B are not considered to be functionally important or linked to the SPA population (see Section 3.3.34).	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site and the absence of the species from the Order land.	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
	Noise and visual disturbance	Construction activities have the potential to disturb birds nesting and foraging outside the designated site; however, this site is 1.4 km from the Order land and Woodlark recorded on Sunnica East Site B are not considered to be functionally important or linked to the SPA population (see Section 3.3.34).	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site and the absence of the species from the Order land.	No
Nightjar	Non-physical disturbance	Construction activities leading to light spill have the potential to disturb birds nesting and foraging outside the designated site; however, this site is 1.4 km from the Order land and Woodlark recorded on Sunnica East Site B are not considered to be functionally important or linked to the SPA population (see Section 3.3.34).	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site and the absence of the species from the Order land.	No
	Habitat loss and/or degradation	Construction activities have the potential to result in habitat degradation; however, this site is 1.4 km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
	Physical Displacement	Construction activities have the potential to displace birds nesting and foraging outside the designated site; however, this site is 1.4 km from the Order land and no Nightjar were recorded during surveys.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site and the absence of the species from the Order land.	No
	Noise and visual disturbance	Construction activities have the potential to disturb birds nesting	None, construction activities are unlikely to affect the site directly given distance between the Order land and the	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
		and foraging outside the designated site; however, this site is 1.4 km from the Order land and no Nightjar were recorded during site surveys.	designated site and the absence of the species from the Order land.	
	Non-physical disturbance	Construction activities leading to light spill have the potential to disturb birds nesting and foraging outside the designated site; however, this site is 1.4 km from the Order land and no Nightjar were recorded during surveys.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site and the absence of the species from the Order land.	No
Stone Curlew	Habitat loss and/or degradation	Construction activities have the potential to result in habitat degradation; however, this site is 1.4 km from the Order land. Habitat loss and/or degradation to individuals occurring outside the site boundary are dealt with in potential impacts outlined in the following rows.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site. Habitat loss and/or degradation to individuals occurring outside the site boundary are dealt with in potential impacts outlined in the following rows.	No
	Physical Displacement from functionally linked land.	Construction activities have the potential to displace birds nesting and foraging on functionally linked land outside the designated site; although, this site is 1.4 km from the Order land, Stone Curlew was recorded breeding within the Order land and adjacent to it.	As discussed in Section 3.3 of this report, the population of Stone Curlew present on the Order land is considered to be functionally linked to Breckland SPA populations. Therefore, construction activities have the potential to displace nesting and foraging Stone Curlew associated with the designated site.	Yes
	Noise and visual disturbance	Construction activities have the potential to disturb birds nesting and foraging outside the designated site; although, this site is 1.4 km from the Order land Stone Curlew	As discussed in Section 3.3 of this report, the population of Stone Curlew present on the Order land is considered to be functionally linked to Breckland SPA populations. Therefore, construction activities have the potential to disturb Stone Curlew associated with the designated site.	Yes

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
		was recorded breeding within the Order land and adjacent to it.		
	Non-physical disturbance	Construction activities leading to light spill have the potential to disturb birds nesting and foraging outside the designated site; although, this site is 1.4 km from the Order land, Stone Curlew were recorded breeding within the Order land and adjacent to it.	As discussed in Section 3.3 of this report the population of Stone Curlew present on the Order land is considered to be functionally linked to Breckland SPA populations. Therefore, construction activities have the potential to disturb Stone Curlew associated with the designated site.	Yes
Wicken Fen Ramsar				
Ramsar criteria 1[6]	Habitat loss and/or degradation	Construction activities have the potential to result in habitat and/habitats degradation; however, this site is approximately 2.1km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
	Habitat contamination	Contamination from water pollution; soil and groundwater contamination and air pollution. Effects may result during construction activities from operating heavy machinery, increased traffic to the construction site, accidental spills in storage areas.	None – given the distance to the site it is unlikely that contamination from pollution could affect the designated site.	No

[6] Ramsar criterion 1 - One of the most outstanding and representative remnants of the East Anglian peat fens. The area is one of the few which has not been drained. Traditional management has created a mosaic of habitats from open water to sedge and litter fields.

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
	Non-physical disturbance	Wicken Fen is located more than 2km from the Order land.	None – given the distance to the site it is unlikely that non-physical disturbance could affect the designated site.	No
Ramsar criteria 2[7]	Habitat loss and/or degradation	Construction activities have the potential to result in habitat and/habitats degradation; however, this site is approximately 2.1km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
	Habitat contamination	Contamination from water pollution; soil and groundwater contamination and air pollution. Effects may result during construction activities from operating heavy machinery, increased traffic to the construction site, accidental spills in storage areas.	None – given the distance to the site it is unlikely that contamination from pollution could affect the designated site.	No
	Non-physical disturbance	Wicken Fen is located more than 2km from the Order land.	None – given the distance to the site it is unlikely that non-physical disturbance could affect the designated site.	No
Rex Graham Reserve SAC				
Semi-natural dry grasslands and	Habitat loss and/or degradation	No direct habitat loss will occur. Construction activities have the	There is the potential that construction traffic associated with the Scheme will elevate levels of air pollution and deposition	~~No~~Yes

[7] Ramsar criterion 2 - The site supports one endangered species of Red Data Book plant, the fen violet *Viola persicifolia*, which survives at only two other sites in Britain. It also contains eight nationally scarce plants and 121 Red Data Book invertebrates.

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)		potential to result in habitat and/habitats degradation due to airborne pollutants; however, this site is 3km from the Order land.	of harmful pollutants on sensitive habitats and plant communities. ~~None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.~~	
	Habitat contamination	~~Contamination from air pollution.~~ Effects during construction activities from operating heavy machinery, dust generation and increased traffic as a result of the Scheme.	None, construction activities are unlikely to affect the site directly given the distance between the Order land and the designated site and absence of ecological and hydrological connections.	No
	Non-physical disturbance	The site is located more than 3km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Breckland SAC				
Inland dunes with open *Corynephorus* and *Agrostis* grasslands	Habitat loss and/or degradation	No direct habitat loss will occur. Construction activities have the potential to result in habitat and/habitats degradation due to airborne pollutants; however, this site is 3.1km from the Order land.	There is the potential that construction traffic associated with the Scheme will elevate levels of air pollution and deposition of harmful pollutants on sensitive habitats and plant communities. ~~None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.~~	Yes~~No~~
	Habitat contamination	~~Contamination from air pollution.~~ Effects during construction activities from operating heavy machinery, dust generation and increased traffic as a result of the Scheme.	None, construction activities are unlikely to affect the site directly given the distance between the Order land and the designated site and absence of ecological and hydrological connections.	No
	Non-physical disturbance	The site is located 3.1km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Natural eutrophic lakes with *Magnopotamion*	Habitat loss and/or degradation	No direct habitat loss will occur. Construction activities have the potential to result in habitat and/habitats degradation due to	There is the potential that construction traffic associated with the Scheme will elevate levels of air pollution and deposition of harmful pollutants on sensitive habitats and plant communities. ~~None, construction activities are unlikely to~~	Yes~~No~~

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
or *Hydrocharition* - type vegetation		airborne pollutants; however, this site is 3.1km from the Order land.	~~affect the site directly given distance between the Order land and the designated site.~~	
	Habitat contamination	~~Contamination from air pollution.~~ Effects during construction activities from operating heavy machinery, dust generation and increased traffic as a result of the Scheme.	~~None, construction activities are unlikely to affect the site directly given the distance between the Order land and the designated site and absence of ecological and hydrological connections.~~	No
	Non-physical disturbance	The site is located 3.1km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
European dry heaths	Habitat loss and/or degradation	No direct habitat loss will occur. Construction activities have the potential to result in habitat and/habitats degradation due to airborne pollutants; however, this site is 3.1km from the Order land.	There is the potential that construction traffic associated with the Scheme will elevate levels of air pollution and deposition of harmful pollutants on sensitive habitats and plant communities.~~None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.~~	Yes~~No~~
	Habitat contamination	~~Contamination from air pollution.~~ Effects during construction activities from operating heavy machinery, dust generation and increased traffic as a result of the Scheme.	None, construction activities are unlikely to affect the site directly given the distance between the Order land and the designated site and absence of ecological and hydrological connections.	No
	Non-physical disturbance	The site is located 3.1km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	Habitat loss and/or degradation	No direct habitat loss will occur. Construction activities have the potential to result in habitat and/habitats degradation due to airborne pollutants; however, this site is 3.1km from the Order land.	There is the potential that construction traffic associated with the Scheme will elevate levels of air pollution and deposition of harmful pollutants on sensitive habitats and plant communities.~~None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.~~	Yes~~No~~
	Habitat contamination	~~Contamination from air pollution.~~ Effects during construction activities	None, construction activities are unlikely to affect the site directly given the distance between the Order land and the	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
		from operating heavy machinery, dust generation and increased traffic as a result of the Scheme.	designated site and absence of ecological and hydrological connections.	
	Non-physical disturbance	The site is located 3.1km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	Habitat loss and/or degradation	No direct habitat loss will occur. Construction activities have the potential to result in habitat and/habitats degradation due to airborne pollutants; however, this site is 3.1km from the Order land.	There is the potential that construction traffic associated with the Scheme will elevate levels of air pollution and deposition of harmful pollutants on sensitive habitats and plant communities. ~~None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.~~	Yes~~No~~
	Habitat contamination	~~Contamination from air pollution.~~ Effects during construction activities from operating heavy machinery, dust generation and increased traffic as a result of the Scheme.	None, construction activities are unlikely to affect the site directly given the distance between the Order land and the designated site and absence of ecological and hydrological connections.	No
	Non-physical disturbance	The site is located 3.1km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Great crested newt *Triturus cristatus*	Habitat loss and/or degradation	Construction activities have the potential to result in habitat and/habitats degradation; however, this site is 3.1km from the Order land.	None, construction activities are unlikely to affect the site directly given the distance between the Order limits and the designated site.	No
	Habitat contamination	Contamination from air and surface water pollution. Effects during construction activities from operating heavy machinery, dust generation and increased traffic as a result of the Scheme.	None, construction activities are unlikely to affect the site directly given the distance between the Order land and the designated site and absence of ecological and hydrological connections.	No

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
	Non-physical disturbance	The site is located 3.1km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Devil's Dyke SAC				
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	Habitat loss and/or degradation	No direct habitat loss will occur. Construction activities have the potential to result in habitat and/habitats degradation due to airborne pollutants; ~~due to airborne pollutants;~~ however, this site is 4.5km from the Order land.	There is the potential that construction traffic associated with the Scheme will elevate levels of air pollution and deposition of harmful pollutants on sensitive habitats and plant communities. ~~None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.~~	Yes~~No~~
	Habitat contamination	~~Contamination from air pollution.~~ Effects during construction activities from operating heavy machinery, dust generation and increased traffic as a result of the Scheme.	None, construction activities are unlikely to affect the site directly given the distance between the Order land and the designated site and absence of ecological and hydrological connections.	No
	Non-physical disturbance	The site is located 4.5km from the Order land.	None, construction activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No

Table 4-2: Summary of likely significant effects - Operation

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
Fenland SAC				
Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*. (Calcium-rich fen dominated by great fen sedge (saw sedge))*	Non-physical disturbance	Chippenham Fen is adjacent to the Order land. The site could be affected by indirect light pollution due to security lighting during the operational phase.	None – there will be no lighting of the perimeter fence at Sunnica West Site B. Existing boundary features (woodland/hedgerows) will also reduce the potential for light spill on sensitive habitats during operation.	No
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows)	Non-physical disturbance	Chippenham Fen is adjacent to the Order land. The site could be affected by indirect light pollution due to security lighting during the operational phase.	None – there will be no lighting of the perimeter fence at Sunnica West Site B. Existing boundary features (woodland/hedgerows) will also reduce the potential for light spill on sensitive habitats during operation.	No
Spined loach (*Cobitis taenia)*	Non-physical disturbance	Chippenham Fen is adjacent to the Order land.	None – due to the absence of the species from Chippenham Fen and the distance between Wicken Fen and the Order land.	No
Great Crested Newt (*Triturus cristatus*)	Non-physical disturbance	Chippenham Fen is adjacent to the Order land.	None - due to the absence of the species from Chippenham Fen and the distance between Wicken Fen and Woodwalton Fen and the Order land.	No
Chippenham Fen Ramsar				
Ramsar Criterion 1[8]	Non-physical disturbance	Chippenham Fen is adjacent to the Order land. The site could be affected by indirect light pollution due to security lighting during the operational phase.	None – there will be no lighting of the perimeter fence at Sunnica West Site B. Existing boundary features will also reduce the potential for light spill on sensitive habitats during operation.	No

[8] Ramsar Criterion 1 - A spring-fed calcareous basin mire with a long history of management, which is partly reflected in the diversity of present-day vegetation.

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
Ramsar Criterion 2[9]	Non-physical disturbance	Chippenham Fen is adjacent to the Order land. The site could be affected by indirect light pollution due to security lighting during the operational phase.	None – there will be no lighting of the perimeter fence at Sunnica West Site B. Existing boundary features will also reduce the potential for light spill on sensitive habitats during operation.	No
	Physical displacement	Chippenham Fen is adjacent to the Order land. Egg-laying aquatic invertebrates associated with designated sites could be attracted to solar panels (see Technical Note Review of impact of Sunnica energy farm on aquatic invertebrates)	It has been noted that research has demonstrated that insects that lay their eggs in water may mistake solar panels for water bodies and try to lay their eggs on them, which could affect their reproductive biology. The Chippenham Fen Ramsar Information Sheet cites 12 nationally important invertebrate species occurring at Chippenham Fen: *Deltote bankiana* (a moth), *Clubiona rosserae* (a spider), *Parochthiphila spectabilis* (an aphid fly), *Cyrturella albosetosa* (a species of *Thaumatomyia* (grass flies), *Gyrophaena pseudonana* (a rove beetle), *Tasciocera collini* (a true fly), *Scrobipalpa pauperella* (a moth), *Heterosphilus fuscexilis* (an Ichneumon wasp), *Phrudus badensis* (an ichneumon wasp), *Blacometeorus pusillus* (an Ichneumon wasp), *Entedon marci* (a wasp). With the exception of the Dolichopodidae species none are	No

[9] Ramsar criterion 2 - The invertebrate fauna is very rich, partly due to its transitional position between Fenland and Breckland. The species list is very long, including many rare and scarce invertebrates characteristic of ancient fenland sites in Britain.

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
			associated with egg laying in water. In order to reach a solar array which is facing in a southerly direction, these flies would have to ascend to a height of 27 m in order to see the solar panels and then fly at least 200 m to reach them, coupled with the prevailing wind being from the south-west.	
Ramsar Criterion 3[10]	Non-physical disturbance	Chippenham Fen is adjacent to the Order land. The site could be affected by indirect light pollution due to security lighting during the operational phase.	None – there will be no lighting of the perimeter fence at Sunnica West Site B. Existing boundary features will also reduce the potential for light spill on sensitive habitats during operation.	No
Noteworthy Fauna - Breeding Bird Assemblage[11]	Non-physical disturbance	Chippenham Fen is adjacent to the Order land. The site could be affected by indirect light pollution due to security lighting during the operational phase.	None – there will be no lighting of the perimeter fence at Sunnica West Site B. Existing boundary features will also reduce the potential for light spill on sensitive habitats during operation.	No
Breckland SPA				
Woodlark	Noise and visual disturbance	Operational activities have the potential to disturb birds nesting and foraging outside the designated site; however, this site is 1.4km from the Order land and no Woodlark were recorded during site surveys.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site and the absence of the species from the Order land.	No

[10] Ramsar criterion 3 - The site supports diverse vegetation types, rare and scarce plants. The site is the stronghold of Cambridge milk parsley (*Selinum carvifolia*).
[11] The breeding bird assemblage is also listed under 'noteworthy fauna'. Breeding birds include *Gallinago gallinago*, *Scolopax rusticola*, *Luscinia megarhynchos, Locustella naevia* and *Acrocephalus* spp

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
	Non-physical disturbance	Operational activities leading to light spill have the potential to disturb birds nesting and foraging outside the designated site; however, this site is 1.4km from the Order land and no Woodlark were recorded during site surveys.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site and the absence of the species from the Order land.	No
Nightjar	Noise and visual disturbance	Operational activities have the potential to disturb birds nesting and foraging outside the designated site; however, this site is 1.4km from the Order land and no Nightjar were recorded during site surveys.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site and the absence of the species from the Order land.	No
	Non-physical disturbance	Operational activities leading to light spill have the potential to disturb birds nesting and foraging outside the designated site; however, this site is 1.4km from the Order land and no Nightjar were recorded during site surveys.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site and the absence of the species from the Order land.	No
Stone Curlew	Physical Displacement from functionally linked land.	The operational solar farm has the potential to displace birds nesting and foraging on functionally linked land outside the designated site; although, this site is 1.4 km from the Order land, Stone Curlew was recorded breeding within the Order land and adjacent to it. Whilst, this potential impact is likely to occur at the construction stage (see Table 4-1), it will continue throughout operation, and so is considered here as well.	As discussed in Section 3.3 of this report, the population of Stone Curlew present on the Order land is considered to be functionally linked to Breckland SPA populations. Therefore, the operational solar farm has the potential to displace nesting and foraging Stone Curlew associated with the designated site.	Yes
	Noise and visual disturbance	Operational activities have the potential to disturb birds nesting and	As discussed in Section 3.3 of this report the population of Stone	Yes

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
		foraging outside the designated site; although, this site is 1.4km from the Order land Stone Curlew were recorded breeding within the Order land.	Curlew present on the Order land is considered to be functionally linked to Breckland SPA populations. Therefore, operational activities have the potential to disturb Stone Curlew associated with the designated site.	
	Non-physical disturbance	Operational activities leading to light spill have the potential to disturb birds nesting and foraging outside the designated site; although, this site is 1.4km from the Order land Stone Curlew were recorded breeding within the Order land.	As discussed in Section 3.3 of this report the population of Stone Curlew present on the Order land is considered to be functionally linked to Breckland SPA populations. The areas embedded within the Scheme for Stone Curlew are outside the operational energy farm and therefore, will not be subject to potential light spill from motion detection security lighting.	No
Wicken Fen Ramsar				
Ramsar criteria 1[12]	Non-physical disturbance	Wicken Fen is located 2.1 km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Ramsar criteria 2[13]	Non-physical disturbance	Wicken Fen is located 2.1 km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Rex Graham Reserve SAC				

[12] Ramsar criterion 1 - One of the most outstanding and representative remnants of the East Anglian peat fens. The area is one of the few which has not been drained. Traditional management has created a mosaic of habitats from open water to sedge and litter fields.
[13] Ramsar criterion 2 - The site supports one endangered species of Red Data Book plant, the fen violet *Viola persicifolia*, which survives at only two other sites in Britain. It also contains eight nationally scarce plants and 121 Red Data Book invertebrates

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites	Non-physical disturbance	The site is located 3 km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Breckland SAC				
Inland dunes with open *Corynephorus* and *Agrostis* grasslands	Non-physical disturbance	The site is located 3 km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation	Non-physical disturbance	The site is located 3 km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
European dry heaths	Non-physical disturbance	The site is located 3km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	Non-physical disturbance	The site is located 3 km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*	Non-physical disturbance	The site is located 3 km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Great crested newt *Triturus cristatus*	Non-physical disturbance	The site is located 3 km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No
Devil's Dyke SAC				

Qualifying Features	Potential Impacts	Source	Pathway	Likely Significant Effect
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites	Non-physical disturbance	The site is located 5 km from the Order land.	None, operational activities are unlikely to affect the site directly given distance between the Order land and the designated site.	No

4.4 In Combination Effects with other Plans or Projects

4.4.1 PINS Advice Note Ten: Habitat Regulations Assessment relevant to Nationally Significant Infrastructure Projects (Ref 6) states that in assessing in-combination effects the following projects should be considered:

a. Projects that are under construction.
b. Permitted application(s) not yet implemented.
c. Submitted application(s) not yet determined.
d. All refusals subject to appeal procedures not yet determined.
e. Projects on the National Infrastructure's programme of projects.
f. Projects identified in emerging development plans, recognising that much information on relevant proposals will be limited and the degree of uncertainty which may be present.

4.4.2 In order to inform fully the appropriate assessment process, a number of surrounding plans and projects have been consulted to determine likely significant effects that could arise from the Scheme in combination with these other plans and projects. With reference to **Appendix 5A** of this Environmental Statement**APP-055]** including **Figure 5-1**, these have been selected because they were the main land use plans and projects that are located within 10km of the Scheme, and may interact with the European Sites discussed in this report. Projects selected were those that:

a. had similar components that may lead to similar impact pathways, *e.g.* other solar schemes;
b. were of a scale and extent which may lead to significant changes in land use and therefore, similar impact pathways, e.g. residential development and urban expansion; and
c. were of a geographical extent similar to that of the Scheme, whereby features associated with designated sites may interact with both the Scheme and one or more of the screened projects.

4.4.3 The full long list of cumulative development has been discussed and agreed with West Suffolk Council (WSC) and East Cambridgeshire District Council (ECDC). The schemes in Table 4-3 were given particular consideration owing to their proximity to the Scheme, application status and potential for cumulative effects, due to similar impacts on European sites.

Table 4-3: Summary of Relevant Schemes considered for Cumulative Effects

Application reference	Application for 'other development' and brief description	Distance from Order limits	Summary of Reported Likely Significant Effects
17/02205/FUL	Development of a 49.9MW battery storage facility, bridge and associated infrastructure	50 m south of the Burwell sub-station extension	None – mitigation provided on site and no significant impacts reported. The applicant and NE concluded that the Scheme was not likely to have significant effects on European sites, *i.e.* Devil's Dyke SAC and an Appropriate Assessment was not required.
19/00155/FUL	Application for the construction and operation of a 49.9MW battery storage facility, fencing, landscape planting and site access on land adjacent to the operational Burwell 400kV substation	50 m south of the Burwell sub-station extension	None – mitigation provided on site and no significant impacts reported. No HRA was submitted with the application, as the applicant had concluded that impacts to European sites, *i.e.* Fenland SAC/Wicken Fen Ramsar, were considered highly unlikely.
15/00723/ESF	Installation and operation of a solar farm and associated infrastructure	800 m north of the Burwell sub-station and cable route	None – mitigation provided on site and no significant impacts reported. No HRA was submitted with the application.
19/01576/SCREEN	SCREENING OPINION - Proposed Solar Farm	1.5 km west of Sunnica West site B	None at screening stage. No HRA currently available, but NE in their response to the screening opinion, considered the scheme unlikely to significantly affect European sites.
F/2013/0257/HYB	Hybrid application: Outline application - demolition of Hundred Acre Farm and the construction of up to 268 dwellings, new public open space, drainage ditches, associated access, landscaping, infrastructure and ancillary works on land East of Red Lodge and the construction of up to 225 square metres of Class A1 retail floorspace on land forming part of Phase 4a Kings Warren, as amended. Full application - (Phase A): construction of	3.2 km south-east of Sunnica East site	None – mitigation provided on site and no significant impacts reported. The applicant and NE concluded that there would be no l kely significant effect on Breckland SPA, and in particular, Stone-curlew, from the scheme.

Application reference	Application for 'other development' and brief description	Distance from Order limits	Summary of Reported Likely Significant Effects
	106 dwellings (including the relocation of 3 committed dwellings from Phase 4a), new public open spaces, associated access, landscaping, infrastructure and ancillary works on land East of Red Lodge. Restoration of open Breck grassland on land South East of Herringswell, as amended.		
20/00557/ESF	Proposed Development of a Solar Farm and Ancillary Development	<1 km west from Sunnica West Site B	No – mitigation provided on site and no significant impacts reported. No HRA was submitted with the application, but NE had no objection on the grounds of likely significant to European sites.
21/00062/SCREEN	SCREENING OPINION - Proposed development for a solar farm with site area of c.73 hectares (excluding grid connection and access)	2.7 km west of Sunnica West Site B	None at screening stage. No HRA currently available, but NE in their response to the screening opinion, considered the scheme unlikely to significantly affect European sites.
20/01081/SCOPE	SCOPING OPINION Bexwell to Bury St Edmunds Pipeline	Cuts across cable route	None at scoping opinion stage. The applicant in their HRA concluded that there would be no likely significant effect on Breckland SPA, and in particular, Stone-curlew, from the scheme.
21/00062/SCREEN	SCREENING OPINION - Proposed development for a solar farm with site area of c.73 hectares (excluding grid connection and access)	2.7 km west of Sunnica West Site B	None at screening stage. No HRA was submitted with the Application, but NE had no objection on the grounds of likely significant to European sites.
DC/21/0217/FUL	Planning application - a. Commercial polyhouses with office and welfare area; b. hardstanding and loading bays, car parking, reservoir, landscaping and associated works; c. new access	Adjacent to Sunnica East Site B	Unsure at this stage. The scheme has the potential for likely significant effects on Stone-curlew associated with the Breckland SPA. At this stage it is unclear how this would be mitigated, although offsite mitigation has been proposed. Irrespective of this, the applicant

Application reference	Application for 'other development' and brief description	Distance from Order limits	Summary of Reported Likely Significant Effects
			and their scheme would need to deliver mitigation to avoid significant adverse effects to Stone-curlew and therefore, the integrity of the Breckland SPA.
21/00706/ESF	Proposed Development of a Solar Farm and Ancillary Development	3.1 km west from Sunnica West Site B	No – mitigation provided on site and no significant impacts reported. No HRA was submitted with the application, but the applicant concluded no likely significant effects on European sites.

5 Stage 2 – Appropriate Assessment

5.1.1 For all European sites considered in this report, the need to take impacts forward to appropriate assessment was less to do with the need for further technical impact assessment to understand the adverse effects, and more because of the need to take mitigation into account in forming a conclusion regarding effects on integrity. The scale and nature of the effects and the necessary mitigation measures could be identified at the time the assessment of Likely Significant Effects was undertaken but the People over Wind ruling (Ref 8) suggests that measures which are implemented to avoid impacts to European Sites cannot be taken into account at that stage and thus can only be taken into account in an 'appropriate assessment'. A precautionary approach has been taken to identifying those mitigation measures that could be caught by this ruling in the Stage 1 assessment.

5.1.2 For the purpose of the decommissioning period, Likely Significant Effects are the same as those arising in the construction period and are therefore, not assessed separately. Where reference is made to the Construction Environmental Management Plan (CEMP), at the point of decommissioning, mitigation will be included within the Framework Decommissioning Environmental Management Plan (DEMP).

5.1.3 The following impacts identified during construction in Table 4-1 for which likely significant effects could not be ruled out at Stage 1 and which require further assessment at Stage 2 are:

d. **Fenland SAC**: Calcareous fens with Great Fen-sedge *Cladium mariscus* and species of the *Caricion davallianae*. (Calcium-rich fen dominated by Great Fen-sedge (saw sedge))*. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

e. **Fenland SAC**: Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

f. **Chippenham Fen Ramsar**: Ramsar Criterion 1 - A spring-fed calcareous basin mire with a long history of management, which is partly reflected in the diversity of present-day vegetation. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

g. **Chippenham Fen Ramsar**: Ramsar Criterion 2 - The invertebrate fauna is very rich, partly due to its transitional position between Fenland and Breckland. The species list is very long, including many rare and scarce invertebrates characteristic of ancient fenland sites in Britain. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

h. **Chippenham Fen Ramsar**: Ramsar Criterion 3 - The site supports diverse vegetation types, rare and scarce plants. The site is the stronghold of Cambridge milk parsley (*Selinum carvifolia*). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

i. **Chippenham Fen Ramsar**: Noteworthy Fauna – Breeding Bird Assemblage. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

j. **Breckland SPA**: Stone Curlew. **Impact Pathway** Physical Displacement from functionally linked land - Displacement of Stone Curlew through loss of nesting and foraging within the Order land during construction.

k. **Breckland SPA**: Stone Curlew. **Impact Pathway** Noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary during construction.

l. **Breckland SPA**: Stone Curlew. **Impact Pathway** Non-physical disturbance - disturbance to sensitive species occurring within or outside the designated site boundary during construction.

m. **Rex Graham Reserve SAC**: Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

n. **Breckland SAC**: Inland dunes with open *Corynephorus* and *Agrostis* grasslands. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

o. **Breckland SAC**: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

p. **Breckland SAC**: European dry heaths. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

q. **Breckland SAC**: Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

r. **Breckland SAC**: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

s. **Devil's Dyke SAC**: Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

5.1.4 The following impacts identified during operation in Table 4-2 for which likely significant effects could not be ruled out at Stage 1 and which require further assessment at Stage 2 are:

a. **Breckland SPA**: Stone Curlew. **Impact Pathway** Noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary during operation.

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b. **Breckland SPA**: Stone Curlew. **Impact Pathway** Physical Displacement from functionally linked land – Continued displacement of Stone Curlew through loss of nesting and foraging within the Order land during operation.

~~a.~~

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5.2 Statement to Inform Appropriate Assessment for Fenland SAC

5.2.1 For Fenland SAC the following pathway exists for which likely significant effects to some qualifying features could not be ruled out at Stage 1:

a. Calcareous fens with Great Fen-sedge *Cladium mariscus* and species of the *Caricion davallianae*. (Calcium-rich fen dominated by Great Fen-sedge (saw sedge))*. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

b. Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

Impact Pathway: Degradation to Calcareous fens with Great Fen-sedge *Cladium mariscus* and species of the *Caricion davallianae*. (Calcium-rich fen dominated by Great Fen-sedge (saw sedge))*.

5.2.2 Part of the SAC (Chippenham Fen) is directly adjacent to the Order land ~~at Sunnica West Site B.~~ The Scheme will involve construction works within 100 m of Chippenham Fen.

5.2.3 In the absence of mitigation, the Scheme could have an adverse effect on the integrity of the Annex 1 habitat *Calcareous fens with Great Fen-sedge (Cladium mariscus) and species of the* Caricion davallianae. *(Calcium-rich fen dominated by Great Fen-sedge (saw sedge))* through dust deposition, for the following reasons:

a. The Scheme site area is greater than 10,000 m^2 (a threshold quoted in the Institute of Air Quality Management guidance document for assessing dust impacts), and therefore the potential dust emissions magnitude associated with earthworks and for construction activities is considered to be large; and

b. The number of construction-related HDV movements generated by the entire Scheme is estimated to exceed 50 vehicles per day during the peak of the construction. Fifty is a threshold quoted in the Institute of Air Quality Management guidance document for assessing dust impacts. Considering the size of the Order land, and the soil type, the potential dust emissions magnitude for trackout is assumed to be large, although for construction movements south of Chippenham Fen, along Grid Connection Route B this will be considerably lower in terms of duration and spatial extent.~~.~~

5.2.4 Dust emissions during construction could therefore affect the Annex 1 habitat *Calcareous fens with Great Fen-sedge* Cladium mariscus *and species of the* Caricion davallianae. *(Calcium-rich fen dominated by Great Fen-sedge (saw sedge))* present within those parts of the SAC that lie relatively close to the works (i.e. within 200m), by coating vegetation and thus affecting evapotranspiration and

photosynthesis. It is impossible to quantify the amount of dust soiling that would occur at any given time in the absence of mitigation. Plant communities near short-term works are likely to recover within a year of the dust soiling stress ceasing (Ref 18). Therefore, the scale of any adverse effect even in an unmitigated situation would be small. Nonetheless, in the absence of controlling measures, coating of dust on vegetation close to the works area would potentially result in an adverse effect that could affect the integrity of the SAC.

Mitigation

5.2.5 Due to the sensitivity of the vegetation, the proximity of the works and the potential scale of dust generating activities, specific mitigation measures will be required. Considerable effort has been devoted over the years by various bodies to developing measures to control dust generation and dissemination. There is high confidence in the effectiveness of these measures based upon many years of practice. The measures that will be deployed on this Scheme are being incorporated into a Framework Construction Environment Management Plan (CEMP) which will be submitted as part of the DCO application and finalised ~~at~~ prior to construction. The measures in the CEMP will then be applied in practice by the appointed contractors wherever dust generation is a concern. The contractor will need flexibility to determine which measures are most effective in a given situation, i.e., when undertaking cable preparation and laying works along Grid Connection Route B in proximity to Chippenham Fen and will include, where appropriate , ~~but~~ the measures ~~are~~ listed in the Institute of Air Quality Management guidance on assessment of dust from demolition and construction (Ref 16~~7~~) ~~and include~~:

a. Implement wetting of dust generating activities, which are usually incorporated into a Dust Management Plan (where necessary) produced by the contractor.
b. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust and record inspection results
c. Increase the frequency of inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
d. Locate dust causing activities away from receptors, as far as is possible.
e. Use intelligent screening where possible – e.g. locating site offices between potentially dusty activities and the receptors.
f. Erect solid screens or barriers around the site boundary if necessary.
g. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period where operations are within 100m of receptors.
h. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.
i. Depending on the duration that stockpiles will be present and their size, cover, seed, fence or water to prevent wind whipping.
j. Sheet vehicles carrying dusty substrates.
k. Ensure all vehicles switch off engines when stationary, *i.e.* no idling vehicles.

l. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas.

m. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.

n. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.

o. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.

p. Use enclosed chutes, conveyors and covered skips, where practicable.

q. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

r. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

5.2.6 These are long-standing tried and tested measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level. Hence the residual effect will normally be 'not significant'. Given this, a high level of confidence can be placed in a conclusion of no adverse effect on integrity with their deployment.

In Combination Effects

5.2.7 No in combination effects have been identified for this impact pathway on this European Site, due to the distances from the designated site to the Schemes identified in Table 4-3 and nature of the Schemes, *i.e*. solar installations.

Impact Pathway: Degradation to Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows).

5.2.8 Part of the SAC (Chippenham Fen) is directly adjacent to the Order land ~~at Sunnica West Site B.~~ The Scheme will involve construction works within 100 m of Chippenham Fen.

5.2.9 In the absence of mitigation, the Scheme could have an adverse effect on the integrity of the Annex 1 habitat *Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows)* through dust deposition, for the following reasons:

a. The Scheme site area is greater than 10,000 m^2 (a threshold quoted in the Institute of Air Quality Management guidance document for assessing dust impacts), and therefore the potential dust emissions magnitude associated with earthworks and for construction activities is considered to be large; and

b. The number of construction-related HDV movements generated by the entire Scheme is estimated to exceed 50 vehicles per day during the peak of the construction. Fifty is a threshold quoted in the Institute of Air Quality

Management guidance document for assessing dust impacts. Considering the size of the Order land, and the soil type, the potential dust emissions magnitude for trackout is assumed to be large, although for construction movements south of Chippenham Fen, along Grid Connection Route B this will be considerably lower in terms of duration and spatial extent.

5.2.10 Dust emissions during construction could therefore affect the Annex 1 habitat *Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows)* present within those parts of the SAC that lie relatively close to the works (i.e. within 200m), by coating vegetation and thus affecting evapotranspiration and photosynthesis. It is impossible to quantify the amount of dust soiling that would occur at any given time in the absence of mitigation. Plant communities near short-term works are likely to recover within a year of the dust soiling stress ceasing (Ref 18). Therefore, the scale of any adverse effect even in an unmitigated situation would be small. Nonetheless, in the absence of controlling measures, coating of dust on vegetation close to the works area would potentially result in an adverse effect that could affect the integrity of the SAC.

Mitigation

5.2.11 Due to the sensitivity of the vegetation, the proximity of the works and the potential scale of dust generating activities, specific mitigation measures will be required. Considerable effort has been devoted over the years by various bodies to developing measures to control dust generation and dissemination. There is high confidence in the effectiveness of these measures based upon many years of practice. The measures that will be deployed on this Scheme are being incorporated into an Framework Construction Environment Management Plan (CEMP) which has been submitted as part of the DCO application and will be finalised prior to construction and approved by the relevant local planning authority. The measures in the CEMP will then be applied in practice by the appointed contractors wherever dust generation is a concern. The contractor will need flexibility to determine which measures are most effective in a given situation, i.e., when undertaking cable preparation and laying works along Grid Connection Route B in proximity to Chippenham Fen and will include, where appropriate, ~~but~~ the measures ~~are~~ listed in the Institute of Air Quality Management guidance on assessment of dust from demolition and construction (Ref 16~~7~~) ~~and include~~:

a. Implement wetting of dust generating activities, which are usually incorporated into a Dust Management Plan (where necessary) produced by the contractor.

b. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust and record inspection results

c. Increase the frequency of inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

d. Locate dust causing activities away from receptors, as far as is possible.

e. Use intelligent screening where possible – e.g. locating site offices between potentially dusty activities and the receptors.

f. Erect solid screens or barriers around the site boundary if necessary.

g. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period where operations are within 100m of receptors.

h. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.

i. Depending on the duration that stockpiles will be present and their size, cover, seed, fence or water to prevent wind whipping.

j. Sheet vehicles carrying dusty substrates.

k. Ensure all vehicles switch off engines when stationary, *i.e.* no idling vehicles.

l. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas.

m. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.

n. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.

o. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.

p. Use enclosed chutes, conveyors and covered skips, where practicable.

q. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

r. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

5.2.12 These are long-standing tried and tested measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level. Hence the residual effect will normally be 'not significant'. Given this, a high level of confidence can be placed in a conclusion of no adverse effect on integrity with their deployment.

In Combination Effects

5.2.13 No in combination effects have been identified for this impact pathway on this European Site, due to the distances from the designated site to the Schemes identified in Table 4-3 and nature of the Schemes, *i.e*. solar installations, and the likelihood that the same standard dust mitigation measures would be in place for those developments.

5.3 Statement to Inform Appropriate Assessment for Chippenham Fen Ramsar

For Chippenham Fen Ramsar the following pathway exists for which likely significant effects to some of the qualifying features could not be ruled out at Stage 1:

a. Ramsar Criterion 1 - A spring-fed calcareous basin mire with a long history of management, which is partly reflected in the diversity of present-day vegetation. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

b. Ramsar Criterion 2 - The invertebrate fauna is very rich, partly due to its transitional position between Fenland and Breckland. The species list is very long, including many rare and scarce invertebrates characteristic of ancient fenland sites in Britain. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

c. Ramsar Criterion 3 - The site supports diverse vegetation types, rare and scarce plants. The site is the stronghold of Cambridge milk parsley (*Selinum carvifolia).* **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

d. Noteworthy Fauna – Breeding Bird Assemblage. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

Impact Pathway: Degradation to A spring-fed calcareous basin mire with a long history of management (Ramsar Criterion 1)

5.3.1 Chippenham Fen Ramsar is directly adjacent to the Scheme boundary ~~at Sunnica West Site B~~. The Scheme will involve construction works within 100m Chippenham Fen.

5.3.2 In the absence of mitigation, the Scheme could have an adverse effect on the integrity of the Ramsar Criterion 1 habitat *A spring-fed calcareous basin mire with a long history of management* through dust deposition, for the following reasons:

a. The Scheme site area is greater than 10,000 m^2, and therefore the potential dust emissions magnitude associated with earthworks and for construction activities is considered to be large; and

b. The number of construction-related HDV movements generated by the entire Scheme is estimated to exceed 50 vehicles per day during the peak of the construction. Considering the size of the Order land, and the soil type, the potential dust emissions magnitude for trackout is assumed to be large. although for construction movements south of Chippenham Fen, along Grid Connection Route B this will be considerably lower in terms of duration and spatial extent.

5.3.3 Dust emissions during construction could therefore affect the Ramsar Criterion 1 habitat *A spring-fed calcareous basin mire with a long history of management* that lie relatively close to the works (i.e. within 200m), by coating vegetation and thus

affecting evapotranspiration and photosynthesis. It is impossible to quantify the amount of dust soiling that would occur at any given time in the absence of mitigation. Plant communities near short-term works are likely to recover within a year of the dust soiling stress ceasing (Ref 18). Therefore, the scale of any adverse effect even in an unmitigated situation would be small. Nonetheless, in the absence of controlling measures, coating of dust on vegetation close to the works area would potentially result in an adverse effect that could affect the integrity of the SAC.

Mitigation

5.3.4 Due to the sensitivity of the vegetation, the proximity of the works and the potential scale of dust generating activities, specific mitigation measures will be required. Considerable effort has been devoted over the years by various bodies to developing measures to control dust generation and dissemination. There is high confidence in the effectiveness of these measures based upon many years of practice. The measures that will be deployed on this Scheme are being incorporated into an CEMP which will be submitted as part of the DCO application and finalised prior to construction. The measures in the CEMP will then be applied in practice by the appointed contractors wherever dust generation is a concern. The contractor will need flexibility to determine which measures are most effective in a given situation, i.e., when undertaking cable preparation and laying works along Grid Connection Route B in proximity to Chippenham Fen and will include, where appropriate ~~but~~ the measures ~~are~~ listed in the Institute of Air Quality Management guidance on assessment of dust from demolition and construction (Ref 16) ~~and include~~:

a. Implement wetting of dust generating activities, which are usually incorporated into a Dust Management Plan (where necessary) produced by the contractor.
b. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust and record inspection results;
c. Increase the frequency of inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
d. Locate dust causing activities away from receptors, as far as is possible.
e. Use intelligent screening where possible – e.g. locating site offices between potentially dusty activities and the receptors.
f. Erect solid screens or barriers around the site boundary if necessary.
g. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period where operations are within 100m of receptors.
h. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.
i. Depending on the duration that stockpiles will be present and their size, cover, seed, fence or water to prevent wind whipping.
j. Sheeting of vehicles carrying dusty substrates;
k. Ensure all vehicles switch off engines when stationary – no idling vehicles;

l. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas

m. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.

n. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable

o. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.

p. Use enclosed chutes, conveyors and covered skips, where practicable.

q. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

r. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

5.3.5 These are long-standing tried and tested measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level. Hence the residual effect will normally be 'not significant'. Given this, a high level of confidence can be placed in a conclusion of no adverse effect on integrity with their deployment.

In Combination Effects

5.3.6 No in combination effects have been identified for this impact pathway on this European Site, due to the distances from the designated site to the Schemes identified in Table 4-3 and nature of the Schemes, *i.e*. solar installations.

Impact Pathway: Degradation to habitats supporting a rich invertebrate fauna including many rare and scarce invertebrates characteristic of ancient fenland sites in Britain (Ramsar Criterion 2)

5.3.7 Chippenham Fen Ramsar is directly adjacent to the Scheme boundary ~~at Sunnica West Site B.~~ The Scheme will involve construction works within 100m Chippenham Fen.

5.3.8 In the absence of mitigation, the Scheme could have an adverse effect on the integrity of the habitats supporting Ramsar Criterion 2 *rich invertebrate fauna including many rare and scarce invertebrates characteristic of ancient fenland sites in Britain* through dust deposition, for the following reasons:

a. The Scheme site area is greater than 10,000 m^2, and therefore the potential dust emissions magnitude associated with earthworks and for construction activities is considered to be large; and

b. The number of construction-related HDV movements generated by the entire Scheme is estimated to exceed 50 vehicles per day during the peak of the construction. Considering the size of the Order land, and the soil type, the potential dust emissions magnitude for trackout is assumed to be large.

although for construction movements south of Chippenham Fen, along Grid Connection Route B this will be considerably lower in terms of duration and spatial extent.

5.3.9 Dust emissions during construction could therefore affect habitats supporting Ramsar Criterion 2 *rich invertebrate fauna including many rare and scarce invertebrates characteristic of ancient fenland sites in Britain* that lie relatively close to the works (i.e. within 200m), by coating vegetation and thus affecting evapotranspiration and photosynthesis. It is impossible to quantify the amount of dust soiling that would occur at any given time in the absence of mitigation. Plant communities near short-term works are likely to recover within a year of the dust soiling stress ceasing (Ref 18). Therefore, the scale of any adverse effect even in an unmitigated situation would be small. Nonetheless, in the absence of controlling measures, coating of dust on vegetation close to the works area would potentially result in an adverse effect that could affect the integrity of the Ramsar.

Mitigation

5.3.10 Due to the sensitivity of the vegetation, the proximity of the works and the potential scale of dust generating activities, specific mitigation measures will be required. Considerable effort has been devoted over the years by various bodies to developing measures to control dust generation and dissemination. There is high confidence in the effectiveness of these measures based upon many years of practice. The measures that will be deployed on this Scheme are being incorporated into an CEMP which has submitted as part of the DCO application and will be finalised prior to construction and approved by the relevant local planning authority. The measures in the CEMP will then be applied in practice by the appointed contractors wherever dust generation is a concern. The contractor will need flexibility to determine which measures are most effective in a given situation, i.e., when undertaking cable preparation and laying works along Grid Connection Route B in proximity to Chippenham Fen and will include, where appropriate, ~~but~~ the measures ~~are~~ listed in the Institute of Air Quality Management guidance on assessment of dust from demolition and construction (Ref 16) ~~and include~~:

a. Implement wetting of dust generating activities, which are usually incorporated into a Dust Management Plan (where necessary) produced by the contractor.
b. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust and record inspection results;
c. Increase the frequency of inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
d. Locate dust causing activities away from receptors, as far as is possible.
e. Use intelligent screening where possible – e.g. locating site offices between potentially dusty activities and the receptors.
f. Erect solid screens or barriers around the site boundary if necessary.
g. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period where operations are within 100m of receptors.

h. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.

i. Depending on the duration that stockpiles will be present and their size, cover, seed, fence or water to prevent wind whipping.

j. Sheeting of vehicles carrying dusty substrates;

k. Ensure all vehicles switch off engines when stationary – no idling vehicles;

l. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas

m. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.

n. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable

o. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.

p. Use enclosed chutes, conveyors and covered skips, where practicable.

q. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

r. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

5.3.11 These are long-standing tried and tested measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level. Hence the residual effect will normally be 'not significant'. Given this, a high level of confidence can be placed in a conclusion of no adverse effect on integrity with their deployment.

In Combination Effects

5.3.12 No in combination effects have been identified for this impact pathway on this European Site, due to the distances from the designated site to the Schemes identified in Table 4-3 and nature of the Schemes, *i.e*. solar installations. , and the likelihood that the same standard dust mitigation measures would be in place for those developments.

Impact Pathway: Degradation to habitats supporting diverse vegetation types, rare and scarce plants, including Cambridge milk parsley (*Selinum carvifolia).* (Ramsar Criterion 3)

5.3.13 Chippenham Fen Ramsar is directly adjacent to the Scheme boundary ~~at Sunnica West Site B.~~ The Scheme will involve construction works within 100m Chippenham Fen.

5.3.14 In the absence of mitigation, the Scheme could have an adverse effect on the integrity of the habitats supporting Ramsar Criterion 3 *diverse vegetation types, rare and scarce plants, including Cambridge milk parsley (Selinum carvifolia)* through dust deposition, for the following reasons:

a. The Scheme site area is greater than 10,000 m^2, and therefore the potential dust emissions magnitude associated with earthworks and for construction activities is considered to be large; and

b. The number of construction-related HDV movements generated by the entire Scheme is estimated to exceed 50 vehicles per day during the peak of the construction. Considering the size of the Order land, and the soil type, the potential dust emissions magnitude for trackout is assumed to be large, although for construction movements south of Chippenham Fen, along Grid Connection Route B this will be considerably lower in terms of duration and spatial extent.

5.3.15 Dust emissions during construction could therefore affect habitats supporting Ramsar Criterion 3 *diverse vegetation types, rare and scarce plants, including Cambridge milk parsley (Selinum carvifolia)* that lie relatively close to the works (i.e. within 200m), by coating vegetation and thus affecting evapotranspiration and photosynthesis. It is impossible to quantify the amount of dust soiling that would occur at any given time in the absence of mitigation. Plant communities near short-term works are likely to recover within a year of the dust soiling stress ceasing (Ref 18). Therefore, the scale of any adverse effect even in an unmitigated situation would be small. Nonetheless, in the absence of controlling measures, coating of dust on vegetation close to the works area would potentially result in an adverse effect that could affect the integrity of the Ramsar.

Mitigation

5.3.16 Due to the sensitivity of the vegetation, the proximity of the works and the potential scale of dust generating activities, specific mitigation measures will be required. Considerable effort has been devoted over the years by various bodies to developing measures to control dust generation and dissemination. There is high confidence in the effectiveness of these measures based upon many years of practice. The measures that will be deployed on this Scheme are being incorporated into an CEMP which has submitted as part of the DCO application and will be finalised prior to construction and approved by the relevant local planning authority. The measures in the CEMP will then be applied in practice by the appointed contractors wherever dust generation is a concern. The contractor will need flexibility to determine which measures are most effective in a given situation, i.e., when undertaking cable preparation and laying works along Grid Connection Route B in proximity to Chippenham Fen and will include, where appropriate, ~~but~~ the measures ~~are~~ listed in the Institute of Air Quality Management guidance on assessment of dust from demolition and construction (Ref 16) ~~and include~~:

a. Implement wetting of dust generating activities, which are usually incorporated into a Dust Management Plan (where necessary) produced by the contractor.

b. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust and record inspection results;

c. Increase the frequency of inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
d. Locate dust causing activities away from receptors, as far as is possible.
e. Use intelligent screening where possible – e.g. locating site offices between potentially dusty activities and the receptors.
f. Erect solid screens or barriers around the site boundary if necessary.
g. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period where operations are within 100m of receptors.
h. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.
i. Depending on the duration that stockpiles will be present and their size, cover, seed, fence or water to prevent wind whipping.
j. Sheeting of vehicles carrying dusty substrates;
k. Ensure all vehicles switch off engines when stationary – no idling vehicles;
l. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas
m. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.
n. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
o. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.
p. Use enclosed chutes, conveyors and covered skips, where practicable.
q. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
r. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

5.3.17 These are long-standing tried and tested measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level. Hence the residual effect will normally be 'not significant'. Given this, a high level of confidence can be placed in a conclusion of no adverse effect on integrity with their deployment.

In Combination Effects

5.3.18 No in combination effects have been identified for this impact pathway on this European Site, due to the distances from the designated site to the Schemes identified in Table 4-3 and nature of the Schemes, *i.e*. solar installations, and the

likelihood that the same standard dust mitigation measures would be in place for those developments.

Impact Pathway: Degradation to habitats supporting a notable breeding bird assemblage (Ramsar Criterion – Noteworthy Fauna)

5.3.19 Chippenham Fen Ramsar is directly adjacent to the Scheme boundary ~~at Sunnica West Site B~~. The Scheme will involve construction works within 100m Chippenham Fen.

5.3.20 In the absence of mitigation, the Scheme could have an adverse effect on the integrity of the habitats supporting Ramsar Criterion – Noteworthy Fauna *Breeding Bird Assemblage* through dust deposition, for the following reasons:

a. The Scheme site area is greater than 10,000 m^2, and therefore the potential dust emissions magnitude associated with earthworks and for construction activities is considered to be large; and

b. The number of construction-related HDV movements generated by the entire Scheme is estimated to exceed 50 vehicles per day during the peak of the construction. Considering the size of the Order land, and the soil type, the potential dust emissions magnitude for trackout is assumed to be large, although for construction movements south of Chippenham Fen, along Grid Connection Route B this will be considerably lower in terms of duration and spatial extent.

5.3.21 Dust emissions during construction could therefore affect habitats supporting Ramsar Criterion – Noteworthy Fauna *Breeding Bird Assemblage* that lie relatively close to the works (i.e. within 200m), by coating vegetation and thus affecting evapotranspiration and photosynthesis. It is impossible to quantify the amount of dust soiling that would occur at any given time in the absence of mitigation. Plant communities near short-term works are likely to recover within a year of the dust soiling stress ceasing (Ref 18). Therefore, the scale of any adverse effect even in an unmitigated situation would be small. Nonetheless, in the absence of controlling measures, coating of dust on vegetation close to the works area would potentially result in an adverse effect that could affect the integrity of the Ramsar.

Mitigation

5.3.22 Due to the sensitivity of the vegetation, the proximity of the works and the potential scale of dust generating activities, specific mitigation measures will be required. Considerable effort has been devoted over the years by various bodies to developing measures to control dust generation and dissemination. There is high confidence in the effectiveness of these measures based upon many years of practice. The measures that will be deployed on this Scheme are being incorporated into an CEMP which has submitted as part of the DCO application and will be finalised prior to construction and approved by the relevant local planning authority. The measures in the CEMP will then be applied in practice by the appointed contractors wherever dust generation is a concern. The contractor will need flexibility to determine which measures are most effective in a given situation, i.e., when undertaking cable preparation and laying works along Grid Connection Route B in proximity to Chippenham Fen and will include, where

appropriate but the measures are listed in the Institute of Air Quality Management guidance on assessment of dust from demolition and construction (Ref 16) and include:

a. Implement wetting of dust generating activities, which are usually incorporated into a Dust Management Plan (where necessary) produced by the contractor.
b. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust and record inspection results;
c. Increase the frequency of inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
d. Locate dust causing activities away from receptors, as far as is possible.
e. Use intelligent screening where possible – e.g. locating site offices between potentially dusty activities and the receptors.
f. Erect solid screens or barriers around the site boundary if necessary.
g. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period where operations are within 100m of receptors.
h. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.
i. Depending on the duration that stockpiles will be present and their size, cover, seed, fence or water to prevent wind whipping.
j. Sheeting of vehicles carrying dusty substrates;
k. Ensure all vehicles switch off engines when stationary – no idling vehicles;
l. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas
m. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.
n. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
o. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.
p. Use enclosed chutes, conveyors and covered skips, where practicable.
q. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
r. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

5.3.23 These are long-standing tried and tested measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level. Hence the residual effect will normally be ‘not significant’. Given this, a high level

of confidence can be placed in a conclusion of no adverse effect on integrity with their deployment.

In Combination Effects

5.3.24 No in combination effects have been identified for this impact pathway on this European Site, due to the distances from the designated site to the Schemes identified in Table 4-3 and nature of the Schemes, *i.e*. solar installations, and the likelihood that the same standard dust mitigation measures would be in place for those developments.

5.4 Statement to Inform Appropriate Assessment for Breckland SPA

5.4.1 For Breckland SPA the following pathways exist for which likely significant effects could not be dismissed:

a. Stone Curlew. **Impact Pathway** Physical Displacement from functionally linked land - Displacement of Stone Curlew through loss of nesting and foraging within the Order land during construction.

b. Stone Curlew. **Impact Pathway** Noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary during construction.

c. Stone Curlew. **Impact Pathway** Non-physical disturbance - disturbance to sensitive species occurring within or outside the designated site boundary during construction.

d. Stone Curlew. **Impact Pathway** Noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary during operation.

e. Stone Curlew. **Impact Pathway** Physical Displacement from functionally linked land – Continued displacement of Stone Curlew through loss of nesting and foraging within the Order land during operation.

Impact Pathway: Physical Displacement from functionally linked land - Displacement of Stone Curlew through loss of nesting and foraging within the Order land during construction.

5.4.2 Stone Curlew is a ground nesting bird which breeds on downland, heathland and arable farmland in the south and east of England. Within the Brecks area, the birds prefer areas of short, sparse vegetation on light, stony soils, ideally associated with dry, sandy, semi-natural 'breck' heaths, but this may also include fallow land or spring-sown crops on arable farmland. Within and around the Breckland SPA this has been achieved by the establishment of Stone Curlew plots, which are generally 2ha areas of cultivated land within arable crops, or in some cases within pastures, which are kept free of crops and other vegetation before the arrival of the Stone Curlew in March.

5.4.3 The population occurring in and around the Order land use a combination of fallow, spring-sown crops, such as beet and onions, bare ground associated with poultry farming and fields margins. Where possible, the RSPB works with a number of landowners in and round the Order land to create Stone Curlew plots. From AECOM's observations and discussions with the RSPB, this is usually a maximum of one plot annually. Stone Curlew is, therefore, reliant on the cropping regime in any given year and the availability of suitable areas of fallow and spring-sown crops to be able to nest. This is reflected in the observations of Stone Curlew occurrence and distribution noted in surveys undertaken by the Applicant in 2019 and 2020 and detailed in the Table 3-3~~Table 3-3~~.

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5.4.4 Data on Stone Curlew nesting records dating back to 2009 were obtained for an area up to 2km from the Order land. Following examination of these data and targeted Stone Curlew surveys of the Order land and a 2 km buffer undertaken by the Applicant in 2019, 2020 and 2021 (Table 3-3~~Table 3-3~~), it was established that up to five pairs of Stone Curlew regularly breed within the Order land and/or

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surrounding area. Although this population is outside the SPA, Natural England have advised that ringing studies have demonstrated that it is connected to the population that nests in the SPA, with regular interchange of individuals, in both directions, from the SPA. As such, the Scheme will result in a net reduction in breeding opportunities for the species which could affect the ability of Breckland SPA to achieve its conservation targets, such as through increased competition for resources.

5.4.5 In their response to the HRA screening opinion, Natural England stated that land to be used for offsetting impacts on Stone Curlew should not be:

a. within 1.5 km from any residential settlements, infrastructure or major roads;
b. within 500 m of any buildings or smaller roads, *i.e.* access roads; and
c. within 400 m of any Public Right of Way (PRoW), other permissive path or area used for recreation.

5.4.6 With reference to Table 3-3~~Table 3-3~~ and RSPB data, it is clear that Stone Curlew within the Order land and surrounding area do not conform to the general guidance for territory occupancy and nesting sites. The areas embedded within the Scheme design for offsetting impacts on Stone Curlew utilise the species' current and historical distribution across the Order land, irrespective of whether these meet the above criteria. Since this replicates the conditions the birds are already utilising (see Table 3-3~~Table 3-3~~), it is considered a suitably robust approach informed by empirical information on the nesting behaviour of the specific Stone Curlew pairs in question in this landscape.

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Mitigation

5.4.7 Discussions with Natural England and RSPB in preparing this appropriate assessment have identified that the mitigation objective should be to ensure no net loss of breeding pairs in Breckland SPA by embedding sufficient areas within the Scheme design to offset the loss of potentially suitable arable farmland through erection of solar arrays. Since the arable farmland used by nesting Stone Curlew to be lost is outside the SPA boundary itself, the provision of replacement habitat does not class as 'compensation' *sensu* the Habitats Directive. In other words, the replacement Stone Curlew habitat does not constitute 'compensation' for adverse effects on the Stone Curlew population of Breckland SPA but is intended to avoid an adverse effect on the SPA population by ensuring that there is no decline in nesting and foraging opportunities for the overall Brecks population, which might otherwise result in increased competition for resources with the SPA birds. There is precedent for this approach in the case of the A303 (Amesbury to Berwick Down) DCO[14] in which replacement Stone Curlew plots were not deemed compensation for adverse effects on the integrity of Salisbury Plain SPA because they were to accommodate the linked broader Wessex population rather than to the SPA itself. The Scheme design has embedded sufficient land to offset any potential reduction in arable farmland, that may, in any given year, be used by Stone Curlew.

[14] A303 Amesbury to Berwick Down. Deadline 9. 8.63 Applicant's Response to Rule 17 Letter [PD-017]

5.4.8 As the provision of offsetting habitat is based on the species' fluid distribution within a farming landscape, the figure of a minimum of 16ha per pair has been applied. This acknowledges the requirement for not only suitable nesting sites, but also the requirement for foraging habitat.

5.4.9 The offsetting provision embedded within the Scheme design will be secured via the Requirement within the Draft DCO **[REP2-022]** and consists of the following:

Nesting Plots

5.4.10 Ten 2 ha plots will be created across Sunnica East Sites A and B, in fields where Stone Curlew have been recorded during surveys. To maximise the potential for take up two plots have been allocated per pair. Plots unoccupied for nesting will contribute an important resource for foraging pairs. Three are proposed in ECO1, three in ECO2 and four across ECO3. Details of plot creation and management in the Brecks are provided by the RSPB information Note 'Managing nest plots for stone-curlews' (Ref 19), with further requirements set out in the Countryside Stewardship Higher Tier 'AB4: Nesting plots for stone curlew' guidance note (Ref 20). Plots will be a minimum of 100m apart. Various cultivation techniques will used to create a rough tilth and/or areas of bare ground, depending on ground conditions and other environmental factors or constraints. The new plots will be provided in advance of the loss of any existing habitat. This will mean that the new plots will be to be available in the breeding season prior to construction commencing.

Foraging habitat

5.4.11 Recent research has shown that the creation of bare ground provides an important foraging resource for breeding Stone Curlew, particularly if this is located near to the nesting site; most foraging by Stone Curlew occurs within 1km of the nest (Ref 21). As well as providing suitable nesting opportunities, the plots, delivered in advance of the loss of any existing habitat and located within areas shown by surveys to be used by Stone Curlew, will also deliver important foraging areas in close proximity to the nest site (approximately 100m).

5.4.12 As well as the bare ground plots, approximately 108ha of predominantly arable farmland have been embedded within the Scheme for reversion to grassland, specifically managed to create a close-cropped sward, suitable for Stone Curlew. Small areas of existing acid grassland have also been retained within the Scheme design in Sunnica East Site B and these will form the basis of reverting adjacent areas in Sunnica East Site B to semi-natural grassland, characteristic of the Breckland heaths. In time this will provide a high quality habitat, offering both nesting and foraging opportunities for Stone Curlew. The disturbed plots will be retained within these established grassland areas for the lifespan of the project.

5.4.13 Within Sunnica East Site A the offsetting area will be sown with a chalk grassland mix and managed specifically for Stone Curlew, *i.e*. maintaining a close-cropped sward. The plots will be retained within these established grassland areas for the lifespan of the project.

5.4.14 Stone Curlew has a fluid distribution within the farming landscape of the Order limits and surrounding area and is reliant on the cropping regime in any given

year to provide suitable areas of fallow and spring-sown crops to be able to nest. As such the nesting locations can vary annually depending on this availability. The Scheme has taken this fluid nesting distribution into consideration and sought to avoid blocks of land where regular nesting attempts have been observed *e.g.,* those in ECO3. This principal of avoidance has guided the locations of the offsetting areas which have taken into account not only the species existing distribution, but also the design and construction elements of the Scheme (e.g., to minimise construction disturbance), the location of residential areas and the ability to be able to secure large continuous blocks of land to maximise delivery of habitat creation and nesting plot opportunities and allow for efficient management. Alternative mitigation measures, including the creation of Stone Curlew nesting plots in arable fields outside the Order limits were considered, but the ability of the Scheme to incorporate the creation of permanent grasslands with managed nesting plots within the Order limits and thus not requiring third party land, was considered the optimal solution for not only providing, but securing, long term, high quality nesting and foraging habitat for the Stone Curlew population occurring within and surrounding the Order limits. The use of nesting plots is a proven method for providing suitable nesting habitat for Stone Curlew in Breckland and is supported by the RSPB information note 'Managing nest plots for stone-curlews'.

5.4.15 There is a high degree of confidence that the Stone Curlew plots and foraging habitat will be utilised as it is to be provided in suitable areas regularly used by Stone Curlew, and the habitat, including nesting plots, is being designed and delivered following what has been successful with the other similar habitat and nesting plots around the Breckland area. The provision of this habitat will ensure no net loss of breeding territories within the Order land. Therefore, it is considered that the Scheme will result in no adverse effect on the integrity of the SPA through this pathway.

In Combination Effects

5.4.16 No in combination effects have been identified for this impact pathway on this European site.

Impact Pathway: Noise and visual disturbance – disturbance to sensitive species occurring within or outside the designated site boundary during construction.

5.4.17 Stone Curlew breed outside the SPA within the Order land and surrounding farmland. These populations of Stone Curlew would have the potential to be disturbed by increased vehicular movements and human disturbance during construction. Disturbance impacts would have the potential to cause stress, which may result in a reduction in their resilience and breeding success. In extreme cases disturbance may result in the abandonment of breeding territories and nest sites.

5.4.18 It is considered that this pathway could arise from any construction works within 500m[15] (Ref 22) of nesting locations or newly created habitats that are undertaken during the breeding season and which represent a level of activity that exceeds the current levels to which those locations are exposed. If construction were to occur within this distance of nesting locations or the new provision of habitat, then it would have an adverse effect on the integrity of the SPA by causing any nesting Stone Curlew pair to abandon their nest or avoid using the new habitat provisions.

Mitigation

5.4.19 The primary effective mitigation measures will consist of ensuring that the construction is phased so that areas within 500m of the new habitat provisions are developed outside the Stone Curlew breeding season of March to October and that the replacement provisions are ready for use by Stone Curlew by the breeding season at the start of construction. All construction staff working within Sunnica East Sites A and B will also be given a toolbox talk regarding the sensitivity of Stone Curlew.

5.4.20 These measures are included in the Framework CEMP submitted with the DCO application and which will be finalised prior to construction in accordance with that Framework CEMP. With these measures in place it is considered that no construction-related disturbance of nesting Stone Curlew would occur since they will not be present at the when the most potentially disturbing works take place. As such, no adverse effect on the integrity of the SPA would arise through this pathway.

In Combination Effects

5.4.21 No in combination effects have been identified for this impact pathway on this European site.

Impact Pathway: Non-physical disturbance - disturbance to sensitive species occurring within or outside the designated site boundary during construction.

5.4.22 Stone Curlew breed outside the SPA within the Order land and surrounding farmland. These populations of Stone Curlew would have the potential to be disturbed during construction by non-physical sources such as construction lighting. Disturbance impacts would have the potential to cause stress, which may result in a reduction in their resilience and breeding success. In extreme cases disturbance may result in the abandonment of breeding territories and nest sites.

5.4.23 It is considered that this pathway could arise from any construction works within 500m[16] (Ref 22) of nesting locations or newly created habitats that are

[15] 500m is considered to be the distance at which recreational activities may disturb Stone Curlew. This distance is considered appropriate when assessing construction disturbance, such as movements of the workforce.
[16] 500m is considered to be the distance at which recreational activities may disturb Stone Curlew. This distance is considered appropriate when assessing construction disturbance, such as movements of the workforce.

undertaken during the breeding season. If construction activities requiring the use of lighting were to occur within this distance of nesting locations or the new provision of habitat, then it would have an adverse effect on the integrity of the SPA by causing any nesting Stone Curlew pair to abandon their nest or avoid using the new habitat provisions.

Mitigation

5.4.24 The primary effective mitigation measures will consist of ensuring that the construction is phased so that areas within 500m of the new habitat provisions are developed outside the Stone Curlew breeding season of March to October and that the replacement provisions are ready for use by Stone Curlew by the breeding season at the start of construction. This will avoid the potential for any construction lighting potentially spilling into areas used by Stone Curlew.

5.4.25 These measures are included in the Framework CEMP submitted with the DCO application and which will be finalised prior to construction in accordance with that Framework CEMP. With these measures in place it is considered that no construction-related disturbance of nesting Stone Curlew would occur. As such, no adverse effect on the integrity of the SPA would arise through this pathway.

In Combination Effects

5.4.26 No in combination effects have been identified for this impact pathway on this European site.

Impact Pathway: Operational disturbance of nesting Stone Curlew from maintenance visits

5.4.27 During operation the Scheme will require regular maintenance visits, which if occurring within the nesting season have the potential to disturb breeding Stone Curlew.

Mitigation

5.4.28 The offsetting habitats have been embedded into the Scheme in areas where operational access will not be required. Irrespective of this all operational staff working within 500m of the offsetting areas will also be given a toolbox talk regarding the sensitivity of Stone Curlew and where possible, maintenance within 500m of the offsetting areas will be scheduled between November and February.

5.4.29 This measure is included in the Framework Operational Environmental Management Plan (OEMP) submitted with the DCO application and will be finalised prior to operation in accordance with that outline. With these measures in place it is considered that no operational-related disturbance of nesting Stone Curlew would occur since they will not be present in areas subject to operational maintenance visits. As such, no adverse effect on the integrity of the SPA would arise through this pathway.

In Combination Effects

5.4.30 No in combination effects have been identified for this impact pathway on this European site.

Impact Pathway: Physical Displacement from functionally linked land – Continued displacement of Stone Curlew through loss of nesting and foraging within the Order land during operation.

5.4.31 The displacement of Stone Curlew from functionally linked land within the Order limits will occur during construction and is deal with in detail in sections 5.4.2-5.4.16. However, recognising that this displacement will continue during operation, the impact pathway is also discussed here.

5.4.32 Stone Curlew is a ground nesting bird which breeds on downland, heathland and arable farmland in the south and east of England. Within the Brecks area, the birds prefer areas of short, sparse vegetation on light, stony soils, ideally associated with dry, sandy, semi-natural 'breck' heaths, but this may also include fallow land or spring-sown crops on arable farmland. Within and around the Breckland SPA this has been achieved by the establishment of Stone Curlew plots, which are generally 2ha areas of cultivated land within arable crops, or in some cases within pastures, which are kept free of crops and other vegetation before the arrival of the Stone Curlew in March.

5.4.33 The population occurring in and around the Order land use a combination of fallow, spring-sown crops, such as beet and onions, bare ground associated with poultry farming and fields margins. Where possible, the RSPB works with a number of landowners in and round the Order land to create Stone Curlew plots. From AECOM's observations and discussions with the RSPB, this is usually a maximum of one plot annually. Stone Curlew is, therefore, reliant on the cropping regime in any given year and the availability of suitable areas of fallow and spring-sown crops to be able to nest. This is reflected in the observations of Stone Curlew occurrence and distribution noted in surveys undertaken by the Applicant in 2019 and 2020 and detailed in the **Table 3 3**.

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5.4.34 Data on Stone Curlew nesting records dating back to 2009 were obtained for an area up to 2km from the Order land. Following examination of these data and targeted Stone Curlew surveys of the Order land and a 2 km buffer undertaken by the Applicant in 2019, 2020 and 2021 (**Table 3-3~~Table 3-3~~**), it was established that up to five pairs of Stone Curlew regularly breed within the Order land and/or surrounding area. Although this population is outside the SPA, Natural England have advised that ringing studies have demonstrated that it is connected to the population that nests in the SPA, with regular interchange of individuals, in both directions, from the SPA. As such, the Scheme will result in a net reduction in breeding opportunities for the species which could affect the ability of Breckland SPA to achieve its conservation targets, such as through increased competition for resources.

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5.4.35 With reference to Table 3 3 and RSPB data, it is clear that Stone Curlew within the Order land and surrounding area do not conform to the general guidance for territory occupancy and nesting sites. The areas embedded within the Scheme design for offsetting impacts on Stone Curlew utilise the species' current and

historical distribution across the Order land, irrespective of whether these meet the above criteria. Since this replicates the conditions the birds are already utilising (see Table 3 3), it is considered a suitably robust approach informed by empirical information on the nesting behaviour of the specific Stone Curlew pairs in question in this landscape.

Mitigation

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5.4.36 Discussions with Natural England and RSPB in preparing this appropriate assessment have identified that the mitigation objective should be to ensure no net loss of breeding pairs in Breckland SPA by embedding sufficient areas within the Scheme design to offset the loss of potentially suitable arable farmland through erection of solar arrays. Since the arable farmland used by nesting Stone Curlew to be lost is outside the SPA boundary itself, the provision of replacement habitat does not class as 'compensation' sensu the Habitats Directive. In other words, the replacement Stone Curlew habitat does not constitute 'compensation' for adverse effects on the Stone Curlew population of Breckland SPA but is intended to avoid an adverse effect on the SPA population by ensuring that there is no decline in nesting and foraging opportunities for the overall Brecks population, which might otherwise result in increased competition for resources with the SPA birds. There is precedent for this approach in the case of the A303 (Amesbury to Berwick Down) DCO in which replacement Stone Curlew plots were not deemed compensation for adverse effects on the integrity of Salisbury Plain SPA because they were to accommodate the linked broader Wessex population rather than to the SPA itself. The Scheme design has embedded sufficient land to offset any potential reduction in arable farmland, that may, in any given year, be used by Stone Curlew.

5.4.37 As the provision of offsetting habitat is based on the species' fluid distribution within a farming landscape, the figure of a minimum of 16ha per pair has been applied. This acknowledges the requirement for not only suitable nesting sites, but also the requirement for foraging habitat.

5.4.38 The offsetting provision embedded within the Scheme design will be secured via the Requirement within the Draft DCO [REP2-022] and consists of the following:

Nesting Plots

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5.4.39 Ten 2 ha plots will be created across Sunnica East Sites A and B, in fields where Stone Curlew have been recorded during surveys. To maximise the potential for take up two plots have been allocated per pair. Plots unoccupied for nesting will contribute an important resource for foraging pairs. Three are proposed in ECO1, three in ECO2 and four across ECO3. Details of plot creation and management in the Brecks are provided by the RSPB information Note 'Managing nest plots for stone-curlews' (Ref 19), with further requirements set out in the Countryside Stewardship Higher Tier 'AB4: Nesting plots for stone curlew' guidance note (Ref 20). Plots will be a minimum of 100m apart. Various cultivation techniques will used to create a rough tilth and/or areas of bare ground, depending on ground conditions and other environmental factors or constraints. The new plots will be provided in advance of the loss of any existing habitat. This will mean that the new plots will be to be available in the breeding season prior to construction commencing.

Foraging habitat

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5.4.40 Recent research has shown that the creation of bare ground provides an important foraging resource for breeding Stone Curlew, particularly if this is located near to the nesting site; most foraging by Stone Curlew occurs within 1km of the nest (Ref 21). As well as providing suitable nesting opportunities, the plots, delivered in advance of the loss of any existing habitat and located within areas shown by surveys to be used by Stone Curlew, will also deliver important foraging areas in close proximity to the nest site (approximately 100m).

5.4.41 As well as the bare ground plots, approximately 108ha of predominantly arable farmland have been embedded within the Scheme for reversion to grassland, specifically managed to create a close-cropped sward, suitable for Stone Curlew. Small areas of existing acid grassland have also been retained within the Scheme design in Sunnica East Site B and these will form the basis of reverting adjacent areas in Sunnica East Site B to semi-natural grassland, characteristic of the Breckland heaths. In time this will provide a high quality habitat, offering both nesting and foraging opportunities for Stone Curlew. The disturbed plots will be retained within these established grassland areas for the lifespan of the project.

5.4.42 Within Sunnica East Site A the offsetting area will be sown with a chalk grassland mix and managed specifically for Stone Curlew, i.e. maintaining a close-cropped sward. The plots will be retained within these established grassland areas for the lifespan of the project.

5.4.43 Stone Curlew has a fluid distribution within the farming landscape of the Order limits and surrounding area and is reliant on the cropping regime in any given year to provide suitable areas of fallow and spring-sown crops to be able to nest. As such the nesting locations can vary annually depending on this availability. The Scheme has taken this fluid nesting distribution into consideration and sought to avoid blocks of land where regular nesting attempts have been observed e.g., those in ECO3. This principal of avoidance has guided the locations of the offsetting areas which have taken into account not only the species existing distribution, but also the design and construction elements of the Scheme (e.g., to minimise construction disturbance), the location of residential areas and the ability to be able to secure large continuous blocks of land to maximise delivery of habitat creation and nesting plot opportunities and allow for efficient management. Alternative mitigation measures, including the creation of Stone Curlew nesting plots in arable fields outside the Order limits were considered, but the ability of the Scheme to incorporate the creation of permanent grasslands with managed nesting plots within the Order limits and thus not requiring third party land, was considered the optimal solution for not only providing, but securing, long term, high quality nesting and foraging habitat for the Stone Curlew population occurring within and surrounding the Order limits. The use of nesting plots is a proven method for providing suitable nesting habitat for Stone Curlew in Breckland and is supported by the RSPB information note 'Managing nest plots for stone-curlews'.

5.4.44 There is a high degree of confidence that the Stone Curlew plots and foraging habitat will be utilised as it is to be provided in suitable areas regularly used by Stone Curlew, and the habitat, including nesting plots, is being designed and delivered following what has been successful with the other similar habitat and

nesting plots around the Breckland area. The provision of this habitat will ensure no net loss of breeding territories within the Order land. Therefore, it is considered that the Scheme will result in no adverse effect on the integrity of the SPA through this pathway.

In Combination Effects

5.4.45 No in combination effects have been identified for this impact pathway on this European site.

5.5 Statement to Inform Appropriate Assessment for Rex Graham Reserve SAC

5.5.1 For Rex Graham Reserve SAC the following pathways exist for which likely significant effects could not be dismissed:

a. Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

5.5.2 Details of air quality modelling for Rex Graham Reserve SAC are presented in Annex D (with reference to Transect 4). This shows that the critical level for NOx and critical load for nitrogen deposition are exceeded when contributions are considered in combination with future baseline traffic levels. The Scheme on its own does not exceed the relevant thresholds.

5.5.3 With regard to the fact that the critical level (for NOx) or critical load (for nitrogen deposition) are exceeded the following are relevant:

a. Paragraph 5.26 of the only Natural England guidance on the issue states that 'An exceedance [of the critical level or load] alone is insufficient to determine the acceptability (or otherwise) of a project'. So, the fact that the critical level for NOx or critical load for nitrogen are already exceeded is not a legitimate basis to conclude that any further NOx or nitrogen (no matter how small) will result in an adverse effect.

b. Paragraph 4.25 of the same NE guidance states '…1% of critical load/level are considered by Natural England's air quality specialists (and by industry, regulators and other statutory nature conservation bodies) to be suitably precautionary, as any emissions below this level are widely considered to be imperceptible…There can therefore be a high degree of confidence in its application to screen for risks of an effect'.

NOx

5.5.4 In most cases the critical level (30 micrograms per cubic metre) is not forecast to be exceeded in 2023. Even where it is forecast to be exceeded (only within c. 10m of the roadside) APIS[17] identifies that negative effects of NOx/NO_2 in atmosphere (as distinct from its role in nitrogen deposition) are most likely to arise in the presence of equivalent concentrations of sulphur dioxide (SO_2). Vehicle exhausts do not emit SO_2 and APIS indicates that background SO_2

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[17] [redacted]

concentrations at these SSSIs are very low (c. 1 μgm^{-3}) compared to critical levels for SO_2 of 10-20 μgm^{-3}. Since the SO_2 concentrations are so low no synergistic effect with NOx is expected.

Other pollutants

5.5.5 For all other pollutants (ammonia, nitrogen and acid) the critical level or critical load is generally forecast to be exceeded in both 2019 and 2023. However, in all cases the contribution of the project is well below the '1% of the critical level/load threshold'. For example, a maximum of 0.02 μgm^{-3} for ammonia compared to a screening threshold of 0.03 μgm^{-3}, and a typical nitrogen deposition below 0.1 kgN/ha/yr compared to a screening threshold on those transects of 0.10-0.15 kgN/ha/yr).

5.5.6 In addition to the contribution of the project being very small indeed, they are also temporary, being forecast to last for c. 2 years. This is relevant because over short timescales all pollutant concentrations fluctuate considerably around the annual average values used for critical levels/loads due to normal variations in traffic flows and matters such as meteorology. For example, scrutiny of ammonia data from the UKEAP national ammonia monitoring network for a range of sites covering 2010-2019 shows that the normal variation in ammonia concentrations throughout a year can be as high as 3-4 $\mu g/m^3$ (100-133% of the critical level), and even at rural sites concentrations generally fluctuate by more than 1 $\mu g/m^3$ (33% of the critical level) throughout the year.

5.5.7 Natural England guidance makes it clear that exceedance of these thresholds does not automatically mean an adverse effect on integrity will arise. Paragraph 5.28 of that guidance states '*In practice, where a site is already exceeding a relevant benchmark, the extent to which additional increments from plans and projects would undermine a conservation objective to 'restore' will involve further consideration of whether there is credible evidence that the emissions represent a real risk that the ability of other national or local measures and initiatives to otherwise reduce background levels will be compromised in a meaningful manner'.*

5.5.8 Critical levels and critical loads are based upon an assumption of long-term (i.e. many years or decades) exposure because over the short-term such fluctuations as are forecast from the project will effectively constitute statistical noise and will not affect the ability of other national or local initiatives to otherwise reduce background levels. For example, according to the World Health Organisation '… *critical loads relate to the potential effects over periods of decades… critical loads provide the long-term deposition [emphasis added] below which we are sure that adverse ecosystem effects will not occur*'[18].

5.5.9 Furthermore, an individual plan or project with a very small contribution can be dismissed on the following basis:

a. In Advocate-General Sharpston's Opinion in European Court of Justice Case C-258/11 she specified in Paragraph 48 that '*the requirement for an effect to*

[18] page 220, World Health Organization. 2000. Air Quality Guidelines for Europe. WHO Regional Publications, European Series, No. 91. Second Edition

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be 'significant' exists in order to lay down a de minimis threshold. Plans and projects that have no appreciable effect on the site can therefore be excluded. If all plans and projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill.'; and

b. In Wealden v SSCLG [2017] EWHC 351 (Admin) (2017), which specifically concerned the need for 'in combination' assessment in air quality modelling for European sites, Mr. Justice Jay accepted that if the contribution of an individual plan or project to traffic growth or resulting air quality effects was 'very small indeed', it could be legitimately and legally excluded from 'in combination' assessment.

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5.5.10 Therefore, while the project will make a contribution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Rex Graham Reserve SAC to achieve its conservation objectives.

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5.6 Statement to Inform Appropriate Assessment for Breckland SAC

5.6.1 For Breckland SAC the following pathways exist for which likely significant effects could not be dismissed:

a. Inland dunes with open *Corynephorus* and *Agrostis* grasslands. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

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b. Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

c. European dry heaths. **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

d. Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

e. Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

5.6.2 Details of air quality modelling for Breckland SAC are presented in Annex D (with reference to Transects 2 and 3). This shows that the critical level for NOx and critical load for nitrogen deposition are exceeded when contributions are considered in combination with future baseline traffic levels. The Scheme on its own does not exceed the relevant thresholds.

5.6.3 With regard to the fact that the critical level (for NOx) or critical load (for nitrogen deposition) are exceeded the following are relevant:

f. Paragraph 5.26 of the only Natural England guidance on the issue states that 'An exceedance [of the critical level or load] alone is insufficient to determine the acceptability (or otherwise) of a project'. So, the fact that the critical level for NOx or critical load for nitrogen are already exceeded is not a legitimate

basis to conclude that any further NOx or nitrogen (no matter how small) will result in an adverse effect.

g. Paragraph 4.25 of the same NE guidance states '…1% of critical load/level are considered by Natural England's air quality specialists (and by industry, regulators and other statutory nature conservation bodies) to be suitably precautionary, as any emissions below this level are widely considered to be imperceptible…There can therefore be a high degree of confidence in its application to screen for risks of an effect'.

NOx

5.6.4 In most cases the critical level (30 micrograms per cubic metre) is not forecast to be exceeded in 2023. Even where it is forecast to be exceeded (only within c. 10m of the roadside) APIS[19] identifies that negative effects of NOx/NO_2 in atmosphere (as distinct from its role in nitrogen deposition) are most likely to arise in the presence of equivalent concentrations of sulphur dioxide (SO_2). Vehicle exhausts do not emit SO_2 and APIS indicates that background SO_2 concentrations at these SSSIs are very low (c. 1 μgm^{-3}) compared to critical levels for SO_2 of 10-20 μgm^{-3}. Since the SO_2 concentrations are so low no synergistic effect with NOx is expected.

Other pollutants

5.6.5 For all other pollutants (ammonia, nitrogen and acid) the critical level or critical load is generally forecast to be exceeded in both 2019 and 2023. However, in all cases the contribution of the project is well below the '1% of the critical level/load threshold'. For example, a maximum of 0.02 μgm^{-3} for ammonia compared to a screening threshold of 0.03 μgm^{-3}, and a typical nitrogen deposition below 0.1 kgN/ha/yr compared to a screening threshold on those transects of 0.10-0.15 kgN/ha/yr). There is only one location where nitrogen deposition due to the project exceeds 0.10 kgN/ha/yr (10.95m from the road on Transect T2) and even there it only does so marginally (being 0.11 kgN/ha/yr) falling below 0.10 kgN/ha/yr by 20m from the road.

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5.6.6 In addition to the contribution of the project being very small indeed, they are also temporary, being forecast to last for c. 2 years. This is relevant because over short timescales all pollutant concentrations fluctuate considerably around the annual average values used for critical levels/loads due to normal variations in traffic flows and matters such as meteorology. For example, scrutiny of ammonia data from the UKEAP national ammonia monitoring network for a range of sites covering 2010-2019 shows that the normal variation in ammonia concentrations throughout a year can be as high as 3-4 $\mu g/m^3$ (100-133% of the critical level), and even at rural sites concentrations generally fluctuate by more than 1 $\mu g/m^3$ (33% of the critical level) throughout the year.

5.6.7 Natural England guidance makes it clear that exceedance of these thresholds does not automatically mean an adverse effect on integrity will arise. Paragraph 5.28 of that guidance states '*In practice, where a site is already exceeding a relevant benchmark, the extent to which additional increments from plans and projects would undermine a conservation objective to 'restore' will involve further*

19 [redacted]

consideration of whether there is credible evidence that the emissions represent a real risk that the ability of other national or local measures and initiatives to otherwise reduce background levels will be compromised in a meaningful manner'.

5.6.8 Critical levels and critical loads are based upon an assumption of long-term (i.e. many years or decades) exposure because over the short-term such fluctuations as are forecast from the project will effectively constitute statistical noise and will not affect the ability of other national or local initiatives to otherwise reduce background levels. For example, according to the World Health Organisation '*… critical loads relate to the potential effects over periods of decades… critical loads provide the long-term deposition [emphasis added] below which we are sure that adverse ecosystem effects will not occur*'[20].

5.6.9 Furthermore, an individual plan or project with a very small contribution can be dismissed on the following basis:

h. In Advocate-General Sharpston's Opinion in European Court of Justice Case C-258/11 she specified in Paragraph 48 that '*the requirement for an effect to be 'significant' exists in order to lay down a de minimis threshold. Plans and projects that have no appreciable effect on the site can therefore be excluded. If all plans and projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill.*'; and

i. In Wealden v SSCLG [2017] EWHC 351 (Admin) (2017), which specifically concerned the need for 'in combination' assessment in air quality modelling for European sites, Mr. Justice Jay accepted that if the contribution of an individual plan or project to traffic growth or resulting air quality effects was 'very small indeed', it could be legitimately and legally excluded from 'in combination' assessment.

5.6.10 Therefore, while the project will make a contribution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Breckland SAC to achieve its conservation objectives.

5.7 Statement to Inform Appropriate Assessment for Devil's Dyke SAC

5.7.1 For Devil's Dyke SAC the following pathways exist for which likely significant effects could not be dismissed:

a. Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites). **Impact Pathway** Habitat loss and/or degradation – degradation to designated habitats through airborne pollutants.

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5.7.2 Details of air quality modelling for Devil's Dyke SAC are presented in Annex D (with reference to Transect 1). This shows that the critical level for NOx and critical load for nitrogen deposition are exceeded when contributions are

[20] page 220, World Health Organization. 2000. Air Quality Guidelines for Europe. WHO Regional Publications, European Series, No. 91. Second Edition

considered in combination with future baseline traffic levels. The Scheme on its own does not exceed the relevant thresholds.

5.7.3 With regard to the fact that the critical level (for NOx) or critical load (for nitrogen deposition) are exceeded the following are relevant:

b. Paragraph 5.26 of the only Natural England guidance on the issue states that 'An exceedance [of the critical level or load] alone is insufficient to determine the acceptability (or otherwise) of a project'. So, the fact that the critical level for NOx or critical load for nitrogen are already exceeded is not a legitimate basis to conclude that any further NOx or nitrogen (no matter how small) will result in an adverse effect.

c. Paragraph 4.25 of the same NE guidance states '…1% of critical load/level are considered by Natural England's air quality specialists (and by industry, regulators and other statutory nature conservation bodies) to be suitably precautionary, as any emissions below this level are widely considered to be imperceptible…There can therefore be a high degree of confidence in its application to screen for risks of an effect'.

NOx

5.7.4 In most cases the critical level (30 micrograms per cubic metre) is not forecast to be exceeded in 2023. Even where it is forecast to be exceeded (only within c. 10m of the roadside) APIS[21] identifies that negative effects of NOx/NO_2 in atmosphere (as distinct from its role in nitrogen deposition) are most likely to arise in the presence of equivalent concentrations of sulphur dioxide (SO_2). Vehicle exhausts do not emit SO_2 and APIS indicates that background SO_2 concentrations at these SSSIs are very low (c. 1 μgm^{-3}) compared to critical levels for SO_2 of 10-20 μgm^{-3}. Since the SO_2 concentrations are so low no synergistic effect with NOx is expected.

Other pollutants

5.7.5 For all other pollutants (ammonia, nitrogen and acid) the critical level or critical load is generally forecast to be exceeded in both 2019 and 2023. However, in all cases the contribution of the project is well below the '1% of the critical level/load threshold'. For example, a maximum of 0.02 μgm^{-3} for ammonia compared to a screening threshold of 0.03 μgm^{-3}, and a typical nitrogen deposition below 0.1 kgN/ha/yr compared to a screening threshold on those transects of 0.10-0.15 kgN/ha/yr).

5.7.6 In addition to the contribution of the project being very small indeed, they are also temporary, being forecast to last for c. 2 years. This is relevant because over short timescales all pollutant concentrations fluctuate considerably around the annual average values used for critical levels/loads due to normal variations in traffic flows and matters such as meteorology. For example, scrutiny of ammonia data from the UKEAP national ammonia monitoring network for a range of sites covering 2010-2019 shows that the normal variation in ammonia concentrations throughout a year can be as high as 3-4 $\mu g/m^3$ (100-133% of the critical level),

21 [redacted]

and even at rural sites concentrations generally fluctuate by more than 1 µg/m^3 (33% of the critical level) throughout the year.

5.7.7 Natural England guidance makes it clear that exceedance of these thresholds does not automatically mean an adverse effect on integrity will arise. Paragraph 5.28 of that guidance states '*In practice, where a site is already exceeding a relevant benchmark, the extent to which additional increments from plans and projects would undermine a conservation objective to 'restore' will involve further consideration of whether there is credible evidence that the emissions represent a real risk that the ability of other national or local measures and initiatives to otherwise reduce background levels will be compromised in a meaningful manner'.*

5.7.8 Critical levels and critical loads are based upon an assumption of long-term (i.e. many years or decades) exposure because over the short-term such fluctuations as are forecast from the project will effectively constitute statistical noise and will not affect the ability of other national or local initiatives to otherwise reduce background levels. For example, according to the World Health Organisation '*… critical loads relate to the potential effects over periods of decades… critical loads provide the long-term deposition [emphasis added] below which we are sure that adverse ecosystem effects will not occur*'[22].

5.7.9 Furthermore, an individual plan or project with a very small contribution can be dismissed on the following basis:

d. In Advocate-General Sharpston's Opinion in European Court of Justice Case C-258/11 she specified in Paragraph 48 that '*the requirement for an effect to be 'significant' exists in order to lay down a de minimis threshold. Plans and projects that have no appreciable effect on the site can therefore be excluded. If all plans and projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill.*'; and

e. In Wealden v SSCLG [2017] EWHC 351 (Admin) (2017), which specifically concerned the need for 'in combination' assessment in air quality modelling for European sites, Mr. Justice Jay accepted that if the contribution of an individual plan or project to traffic growth or resulting air quality effects was 'very small indeed', it could be legitimately and legally excluded from 'in combination' assessment.

5.7.10 Therefore, while the project will make a contribution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Devil's Dyke SAC to achieve its conservation objectives.

~~5.4.30~~

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[22] page 220, World Health Organization. 2000. Air Quality Guidelines for Europe. WHO Regional Publications, European Series, No. 91. Second Edition

6 Proposals for Monitoring and Reporting

6.1 Monitoring

Fenland SAC and Chippenham Fen Ramsar site

6.1.1 The Dust Management Plan, set out in the Framework CEMP, will include measures to minimise dust generation as well as identifying periods when the wind direction is towards a given European Site(s). Given the coincidence of wind direction and dry weather during construction works, a check would be made of the European Site for a noticeable dust deposition. If a significant dust deposition does occur, the expectation would be that this would be washed off by normal weather, but dust control measures will be updated to ensure it does not reoccur.

Breckland SPA

6.1.2 The Applicant will employ an Ecological Clerk of Works to monitor Stone Curlew during construction and decommissioning. In addition, the Ecological Clerk of Works will monitor the use of the Stone Curlew offsetting areas annually ~~for five years~~ following start of operation and throughout the entirety of ~~then bi-annually until year ten of~~ operation. Monitoring will include both the occupancy of the offsetting habitats by Stone Curlew and the condition of these habitats, in the context of providing optimal nesting and foraging habitat. Annual monitoring reports will be submitted for review and consultation within the Sunnica Ecology Advisory Group, to allow any remedial actions to be identified, agreed and implemented.

6.2 Reporting

6.2.1 The monitoring undertaken by the construction contractor will be documented in their construction logs.

7 Consultations

7.1.1 Natural England and RSPB have been consulted throughout the Scheme development, EIA and HRA processes with regard to the loss of Stone Curlew breeding habitat, including devising mitigation. Natural England has also been consulted on the HRA screening exercises (Likely Significant Effects) and has engaged in the Examination process.

8 Conclusions

8.1.1 The following measures identified in this appropriate assessment would need to be implemented during construction and decommissioning in order to ensure no adverse effects on integrity:

a. A CEMP and DEMP containing mitigation measures for construction dust on Fenland SAC/Chippenham Fen Ramsar and construction disturbance to Stone Curlew associated with Breckland SPA and its implementation; and
b. The delivery of habitat to offset the loss of breeding habitat for Stone Curlew.

8.1.2 Following the implementation of the mitigation noted above it is concluded that the Scheme would have no adverse effect on the integrity of any European sites alone or in combination with other projects and plans.

8.1.3 There are no residual effects that would constitute an adverse effect on the integrity of European Sites either alone or in combination with other plans or projects.

9 References

Ref 1 Anon. 2018. Conservation of Habitats and Species Regulations 2017 (as amended). HMSO, London.

Ref 2 HMSO (2019) The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. HMSO, London

Ref 3 National Planning Policy Framework. Department for Communities and Local Government. Available online.

Ref 4 European Commission (2001): Assessment of plans and projects significantly affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and 6(4) of the Habitats Directive.

Ref 5 Ministry of Housing, Communities & Local Government (2019). Appropriate Assessment. Available online.

Ref 6 The Planning Inspectorate (2017). Habitats Regulations Assessment. Available online.

Ref 7 Holohan ruling (C-461/17)

Ref 8 People Over Wind and Sweetman v Coillte Teoranta (C-323/17)

Ref 9 European Court of Justice in the 'Cooperatie Mobilisation for the Environment and Vereniging Leefmilieu (Dutch Nitrogen)' ruling.

Ref 10 Environment Agency (2016). Air emissions risk assessment for your environmental permit. Available online.

Ref 11 Department for Business, Energy and Industrial Strategy (2021) Guidelines on the assessment of transboundary impacts of energy developments on Natura 2000 sites outside the UK. Available online.

Ref 12 Environment Agency Ecology Data Explorer (https://environment.data.gov.uk/ecology/explorer/) [accessed May 2021]

Ref 13 Wolseley, P. A.; James, P. W.; Theobald, M. R.; Sutton, M. A. (2006). Detecting changes in epiphytic lichen communities at sites affected by atmospheric ammonia from agricultural sources. Lichenologist 38: 161-176

Ref 14 Dijk, N. (2011) Dry deposition of ammonia gas drives species change faster than wet deposition of ammonium ions: evidence from a long-term field manipulation. Global Change Biology 17: 3589-3607

Ref 15 UK Centre for Ecology and Hydrology (CEH) (2016c). Sulphur Dioxide. Available online.

Ref 16 IAQM (2014). Guidance on the assessment of dust from demolition and construction. Institute of Air Quality Management.

Ref 17 Department for Transport (DfT) (2016). Standards for Highways online resources. Available online.

Ref 18 Guderian, R. (1986). Terrestrial ecosystems: particulate deposition. In: Air Pollutants and Their Effects on the Terrestrial Ecosystem (Legge AH, Krupa SV, eds). Advances in Environmental Science and Technology, Vol. 18. 339-363, Wiley, New York, USA.

Ref 19 RSPB information Note. 'Managing nest plots for stone-curlews', Version 2 – Eastern England

Ref 20 Natural England (2018) Countryside Stewardship grants Higher Tier 'AB4: Nesting plots for stone curlew' guidance note.

Ref 21 Hawkes, R.W., Smart, J., Brown, A., Green, R.E., Jones, H. & Dolman, P.M. (2021) Effects of experimental land management on habitat use by Eurasian Stone-curlews. Animal Conservation – open access article.

Ref 22 Taylor, E.C., Green, R.E., Perrins, J., 2007. Stone-curlews *Burhinus oedicnemus* and recreational disturbance: developing a management tool for access. RSPB. Ibis (2007), 149 (Suppl. 1), 37–44.

Ref 23 Institute of Air Quality Management (IAQM) (2017). A guide to navigating the assessment of air quality effects on designated sites. IAQM and CIEEM.

Annex A Relevant Impact Pathways

A.1.1.1 The European sites included within this screening assessment are:

a. Fenland SAC;
b. Chippenham Fen Ramsar;
c. Breckland SPA;
d. Wicken Fen Ramsar;
e. Rex Graham Reserve SAC;
f. Breckland SAC; and
g. Devil's Dyke SAC.

A.1 The impact pathways considered in this Likely Significant Effects Report, which are referred to in the detailed screening matrices below.

Designation	Impact Pathways Identified on the current evidence base
Fenland SAC	Habitat loss and/or degradation during construction. Habitat contamination from surface water pollution, soil and groundwater contamination and air pollution during construction. Non-physical disturbance, such as indirect light spill during construction and operational lighting. Groundwater disturbance during construction. Noise and visual disturbance during construction.
Chippenham Fen Ramsar	Habitat loss and/or degradation during construction. Habitat contamination from surface water pollution, soil and groundwater contamination and air pollution during construction. Non-physical disturbance, such as indirect light spill during construction and operational lighting. Groundwater disturbance during construction. Noise and visual disturbance during construction.
Breckland SPA	Habitat loss and/or degradation during construction. Physical displacement of nesting and foraging SPA birds outside the designated site boundary during construction and operation. Habitat contamination from surface water pollution, soil and groundwater contamination and air pollution during construction. Non-physical disturbance, such as indirect light spill during construction and operational lighting. Noise and visual disturbance during construction and operation.
Wicken Fen Ramsar	Habitat loss and/or degradation during construction. Habitat contamination from surface water pollution, soil and groundwater contamination and air pollution during construction. Non-physical disturbance, such as indirect light spill during construction and operational lighting.
Rex Graham Reserve SAC	Habitat loss and/or degradation during construction. Habitat contamination from surface water pollution, soil and groundwater contamination and air pollution during construction. Non-physical disturbance, such as indirect light spill during construction and operational lighting.
Breckland SAC	Habitat loss and/or degradation during construction. Habitat contamination from surface water pollution, soil and groundwater contamination and air pollution during construction. Non-physical disturbance, such as indirect light spill during construction and operational lighting.
Devil's Dyke SAC	Habitat loss and/or degradation during construction. Habitat contamination from surface water pollution, soil and groundwater contamination and air pollution during construction. Non-physical disturbance, such as indirect light spill during construction and operational lighting.

Annex B Screening Matrices

B1. Screening matrix assessing the qualifying features of the Fenland SAC against the identified impact pathways during construction (C columns) and operation (O columns). Decommissioning is not represented by a separate column as the effects are included within the consideration of construction. The matrix key is provided below.

General matrix key:

✓ = Likely significant effect cannot be excluded

× = Likely significant effect can be excluded

C = Construction

O = Operation

European Site	Qualifying Features						
	Effect	Habitat Loss and/or Degradation	Habitat Contamination	Non-physical Disturbance		Groundwater disturbance	Noise and Visual Disturbance
	Stage of Scheme	C	C	C	O	C	C
Fenland SAC	Calcareous fens with Great Fen-sedge *Cladium mariscus* and species of the *Caricion davallianae*. (Calcium-rich fen dominated by great fen sedge (saw sedge))*	✓a	×b	×c	×c	×d	
	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows)	✓a	×b	×c	×c	×d	
	Spined loach *Cobitis taenia*		×e				

European Site	Qualifying Features					
	Great crested Newt *Triturus cristatus*		×f			×g

a. The assessment in Table 4-1~~Table 4-1~~ highlights that Likely Significant Effects of habitat degradation on sensitive habitats cannot be excluded. This is because the Scheme is adjacent Chippenham Fen and the habitat within this site could be affected by airborne pollutants.

b. The assessment in Table 4-1~~Table 4-1~~ highlights that all watercourses connected to Chippenham Fen are upstream of the Order land and thus water impacts will not occur. The installation of struts to a depth of up to 3.5m below ground is not considered to be a significant risk of mobilising contaminants, creating a contaminant pathway and risking infiltration to the water table. This impact pathway is screened out from Appropriate Assessment.

c. Table 4-1~~Table 4-1~~ concludes that non-physical disturbance, such as indirect lighting during construction and operation will not impact on sensitive habitats, particularly given any light spill will be reduced by existing boundary features (woodland/hedgerows). This impact pathway is screened out from Appropriate Assessment.

d. The assessment in Table 4-1~~Table 4-1~~ highlights that all structures are anticipated to be above the Chalk aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. This impact pathway is screened out from Appropriate Assessment.

e. The assessment in Table 4-1~~Table 4-1~~ concludes that habitat contamination will not impact Spined Loach, as the species is present at Wicken Fen, which is over 2km from the Order land. This impact pathway is screened out from Appropriate Assessment.

f. Table 4-1~~Table 4-1~~ concludes that habitat loss and/or degradation, will not impact on Great Crested Newt, as the species is not known to occur within Chippenham Fen or within 2km of the Scheme. This impact pathway is screened out from Appropriate Assessment.

g. Table 4-1~~Table 4-1~~ concludes that disturbance during construction will not impact on Great Crested Newt, as the species is not known to occur within Chippenham Fen or within 2km of the Scheme. This impact pathway is screened out from Appropriate Assessment.

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B2. Screening matrix assessing the qualifying features of the Chippenham Fen Ramsar against the identified impact pathways during construction (C columns) and operation (O columns). Decommissioning is not represented by a separate column as the effects are included within the consideration of construction.

European Site	Qualifying Features						
	Effect	Habitat Loss and/or Degradation	Habitat Contamination	Non-physical Disturbance		Groundwater disturbance	Noise and Visual Disturbance
	Stage of Scheme	C	C	C	O	C	C
Chippenham Fen Ramsar	Ramsar Criterion 1 - A spring-fed calcareous basin mire with a long history of management, which is partly reflected in the diversity of present-day vegetation.	✓a	×b	×c	×c	×d	
	Ramsar criterion 2 - The invertebrate fauna is very rich, partly due to its transitional position between Fenland and Breckland. The species list is very long, including many rare and scarce invertebrates characteristic of ancient fenland sites in Britain.	✓a	×b	×c	×c	×d	

European Site	Qualifying Features					
	Ramsar criterion 3 - The site supports diverse vegetation types, rare and scarce plants. The site is the stronghold of Cambridge milk parsley (*Selinum carvifolia*).	✓a	×b	×c	×c	×d	
	Noteworthy Fauna Breeding Bird Assemblage.	✓a	×b	×c	×c	×d	×e

a. The assessment in Table 4-1~~Table 4-1~~ highlights that Likely Significant Effects of habitat degradation on sensitive habitats cannot be excluded. This is because the Scheme is adjacent Chippenham Fen and the habitat within this site could be affected by airborne pollutants.

b. The assessment in Table 4-1~~Table 4-1~~ highlights that all watercourses connected to Chippenham Fen are upstream of the Order land and thus water impacts will not occur. The installation of struts to a depth of up to 3.5m below ground is not considered to be a significant risk of mobilising contaminants, creating a contaminant pathway and risking infiltration to the water table. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

c. Table 4-1~~Table 4-1~~ concludes that non-physical disturbance, such as indirect lighting during construction and operation will not impact on sensitive habitats, particularly given any light spill will be reduced by existing boundary features (woodland/hedgerows). It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

d. The assessment in Table 4-1~~Table 4-1~~ highlights that all structures are anticipated to be above the Chalk aquifer water table and therefore will not affect groundwater flow to Chippenham Fen. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

e. The assessment in Table 4-1~~Table 4-1~~ highlights predicted construction noise levels to which the fenland breeding bird assemblage will be subject will not occur at a level which will disturb birds nesting or defending a territory. The workforce and any construction lighting will

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also be screened from this assemblage by existing vegetation and the distance to construction works. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

B.3 Detailed screening matrix assessing the qualifying features of the Breckland SPA against the identified impact pathways during construction (C columns) and operation (O columns). Decommissioning is not represented by a separate column as the effects are included within the consideration of construction.

European Site	Qualifying Features							
	Effect	Habitat Loss and/or Degradation	Non-physical Disturbance		Noise and Visual Disturbance		Physical Displacement	
	Stage of Scheme	C	C	O	C	O	C	O
Breckland SPA	Woodlark	×a	×b	×b	×c	×c	×d	
	Nightjar	×e	×f	×f	×g	×g	×h	
	Stone Curlew	×i	✓j	✓j	✓k	✓k	✓l	✓m

a. Table 4-1~~Table 4-1~~ concludes that Likely Significant Effects of habitat loss and/or degradation, from construction activities on habitats used by Woodlark are unlikely given the distance between the Scheme and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

b. Table 4-1~~Table 4-1~~ concludes that Likely Significant Effects of non-physical disturbance from construction and operational activities, such as light spill is unlikely to disturb Woodlark given the distance between the Scheme and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

c. Table 4-1~~Table 4-1~~ concludes that Likely Significant Effects of noise and visual disturbance from construction and operational activities are unlikely to disturb Woodlark given the distance between the Scheme and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

d. Table 4-1~~Table 4-1~~ concludes that Likely Significant Effects of physical displacement of Woodlark nesting and foraging outside the Breckland SPA are unlikely given the distance between the Scheme and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

e. Table 4-1~~Table 4-1~~ concludes that Likely Significant Effects of habitat loss and/or degradation, from construction activities on habitats used by Nightjar are unlikely given the distance between the Scheme and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

f. Table 4-1~~Table 4-1~~ concludes that Likely Significant Effects of non-physical disturbance from construction and operational activities, such as light spill is unlikely to disturb Nightjar given the distance between the Scheme and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment. g. Table

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4-1~~Table 4-1~~ concludes that Likely Significant Effects of noise and visual disturbance from construction and operational activities are unlikely to disturb Nightjar given the distance between the Scheme and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

h. Table 4-1~~Table 4-1~~ concludes that Likely Significant Effects of physical displacement of Nightjar nesting and foraging outside the Breckland SPA are unlikely given the distance between the Scheme and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

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i. Table 4-1~~Table 4-1~~ concludes that Likely Significant Effects of habitat loss and/or degradation, from construction activities on habitats used by Stone Curlew within the SPA are unlikely given the distance between the Scheme and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

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j. The assessment in Table 4-1~~Table 4-1~~ and Section 3.3 highlight that Stone Curlew populations present on the Order land are functionally linked to the Breckland SPA and therefore, Likely Significant Effects of non-physical disturbance from construction and operational activities, have the potential to affect the Breckland SPA Stone Curlew population. This impact pathway is screened into Appropriate Assessment.

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k. The assessment in Table 4-1~~Table 4-1~~ and Section 3.3 concludes that Stone Curlew populations present on the Order land are functionally linked to the Breckland SPA and therefore, Likely Significant Effects of noise and visual disturbance from construction and operational activities on the Breckland SPA Stone Curlew population cannot be excluded. This impact pathway is screened into Appropriate Assessment.

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l. The assessment in Table 4-1~~Table 4-1~~ and Section 3.3 highlights that Stone Curlew populations present on the Order land are functionally linked to the Breckland SPA and therefore, Likely Significant Effects of physical displacement from construction of the Scheme cannot be excluded. This impact pathway is screened into Appropriate Assessment.

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m. The assessment in **Table 4-1~~Table 4-2~~** and Section 3.3 highlights that Stone Curlew populations present on the Order land are functionally linked to the Breckland SPA and therefore, Likely Significant Effects of physical displacement arising during construction of the Scheme and continuing during operation cannot be excluded. This impact pathway is screened into Appropriate Assessment.

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B4. Detailed screening matrix assessing the qualifying features of the Wicken Fen Ramsar against the identified impact pathways during construction (C columns) and operation (O columns). Decommissioning is not represented by a separate column as the effects are included within the consideration of construction.

European Site	Qualifying Features				
	Effect	Habitat Loss and/or Degradation	Habitat Contamination	Non-physical Disturbance	
	Stage of Scheme	C	C	C	O
Wicken Fen Ramsar	Ramsar Criterion 1 - East Anglian peat fens	×a	×b	×c	×c
	Ramsar Criterion 2 - Fen violet *Viola persicifolia* and other nationally scarce plants and Red Data Book invertebrates.	×a	×b	×c	×c

a. The assessment in Table 4-1~~Table 4-1~~ highlights that Likely Significant Effects of habitat degradation on sensitive habitats and species are unlikely, given the distance of over 2km between the Scheme boundary and Wicken Fen. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

b. The assessment in Table 4-1~~Table 4-1~~ highlights that Likely Significant Effects of habitat contamination of sensitive habitats and species are unlikely, given the distance of over 2km between the Scheme boundary and Wicken Fen. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

c. Table 4-1~~Table 4-1~~ concludes that non-physical disturbance, such as indirect lighting during construction and operation will not impact on sensitive habitats and species, given the distance of over 2km between the Scheme boundary and Wicken Fen. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

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B5. Detailed screening matrix assessing the qualifying features of the Rex Graham Reserve SAC against the identified impact pathways during construction (C columns) and operation (O columns). Decommissioning is not represented by a separate column as the effects are included within the consideration of construction.

European Site	Qualifying Features				
	Effect	Habitat Loss and/or Degradation	Habitat Contamination	Non-physical Disturbance	
	Stage of Scheme	C	C	C	O
Rex Graham Reserve SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites	✓~~×~~a	×b	×c	×c

a. The assessment in **Table 4-1**~~**Table 4-1**~~ highlights that Likely Significant Effects of habitat degradation on sensitive habitats cannot be excluded. This is because construction traffic associated with the Scheme could generate airborne pollutants that may degrade sensitive habitats and plant communities.~~The assessment in **Table 4-1** highlights that Likely Significant Effects of habitat degradation on sensitive habitats and species are unlikely, given the distance of over 3km between the Scheme boundary and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.~~

b. **Table 4-1**~~**Table 4-1**~~ concludes that habitat contamination, will not impact on sensitive habitats and species, given the distance of over 3km between the Scheme boundary and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

c. **Table 4-1**~~**Table 4-1**~~ concludes that non-physical disturbance, such as indirect lighting during construction and operation will not impact on sensitive habitats and species, given the distance of over 2km between the Scheme boundary and the designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

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B6. Detailed screening matrix assessing the qualifying features of the Breckland SAC against the identified impact pathways during construction (C columns) and operation (O columns). Decommissioning is not represented by a separate column as the effects are included within the consideration of construction.

European Site	Qualifying Features				
	Effect	Habitat Loss and/or Degradation	Habitat Contamination	Non-physical Disturbance	
	Stage of Scheme	C	C	C	O
Breckland SAC	Inland dunes with open *Corynephorus* and *Agrostis* grasslands	✓~~×~~a	×b	×c	×c
	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation	✓~~×~~a	×b	×c	×c
	European dry heaths	✓~~×~~a	×b	×c	×c
	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	✓~~×~~a	×b	×c	×c
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*	✓~~×~~a	×b	×c	×c
	Great crested newt *Triturus cristatus*	×a	×b	×c	×c

a. The assessment in **Table 4-1**~~**Table 4-1**~~ highlights that Likely Significant Effects of habitat degradation on sensitive habitats cannot be excluded. This is because construction traffic associated with the Scheme could generate airborne pollutants that may degrade sensitive habitats and plant communities.~~The assessment in **Table 4-1** highlights that Likely Significant Effects of habitat degradation on sensitive habitats and species are unlikely, given the distance of over 3km between the Scheme boundary and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.~~

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b. **Table 4-1**~~**Table 4-1**~~ concludes that habitat contamination, will not impact on sensitive habitats and species, given the distance of over 3km between the Scheme boundary and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

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c. Table 4-1~~Table 4-1~~ concludes that non-physical disturbance, such as indirect lighting during construction and operation will not impact on sensitive habitats and species, given the distance of over 2km between the Scheme boundary and the designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

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B7. Detailed screening matrix assessing the qualifying features of the Devil's Dyke SAC against the identified impact pathways during construction (C columns) and operation (O columns). Decommissioning is not represented by a separate column as the effects are included within the consideration of construction.

European Site	Qualifying Features				
	Effect	Habitat Loss and/or Degradation	Habitat Contamination	Non-physical Disturbance	
	Stage of Scheme	C	C	C	O
Devil's Dyke SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	✓~~×~~a	×b	×c	×c

a. The assessment in **Table 4-1~~Table 4-1~~** highlights that Likely Significant Effects of habitat degradation on sensitive habitats cannot be excluded. This is because construction traffic associated with the Scheme could generate airborne pollutants that may degrade sensitive habitats and plant communities. ~~The assessment in **Table 4-1** highlights that Likely Significant Effects of habitat degradation on sensitive habitats and species are unlikely, given the distance of over 3km between the Scheme boundary and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.~~

b. **Table 4-1~~Table 4-1~~** concludes that habitat contamination, will not impact on sensitive habitats and species, given the distance of over 3km between the Scheme boundary and designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

c. **Table 4-1~~Table 4-1~~** concludes that non-physical disturbance, such as indirect lighting during construction and operation will not impact on sensitive habitats and species, given the distance of over 2km between the Scheme boundary and the designated site. It is therefore considered that no likely significant effects from this impact pathway would arise; and thus it is also screened out from Appropriate Assessment.

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Annex C PINS Appropriate Assessment Matrices

9.1.1 Likely Significant Effects have been identified for the following sites:

a. Fenland SAC;

b. Chippenham Fen Ramsar; ~~and~~

c. Breckland SPA;

d. Rex Graham Reserve SAC;

e. Breckland SAC; and

~~e.~~f. Devil's Dyke SAC.~~-~~

9.1.2 These sites have been subject to further assessment in order to establish if the Scheme could have an adverse effect on their integrity, taking account of mitigation. Evidence for the conclusions reached on integrity is detailed within the footnotes to the matrices below.

Matrix Key

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

✕ = Adverse effect on integrity **can** be excluded

C = construction (decommissioning effects are considered the same as construction, so are not presented separately.

O = operation

C.1 HRA Integrity Matrix 1: Fenland SAC

Name of European site and designation: Fenland SAC				
EU Code: UK0014782				
Distance to NSIP: 0m				
European site features	**Adverse effect on integrity**			
Effect	Degradation to designated habitats through airborne pollutants (dust deposition)		In combination effects	
Stage of Development	C	O	C	O
Calcareous fens with Great Fen-sedge *Cladium mariscus* and species of the *Caricion davallianae*. (Calcium-rich fen dominated by Great Fen-sedge (saw sedge))*	X a			
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows)	X a			

a. Fenland plant communities could be affected by dust deposition during construction if it is unmanaged. However, the dust control measures that will be deployed on this Scheme (secured through the Framework CEMP) are long-standing tried and tested nature of

these measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level (Paragraph 5.1.2-5.1.6)

C.2 HRA Integrity Matrix 2: Chippenham Fen Ramsar

Name of European site and designation: Chippenham Fen Ramsar				
Site number: 544				
Distance to NSIP: 0m				
European site features	**Adverse effect on integrity**			
Effect	Degradation to designated habitats through airborne pollutants (dust deposition)		In combination effects	
Stage of Development	C	O	C	O
Ramsar Criterion 1 - A spring-fed calcareous basin mire with a long history of management, which is partly reflected in the diversity of present-day vegetation	X a			
Ramsar criterion 2 - The invertebrate fauna is very rich, partly due to its transitional position between Fenland and Breckland. The species list is very long, including many rare and scarce invertebrates characteristic of	X b			

ancient fenland sites in Britain.				
Ramsar criterion 3 - The site supports diverse vegetation types, rare and scarce plants. The site is the stronghold of Cambridge milk parsley (*Selinum carvifolia*).	X c			
Noteworthy Fauna Breeding Bird Assemblage.	X d			

a. Fenland plant communities could be affected by dust deposition during construction if it is unmanaged. However, the dust control measures that will be deployed on this Scheme (secured through the Framework CEMP) are long-standing tried and tested nature of these measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level (Paragraph 5.3.1-5.3.6).
b. Habitats supporting notable invertebrate fauna could be affected by dust deposition during construction if it is unmanaged. However, the dust control measures that will be deployed on this Scheme (secured through the Framework CEMP) are long-standing tried and tested nature of these measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust
c. Habitats supporting diverse vegetation types, rare and scare plants could be affected by dust deposition during construction if it is unmanaged. However, the dust control measures that will be deployed on this Scheme (secured through the Framework CEMP) are long-standing tried and tested nature of these measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level (Paragraph 5.3.13-5.3.18).
d. Habitats supporting a notable breeding bird assemblage could be affected by dust deposition during construction if it is unmanaged. However, the dust control measures that will be deployed on this Scheme (secured through the Framework CEMP) are long-standing tried and tested nature of these measures, which are explicitly recommended in guidance produced by the Institute of Air Quality Management as being measures that will normally reduce dust effects to an insignificant level (Paragraph 5.3.19-5.3.24).

C.3 HRA Integrity Matrix 3: Breckland SPA

Name of European site and designation: Breckland SPA								
EU Code: UK9009201								
Distance to NSIP: 1,400m								
European site features	Adverse effect on integrity							
Effect	Physical displacement of nesting and foraging Stone Curlew from functionally linked land during construction		Noise and visual disturbance to nesting Stone Curlew during construction and operation		Non-physical disturbance to Stone Curlew through construction lighting		In combination effects	
Stage of Development	C	O	C	O	C	O	C	O
Stone curlew	X a	X b	X ~~c~~b	X ~~d~~c	X ~~e~~d			

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a. The loss of up to five breeding territories for Stone Curlew due to the footprint of the Order land would have an adverse effect on the integrity of the SPA (even though it is outside the SPA boundary) as it would reduce nesting opportunities for the SPA population. Discussions with Natural England and RSPB in preparing this appropriate assessment have identified that the mitigation objective should be to ensure no net loss of breeding pairs in the Order land by delivering a replacement habitat provision before the existing habitat is lost to the Scheme. Since the area to be lost is outside the SPA boundary itself, the provision of replacement habitat does not class as 'compensation' *sensu* the Habitats Directive. The Scheme design has embedded sufficient land and specific nesting areas following relevant guidance to offset any potential reduction in arable farmland, that may in any given year be used by Stone Curlew (Paragraph 5.4.2-5.4.15).

~~a.~~b. The loss of up to five breeding territories for Stone Curlew due to the footprint of the Order land would have an adverse effect on the integrity of the SPA (even though it is outside the SPA boundary) as it would reduce nesting opportunities for the SPA population. This has already been considered in footnote a for construction, but given the impact will continue during operation, is also discussed here. Discussions with Natural England and RSPB in preparing this appropriate assessment have identified that the mitigation objective should be to ensure no net loss of breeding pairs in the Order land by delivering a replacement habitat provision before the existing habitat is lost to the Scheme. Since the area to be lost is outside the SPA boundary itself, the provision of replacement habitat does not class as 'compensation' *sensu* the Habitats Directive. The Scheme design has embedded sufficient land and specific nesting areas following relevant guidance to offset any potential reduction in arable farmland, that may in any given year be used by Stone Curlew (Paragraph 5.4.31-5.4.45)

~~b.~~c. The construction of the Scheme would have an adverse effect if it took place during the nesting season. However, all construction works within 500 m of the new habitat provisions will take place outside the Stone Curlew breeding season of March to October. With

these measures in place, it is considered that no construction-related disturbance of nesting stone curlew would occur and thus no adverse effect on the integrity of the SPA would arise through this pathway (Paragraph 5.4.16 - 5.3.20).

~~c.~~d. During operation, the Scheme will require regular maintenance visits, which if occurring within the nesting season have the potential to disturb breeding Stone Curlew. The offsetting habitats have been embedded into the Scheme in areas where operational access will not be required. Irrespective of this, all operational staff working within 500 m of the offsetting areas will also be given a toolbox talk regarding the sensitivity of Stone Curlew. As such, no adverse effect on the integrity of the SPA would arise through this pathway (Paragraph 5.3.21-5.3.23).

e. Lighting during construction of the Scheme could have an adverse effect if it took place during the nesting season. However, all construction works within 500 m of the new habitat provisions will take place outside the Stone Curlew breeding season of March to October. With these measures in place, it is considered that no construction-related disturbance, including non-physical disturbance through construction lighting, of nesting stone curlew would occur and thus no adverse effect on the integrity of the SPA would arise through this pathway (Paragraph 5.4.21 - 5.3.25)

C.4 HRA Integrity Matrix 4: Rex Graham Reserve SAC

Name of European site and designation: Rex Graham Reserve SAC				
EU Code: UK0019866				
Distance to NSIP: 3,000m				
European site features	**Adverse effect on integrity**			
Effect	Degradation to designated habitats through airborne pollutants (dust deposition)		In combination effects	
Stage of Development	C	O	C	O
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites			✓a	

a. Important habitat and plant communities could be affected by air pollutants associated with construction traffic. However, while the project will make a contr bution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Rex Graham Reserve SAC to achieve its conservation objectives (Paragraph 5.5.1-5.5.10).

C.5 HRA Integrity Matrix 5: Breckland SAC

Name of European site and designation: Breckland SAC				
Site number: UK0019865				
Distance to NSIP: 3,100m				
European site features	**Adverse effect on integrity**			
Effect	Degradation to designated habitats through airborne pollutants (dust deposition)		In combination effects	
Stage of Development	C	O	C	O
Inland dunes with open *Corynephorus* and *Agrostis* grasslands			✓*a	
Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation			✓b	
European dry heaths			✓c	
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites			✓d	
Alluvial forests with *Alnus glutinosa* and			✓e	

Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)				

a. Important habitat and plant communities could be affected by air pollutants associated with construction traffic. However, while the project will make a contr bution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Breckland SAC to achieve its conservation objectives (Paragraph 5.6.1-5.5.10).
b. Important habitat and plant communities could be affected by air pollutants associated with construction traffic. However, while the project will make a contr bution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Breckland SAC to achieve its conservation objectives (Paragraph 5.6.1-5.5.10).
c. Important habitat and plant communities could be affected by air pollutants associated with construction traffic. However, while the project will make a contr bution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Breckland SAC to achieve its conservation objectives (Paragraph 5.6.1-5.5.10).
d. Important habitat and plant communities could be affected by air pollutants associated with construction traffic. However, while the project will make a contr bution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Breckland SAC to achieve its conservation objectives (Paragraph 5.6.1-5.5.10).
e. Important habitat and plant communities could be affected by air pollutants associated with construction traffic. However, while the project will make a contr bution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Breckland SAC to achieve its conservation objectives (Paragraph 5.6.1-5.5.10).

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C.6 HRA Integrity Matrix 6: Devil's Dyke SAC

Name of European site and designation: Devil's Dyke SAC				
EU Code: UK0030037				
Distance to NSIP: 4,500m				
European site features	**Adverse effect on integrity**			
Effect	Degradation to designated habitats through airborne pollutants (dust deposition)		In combination effects	
Stage of Development	C	O	C	O
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites			✓a	

a. Important habitat and plant communities could be affected by air pollutants associated with construction traffic. However, while the project will make a contr bution to ammonia, nitrogen and acid deposition in combination with other plans and projects, it will not materially affect the ability of Devil's Dyke SAC to achieve its conservation objectives (Paragraph 5.7.1-5.7.10).

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Annex D Air Quality Modelling for Rex Graham Reserve SAC, Breckland SAC and Devil's Dyke SAC

Sunnica Energy Farm

SAC Air Quality Assessment

Sunnica Energy Farm Ltd

January 2023

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
Jessica Heredge Air Quality Consultant	Julian Mann Senior Air Quality Consultant	Jessica Muirhead Principal Air Quality Consultant	Neal Gates Technical Director (Ecology)

Revision History

Revision	Revision date	Details	Authorized	Name	Position
1.0	06/01/2023	Internal issue	JM	Jessica Muirhead	Principal Air Quality Consultant
1.1	13/01/2023	External Release	NG	Neal Gates	Technical Director (Ecology)

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

Sunnica Energy Farm Ltd

Prepared by:

Jessica Heredge
Air Quality Consultant
E: [redacted]aecom.com

AECOM Limited
Midpoint, Alencon Link
Basingstoke
Hampshire RG21 7PP
United Kingdom

T: +44(0)1256 310200
[redacted]

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Assessment Criteria

Critical Levels

Annual mean critical levels of NO_x and NH_3 are summarised in Table 1. These are concentrations above which adverse effects on ecosystems may occur based on present knowledge. The critical level for NO_x is taken from the EU Ambient Air Quality Directive 2008/50/EU [1] which has also been set as the Air Quality Strategy objective for the protection of vegetation and ecosystems, and has been incorporated into English legislation.

The critical levels for NH_3 have not been incorporated into legislation and are a recommendation made by the United Nations Economic Commission for Europe (UNECE) Executive Body for the Convention on Long-Range Transboundary Air Pollution (CLRTAP) [2].

Table 1 Annual Mean Critical Levels (NO_x and NH_3)

Pollutant	Critical Level
Oxides of nitrogen (NOx)	30 µg/m^3
Ammonia (NH_3)	3 µg/m^3 for higher plants 1 µg/m^3 for lichens and bryophytes

Pollutants of Interest

The pollutants of interest with regard to sensitive ecosystems for which critical levels and critical loads exist, and which are included in the air quality modelling and assessment of impacts on the SACs, are NO_x, NH_3, and nitrogen and acid deposition. Modelling of these pollutants is undertaken to assess the air quality impacts of the Proposed Development.

Nitrogen Oxides

Defra has published an Emissions Factors Toolkit (EFT) containing NO_x emissions rates for local authorities to use for Local Air Quality Management (LAQM) assessments. The EFT is also used for other purposes including Environmental Impact Assessments (EIAs) and HRAs. Version 11.0 of the EFT was updated to extend the basic vehicle fleet mix for roads in England (excluding London) up to 2050. The basic vehicle fleet splits are based on data provided by DfT / Highways England (now National Highways). The composition of Euro emission standards and distribution of vehicle sizes/weights remain constant from 2030 until 2050.

The intended use of the extended dataset to 2050 is in support of climate assessments and appraisals only. However, Defra advises that "*Where emissions are to be used after 2030 to inform air quality assessments, the appropriate caveats around the limitations of the analysis must be included to accompany the assessment*".

Detailed dispersion modelling of road traffic emissions of NO_x has been undertaken using the latest version of ADMS Roads (currently v5), combined with the EFT v11.0 emission rates. The subsequent contribution of emitted NOx to nitrogen deposition within the SAC has also been assessed.

Ammonia

In February 2020, Air Quality Consultants developed and published the Calculator for Road Emissions of Ammonia (CREAM) tool, "*in order to allow tentative predictions regarding trends in traffic-related ammonia emissions over time"*. The tool is based upon remotely sensed pollutant measurements, published real-world fuel consumption data, and ambient measurements of ammonia recorded in Ashdown Forest (2014-2016).

The report that was published alongside the CREAM tool states that:

> "*It should be recognised that these emissions factors remain uncertain. Using them to make future year predictions will clearly be an improvement on any assessment which omits ammonia. They are also considered to be more robust than the emissions factors contained in the EEA Guidebook, which risk*

significantly under-predicting ammonia emissions. The emissions factors contained in the CREAM model can be considered to provide the most robust estimate of traffic-related ammonia possible at the present time, but they may be updated in the future as more information becomes available."

The CREAM tool currently uses vehicle fleet information from Defra's EFT v9 which has now been superseded. AECOM has therefore applied the ammonia emission factors, as derived by Air Quality Consultants and in the current version of CREAM, with the average vehicle fleet on rural roads from EFT v11.0 to estimate emissions in the SAC.

The latest version of ADMS Roads has been employed to model the dispersion of emissions of NH_3 from road traffic, consistent with the approach for modelling emissions of NOx, and the subsequent contribution of emitted NH_3 to nitrogen deposition within the SAC has also been assessed.

Model Data

Receptors

Construction phase road traffic impacts were assessed for the following SACs along 200m transects extending from the nearest point of the SAC to the road edge:

- Devil's Dyke (transect T1);
- Breckland (transects T2 & T3); and
- Rex Graham (transect T4).

Individual model receptors were placed at 10m intervals from the nearest point to the road edge out to 200m from the road edge along each transect. Figures 1-4 show the locations of the transects with respect to the modelled roads.

Background Data

Background concentrations of NO_2 and NO_x for 2019 and 2023 were extracted from Defra's 2018-based 1x1 km background maps [3]. Contributions from explicitly modelled source sectors were removed from the background concentrations, in accordance with Defra guidance [4]. This is consistent with the methodology applied in the initial Air Quality Impact Assessment for the Proposed Development.

These data are presented in Table 2.

Table 2 Defra Mapped Background Pollutant Concentrations

Transects	Road Name	Grid Square (X, Y)	Annual Mean Concentrations(µg/m³)			
			2019 NO_x	2019 NO_2	2023 NO_x	2023 NO_2
T1	A14	560500, 262500	11.0	8.5	9.1	7.1
T2	A11	578500, 277500	8.8	6.9	7.6	6.0
T3	A11	578500, 277500	8.8	6.9	7.6	6.0
T4	A11	573500, 274500	9.3	7.3	7.9	6.2

Note: Sectors removed as emissions included in detailed dispersion modelling: Motorway (in of 1x1km grid square), Trunk A road (in of 1x1km grid square) and Primary A Road (in of 1x1km grid square)

Ecological Data

The Air Pollution Information System (APIS[1]) provides '*a searchable database and information on pollutants and their impacts on habitats and species*'. Data for the appropriate habitats have been applied for each receptor in the study. This includes critical loads of nitrogen and the average nitrogen and acid deposition rates to the habitat, as presented in Table 3.

Background concentrations of ammonia were also sourced from modelled maps available from APIS, thereby accounting for all sources that are not explicitly defined in the model. This assessment has utilised the minimum rate of improvement in background nitrogen deposition of 0.07 kgN/ha/yr, as forecast by the Nitrogen Futures study [5].

Table 3 APIS Data for Ecological Transects for 2018-2020

Transect	Average N Dep kgN/ha/yr[$]	Critical Load N Dep kgN/ha/yr	Total Av. Acid Dep keq/ha/yr N[$]	Critical Load N Acid Dep keq/ha/yr MinCLMaxN	Background NH_3 (µg/m^3)*
T1	17.8	15 - 25	1.32	4.86	2.04
T2	23.0	8 - 15	1.67	4.36	2.83
T3	23.0	8 - 15	1.67	4.36	2.83
T4	19.2	15 - 25	1.41	4.86	2.32

Note: [$] Average nitrogen deposition rate (kgN/ha/yr) projected to decrease by 0.28 kgN/ha/yr from base year to future year (i.e. 0.07 x 4 years = 0.28 kgN/ha/yr). This results in a corresponding decrease in acid deposition of 0.02 keq/ha/yr N.

Nitrogen Deposition

Deposited nitrogen (kgN/ha/year) from road traffic derived NH_3 and NO_2 was estimated using the conversion rates and deposition velocities presented in Table 4. All transects were modelled and analysed using data for 'grassland' habitats.

Table 4 Nitrogen Conversion Rates and Deposition Velocities

Pollutant	Habitat	Nitrogen deposition conversion rates	Deposition velocity
NO_2	Grassland	1 µg/m^3 NO_2 = 0.29 kgN/ha/yr	0.0015 m/s
NH_3	Grassland	1 µg/m^3 NH_3 = 7.8 kgN/ha/yr	0.020 m/s

[1] [redacted]

Model Results

The following tables present the results of the air quality assessment for the SACs, demonstrating contributions from the Scheme alone and in-combination with future traffic baseline, as well as critical load thresholds. Further analysis and interpretation of these data have been provided in the HRA.

Table 5 Total Annual Mean NO_x (µg/m^3)

Transect Point	2019 Baseline	2023 Future Baseline	2023 DM	2023 DM + Construction	Change (DS-DM)	Change (DS-FB)
T1_135.5m	**33.64**	22.87	24.19	24.34	0.15	1.46
T1_140m	**33.12**	22.55	23.84	23.99	0.14	1.43
T1_150m	**32.05**	21.90	23.13	23.27	0.14	1.36
T1_160m	**31.07**	21.31	22.48	22.61	0.13	1.30
T1_170m	**30.17**	20.77	21.89	22.01	0.13	1.25
T1_180m	29.35	20.27	21.34	21.46	0.12	1.19
T1_190m	28.60	19.81	20.84	20.95	0.12	1.14
T1_200m	27.90	19.38	20.37	20.48	0.11	1.10
T2_10.95m	49.98	33.25	35.56	35.82	0.26	2.57
T2_20m	38.91	26.34	28.05	28.25	0.20	1.91
T2_30m	32.37	22.25	23.61	23.77	0.15	1.52
T2_40m	28.32	19.72	20.86	20.99	0.13	1.27
T2_50m	25.52	17.97	18.96	19.07	0.11	1.10
T2_60m	23.44	16.68	17.55	17.64	0.10	0.97
T2_70m	21.84	15.68	16.45	16.54	0.09	0.86
T2_80m	20.55	14.88	15.58	15.66	0.08	0.78
T2_90m	19.50	14.22	14.86	14.93	0.07	0.71
T2_100m	18.62	13.67	14.26	14.32	0.07	0.65
T2_110m	17.87	13.20	13.75	13.81	0.06	0.61
T2_120m	17.22	12.80	13.30	13.36	0.06	0.56
T2_130m	16.67	12.45	12.92	12.98	0.05	0.52
T2_140m	16.18	12.15	12.59	12.64	0.05	0.49
T2_150m	15.75	11.88	12.29	12.34	0.05	0.46
T2_160m	15.36	11.64	12.03	12.08	0.04	0.44
T2_170m	15.02	11.43	11.80	11.84	0.04	0.41
T2_180m	14.72	11.24	11.59	11.63	0.04	0.39
T2_190m	14.44	11.06	11.40	11.44	0.04	0.37
T2_200m	14.19	10.90	11.23	11.26	0.04	0.36
T3_9.35m	**48.16**	**32.04**	**34.22**	**34.46**	0.24	2.41
T3_10m	**47.37**	**31.55**	**33.69**	**33.92**	0.23	2.37
T3_20m	**38.72**	26.17	27.87	28.05	0.19	1.88
T3_30m	**33.56**	22.96	24.39	24.54	0.16	1.58
T3_40m	**30.09**	20.80	22.04	22.18	0.14	1.37
T3_50m	27.52	19.21	20.31	20.43	0.12	1.22
T3_60m	25.56	17.98	18.97	19.08	0.11	1.10
T3_70m	23.97	17.00	17.90	18.00	0.10	1.00
T3_80m	22.67	16.19	17.01	17.10	0.09	0.92
T3_90m	21.57	15.50	16.26	16.35	0.08	0.85
T3_100m	20.63	14.92	15.62	15.70	0.08	0.78
T3_110m	19.82	14.41	15.07	15.14	0.07	0.73
T3_120m	19.11	13.97	14.59	14.65	0.07	0.68
T3_130m	18.49	13.58	14.16	14.22	0.06	0.64
T3_140m	17.93	13.24	13.78	13.84	0.06	0.61
T3_150m	17.44	12.93	13.45	13.50	0.06	0.57
T3_160m	17.00	12.66	13.14	13.20	0.05	0.54
T3_170m	16.60	12.41	12.87	12.92	0.05	0.52
T3_180m	16.24	12.18	12.63	12.68	0.05	0.49
T3_190m	15.92	11.98	12.41	12.45	0.05	0.47

Transect Point	2019 Baseline	2023 Future Baseline	2023 DM	2023 DM + Construction	Change (DS-DM)	Change (DS-FB)
T3_200m	15.62	11.80	12.20	12.25	0.05	0.45
T4_26.45m	**38.47**	26.07	27.72	27.90	0.18	1.83
T4_30m	**36.44**	24.81	26.35	26.52	0.17	1.71
T4_40m	**32.13**	22.13	23.44	23.59	0.15	1.46
T4_50m	29.09	20.24	21.39	21.52	0.13	1.28
T4_60m	26.80	18.81	19.84	19.95	0.11	1.14
T4_70m	24.99	17.68	18.61	18.71	0.10	1.03
T4_80m	23.52	16.77	17.62	17.71	0.09	0.94
T4_90m	22.30	16.01	16.79	16.87	0.09	0.86
T4_100m	21.27	15.37	16.08	16.16	0.08	0.79
T4_110m	20.38	14.81	15.47	15.55	0.07	0.74
T4_120m	19.61	14.33	14.95	15.02	0.07	0.69
T4_130m	18.93	13.91	14.49	14.55	0.06	0.64
T4_140m	18.33	13.54	14.08	14.14	0.06	0.60
T4_150m	17.79	13.21	13.71	13.77	0.06	0.56
T4_160m	17.32	12.91	13.39	13.44	0.05	0.53
T4_170m	16.89	12.64	13.10	13.15	0.05	0.50
T4_180m	16.51	12.40	12.83	12.88	0.05	0.48
T4_190m	16.16	12.19	12.59	12.64	0.05	0.45
T4_200m	15.84	11.99	12.38	12.42	0.04	0.43

Table 6 Total Annual Mean NH_3 (µg/m^3)

Transect Point	2019 Baseline	2023 Future Baseline	2023 DM	2023 DM + Construction	Change (DS-DM)	Change (DS-FB)
T1_135.5m	2.87	2.93	**3.02**	**3.03**	0.01	0.09
T1_140m	2.85	2.91	3.00	**3.01**	0.01	0.09
T1_150m	2.81	2.87	2.95	2.96	0.01	0.09
T1_160m	2.78	2.83	2.91	2.92	0.01	0.08
T1_170m	2.75	2.80	2.87	2.88	0.01	0.08
T1_180m	2.72	2.76	2.83	2.84	0.01	0.08
T1_190m	2.69	2.73	2.80	2.81	0.01	0.07
T1_200m	2.66	2.71	2.77	2.78	0.01	0.07
T2_10.95m	4.21	4.32	4.45	4.47	0.02	0.15
T2_20m	3.84	3.92	4.02	4.03	0.01	0.11
T2_30m	3.62	3.68	3.76	3.77	0.01	0.09
T2_40m	3.49	3.54	3.60	3.61	0.01	0.08
T2_50m	3.39	3.44	3.49	3.50	0.01	0.06
T2_60m	3.32	3.36	3.41	3.42	0.01	0.06
T2_70m	3.27	3.30	3.35	3.35	0.01	0.05
T2_80m	3.23	3.26	3.30	3.30	0.01	0.05
T2_90m	3.19	3.22	3.25	3.26	<0.01	0.04
T2_100m	3.16	3.19	3.22	3.22	<0.01	0.04
T2_110m	3.13	3.16	3.19	3.19	<0.01	0.04
T2_120m	3.11	3.13	3.16	3.17	<0.01	0.03
T2_130m	3.09	3.11	3.14	3.15	<0.01	0.03
T2_140m	3.08	3.10	3.12	3.13	<0.01	0.03
T2_150m	3.06	3.08	3.11	3.11	<0.01	0.03
T2_160m	3.05	3.07	3.09	3.09	<0.01	0.03
T2_170m	3.04	3.05	3.08	3.08	<0.01	0.02
T2_180m	3.03	3.04	3.06	3.07	<0.01	0.02
T2_190m	3.02	3.03	3.05	3.06	<0.01	0.02
T2_200m	3.01	3.02	3.04	3.05	<0.01	0.02
T3_9.35m	**4.17**	**4.27**	**4.40**	**4.41**	0.02	0.14
T3_10m	**4.14**	**4.24**	**4.36**	**4.38**	0.02	0.14

Transect Point	2019 Baseline	2023 Future Baseline	2023 DM	2023 DM + Construction	Change (DS-DM)	Change (DS-FB)
T3_20m	**3.84**	**3.92**	**4.02**	**4.03**	0.01	0.11
T3_30m	**3.67**	**3.73**	**3.82**	**3.83**	0.01	0.09
T3_40m	**3.55**	**3.60**	**3.68**	**3.69**	0.01	0.08
T3_50m	**3.46**	**3.51**	**3.58**	**3.58**	0.01	0.07
T3_60m	**3.40**	**3.44**	**3.50**	**3.50**	0.01	0.07
T3_70m	**3.34**	**3.38**	**3.43**	**3.44**	0.01	0.06
T3_80m	**3.30**	**3.33**	**3.38**	**3.39**	0.01	0.05
T3_90m	**3.26**	**3.29**	**3.34**	**3.34**	0.01	0.05
T3_100m	**3.23**	**3.26**	**3.30**	**3.31**	0.01	0.05
T3_110m	**3.20**	**3.23**	**3.27**	**3.27**	<0.01	0.04
T3_120m	**3.18**	**3.20**	**3.24**	**3.24**	<0.01	0.04
T3_130m	**3.16**	**3.18**	**3.21**	**3.22**	<0.01	0.04
T3_140m	**3.14**	**3.16**	**3.19**	**3.20**	<0.01	0.04
T3_150m	**3.12**	**3.14**	**3.17**	**3.18**	<0.01	0.03
T3_160m	**3.11**	**3.13**	**3.16**	**3.16**	<0.01	0.03
T3_170m	**3.09**	**3.11**	**3.14**	**3.14**	<0.01	0.03
T3_180m	**3.08**	**3.10**	**3.13**	**3.13**	<0.01	0.03
T3_190m	**3.07**	**3.09**	**3.11**	**3.12**	<0.01	0.03
T3_200m	**3.06**	**3.08**	**3.10**	**3.10**	<0.01	0.03
T4_26.45m	**3.31**	**3.39**	**3.49**	**3.50**	0.01	0.11
T4_30m	**3.25**	**3.32**	**3.41**	**3.42**	0.01	0.10
T4_40m	**3.10**	**3.16**	**3.23**	**3.24**	0.01	0.09
T4_50m	**3.00**	**3.05**	**3.11**	**3.12**	0.01	0.08
T4_60m	2.92	2.96	**3.02**	**3.03**	0.01	0.07
T4_70m	2.86	2.90	2.95	2.96	0.01	0.06
T4_80m	2.81	2.84	2.89	2.90	0.01	0.06
T4_90m	2.77	2.80	2.84	2.85	0.01	0.05
T4_100m	2.73	2.76	2.80	2.81	0.01	0.05
T4_110m	2.70	2.73	2.77	2.77	<0.01	0.04
T4_120m	2.67	2.70	2.74	2.74	<0.01	0.04
T4_130m	2.65	2.68	2.71	2.71	<0.01	0.04
T4_140m	2.63	2.65	2.69	2.69	<0.01	0.04
T4_150m	2.61	2.63	2.66	2.67	<0.01	0.03
T4_160m	2.60	2.62	2.64	2.65	<0.01	0.03
T4_170m	2.58	2.60	2.63	2.63	<0.01	0.03
T4_180m	2.57	2.59	2.61	2.62	<0.01	0.03
T4_190m	2.56	2.57	2.60	2.60	<0.01	0.03
T4_200m	2.55	2.56	2.59	2.59	<0.01	0.03

Table 7 Combined Total Annual Mean N Deposition (kgN/ha/yr) - NO_x and NH_3

Transect Point	2019 Baseline	2023 Future Baseline	2023 DM	2023 DM + Construction	Change (DS-DM)	Change (DS-FB)
T1_135.5m	23.87	23.25	23.80	23.85	0.05	0.59
T1_140m	23.73	23.12	23.65	23.70	0.05	0.58
T1_150m	23.44	22.85	23.36	23.41	0.05	0.55
T1_160m	23.19	22.60	23.09	23.14	0.05	0.53
T1_170m	22.95	22.38	22.84	22.89	0.04	0.51
T1_180m	22.73	22.17	22.62	22.66	0.04	0.49
T1_190m	22.53	21.98	22.41	22.45	0.04	0.47
T1_200m	22.35	21.81	22.22	22.26	0.04	0.45
T2_10.95m	33.17	32.37	33.23	33.34	0.11	0.97
T2_20m	30.49	29.80	30.45	30.53	0.08	0.73
T2_30m	28.89	28.28	28.79	28.86	0.07	0.58
T2_40m	27.89	27.33	27.76	27.81	0.06	0.49

Transect Point	2019 Baseline	2023 Future Baseline	2023 DM	2023 DM + Construction	Change (DS-DM)	Change (DS-FB)
T2_50m	27.20	26.67	27.04	27.09	0.05	0.42
T2_60m	26.68	26.18	26.51	26.55	0.04	0.37
T2_70m	26.28	25.80	26.10	26.13	0.04	0.33
T2_80m	25.96	25.50	25.76	25.80	0.03	0.30
T2_90m	25.69	25.25	25.49	25.52	0.03	0.27
T2_100m	25.47	25.04	25.26	25.29	0.03	0.25
T2_110m	25.29	24.86	25.07	25.10	0.03	0.23
T2_120m	25.12	24.71	24.90	24.93	0.03	0.22
T2_130m	24.98	24.58	24.76	24.78	0.02	0.20
T2_140m	24.86	24.46	24.63	24.65	0.02	0.19
T2_150m	24.75	24.36	24.52	24.54	0.02	0.18
T2_160m	24.65	24.27	24.42	24.44	0.02	0.17
T2_170m	24.57	24.19	24.33	24.35	0.02	0.16
T2_180m	24.49	24.12	24.25	24.27	0.02	0.15
T2_190m	24.42	24.05	24.18	24.19	0.02	0.14
T2_200m	24.36	23.99	24.11	24.13	0.02	0.14
T3_9.35m	32.81	32.03	32.85	32.95	0.10	0.92
T3_10m	32.62	31.84	32.65	32.75	0.10	0.90
T3_20m	30.49	29.80	30.44	30.52	0.08	0.72
T3_30m	29.21	28.58	29.12	29.19	0.07	0.61
T3_40m	28.35	27.76	28.23	28.29	0.06	0.53
T3_50m	27.71	27.16	27.57	27.63	0.05	0.47
T3_60m	27.22	26.69	27.07	27.11	0.05	0.42
T3_70m	26.82	26.31	26.66	26.70	0.04	0.38
T3_80m	26.50	26.01	26.32	26.36	0.04	0.35
T3_90m	26.22	25.74	26.03	26.07	0.04	0.33
T3_100m	25.98	25.52	25.79	25.82	0.03	0.30
T3_110m	25.78	25.33	25.58	25.61	0.03	0.28
T3_120m	25.60	25.16	25.40	25.43	0.03	0.26
T3_130m	25.44	25.01	25.23	25.26	0.03	0.25
T3_140m	25.30	24.88	25.09	25.12	0.03	0.23
T3_150m	25.18	24.76	24.96	24.99	0.02	0.22
T3_160m	25.07	24.66	24.85	24.87	0.02	0.21
T3_170m	24.97	24.56	24.74	24.76	0.02	0.20
T3_180m	24.88	24.48	24.65	24.67	0.02	0.19
T3_190m	24.80	24.40	24.56	24.58	0.02	0.18
T3_200m	24.72	24.33	24.49	24.51	0.02	0.17
T4_26.45m	26.56	25.88	26.50	26.58	0.08	0.70
T4_30m	26.05	25.40	25.98	26.05	0.07	0.66
T4_40m	24.98	24.38	24.88	24.94	0.06	0.56
T4_50m	24.23	23.66	24.10	24.15	0.06	0.49
T4_60m	23.65	23.11	23.50	23.55	0.05	0.44
T4_70m	23.20	22.69	23.04	23.08	0.04	0.40
T4_80m	22.83	22.34	22.66	22.70	0.04	0.36
T4_90m	22.53	22.05	22.35	22.38	0.04	0.33
T4_100m	22.27	21.80	22.08	22.11	0.03	0.31
T4_110m	22.04	21.59	21.84	21.88	0.03	0.28
T4_120m	21.85	21.41	21.65	21.67	0.03	0.26
T4_130m	21.68	21.25	21.47	21.50	0.03	0.25
T4_140m	21.53	21.11	21.31	21.34	0.03	0.23
T4_150m	21.39	20.98	21.17	21.20	0.02	0.22
T4_160m	21.27	20.87	21.05	21.07	0.02	0.21
T4_170m	21.16	20.77	20.94	20.96	0.02	0.19
T4_180m	21.07	20.67	20.84	20.86	0.02	0.18
T4_190m	20.98	20.59	20.75	20.77	0.02	0.18
T4_200m	20.90	20.52	20.66	20.68	0.02	0.17

Table 8 Combined Total Annual Mean N Acid Deposition (keq/ha/yr) – NO_x and NH_3

Transect Point	2019 Baseline	2023 Future Baseline	2023 DM	2023 DM + Construction	Change (DS-DM)	Change (DS-FB)
T1_135.5m	1.70	1.66	1.70	1.70	<0.01	0.04
T1_140m	1.69	1.65	1.69	1.69	<0.01	0.04
T1_150m	1.67	1.63	1.67	1.67	<0.01	0.04
T1_160m	1.66	1.61	1.65	1.65	<0.01	0.04
T1_170m	1.64	1.60	1.63	1.63	<0.01	0.04
T1_180m	1.62	1.58	1.62	1.62	<0.01	0.03
T1_190m	1.61	1.57	1.60	1.60	<0.01	0.03
T1_200m	1.60	1.56	1.59	1.59	<0.01	0.03
T2_10.95m	2.37	2.31	2.37	2.38	0.01	0.07
T2_20m	2.18	2.13	2.17	2.18	0.01	0.05
T2_30m	2.06	2.02	2.06	2.06	<0.01	0.04
T2_40m	1.99	1.95	1.98	1.99	<0.01	0.03
T2_50m	1.94	1.90	1.93	1.93	<0.01	0.03
T2_60m	1.91	1.87	1.89	1.90	<0.01	0.03
T2_70m	1.88	1.84	1.86	1.87	<0.01	0.02
T2_80m	1.85	1.82	1.84	1.84	<0.01	0.02
T2_90m	1.84	1.80	1.82	1.82	<0.01	0.02
T2_100m	1.82	1.79	1.80	1.81	<0.01	0.02
T2_110m	1.81	1.78	1.79	1.79	<0.01	0.02
T2_120m	1.79	1.77	1.78	1.78	<0.01	0.02
T2_130m	1.78	1.76	1.77	1.77	<0.01	0.01
T2_140m	1.78	1.75	1.76	1.76	<0.01	0.01
T2_150m	1.77	1.74	1.75	1.75	<0.01	0.01
T2_160m	1.76	1.73	1.74	1.75	<0.01	0.01
T2_170m	1.75	1.73	1.74	1.74	<0.01	0.01
T2_180m	1.75	1.72	1.73	1.73	<0.01	0.01
T2_190m	1.74	1.72	1.73	1.73	<0.01	0.01
T2_200m	1.74	1.71	1.72	1.72	<0.01	0.01
T3_9.35m	2.34	2.29	2.35	2.35	0.01	0.07
T3_10m	2.33	2.27	2.33	2.34	0.01	0.06
T3_20m	2.18	2.13	2.17	2.18	0.01	0.05
T3_30m	2.09	2.04	2.08	2.09	<0.01	0.04
T3_40m	2.03	1.98	2.02	2.02	<0.01	0.04
T3_50m	1.98	1.94	1.97	1.97	<0.01	0.03
T3_60m	1.94	1.91	1.93	1.94	<0.01	0.03
T3_70m	1.92	1.88	1.90	1.91	<0.01	0.03
T3_80m	1.89	1.86	1.88	1.88	<0.01	0.03
T3_90m	1.87	1.84	1.86	1.86	<0.01	0.02
T3_100m	1.86	1.82	1.84	1.84	<0.01	0.02
T3_110m	1.84	1.81	1.83	1.83	<0.01	0.02
T3_120m	1.83	1.80	1.81	1.82	<0.01	0.02
T3_130m	1.82	1.79	1.80	1.80	<0.01	0.02
T3_140m	1.81	1.78	1.79	1.79	<0.01	0.02
T3_150m	1.80	1.77	1.78	1.78	<0.01	0.02
T3_160m	1.79	1.76	1.77	1.78	<0.01	0.01
T3_170m	1.78	1.75	1.77	1.77	<0.01	0.01
T3_180m	1.78	1.75	1.76	1.76	<0.01	0.01
T3_190m	1.77	1.74	1.75	1.76	<0.01	0.01
T3_200m	1.77	1.74	1.75	1.75	<0.01	0.01
T4_26.45m	1.90	1.85	1.89	1.90	0.01	0.05
T4_30m	1.86	1.81	1.86	1.86	0.01	0.05
T4_40m	1.78	1.74	1.78	1.78	<0.01	0.04
T4_50m	1.73	1.69	1.72	1.72	<0.01	0.04
T4_60m	1.69	1.65	1.68	1.68	<0.01	0.03

Transect Point	2019 Baseline	2023 Future Baseline	2023 DM	2023 DM + Construction	Change (DS-DM)	Change (DS-FB)
T4_70m	1.66	1.62	1.65	1.65	<0.01	0.03
T4_80m	1.63	1.60	1.62	1.62	<0.01	0.03
T4_90m	1.61	1.58	1.60	1.60	<0.01	0.02
T4_100m	1.59	1.56	1.58	1.58	<0.01	0.02
T4_110m	1.57	1.54	1.56	1.56	<0.01	0.02
T4_120m	1.56	1.53	1.55	1.55	<0.01	0.02
T4_130m	1.55	1.52	1.53	1.54	<0.01	0.02
T4_140m	1.54	1.51	1.52	1.52	<0.01	0.02
T4_150m	1.53	1.50	1.51	1.51	<0.01	0.02
T4_160m	1.52	1.49	1.50	1.51	<0.01	0.01
T4_170m	1.51	1.48	1.50	1.50	<0.01	0.01
T4_180m	1.50	1.48	1.49	1.49	<0.01	0.01
T4_190m	1.50	1.47	1.48	1.48	<0.01	0.01
T4_200m	1.49	1.47	1.48	1.48	<0.01	0.01

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[5] JNCC, “Nitrogen Futures 2020, JNCC Report 665,” 2020. [Online]. Available: https://hub.jncc.gov.uk/assets/04f4896c-7391-47c3-ba02-8278925a99c5.

Appendix A Figures

Figure 1 Modelled Road Network and All Modelled Transects

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PROJECT
SUNNICA ENERGY FARM

CLIENT
SUNNICA LTD.

CONSULTANT
AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP, UK
T +44-(0)1256-824500

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- SAC

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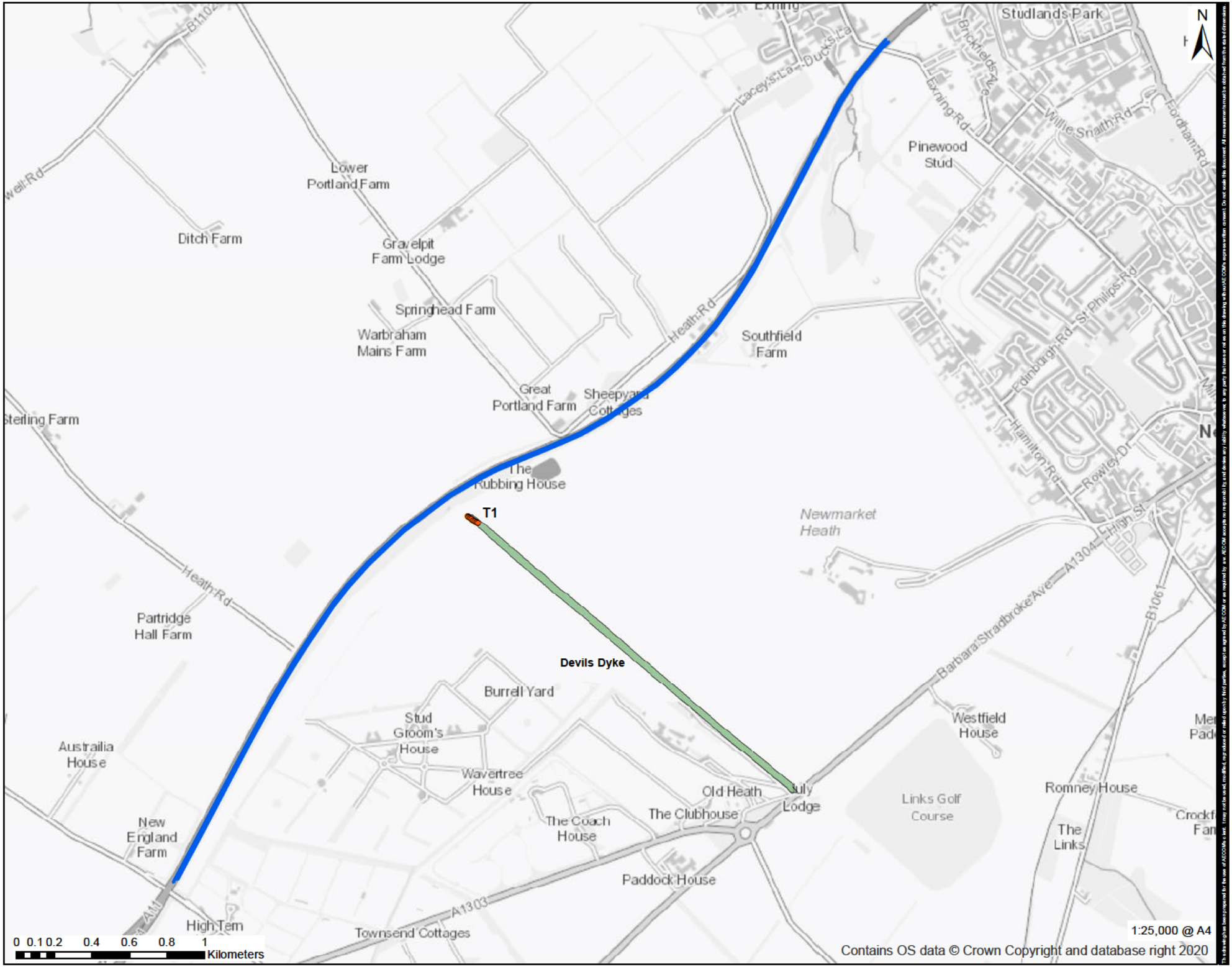
SHEET TITLE
MODELLED ROAD NETWORK AND TRANSECT LOCATIONS

SHEET NUMBER

Figure 2 Modelled Road Network, Devil's Dyke SAC and Transect T1



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PROJECT
SUNNICA ENERGY FARM

CLIENT
SUNNICA LTD.

CONSULTANT
AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP, UK
T +44-(0)1256-824500
[redacted]

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Figure 3 Modelled Road Network, Breckland SAC and Transects T2 and T3

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SUNNICA ENERGY FARM

CLIENT
SUNNICA LTD.

CONSULTANT
AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP, UK
T +44-(0)1256-824500
[redacted]

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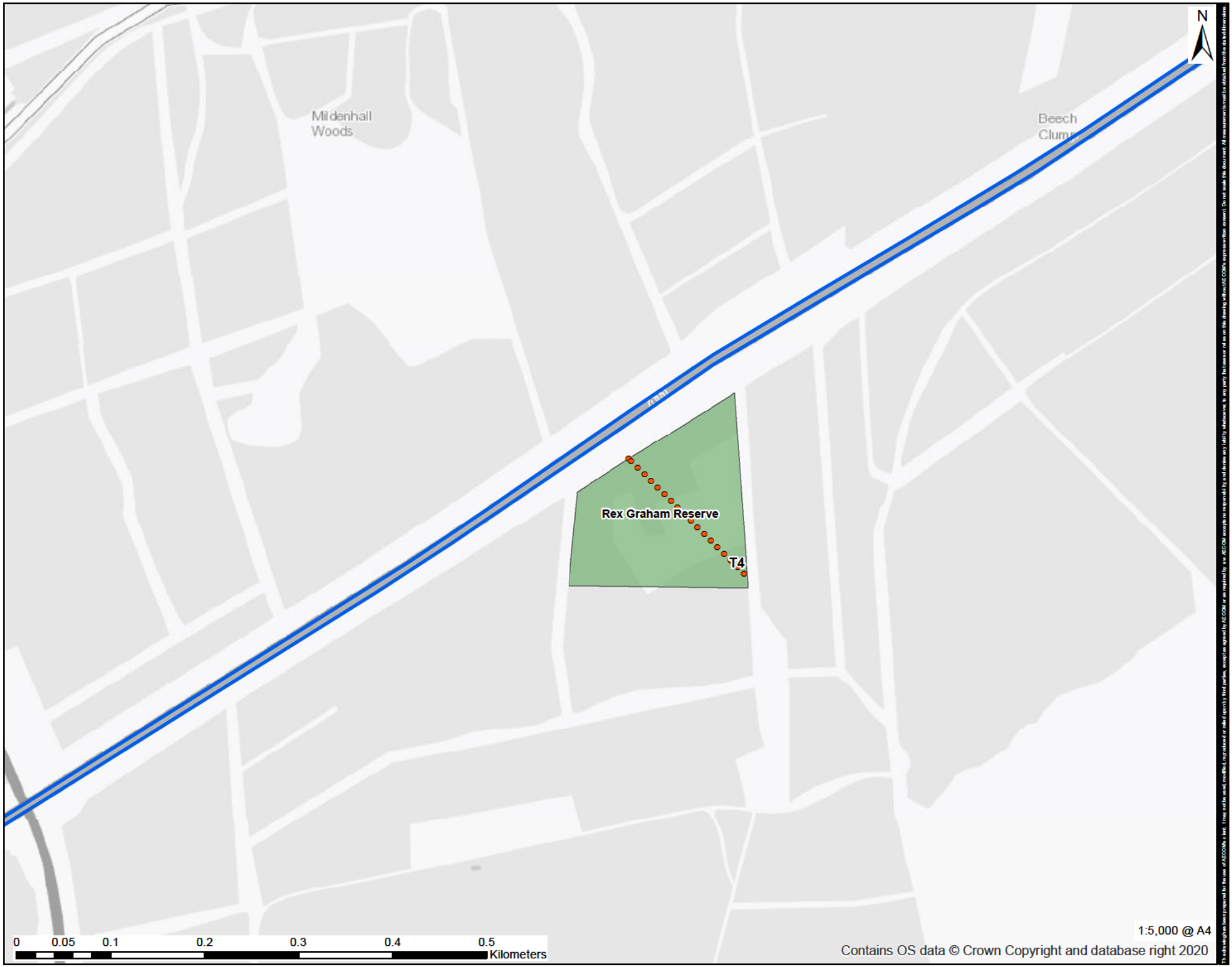
Figure 4 Modelled Road Network, Rex Graham SAC and Transect T4



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PROJECT
SUNNICA ENERGY FARM

CLIENT
SUNNICA LTD.

CONSULTANT
AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP, UK
T +44-(0)1256-824500

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