



BEACON FEN ENERGY PARK

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Chapter 18: Cumulative Effects

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Table of Contents

18.	Cumulative Effects and Interactions.....	1
18.1	Introduction	1
18.2	Legislative Context	1
18.3	Consultation.....	2
18.4	Assessment Methodology.....	3
18.5	Inter-Cumulative Effects.....	6
18.6	Intra-Cumulative	13

Tables

Table 18.1	Scoping Opinion Key Themes – Cumulative Effects.....	2
Table 18.2	Zol extents for assessment of potential cumulative impacts	4
Table 18.3:	Summary of Inter-Cumulative Effects	8
Table 18.4	Summary of Intra Cumulative Effect Interactions during Construction and Decommissioning.....	15
Table 18.5	Summary of Intra Cumulative Effect Interactions during Operation	18

18. Cumulative Effects

18.1 Introduction

18.1.1 In accordance with Schedule 4 of the EIA Regulations, an assessment of potential cumulative effects associated with the Proposed Development has been undertaken, a summary of which is provided within this Chapter. Cumulative effects can take two forms; inter-cumulative and intra-cumulative, which are defined as follows:

- **Inter-Cumulative Effects** – the assessment of inter-cumulative effects considers where there is the potential for the Proposed Development to result in significant effects in combination with other developments. Chapters 6 to 16 of this ES assess where there are inter-cumulative effects, and a summary is provided in this chapter.
- **Intra-Cumulative Effects** – the assessment of intra-cumulative effects considers the interactions between residual impacts of the Proposed Development (in isolation) likely to be experienced for each type of receptor and assesses the significance of these cumulative effects. Chapters 6 to 16 of this Environmental Statement (ES) assess potential intra-cumulative effects, and a summary is provided in this chapter.

18.1.2 A description of the assessment methodology for cumulative effects can be found in **Chapter 4: Scope and Methodology (Document Ref: 6.2 ES Vol.1, 6.2.4)** of the ES. The assessment of cumulative effects has been undertaken with regard to the Nationally Significant Infrastructure Projects (NSIP): Advice on Cumulative Effects Assessment¹ (September 2024).

18.2 Legislative Context

18.2.1 The Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 ('EIA Regulations') references the requirement for an assessment of the effect interactions between types of effect and states that:

"The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors-

...(e) the interaction between the factors referred to in sub-paragraphs (a) to (d)."

18.2.2 Schedule 4, paragraph 5 of the EIA Regulations requires an ES to include:

"A description of the likely significant effects of the development on the environment resulting from, inter alia:

...(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of

¹ <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-cumulative-effects-assessment> (accessed March 2025)

particular environmental importance likely to be affected or the use of natural resources...

The description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development”.

- 18.2.3 In accordance with Schedule 4 of the EIA Regulations, an assessment of potential cumulative effects associated with the Proposed Development has been considered. As highlighted above, cumulative impacts can take two forms; intra-cumulative and inter-cumulative. Consideration of both has been included within the ES.

18.3 Consultation

- 18.3.1 As part of **Appendix 2.1 Scoping Report (Document Ref: 6.3 ES Vol.2, 6.3.1)**, a request for a Scoping Opinion (see **Appendix 2.2 Scoping Opinion (Document Ref: 6.3 ES Vol.2, 6.3.2)**) was sought from the Planning Inspectorate (PINS) (on behalf of the Secretary of State (SoS)) in 2023 as part of the EIA Scoping Process. The key themes of consultation responses (see **Consultation Report (Document Ref: 5.1)** for more details) received to date in relation to cumulative effects are summarised in Table 18.1 below.

Table 18.1 Scoping Opinion Key Themes – Cumulative Effects

KEY THEME	RESPONSE
Inclusion of other Nationally Significant Infrastructure Projects (NSIP)/ Development Consent Order (DCO) applications	PINS and other consultees requested that the ES include an assessment of cumulative effects with other NSIP schemes. As highlighted in Chapter 4: Scope and Methodology (Document Ref: 6.2 ES Vol.1, 6.2.4) , all relevant NSIP applications have been incorporated into Appendix 4.1 Cumulative Assessment: Long List (Document Ref: 6.3 ES Vol.2, 6.3.11) and Appendix 4.2 Cumulative Assessment: Short List (Document Ref: 6.3 ES Vol.2, 6.3.12) . Where cumulative effects occur, these are discussed in Table 18.3 below.
Lincolnshire Reservoir	North Kesteven District Council (NKDC) indicated that the ES (Document Ref: 6.2 ES Vol.1) should consider the cumulative effects of the Proposed Development and Anglian Water's proposed Lincolnshire Reservoir in relation to in particular glint and glare (see Chapter 13 Glint and Glare (Document Ref: 6.2, ES Vol.1, 6.2.13)) and socio economics (see Chapter 15 Socio-Economics (Document Ref: 6.2, ES Vol.1, 6.2.15)). As outlined in Chapter 3 Alternatives and Design Evolution (Document Ref: 6.2 ES Vol.1, 6.2.3) , the decision was made to remove the Beacon Fen South site from the Proposed Development and, therefore, removed the

	potential for some cumulative effects to occur. See Table 18.2 below for further consideration.
Landscape Character	Given the solar projects in the surrounding area, Natural England highlighted that the (Document Ref: 6.2 ES Vol.1) should consider the cumulative effects to landscape character. This has been addressed through the assessment in Chapter 6 Landscape and Visual (Document Ref: 6.2 ES Vol.1, 6.2.6) .
Blanket Zone of Influence (Zol), which may also be referred to as the Study Area	PINS and other consultees indicated that a fixed Zol of 5 km would not be suitable for the appropriate consideration of potential significant and/ or cumulative effects. The respective Zol for Chapter 6 to 16 of this ES (Document Ref: 6.2 ES Vol.1) are listed in Table 18.2, below.

18.3.2 It was noted by PINS that **Appendix 1.1 Scoping Report (Document Ref: 6.3 ES Vol.2, 6.3.1)** did not identify specific developments to be included in the inter-cumulative assessment and advised that these be agreed with relevant consultation bodies including the host Local Planning Authorities (LPA). Following this, a long list of cumulative developments was prepared and sent to North Kesteven District Council (NKDC), Boston Borough Council (BBC), South Holland District Council (SHDC) and Lincolnshire County Council (LCC) on 17th December 2024.

18.3.3 A response from LCC that was received on the 6th January 2025 noted that the table of NSIPs provided required updating as some projects had progressed and others had commenced pre-application consultations (e.g. Meridian Solar and National Grid upgrade schemes for Grimsby to Walpole and Eastern Green Link (EGL) 3 and 4).

18.3.4 Similarly, a response from South & East Lincolnshire Councils Partnership that was received on 6th January 2025 noted that some of the developments listed required updating for Boston and South Holland applications (regarding their current stage), including where conditions had been discharged and where developments have been built and are operational.

18.3.5 The shortlist of developments considered within the inter-cumulative assessment **(Appendix 4.2: Cumulative Assessment: Short List; Document Ref: 6.3 ES Vol.2, 6.3.12)** was subsequently updated in respect of the above responses.

18.4 Assessment Methodology

18.4.1 As discussed in **Chapter 4 Scope and Methodology (Document Ref: 6.2 ES Vol.1, 6.2.4)**, the cumulative effects assessment methodology comprised a four stage approach based on (NSIP): Advice on Cumulative Effects Assessment (September 2024). The four stages are as follows:

- Stage 1 – Establish the study area and identify a long list of ‘other development’ (the ‘development schedule’);
- Stage 2 – Identify a shortlist of ‘other development’ for the cumulative impact assessment;
- Stage 3 – Information gathering; and

- Stage 4 – Assessment.

18.4.2 The long and short lists of cumulative developments which have been considered are presented in **Appendix 4.1 Cumulative Assessment Long List (Document Ref: 6.3 ES Vol.2, 6.3.11)** and **Appendix 4.2 Cumulative Assessment: Short List (Document Ref: 6.3 ES Vol.2, 6.3.12)**.

18.4.3 Where the EIA for the Proposed Development identifies a negligible effect, it is considered that there is no potential for any cumulative effects. The assessment of cumulative effects has, therefore, only considered minor, moderate and major effects identified within this ES (**Document Ref: 6.2 ES Vol.1**).

Zone of Influence

18.4.4 The Zone of Influence (Zol) (which may also be referred to as the ‘Study Area’ depending on context) for potential cumulative effects with other developments defined within Chapters 6 to 16 is outlined in Table 18.2 below. As the Zol may differ across the environmental aspects, the approach has been agreed with the relevant statutory consultees in accordance with the **Appendix 1.2 Scoping Opinion (Document Ref: 6.3 ES Vol.2, 6.3.2)**. The individual Zols have subsequently been combined to define an overall Zol representing the search area within which other developments have been identified.

Table 18.2 Zol extents for assessment of potential cumulative impacts

ENVIRONMENTAL TOPIC	Zone of Influence (Zol)
Landscape & Visual	Assessment guidelines recommend that the Zol area covers the geographical area from which the Proposed Development will be potentially visible but also emphasises the need for a proportionate approach to ensure the assessment is focussed on receptors with the potential to experience significant effects. For the Proposed Development, the study area was defined by a combination of the Zone of Theoretical Visibility (ZTV) and professional judgement, further verified by field surveys and preliminary viewpoint analysis. Based upon these factors, a Zol of 5km from the Order Limits was adopted. See Chapter 6 Landscape and Visual (Document Ref: 6.2 ES Vol.1, 6.2.6) for full details of the Zol.
Ecology	The Zol considered varied between 0.5km to 30km, from the Order Limits depending upon the receptor. See Chapter 7 Ecology (Document Ref: 6.2 ES Vol.1, 6.2.7) , Section 7.4, Table 7.3 Information Relevant to the Desk Study for the various Zol.
Cultural Heritage	Whilst the Zol for designated assets was generally taken as 5km from the Order Limits, designated assets located further away were also considered (where necessary) depending upon their respective importance. For non-designated assets, a Zol of 2km from the Order Limits was applied. See Chapter 8

	Cultural Heritage (Document Ref: 6.2 ES Vol.1, 6.2.8) for full details of the Zol.
Access & Traffic	The Zol included specific highway links and locations where material changes in traffic levels are most likely to occur, or where construction traffic may affect users of existing roads. See Chapter 9 Access and Traffic (Document Ref: 6.2 ES Vol.1, 6.2.9) for full details of the Zol.
Noise & Vibration	Whilst the desk study undertaken utilised a Zol of 300m from the Order Limits (considered to be appropriate to capture nearby existing sensitive receptors) in relation to noise levels, additional specific receptors located further afield were also assessed (as necessary). In terms of vibration during construction, a Zol of 100m from any potential vibration-causing construction activities (e.g. piling) was applied. See Chapter 10 Noise and Vibration (Document Ref: 6.2 ES Vol.1, 6.2.10) for full details of the Zol.
Water Resources & Flood Risk	The desktop study undertaken to establish the baseline water environment and other relevant features extended up to 2 km from the Order Limits. See Chapter 11 Water Resources and Flood risk (Document Ref: 6.2 ES Vol.1, 6.2.6) for full details of the Zol.
Climate Change	In terms of impacts on climate (greenhouse gas (GHG) emissions), both a system boundary and a temporal boundary have been applied. The system boundary considered all activities associated with the Proposed Development that either directly or indirectly release GHG emissions that contribute to climate change effects (irrespective of source and across all relevant project lifecycle stages) for a temporal boundary of the whole life of the Proposed Development, taken to be 45 years. In terms of resilience to climate change, the Proposed Development has been assessed on global climate projections and regional climate projections for a 25km grid surrounding the Order Limits. See Chapter 12 Climate Change (Document Ref: 6.2 ES Vol.1, 6.2.12) for full details of the Zol.
Glint and Glare	A Zol of 5km from the Solar Array Area has been applied for motorists, buildings and railways due to glare intensity diminishing with distance from the source and general ground-level visibility to low-lying objects being minimal at distances greater than 5km. For aerodromes, whilst in most cases those located more than 5km away will be unaffected by glare effects, a Zol of 15km from the Solar Array Area has been applied in accordance with Combined Aerodrome Safeguarding Team guidance. See

	Chapter 13 Glint and Glare (Document Ref: 6.2 ES Vol.1, 6.2.13) for full details of the Zol.
Soils & Agricultural Land	The Zol for soil resources is the Order Limits. The Zol for agricultural land includes the Order Limits but also considers land within the administrative boundary of Lincolnshire County Council. See Chapter 14 Soils and Agricultural Land (Document Ref: 6.2 ES Vol.1, 6.2.14) for full details of the Zol.
Socio-Economic	In terms of a Zol for Chapter 13 Socio-Economics (Document Ref: 6.2 ES Vol.1, 6.2.15) , the assessment considers both a 'direct' and an 'indirect' Area of Influence (Aol) for the Proposed Development. The direct Aol is primarily limited to the North Kesteven District, although the southern part of the Cable Route Corridor reaches Boston Borough, and comprises the communities located within the Order Limits plus a 500m buffer zone. Also included are communities that may be affected by land use changes, access to recreation, impact on tourism and any other economic displacement. The indirect Aol comprises communities potentially impacted by labour requirements for the Proposed Development, economic benefits and supply chain impacts, as well as traffic on roads connecting to the Proposed Development. Employment impacts were limited to a 60-minute travel area. Larger settlements that are well-connected to the Proposed Development area mark an approximate border of the indirect Aol. See Chapter 15 Socio-Economics (Document Ref: 6.2 ES Vol.1, 6.2.15) for full details of the Zol (i.e. the direct and indirect Aol).
Air Quality	For the assessment of the construction phase, existing sensitive receptors located within 250m of the Order Limits or within 50m of the access routes that construction vehicles will take (up to 500m from the Site entrance) have been considered. Operational phase impacts were scoped out following as the traffic generation is below the level which would require a detailed assessment or lead to a significant adverse effect. See Chapter 16 Air Quality (Document Ref: 6.2 ES Vol.1, 6.2.16) for full details of the Zol. .

18.5 Inter-Cumulative Effects

- 18.5.1 The inter-project cumulative effects have been assessed within technical chapters 6 to 16 of this ES. A summary of the outcomes of these assessments is provided in Table 18.3 below. For further details, reference should be made to the respective technical chapters, directly.
- 18.5.2 The list of schemes considered within the assessment of inter-cumulative effects is provided at **Appendix 4.2 Cumulative Assessment: Short List (Document Ref: 6.3 ES Vol.2, 6.3.12)**. Each technical chapter of the ES

considered this list in order to identify schemes which would be likely to result in significant effects with the Proposed Development, in relation to the topic under consideration. Table 18.3 confirms the schemes considered in relation to each topic.

Table 18.3: Summary of Inter-Cumulative Effects

RELEVANT CUMULATIVE PROJECTS	POTENTIAL FOR CUMULATIVE IMPACTS	MITIGATION MEASURES	RESIDUAL CUMULATIVE EFFECT
Chapter 6 Landscape and Visual			
<p>Vicarage Drove (B/21/0443) (B/22/0198)</p> <p>Heckington Fen (EN010123)</p> <p>Bicker Fen Solar Farm (B/22/0356 B/21/0412)</p> <p>Viking Link (EN070008)</p> <p>Little Hale Solar Farm (21/1337/EIASCR)</p>	<p>There is potential for inter-cumulative impacts on landscape character and visual amenity as a result of the addition of the Proposed Development (during construction, operation and decommissioning) and the other developments.</p>	<p>The mitigation measures for the Proposed Development are included within Appendix 2.4: Outline Construction Environmental Management Plan (OCEMP) (Document Ref: 6.3 ES Vol.2, 6.3.7), Appendix 2.5 Outline Decommissioning Environment Management Plan (ODEMP) (Document Ref: 6.3 ES Vol.2, 6.3.8), Appendix 6.7 Outline Landscape and Ecological Management Plan (OLEMP) (Document Ref: 6.3 ES Vol.2, 6.3.19), and are illustrated on Figure 6.31 Landscape Strategy Plan (Document Ref: 6.3 ES Vol.3, 6.4.43).</p> <p>The other developments include their own mitigation measures intended to avoid / reduce adverse impacts on these receptors.</p>	<p>In relation to effects on landscape character there would be no significant adverse cumulative effects. Works associated with the Solar Array Area are sufficiently distant from other considered energy schemes to the south that there is limited intervisibility reducing the potential for cumulative effects to occur. Therefore, cumulative effects are predicted to be focussed on the area adjacent to and to the north of the Bicker Fen substation, in an area where there is the possibility for the simultaneous introduction of cable routes.</p> <p>At a national level the introduction of further development within NCA 46 – The Fens focussed on the area between Swineshead and Heckington will result in the increased characterising presence of energy infrastructure. Overall, this is predicted to have a notable but not significant effect on NCA 46. At all phases of development, the contribution of the Proposed Development to this overall cumulative scenario would be Negligible adverse (Not significant).</p> <p>At the local level there would be Minor adverse (not significant) cumulative effects on the Fenland Sub Area associated with the in combination effects of the Proposed Development and Heckington Fen Solar Park at all development phases assuming construction and decommissioning activity will be at least partially concurrent.</p> <p>In relation to the Holland Fen LCA there would be Minor adverse (Not significant) effects at construction and decommissioning phases assuming a worst case scenario of simultaneous construction activity associated with the cable routes for the Proposed Development, Heckington Fen Solar Park and works associated with Vicarage Drove Solar Farm.</p> <p>Cumulative visual effects at construction will primarily be limited to those resulting from the in combination presence of construction activity associated with the cable routes connecting into Bicker Fen Substation. Major to Moderate (Significant) visual effects have been identified for residential, recreational and transport receptors in the Cable Route Corridor for the Proposed Development in isolation and it is not anticipated that the temporary introduction of further construction activity associated with other identified cumulative schemes will increase the level of effect for these receptors. Therefore, no significant cumulative visual effects are predicted.</p> <p>On completion of the Proposed Development and cessation of construction activity within the Cable Corridor Route there will be limited intervisibility between the Proposed Development and other considered cumulative schemes. There will be no significant adverse cumulative visual effects at the operational phase. As the Cable Route will remain in situ, there will also be no significant visual effects at the decommissioning phase.</p>
Chapter 7 Ecology			
<p>Triton Knoll Electrical System (EN090019)</p> <p>Heckington Fen Solar Park (EN010123)</p>	<p>There is the potential for inter-cumulative impacts upon (one or more of) watercourses, Local Wildlife Sites (LWS), Great Crested Newts (GCN), bird species, bat species, water voles and otters during the construction and / or decommissioning phases of the Proposed Development in-combination with one or more of these developments.</p>	<p>The mitigation measures for the Proposed Development include such provisions as buffers habitat creation and enhancement and are included within Appendix 2.4: Outline Construction Environmental Management Plan (OCEMP) (Document Ref: 6.3 ES Vol.2, 6.3.7) and Appendix 6.7 Outline Landscape and Ecological Management Plan (Document Ref: 6.3 ES Vol.2, 6.3.19), and are illustrated</p>	<p>With the implementation of identified mitigation measures (as described in Chapter 7 Ecology; Document Ref: 6.2 ES Vol.1, 6.2.7), no inter-cumulative effects are anticipated.</p>

RELEVANT CUMULATIVE PROJECTS	POTENTIAL FOR CUMULATIVE IMPACTS	MITIGATION MEASURES	RESIDUAL CUMULATIVE EFFECT
<p>Outer Dowsing Offshore Wind (Generating Station) (EN010130)</p> <p>Lincolnshire Reservoir (WA010003)</p> <p>Springwell Solar Farm (EN010149)</p> <p>Boston Alternative Energy Source (EN010095)</p> <p>Temple Oaks Renewable Energy Park (EN010126)</p>		<p>on Figure 6.31 Landscape Strategy Plan (Document Ref: 6.3 ES Vol.3, 6.4.43). The other developments include their own mitigation measures intended to avoid / reduce adverse impacts on these receptors.</p>	
Chapter 8 Cultural Heritage			
Triton Knoll Electrical System (EN090019)	<p>The Proposed Development and the Triton Knoll development may contribute to the cumulative physical loss of below-ground archaeological resource resulting from development in general. Owing to their proximity, potential inter-cumulative impacts relate to any archaeological features that span both site areas and collectively contribute towards the archaeological landscape of the area.</p> <p>Owing to the location of the Triton Knoll Electrical System, it is considered that no built heritage assets will be subject to inter-cumulative impacts. No inter-cumulative effects to the historic landscape character are anticipated.</p>	<p>Where possible, archaeological assets have been avoided. Geophysical Survey plus an Aerial and LiDAR assessment was undertaken to determine the presence of below ground archaeological remains across the Proposed Development.</p> <p>Archaeological mitigation works will be required prior to the construction stage. This will comprise additional targeted trial trenching, targeted archaeological watching briefs (monitoring and recording during the strip of topsoils), or another appropriate method of archaeological investigation. Appendix 8.11 Archaeological Mitigation Strategy (Document Ref: 6.3 ES Vol.2, 6.3.74) has been prepared for the Proposed Development and outlines mitigation measures. The AMS will continue to be developed with the relevant stakeholders.</p> <p>For screening purposes, buffer zones and enhancement planting have been incorporated into the design.</p>	<p>Depending upon the nature and value of any remains at either the Site or the Triton Knoll site, it is considered that the inter-cumulative impact upon the archaeological resource during construction could be Slight to Moderate adverse. Assuming appropriate mitigation is incorporated by both schemes, effects will not be significant.</p>
<p>Heckington Solar (EN010123)</p> <p>Fen Park</p>	<p>There may be archaeological remains connected through regional typologies between the two projects and, as such, there is the potential for inter-cumulative impacts as a result of ground disturbance.</p> <p>There is also potential for inter-cumulative impacts to the significance of the Grade I Kyme Tower as a result of the two developments.</p>		<p>Overall, it is considered that the inter-cumulative effect upon archaeological assets during construction could be Slight to Moderate adverse. Assuming appropriate mitigation is incorporated by both schemes, effects will not be significant.</p> <p>The 2023 assessment of the Heckington Fen Solar Park concluded that there would not be a significant effect to Kyme Tower as a result of the Heckington Fen development. Considering this, it is anticipated that there would not be any significant inter-cumulative effects to the heritage significance of Kyme Tower during the construction, operational or decommissioning phases of the Proposed Development as a result of both schemes in-combination.</p>
<p>Outer Offshore Generating Station (EN01030)</p> <p>Dowsing Wind, Station</p>	<p>There is potential for inter-cumulative impacts upon archaeological assets as a result of ground disturbance at both sites that could lead to the loss of archaeological resources connected through regional typologies.</p>		<p>Overall, it is considered that the inter-cumulative effect upon the archaeological resources during construction could be Slight to Moderate adverse. Assuming appropriate mitigation is incorporated by both schemes, effects will not be significant.</p>

RELEVANT CUMULATIVE PROJECTS	POTENTIAL FOR CUMULATIVE IMPACTS	MITIGATION MEASURES	RESIDUAL CUMULATIVE EFFECT
Lincolnshire Reservoir (WA010003)	There is potential for inter-cumulative impacts upon archaeological assets as a result of ground disturbance at both sites that could lead to the loss of archaeological resources connected through regional typologies.		Overall, it is considered that the inter-cumulative effect upon the archaeological resources during construction could be Slight to Moderate adverse. Assuming appropriate mitigation is incorporated by both schemes, effects will not be significant.
Various non-NSIP schemes as set out n Table 8.10 of Chapter 8 Cultural Heritage (Document Ref: 6.2 ES Vol.1, 6.2.8)	There is potential for regional typologies to be impacted and potential for interconnected archaeological remains as a result of the multiple works proposed.		With the implementation of identified mitigation measures as described in Chapter 8 Cultural Heritage (Document Ref: 6.2 ES Vol.1, 6.2.8) , no significant inter-cumulative effects are anticipated.
Chapter 9 Access and Transport			
Heckington Fen Solar Farm (EN010123) and other developments, including (planning ref.): <ul style="list-style-type: none">B/21/0121B/23/0423B/24/0231B/24/0245B/24/0363B/24/0415	There is potential for inter-cumulative impacts in relation to construction processes for the Proposed Development on local roads.	Appropriate mitigation measures during the construction phase of the Proposed Development are included within Appendix 2.4 Outline Construction Environment Management Plan (OCEMP) (Document Ref: 6.3 ES vol.2, 6.3.7) and Appendix 9.4 Outline Construction Traffic Management Plan (OCTMP) (Document Ref: 6.3 ES Vol.2, 6.3.57) to minimise impacts on local roads.	No significant inter-cumulative effects were identified as a result of the cumulative impact assessment for the Proposed Development. This was primarily due to the other developments either recording traffic impacts that do not impact the study area for the Proposed Development or that are unlikely to generate traffic during the construction phase of the Proposed Development. For those that do overlap, the cumulative impact assessment for the Proposed Development recorded Negligible (Not Significant) transport effects within the study area during the proposed construction programme.
Chapter 10 – Noise and Vibration			
Triton Knoll Electrical System (EN90019) Heckington Fen Solar Farm (EN010123) Viking Link (H04-0823-17 + 17/1200/FUL) Land at Ewerby Thorpe (14/1034/EIASCR) Land at Vicarage Drove (B/21/0121, B/21/0443, B/22/0198, B/22/0356) Land South of Little Hale Drove (B/17/0340)	There is potential for inter-cumulative effects in relation to construction activity should construction of the Proposed Development (i.e. the Solar Array Area, Bespoke Access Road, Cable Route and works at Bicker Fen Substation) overlap with that of the other developments listed (left).	Appropriate mitigation measures during the construction phase of the Proposed Development are included within Appendix 2.4 Outline Construction Environment Management Plan (OCEMP) (Document Ref: 6.3 ES Vol.2, 6.3.7) to manage / monitor the effects of construction noise.	<p>Following the cumulative impact assessment for the Proposed Development, no significant inter-cumulative effects were identified. This was due to there being no receptors within the overlapping study areas of the Proposed Development and the other developments, for the majority of other developments.</p> <p>There is one receptor (R28) located within 300m of the Cable Route Corridor for the Proposed Development and 300m of the cable corridor for the Heckington Fen Solar Farm development (EN10123). The highest predicted sound level at this receptor is 49 dBA (as a result of the use of trenchless methods such as horizontal directional drilling (HDD)) during the construction phase. Assuming a worst case scenario of both developments simultaneously implementing HDD works, the predicted cumulative sound level at the receptor would be 52 dBA. This is below the 65 dBA threshold stated in BS 5228-1 and, as such, the significance of effect is Negligible (Not Significant).</p>

RELEVANT CUMULATIVE PROJECTS	POTENTIAL FOR CUMULATIVE IMPACTS	MITIGATION MEASURES	RESIDUAL CUMULATIVE EFFECT
Chapter 11 Water Resources and Flood Risk			
A total of 88 other developments were considered and are listed within Error! Reference source not found. in Chapter 11 Water Resources and Flood risk (Document Ref: 6.2 ES Vol.1, 6.2.6)	There is the possibility of inter-cumulative impacts on the water environment when one or more developments are constructed, operational and / or have overlapping decommissioning phases within the same catchment. Potential cumulative effects include deterioration in water quality as a result of pollutants entering waterbodies during construction and / or decommissioning and alteration to the hydrological regime from inappropriate drainage design resulting in increased flood risk.	All developments need to comply with strict planning guidance and regulation relating to the water environment to be acceptable in planning terms. As such, all developments need to incorporate appropriate, pollution prevention measures, mitigation measures and suitable drainage design. This is the case for the Proposed Development (see Appendix 2.4: OCEMP (Document Ref: 6.3 ES Vol.2, 6.3.7), Appendix 2.5 ODEMP (Document Ref: 6.3 ES Vol.2, 6.3.8) and Appendix 11.1 Flood Risk Assessment and Drainage Strategy (Document Ref: 6.3 ES Vol.2, 6.3.81)) and would also be the case for the other developments. Should the developments require permitted activities, these would be subject to control and regulation by the relevant issuing authority. In terms of the operational phase(s), it is assumed that all developments will be appropriately designed (e.g. incorporate the use of a SuDS, <i>etcetera</i>) that would mitigate potential operational phase effects.	On the basis of the implementation of appropriate mitigation measures, potential inter-cumulative effects during construction and / or decommissioning are considered to be Negligible (Not Significant). In terms of the operational phase(s), no significant effects are anticipated.
Chapter 12 Climate Change			
Consideration of inter-cumulative effects has been scoped out of the Climate Change assessment on the basis that consideration would need to account for every other development and activity that generates carbon emissions or releases other greenhouse gas (GHG). As this encompasses, to varying degrees, most of the activity on the globe, it is not practical to consider inter-cumulative effects beyond recognising that it is necessary for each development to reduce carbon (and GHG) emissions, as well as having a duty to minimise its own emissions as far as technically viable. For more details, reference should be made to Chapter 12: Climate Change (Document Ref: 6.2 ES Vol.1, 6.2.12) .			
Chapter 13 Glint and Glare			
Heckington Fen (EN010123)	Potential for inter-cumulative impacts in relation to glare.	The Heckington Fen solar development has been designed to incorporate vegetative screening around its the perimeter. The Proposed Development has also been designed to include vegetative screening (see Figure 6.31 Landscape Strategy Plan Strategy Plan (Document Ref: 6.4 ES Vol.3, 6.4.42)).	As a result of the screening, there is no residual glare anticipated from the Heckington Fen solar development. As such, no inter-cumulative effects are anticipated.
Chapter 14 Soils and Agricultural Land soil			
A total of 51 other developments were considered and are listed within Error! Reference source not found. in Chapter 14 Soils and Agricultural Land (Document Ref: 6.2 ES Vol.1, 6.2.14) .	There are no inter-cumulative impacts on soil resources as effects are contained within each site. There may, however, be potential inter-cumulative impacts in relation to agricultural land within Lincolnshire. See Table 14.15 in Chapter 14 Soils and Agricultural Land (Document Ref: 6.2 ES Vol.1, 6.2.14) for estimated Agricultural Land Classification (ALC) totals per development. See Table 14.16 in Chapter 14 Soils and Agricultural Land (Document Ref: 6.2 ES Vol.1, 6.2.14) for estimated ALC land take summaries.	The other developments are supported by appropriate management / mitigation plans. For the Proposed Development, Appropriate measures are presented in Appendix 14.4 Outline Soil Management Plan (Document Ref: 6.3 ES Vol.2, 6.3.74), Appendix 2.4 Outline Construction Environmental Management Plan (OCEMP) (Document Ref: 6.3 ES Vol.2, 6.3.7) and Appendix 2.5 Outline Decommissioning Construction Environmental Management Plan (ODEMP) (Document Ref: 6.3 ES Vol.2, 6.3.8) .	The total agricultural land take associated with the considered NSIP developments is 11,038ha of which 4,191ha is estimated as Best and Most Versatile (BMV) agricultural land. The total amount of agricultural land for all the considered NSIP developments equates to 1.84% of the agricultural land within the administrative boundaries of Lincolnshire County Council, of which 0.7% is BMV land. The total agricultural land take associated with the considered non-NSIP developments is 925 ha of which 736 ha is estimated as BMV land. The total amount of land for all the considered non-NSIP developments equates to 0.22% of the agricultural land within the administrative boundaries of Lincolnshire County Council, of which 0.16% is BMV land.

RELEVANT CUMULATIVE PROJECTS	POTENTIAL FOR CUMULATIVE IMPACTS	MITIGATION MEASURES	RESIDUAL CUMULATIVE EFFECT
		Additionally, many of the other developments considered are solar and, as per the Proposed Development, impacts on agricultural land are minimal and temporary, with the opportunity for grazing prior to them returning to agriculture use.	When considering all the considered developments within the administrative boundaries of Lincolnshire County Council boundary, they equate to 2% (11,962.85 ha) of the agricultural land, of which 0.82% (4,927 ha) is BMV land. With appropriate mitigation measures in place, the associated inter-cumulative effect in terms of the loss of agricultural BMV land would be moderate (Significant).
Chapter 15 Socio Economic			
A total of 11 other developments were considered and are listed within Error! Reference source not found. in Chapter 15 Socio-economic (Document Ref: 6.2 ES Vol.1, 6.2.15) .	There is the potential for inter-cumulative impacts during the construction phase on key shared receptors within the area of influence (Aol); namely local accommodation and local services due to increased demand from an influx of construction workers (should there be an overlap in construction phases for the Proposed Development and the other developments considered). It has been assumed that, due to local employment, 1,239 workers might require accommodation at the same time. In reality, this will likely vary because of varied flows of workforce, lower worker demand and successful local employment. It should also be noted that the combination of projects will result in job creation across numerous sectors in the region.	For the Proposed Development. mitigation measures are included within Appendix 15.3 Outline Skills, Supply Chain, Employment Plan (OSSCEP) (Document Ref: 6.3 ES Vol.2, 6.3.98) .	In terms of potential inter-cumulative impacts upon local accommodation due to an influx or workers during potentially overlapping construction phases, with mitigation measures (see Appendix 15.3 Outline Skills, Supply Chain, Employment Plan (OSSCEP) (Document Ref: 6.3 ES Vol.2, 6.3.98)) in place, the effect is considered to be not significant. Similarly, in terms of potential inter-cumulative effects upon local services due to an influx or workers during potentially overlapping construction phases, with the mitigation measures (see Section 15.7 of Chapter 15 Socio-economic (Document Ref: 6.2 ES Vol.1, 6.2.15)) in place the effect is considered to be not significant. In terms of job creation within the region, this will have beneficial inter-cumulative effects.
Chapter 16 Air Quality			
Heckington Fen (EN010123) and other developments, including (planning ref.): <ul style="list-style-type: none"> • 14/1034/EIASCR; • 17/1200/FUL; • B/21/0121; • B/21/0443; • B/22/0198; • B/22/0356; and • B/17/0340 	There is potential for inter-cumulative impacts in relation to reduced air quality as a result of development-related traffic and dust generation during both the construction and decommissioning phases of the Proposed Development should they overlap with the same phases for the other developments.	Mitigation measures for the Proposed Development will be included within any Dust Mitigation Plan (DMP) which will form part of the detailed Construction Environmental Management Plan(s) (CEMP) and Decommissioning Environmental Management Plan(s) (DEMP) which must be substantially in accordance with the Appendix 2.4 Outline Construction Environmental Management Plan (OCEMP) (Document Ref: 6.3 ES Vol.2, 6.3.7) and Appendix 2.5 Outline Decommissioning Construction Environmental Management Plan (ODEMP) (Document Ref: 6.3 ES Vol.2, 6.3.8) respectively. The other developments include construction dust mitigation measures implemented through standard good practice construction methods outlined within the other developments respective CEMP(s), DEMP(s) and / or specific dust management plans.	The potential inter-cumulative effects of the Proposed Development in combination with the other developments upon air quality has been assessed as not significant due to the low level of traffic generation and implementation of embedded mitigation measures. Additionally, any effects would be temporary, only lasting the duration of any overlapping construction and / or decommissioning works.

Summary of Inter-Cumulative Effects

18.5.3 There is potential for significant adverse inter-cumulative effects in relation to the following:

- Agricultural land in terms of the total agricultural land (and BMV land) lost due to the Proposed Development in combination with the other developments. When considering all the considered developments within the administrative boundaries of Lincolnshire County Council boundary, they equate to 2% (11,962.85 ha) of the agricultural land, of which 0.82% (4,927 ha) is BMV land.

18.6 Intra-Cumulative Effects

18.6.1 Intra-cumulative impacts relate to impacts that occur as a result of multiple environmental impacts (from the Proposed Development in isolation) on a single receptor. The combined effects of different environmental impacts from the Proposed Development on a single receptor may cause a greater (or lesser) effect than each effect in isolation.

18.6.2 The assessment of intra-cumulative effects is based on the methodology described in **Chapter 4 Scope and Methodology (Document Ref: 6.2 ES Vol.1, 6.2.4)**. As there are no specific guidelines on how the assessment of effect interactions should be undertaken, the assessment is undertaken on a qualitative basis using the results of the individual assessments and informed by professional judgement.

18.6.3 Residual effects presented within the technical chapters have been reviewed to identify receptors that will experience effects from more than one aspect of the environment, to ensure these are then appropriately considered within the EIA. This review identified the following receptor groups, which could experience intra-cumulative effects:

- Residential receptors;
- Fauna species (including bats, birds, otter and water vole);
- Local Wildlife Sites;
- Habitats (grasslands, watercourses & water bodies);
- Designated Heritage Assets;
- Waterbodies and watercourses;
- Non-motorised road users (i.e. cyclists, equestrians and walkers);
- Non-motorised recreational facility users (i.e. cyclists, equestrians and walkers); and
- Motorised road users.

18.6.4 Each chapter has considered the relevant interactions with other topics within their assessments (as necessary) and a summary is provided below within

Tables 18.4 and 18.5. For further details, reference should be made to the respective technical chapters, directly.

Table 18.4 Summary of Intra Cumulative Effect Interactions during Construction and Decommissioning

RECEPTOR	DESCRIPTION OF POTENTIAL EFFECT INTERACTIONS	SIGNIFICANCE OF RESIDUAL EFFECT
Landscape and Visual Receptors: In relation to additional impacts in respect of Air Quality and Noise & Vibration		
Residential Receptors	Nearby residential receptors experiencing visual effects of the construction and decommissioning of the Proposed Development could also experience effects resulting from the noise and dust impacts associated with these activities.	With the mitigation measures related to noise and dust management set out within the Outline Construction Environmental Management Plan (OCEMP) (Document Ref: 6.3 ES Vol.2, 6.3.7) and Outline Decommissioning Construction Environmental Management Plan (ODEMP) (Document Ref: 6.3 ES Vol.2, 6.3.8) in place, no significant intra-cumulative effects are anticipated.
Ecological Receptors: In relation to additional impacts in respect of Landscape, Air Quality, Noise & Vibration, Water Resources and Soils & Agricultural Land		
Fauna species (including bats, birds, otter and water vole)	Potential intra-cumulative impacts may arise through disturbance caused by increased noise and vibration levels as a result of both onsite activities and traffic associated with construction and / decommissioning, plus reduced habitat quality due to dust deposition.	With the mitigation measures related to noise and dust management set out within the OCEMP (Document Ref: 6.3 ES Vol.2, 6.3.7) and ODEMP (Document Ref: 6.3 ES Vol.2, 6.3.8) in place, no significant intra-cumulative effects are anticipated.
Local Wildlife Sites	Potential intra-cumulative impacts may arise through airborne or hydrological pollution events. This could occur for the LWS within the Site, and other sites hydrologically connected to the Site.	A minimum 5 m buffer from built development was applied along or around every watercourse and waterbody within the Site (except where crossings are required). The OCEMP (Document Ref: 6.3 ES Vol 2 6.3.7) and ODEMP (Document Ref: 6.3 ES Vol.2, 6.3.8) include requirements to minimise any possible impacts during construction such as safe storage of chemicals and prevention of sediment run off; and mitigation for the vehicle increase associated with the Proposed Development. With these measures in place, no significant intra-cumulative effects are anticipated.

RECEPTOR	DESCRIPTION OF POTENTIAL EFFECT INTERACTIONS	SIGNIFICANCE OF RESIDUAL EFFECT
Habitats (grasslands, watercourses and water bodies)	Grasslands within the Site could be affected by works which involve soil removal. Uncontrolled works could result in sediment or pollution which may cause increases in the level of silt present and/ or changes to the water chemistry in watercourses and water bodies.	Where the Proposed Development includes soil removal, any soil will be added back in the order that it was removed in. This will include replacing the subsoil first and then replacing any turf (as set out within the Outline Soil Management Plan (OSMP) (Document Ref: 6.3 ES Vol.2, 6.3.95)). A minimum 5 m buffer from built development was applied along or around every watercourse and waterbody within the Site (except where crossings are required). The OCEMP (Document Ref: 6.3 ES Vol 2 6.3.7) and ODEMP (Document Ref: 6.3 ES Vol.2, 6.3.8) include requirements to minimise any possible impacts during construction such as safe storage of chemicals and prevention of sediment run off. With these measures in place, no significant intra-cumulative effects are anticipated.
Cultural Heritage Receptors: In relation to additional impacts in respect of Landscape & Visual, Air Quality, Noise & Vibration and Access & Traffic		
Designated Heritage Assets	Potential intra-cumulative effects may occur in respect of noise, air quality, increased traffic and visual intrusion as a result of construction vehicles and plant within, and accessing, the Site.	<p>These impacts are considered temporary and short-term, limited to working hours and for the duration of the construction and decommissioning phases only. Alongside the measures set out within the OCEMP (Document Ref: 6.3 ES Vol.2, 6.3.7) and ODEMP (Document Ref: 6.3 ES Vol.2, 6.3.8), the intra-cumulative effect on the majority of assets is considered to be not significant.</p> <p>However, the Church of St Andrew at Asgarby, a Grade I Listed Building (NHLE 1061832) will be subject to intervisibility, new movement in the landscape, an increase in traffic noise (previously restricted to the A17 south of the church and the village road), increase in vehicular lighting, an increase in air pollutants and the presence of new highway infrastructure within a predominantly agricultural and historical landscape. The road will be running on a north-south alignment to the east of the church as such this would be a change in movement in the landscape. As such there will be Moderate Adverse (Significant) effect on this asset during construction.</p>

RECEPTOR	DESCRIPTION OF POTENTIAL EFFECT INTERACTIONS	SIGNIFICANCE OF RESIDUAL EFFECT
Water Resources Receptors: In relation to additional impacts in respect of Air Quality and Soils & Agricultural Land		
Waterbodies and watercourses	Potential intra-cumulative impacts may arise through reduced water quality from increased sedimentation as a result of dust deposition; with dust generated through vehicle movements and poor soil management.	With the mitigation measures related to dust management set out within the OCEMP (Document Ref: 6.3 ES Vol.2, 6.3.7) and ODEMP (Document Ref: 6.3 ES Vol.2, 6.3.8) ; the Outline Drainage Strategy within the Flood Risk Assessment (Document Ref: 6.3 ES Vol.2, 6.3.81) ; and the mitigation measures set out within the OSMP (Document Ref: 6.3 ES Vol.2, 6.3.95) in place, no significant intra-cumulative effects are anticipated.
Access & Transport Receptors: In relation to additional impacts in respect of Landscape & Visual, Air Quality and Noise & Vibration		
Non-motorised road users (i.e. cyclists, equestrians and walkers)	Potential intra-cumulative impacts may arise through increased traffic volumes, reduced air quality and increased noise and vibration levels.	With the mitigation measures related to noise and dust management set out within the OCEMP (Document Ref: 6.3 ES Vol.2, 6.3.7) and ODEMP (Document Ref: 6.3 ES Vol.2, 6.3.8) ; and the mitigation measures set out within the Outline Construction Traffic Management Plan (OCTMP) (Document Ref: 6.3 ES Vol.2, 6.3.78) in place, no significant intra-cumulative effects are anticipated.
Non-motorised recreational facility users (i.e. cyclists, equestrians and walkers)	Potential intra-cumulative impacts may arise through Public Rights of Way (PRoW) users being affected by temporary route closures, as well as increased traffic volumes, reduced air quality, increased noise and vibration levels, and reduced amenity; further exacerbating adverse impacts upon wellbeing.	With the mitigation measures related to noise and dust management set out within the OCEMP (Document Ref: 6.3 ES Vol.2, 6.3.7) and ODEMP (Document Ref: 6.3 ES Vol.2, 6.3.8) ; and the mitigation measures set out within the OCTMP (Document Ref: 6.3 ES Vol.2, 6.3.78) and Outline Landscape and Ecological Management Plan (OLEMP) (Document Ref: 6.3 ES Vol. 2, 6.3.19) in place, no significant intra-cumulative effects are anticipated.

Table 18.5 Summary of Intra Cumulative Effect Interactions during Operation

RECEPTOR GROUP	DESCRIPTION OF POTENTIAL EFFECT INTERACTIONS	RESIDUAL SIGNIFICANCE OF EFFECT DETERMINED THROUGH EIA
Landscape and Visual Receptors: In relation to additional impacts in respect of Air Quality and Noise & Vibration		
Residential Receptors	Nearby residential receptors experiencing visual effects of the completed Proposed Development, comprising the Solar Array Area and Bespoke Access Road, could also experience effects resulting from operational noise and glint & glare.	With the proposed noise mitigation, and the proposed planting and landscaping secured via the OLEMP (Document Ref: 6.3 ES Vol. 2, 6.3.19) in place, no significant intra-cumulative effects are anticipated.
Cultural Heritage Receptors: In relation to additional impacts in respect of Landscape & Visual, Air Quality, Noise & Vibration and Access & Traffic		
Designated Heritage Assets	Potential intra-cumulative effects may occur in respect of noise, air quality, increased traffic and visual intrusion as a result of the completed Solar Array Area and vehicle movements associated with its maintenance.	During the operational period the Bespoke Access Road would be used to carry out maintenance and its use reduced compared to the construction phase. In addition, proposed landscaping within the Site secured via the OLEMP (Document Ref: 6.3 ES Vol. 2, 6.3.19) will mitigate potential effects. With these measures in place, no significant intra-cumulative effects are anticipated.

Access & Transport Receptors: In relation to additional impacts in respect of Landscape & Visual, Noise & Vibration and Glint & Glare

Motorised road users	Users of the local highway network may also experience visual and glint & glare effects.	With the proposed planting and landscaping secured via the OLEMP (Document Ref: 6.3 ES Vol. 2, 6.3.19) in place, no significant intra-cumulative effects are anticipated.
Non-motorised road and recreational facility users (i.e. cyclists, equestrians and walkers).	Potential intra-cumulative impacts may arise through and glint / glare, reduced visual amenity and increased noise levels.	With the proposed noise mitigation, and the proposed planting and landscaping secured via the OLEMP (Document Ref: 6.3 ES Vol. 2, 6.3.19) in place, no significant intra-cumulative effects are anticipated.

Summary of Intra-Cumulative Effects

18.6.5 There is potential for significant adverse intra-cumulative effects in relation to the following:

- Up to Moderate Adverse (Significant) effects on the Church of St Andrew at Asgarby, a Grade I Listed Building (NHLE 1061832) during construction due to intervisibility, new movement in the landscape, an increase in traffic noise (previously restricted to the A17 south of the church and the village road), increase in vehicular lighting, an increase in air pollutants and the presence of new highway infrastructure within a predominantly agricultural and historical landscape.

18.6.6 Remaining potential intra-cumulative effects will not be significant following the implementation of embedded and additional mitigation, as set out within **Appendix 2.3 Embedded Mitigation (Document Ref. 6.3 ES Vol.3, 6.3.6)** and **Chapter 19: Summary of Significant Environmental Effects (Document Ref. 6.2 ES Vol.1, 6.2.19)**.