Great North Road Solar and Biodiversity Park

Environmental Statement

Volume 2 – Chapters

Chapter 15 – Climate Change

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15.1 INTRODUCTION

1 This chapter of the Environmental Statement (ES) evaluates the possible impacts of the Development on the climate throughout its construction, operation, and decommissioning phases. It also examines the Development's ability to withstand the physical impacts of climate change and whether any significant effects may occur.

2 The Development would be located to the northwest of Newark, in the Newark and Sherwood district of Nottinghamshire, East Midlands. The Development would be within an area bound by the Order Limits. The Order Limits are to the west of the A1, north of the A617, east of Eakring, and south of Egmanton, to the north and northwest of Staythorpe.

3 The Development is described by ES Chapter 5, Development Description, [EN010162/APP/6.2.5], and briefly summarised here. The Development essentially consists of discrete land parcels proposed to be occupied by solar PV panels and associated infrastructure (Work no. 1), connected by cable route areas (Work no. 2). Up to 4 intermediate substations (Work no. 4) will be spaced around the solar areas, and a Battery Energy Storage System (BESS; Work no. 5a) and 400 kV Compound (Work no. 5b) will collate the electrical energy and step up the voltage before cabling it to the National Grid Staythorpe Substation (Work no. 6), possibly via the Consented Staythorpe BESS (Work no. 7). Road works (Work no. 8; access) will be undertaken, principally to create passing places and create or upgrade access points. Other areas within the Order Limits are identified for mitigation/enhancement (Work no. 3). The Work Areas are shown on ES Figure 5.1 [EN010162/APP/6.3.5.1] and a summary of mitigation/enhancement measures is shown on ES Figure 5.2 [EN010162/APP/6.3.5.2].

4 In accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations (2017), the following aspects of climate change assessment have been considered within this chapter:

- Lifecycle greenhouse gas (GHG) evaluation – the impact of GHG emissions on climate arising over the lifetime of the Development[1]; and
- Climate change resilience (CCR) review – the ability of the Development to withstand anticipated future climate change effects, including damage caused by accidents linked to climate change.

5 This chapter sets out:

- The requirements of principal legislation, national and local policy, and guidance relevant to this assessment;
- The methodology followed for the assessment;

[1] IEMA (2022). Institute of Environmental Management and Assessment (IEMA) Guide: Assessing Greenhouse Gas Emissions and Evaluating Their Significance. [Online]. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010056/TR010056-001649-Climate%20Emergency%20Planning%20and%20Policy%20-%20Appendix%20A%20-%20IEMA%20Guide-%20Assessing%20Greenhouse%20Gas%20Emissions%20and%20Evaluating%20their%20Significance,%20Version%202,%20Feb%202022.pdf. (Accessed 05/03/2025).

- Any associated assumptions and limitations;
- An assessment of the potential effects of the Development on climate change;
- An assessment of the potential impacts of climate change on the Development, and
- Mitigation measures required where necessary.

6 This chapter is supported by Technical Appendix (TA) A15.1, Lifecycle Greenhouse Gas Evaluation [EN010162/APP/6.4.15.1].

7 A glossary of terms is provided in ES Chapter 20 [EN010162/APP/6.2.20].

15.1.1 Development Parameters Assessed

8 The Rochdale Envelope parameters for the Development, as detailed in Chapter 5, Development Description, have been reviewed in relation to the potential effects discussed in this chapter. Overall, the effect of the Development on climate change is beneficial (as is typical for solar farms, and specifically for the Development as is concluded in section 15.7). The "worst case" would therefore be that the Development does not proceed, however, this is the baseline, or "Do Nothing" scenario, against which the effects of the Development should be assessed. A realistic scenario for assessment of effects associated with climate change has therefore been used, which is represented by the illustrative design as set out in Chapter 5.

9 The BESS (within Work no. 5a) is assumed, for the purposes of this chapter, to have a maximum export capacity of 440 MW and be able to sustain this for two hours, thus having a total energy storage capacity of 880 MWh. The BESS energy capacity is not constrained by the design limitations set out in Table 5.9 in Chapter 5; however, increasing its peak power capacity would reduce the number of battery containers while increasing the number of inverters and transformers within the BESS compound. This scenario would likely lower the embodied emissions due to the carbon footprint of each component. As a result, the battery configuration assessed in this chapter is expected to be a realistic worst case, with alternatives likely to have the same or lower embodied carbon.

15.1.2 Consultation

10 An overview of the consultation responses relating to climate change up to the date of preparation of this ES is outlined within Table 15.1.

Table 15.1: Consultation Responses

Consultee	Summary of Consultation Response	Applicant Response
PINS Scoping response December 2023	The Environmental Statement (ES) should provide a description and evaluation, where applicable, of the potential significant impacts the project may have on the climate, as well as its susceptibility to climate change. Additionally, where relevant, the ES should detail and evaluate any adaptive measures that have been integrated into the project's design to address these challenges.	As set out in section 15.1, this chapter assesses these aspects. Adaptive measures have been summarised in sections 15.4.2 and 15.5.
PINS Scoping response December 2023	No [climate change] matters have been proposed to be scoped out of the assessment.	Agreed.
Averham, Kelham & Staythorpe Parish Council Scoping Response December 2023	Page 113 paragraph 573 states “Assessment of the Development's effects on climate change (calculation of carbon footprint) to include calculation of greenhouse gas emissions relating to construction, operation, decommissioning and the production of electricity” In order to fully assess the carbon footprint it is now accepted that the “whole life cycle” of a project should be taken into consideration. In this case there is no mention of the process whereby minerals are extracted, transported, processed, manufactured and delivered in order to produce the components required. The PC would request that this be taken into account to establish the true green credentials of this proposal.	Technical Appendix (TA) A15.1, Lifecycle Greenhouse Gas Evaluation, [EN010162/APP/6.4.15.1] meets this requirement, and the assessment in the chapter is based on this TA.
Averham, Kelham & Staythorpe Parish Council	In addition we would also request a section be included to cover Climate Change.	This chapter covers an assessment of effects related to climate change.

Consultee	Summary of Consultation Response	Applicant Response
Scoping Response December 2023		
Bathley Parish Council Scoping Response December 2023	Given that the site will have to include large areas of grassland (for the sheep), the operational phase will require a grass management strategy for the 40 years. It would seem essential that mowing will be required. Biogas largely consists of methane (CH_4), produced during the natural decomposition of organic material in an airtight environment. Ordinary lawn clippings yield one of the highest volumes of biogas per ton. Methane is a potent greenhouse gas—about 28 times more powerful than carbon dioxide at warming the Earth, on a 100-year timescale, and more than 80 times more powerful over 20 years. If the cuttings from this site grass mowing during spring and summer were not transported off site but left to rot in piles, this would lead to anaerobic digestion, producing methane. Aerobic digestion, as happens when plant matter is incorporated into soil, leads to carbon capture. Without a submitted waste management plan as part of the ES covering this point, it is impossible to evaluate the costs and benefits of the planned grassland. Therefore, the Council believes that the management of 'waste' grass cuttings on- site during the operational phase should be scoped in.	As set out in Table A5.1.3 of TA A5.1, draft outline Landscape and Ecological Management Plan, [EN010162/APP/6.4.5.1] grass will either be left uncut, grazed by sheep, or cut and managed (but not left piled up in fields, thereby avoiding anaerobic decomposition).
The Environment Agency Scoping Response December 2023	Climate change in the context of flood risk should be scoped in.	This is assessed within ES Chapter 9, Water Resources [EN010162/APP/6.2.9], and TA A9.1, Flood Risk Assessment [EN010162/APP/6.4.9.1].

Consultee	Summary of Consultation Response	Applicant Response
The Environment Agency Scoping Response December 2023	The development should consider a climate change allowance of 39% in line with government guidance. Please see the guidance on climate change allowances, Climate change. It would therefore be necessary for climate change to be scoped in to consider the flood risk of the development over its lifetime.	This allowance is used for fluvial flood risk, and effects are assessed on this basis within ES Chapter 9, Water Resources [EN010162/APP/6.2.9], and TA A9.1, Flood Risk Assessment [EN010162/APP/6.4.9.1].
The Environment Agency Scoping Response December 2023	Whatever final design or location is chosen the likely life span of the site will mean that it will need to operate within a changing climate. Therefore, a robust design and sensitive final location selection to accommodate future climate change impacts should be pursued. This will need to consider issues such as flood risk, increased heat, and drought, all of which could impact on the efficient running of the site. Climate change impact risk assessment and adaptation measures should include the potential impact of a changing climate for the expected duration of site operations.	This is included within the assessment of the resilience of the Development to climate change, in sections 15.3.2 and 15.4.2.
Natural England Scoping Response December 2023	The England Biodiversity Strategy published by Defra establishes principles for the consideration of biodiversity and the effects of climate change. The ES should reflect these principles and identify how the development will embed Nature Based Solutions, maintain ecological networks and build resilience to climate change. The ES should also incorporate the policies as set out in NPS EN-1 relating to climate change. The NPPF also requires that the planning system should contribute to the enhancement of the natural environment 'by establishing coherent ecological networks that are more resilient to current and future pressures' (NPPF Para 174), which should be demonstrated through the ES.	This is addressed in section 8.5.13 ES Chapter 8, Ecology and Biodiversity [EN010162/APP/6.2.8].
Newark & Sherwood District Council	Consequently, NSDC would expect reference to be made to relevant NSDC Development Plan Policies including Core Policy 10 (Climate	This is included within this chapter in section 15.1.3.3.

Consultee	Summary of Consultation Response	Applicant Response
Scoping Response December 2023	Change) of the Amended Core Strategy DPD (2019) and Policy DM4 (Renewable and Low Carbon Energy Generation) of the Allocations & Development Management DPD (2013). Other Development Plan policies contained within the two cited documents will be relevant to this Application and should be referenced accordingly within the ES.	
Newark & Sherwood District Council Scoping Response December 2023	The EIA Scoping Report notes that the River Trent is tidally dominated north of Cromwell Lock (para. 270). NSDC therefore considers significant effects are likely to occur in that flooding risk will be increased from climate change during the lifetime of the development. It is therefore suggested that an assessment of sea level rise in climate change resilience review should be scoped-in to the ES.	Consideration of flood risk (including climate change) and the Development is provided within TA A9.1, Flood Risk Assessment [EN010162/APP/6.4.9.1].
Sutton on Trent Parish Council Scoping Response December 2023	Sutton on Trent Parish Council would like to see [Climate Change] included within the proposed Scoping Report.	This chapter provides an assessment of the effects of the Development in relation to climate change.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Chapter 6 of Volume 2 comprehensively explains the requirements to move towards net zero and the Council recognises this need.	This is noted.
Norwell and Norwell Woodhouse Parish Council	At a meeting of our Council on 28th November 2024, senior representatives from the Applicant were asked by a member of the	The Applicant provided a written response by email on 12th December 2024.

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025	public how they arrived at the 400,000 figure. They were not able to answer but later promised an email reply.	
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The reply was eventually received stating the figure ”is based on annual project generation estimates of 1,125,600MWh” which would be enough for 400,000 homes. To achieve that generation, the Applicant would need to use a capacity factor of 16%. However, on page 3 of the Technical Appendix A15.1, the Applicant assumes “a conservative 10% capacity factor for 40-year operational life”.	The 10% is a reasonable worst-case assumption for individual panels (i.e., when comparing DC generation with theoretical maximum DC generation (1120 MWp)). However, for the scheme overall, the factor of 16% is correct, when comparing exported electricity (AC) with the theoretical maximum (800 MW (AC)). The number of homes calculation is based on average household electricity consumption figures from OFGEM of 2,700 kWh per annum.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	This and other publications are predicting increased cloud cover. There does appear to be an absence of peer reviewed research which could support an expectation of an increased capacity factor this far north due to climate change. There is published research that predicts an increase in the South West but increases decline as one goes north such that parts of Scotland will see a decrease.	The cloud cover predictions outlined within Section 15.3.2.2 are based on the latest UK Climate Projections (UKCP18), using RCP8.5 and the 25 km Grid Cell centred at 487500E 362500N, which is representative of the Order Limits. The data predicts that cloud cover is predicted to reduce by 3.5% by 2078.

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The only way that the Applicant's number at 4.7 above can be achieved is by adding a BESS discharge at a time when the arrays are performing at their maximum.	This is not correct. The 10% is a reasonable worst-case assumption for individual panels (i.e., when comparing DC generation with theoretical maximum DC generation (1120 MWp)). However, for the scheme overall, the factor of 16% is correct, when comparing exported electricity (AC) with the theoretical maximum (800 MW (AC)).
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Buying power from the National Grid is cheapest at night. The shortage of power generation is during daytime and teatime hours, with the Country having to import electricity from the likes of France and Norway. Some overnight generation passing through this substation is achieved using local wind turbines. Buying this just diverts renewable energy away from the grid, only to put it back later. It does not attract a carbon avoidance or assist with net zero targets, just financial ones.	The purpose of the BESS is to ensure that excess electricity can be used at times when it is needed. Gas is used to generate electricity only in times of peak demand, when other sources (renewables, nuclear, import from abroad) are insufficient. Electricity from the BESS would be supplied in preference to turning on/up the gas fired power stations, helping keep prices down and minimising climate change effects. The BESS would not draw supply from the grid at times of peak demand (actually the opposite). As well as being charged from excess electricity generated by the Development's solar PV, the BESS would also be charged from the grid when there is excess, cheap electricity available on the grid,

Consultee	Summary of Consultation Response	Applicant Response
		i.e., not from gas. So export from the BESS directly replaces export from gas-fired generation.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The BESS could be recharged from the gas powered Staythorpe Power Station. But again, though this arbitrage might be financially rewarding, it does nothing towards net zero.	The purpose of the BESS is to ensure that excess electricity can be used at times when it is needed. Gas is used to generate electricity only in times of peak demand, when other sources (renewables, nuclear, import from abroad) are insufficient. Electricity from the BESS would be supplied in preference to turning on/up the gas fired power stations, helping keep prices down and minimising climate change effects. The BESS would not draw supply from the grid at times of peak demand (actually the opposite). As well as being charged from excess electricity generated by the Development's solar PV, the BESS would also be charged from the grid when there is excess, cheap electricity available on the grid, i.e., not from gas. So export from the BESS directly replaces export from gas-fired generation.

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Staff working for the Applicant that the two BESS will be able to be recharged from Staythorpe Power Station when overall demand for electricity on the grid is low. This of course will not be 'green' energy.	The purpose of the BESS is to ensure that excess electricity can be used at times when it is needed. Gas is used to generate electricity only in times of peak demand, when other sources (renewables, nuclear, import from abroad) are insufficient. Electricity from the BESS would be supplied in preference to turning on/up the gas fired power stations, helping keep prices down and minimising climate change effects. The BESS would not draw supply from the grid at times of peak demand (actually the opposite). As well as being charged from excess electricity generated by the Development's solar PV, the BESS would also be charged from the grid when there is excess, cheap electricity available on the grid, i.e., not from gas. So export from the BESS directly replaces export from gas-fired generation.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory	The BESS avoidance is shown as 3,246,690 teCO2e. This saving cannot be achieved by overnight recharging from the gas powered Staythorpe as there is no figure in the Emissions Produced table above it, covering the burning of gas. And clearly, it would not be renewable energy. It cannot relate to recharging from wind as that greenhouse gas saving is already credited to those wind turbines.	The purpose of the BESS is to ensure that excess electricity can be used at times when it is needed. Gas is used to generate electricity only in times of peak demand, when other sources (renewables, nuclear, import from abroad) are insufficient. Electricity from

Consultee	Summary of Consultation Response	Applicant Response
Consultation Response 2025		the BESS would be supplied in preference to turning on/up the gas fired power stations, helping keep prices down and minimising climate change effects. The BESS would not draw supply from the grid at times of peak demand (actually the opposite). As well as being charged from excess electricity generated by the Development's solar PV, the BESS would also be charged from the grid when there is excess, cheap electricity available on the grid, i.e., not from gas. So export from the BESS directly replaces export from gas-fired generation. A correct analysis of the greenhouse gas savings from wind turbines would apply a similar approach to the analysis of savings from the solar PV applied in this chapter, namely that the generation replaces the "grid mix" of electricity sources, not the peak topping-up generation provided from gas. Adding a battery means that the wind (or other) electricity can be stored until periods of peak demand, at which point it is used to avoid having to generate electricity from gas. So there should be no double-counting.

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	It therefore follows if the figures are to be believed, that the energy produced by the arrays is capable of saving 4,176,957teCO2e. But the Applicant has produced greenhouse gas saving figures just for the panels and arrived at 930,266teCO2e.	The solar arrays will produce energy when they receive light. This is not necessarily always at peak times, so does not necessarily displace electricity generation from gas fired power stations - the generation from solar displaces grid emissions generally, which are forecast to drop off in the 2030s. The BESS, on the other hand, is assumed always to displace gas generation (at peak times), hence leads to a higher saving.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	In Year 4, it states the 800MW solar panels will produce 1,107698MWh in that year. The Council would wish to know how an 800MW array in Nottinghamshire (excluding a BESS top-up) can produce that much energy when the Council's own figures suggest annual output would at best be nearer 770,880MWh.	The annual energy production is calculated by multiplying the phase capacity by the yield and by the annual degradation. For year 4, this includes the following: Phase 3 capacity x yield x assumed annual degradation. 1120 x 1005 x ((1-0.4)*4) = 1,107,698 MWh.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory	Using the Applicant's own Generation-based long-run marginal Carbon Intensity figures, and similar year by year annual energy production variances, applied to more realistic annual energy production from an 800MW fixed panel development in Nottinghamshire, The Council estimate of carbon avoidance would be circa 682,560 tonnes over 40 years, not 930,266 tonnes.	This is not correct, because the capacity factor used is too low. A 10% factor is a reasonable worst-case assumption for individual panels (i.e., when comparing DC generation with theoretical maximum DC generation (1120 MWp)). However, for the scheme overall, the factor of 16% is correct, when

Consultee	Summary of Consultation Response	Applicant Response
Consultation Response 2025		comparing exported electricity (AC) with the theoretical maximum (800 MW (AC)). Solar PV sites typically employ a strategy referred to as 'oversizing', where more capacity is deployed relative to the grid connection size. This allows the system to more efficiently use the grid capacity available to it, which is often the primary constraint for development. It is beneficial for the project and beneficial for consumers, who get more energy without higher network investments being required.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Taking year 5, using the Applicant's figures (for now), they predict that that year's PV energy production would be 1,103,267 MWh (which earns a carbon avoidance of 93,778 tonnes). In the same year, they predict to export to the BESS 249,177MWh of which 225,073MWh will be later discharged to the grid, earning another carbon avoidance of 82,151 tonnes. But of course, that is double counting the 225,073MWh. That double counting occurs every year. The BESS is being recharged with electricity that already been credited with carbon avoidance. This was pointed out to the Applicant's staff during face to face consultation and they have now accepted that error.	This issue was noted during the statutory consultation period and an amended calculation is presented in this chapter.
Norwell and Norwell Woodhouse Parish Council	The resultant new 40 year total is 702,152 tonnes carbon avoidance from the panel fields and the BESS avoidance total remains at 3,246,690.	An amended calculation is presented in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025		
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	This then brings one back to the overestimation of annual MWh generation, given the size of the arrays. The Council maintain that annual MWh production is 800MW times hours in a year multiplied by the capacity factor. So one could expect that by year 3, given the Applicant's figures, the virtually new panels would be all installed and at their most efficient. Whereas the Council would expect the arrays to be producing 770,880MWh per annum, the Applicant predicts 1,112,146MWh. This represents an overestimation of 44 per cent and is unexplained.	This is not correct, because the capacity factor used is too low. A 10% factor is a reasonable worst-case assumption for individual panels (i.e., when comparing DC generation with theoretical maximum DC generation (1120 MWp)). However, for the scheme overall, the factor of 16% is correct, when comparing exported electricity (AC) with the theoretical maximum (800 MW (AC)). Solar PV sites typically employ a strategy referred to as ‘oversizing’, where more capacity is deployed relative to the grid connection size. This allows the system to more efficiently use the grid capacity available to it, which is often the primary constraint for development. It is beneficial for the project and beneficial for consumers, who get more energy without higher network investments being required.
Norwell and Norwell Woodhouse Parish Council	Recalculating without the overestimate and adopting a constant rate of overestimation, it is the Council's position that the actual carbon	An amended calculation is presented in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025	avoidance for the panels direct to the grid is not 930,266 tonnes but 417,904 tonnes.	
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	This reduces the total net emissions reduction for the 40 years from 1,594,744 to 1,082,382 tonnes. If the Council's calculations are correct, this means that the generating benefits have been overestimated by 47%. This recalculated figure will be even lower given some missing infrastructure from the tables.	An amended calculation is presented in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Council would welcome any further clarity on the Applicant's figures which assisted them in arriving at their totals.	In addition to these consultation comment responses, further detail is provided in this chapter and TA A15.1 [EN010162/APP/6.4.15.1].
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory	Following this assessment and the quantification of any resultant lost carbon avoidance, it is believed that the carbon avoidance overall total as shown in Chapter 15 should be adjusted accordingly.	An amended calculation is presented in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
Consultation Response 2025		
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The following helpful explanation (with our emphasis) is drawn from a footnote on page 14 of EN-3:- “10 Case law, beginning with R v Rochdale MBC Ex p. Tew [2000] Env.L.R.1 establishes that while it is not necessary or possible in every case to specify the precise details of development, the information contained in the ES should be sufficient to fully assess the project’s impact on the environment and establish clearly defined worst case parameters for the assessment. This is sometimes known as ‘the Rochdale Envelope.” It appears the Applicant has done that in the PEIR with regard to the projected CO2 emissions resulting from steel manufacturing.	Yes, this is correct.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	In addition to the above infrastructure item, the Applicant lists just under 5,500 tonnes of other infrastructure items to be made of steel. The implication of the CO2 transportation emissions associated with these items implies that some will also be imported from China. It is hoped that this can be clarified in the ES.	It has been assumed within Chapter 15, climate change, that the Development components, e.g. solar PV modules, PV framework, and BESS cells, will be produced in China and delivered via sea from China, to ensure a worst case scenario is presented. As outlined within section 15.5, only the PV mounting framework has the potential to be produced in the UK, but the potential emissions savings have not been included in the assessment as the mitigation cannot be committed to at this stage.

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Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Bearing in mind 6.3 above, paragraph 169 in the Technical Appendix A13.2 Employment states:- "The Applicant has also engaged in discussions with TATA steel to discuss potential contract for steel supply for the mounting frames." This has probably been included to hint at a possible reduction in steel transport CO2 emissions.	It has been assumed within this chapter, climate change, that the Development components, e.g. solar PV modules, PV framework, and BESS cells, will be produced in China and delivered via sea from China, to ensure a worst case scenario is presented. As outlined within section 15.5, only the PV mounting framework has the potential to be produced in the UK, but the potential emissions savings have not been included in the assessment as the mitigation cannot be committed to at this stage.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Port Talbot works have not closed completely and it is understood that it will continue to mill steel slabs imported from overseas. It is hoped that the ES can enlighten further on steel sourcing so as to provide firmer assessments on the scale of imports from China and the implications for employment in the United Kingdom. If the imported steel slabs come from China, this could actually increase the transportation CO2 emissions as the steel will have to travel to Wales first before coming to Nottinghamshire.	It has been assumed within Chapter 15, climate change, that the Development components, e.g. solar PV modules, PV framework, and BESS cells, will be produced in China and delivered via sea from China, to ensure a worst case scenario is presented. As outlined within section 15.5, only the PV mounting framework has the potential to be produced in the UK, but the potential emissions savings have not been included in the assessment as the mitigation cannot be committed to at this stage.

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Applicant has produced calculations for the CO2 emissions associated with the materials required for this project and the CO2 cost of transporting them. At this early stage of development, the Council accept this is a rough guide only.	This is noted.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Council would wish there to be clarification in the ES about the specifications for the CCTV and lighting poles. Clearly if these are to be steel or aluminium, there needs to be additional entries in the Production and Materials Transport Emissions tables. If they are to be wooden, there is a greenhouse gas cost to pole production and transporting them to site.	In line with the IEMA Guidelines, activities from the Development that do not significantly change the result of the assessment have been excluded from the lifecycle GHG evaluation if they are less than 1% of total emissions, and all exclusions are equal to or less than 5% of total emissions. CCTV and lighting poles would be mounted on steel or aluminium poles. The quantities of these materials will be minimal in comparison to the steel/aluminium used elsewhere in the Development, and would be substantially less than the uncertainty in the totals, and therefore does not warrant inclusion.
Norwell and Norwell Woodhouse Parish Council	There is a similar argument when addressing the issue of deer fencing. This is mentioned in the production emissions. The Applicant sets the fence total length to be 150km. It cites one supplier as an example - Ultimate One Online. Using their product as an example, the Applicant	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025	will need at least 1500 of their 100m wire roles. The weight of that steel according to that company would be 163.5 tonnes.	
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	In the transport emissions table, an incorrect figure of 150 tonnes is provided for Fencing and Gates. Clearly the lowest it can be is 163.5 tonnes but that figure does not include the deer fencing gate frames or other required fencing materials.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	What it also does not include is the 6km of security fencing required for the substations and BESS. The example chosen by the Applicant is using the products from a company called FirstFence. Their example is a 3m length of fence. The Applicant will require 2000 of these units to complete its 6km of fencing plus a similar number of galvanised steel poles. According to that company, the weight of the fencing alone would be 50 tonnes. 2000 poles would weigh circa 13 tonnes.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory	In table 5.5 of Chapter 5, the Applicant confirms that galvanised steel will be used for this security fencing. At the top of page 5 of A15.1, the Applicant has multiplied the 6km of security fencing by the emission factor of 12400kg per kilometre The source is given as Inventory of Carbon and Energy (ICE) Version 3. Their conclusion is that it would lead to 74 tonnes of CO2. The Council only has access to the newer Version 4 of this database. There, the embodied carbon for electro galvanised steel is 2.71 kgCO2e per kilogramme of steel. For the sheet	The PEIR document was drafted before the release of ICE V4. This version has been incorporated into the ES chapter. These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
Consultation Response 2025	or coil production of the galvanised steel needed for the fencing, the embodied carbon for the 63 tonnes would be 171kgCO2e, not 74. 6.2.6	
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	But the emissions will be even higher than that as cutting, shaping and welding of the steel will be required before paint is applied. Solvent based paint has a high embodied carbon footprint.	This has been reviewed and solvent based paint for security fencing has now been considered within the analysis provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Paragraph 60 of Chapter 5 confirms that galvanised steel poles will be used to support the panel frames. However, paragraph 213 of Chapter 9 states the “poles will be made from high-grade aluminium and stainless steel”, the latter of which has a higher embodied carbon factor than galvanised. For the purposes of this analysis, galvanised steel will be presumed. On page 3 of Appendix A15.1, the Applicant estimates that 44,800 tonnes of steel will be required for this purpose.	ES Chapter 9, Water Resources, [EN010162/APP/6.2.9] has been corrected in this respect.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	ICE V4's embodied carbon figure to create this is 2710kgCO2e per tonne of metal, before additional work such as tube rolling and welding is completed. That would bring the tCO2e emissions for this part of the infrastructure, excluding machining, to 121,408 tonnes of CO2, not 69,440. It is accepted that Chapter 15 states that attempts will be made to use steel sourced from electrical arc-furnaces which will reduce the emissions though these furnaces may not be in the UK.	This comment has been addressed in this chapter through an analysis of the data presented in Technical Appendix A15.1: Lifecycle Greenhouse Gas Evaluation [EN010162/APP/6.4.15.1].

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Applicant estimates that 23,520 tonnes of aluminium will be required for the frames. ICE V4 does not produce figures for anodised aluminium or magnelis. V4 does produce figures for aluminium production in China, with a built in use of 31% recycled metal. The embodied carbon factor for China is 14600kgCO2e for every tonne of aluminium, bringing its associated CO2 emissions to 343,392 tonnes as opposed to 156,878.	This comment has been addressed in this chapter through an analysis of the data presented in Technical Appendix A15.1: Lifecycle Greenhouse Gas Evaluation [EN010162/APP/6.4.15.1].
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	If however this metal was sourced from Europe, the figures come down dramatically with a European factor of 6670kgCO2e (with a recycling input of 31%). The CO2 emissions would then be 156,878- the same as the Applicant's figure. This firstly confirms the Applicant's methodology of using the ICE headline factors as opposed to the end of life ones. The problem with the lower figure though is that on page 12 of Appendix A15.1 the Applicant puts the journey distance for the aluminium by sea as 19,600km. A voyage distance assessment shows that that distance is consistent with the aluminium travelling from one of the southern ports in China. Certainly not Europe. This represents a significant reduction in the public benefit. If just these 3 CO2 corrections were applied to the Council's adjusted total carbon avoidance figures, then the total shrinks to 843,803 tonnes. Panel sourcing is often not decided predetermination. However as stated above, the Applicant must establish the worst case scenarios for assessment. Sourcing the aluminium from China is the worst case scenario here. One cannot use the European figures for Chinese aluminium.	Aluminium has been assumed to be sourced in China, as a worst case, so the embodied carbon for this has been revised for the updated design and ICE v4 figures, taking into account this comment in this chapter through an analysis of the data presented in Technical Appendix A15.1: Lifecycle Greenhouse Gas Evaluation [EN010162/APP/6.4.15.1].

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Following a stage 2 consultation public event, there is now some doubt as to whether aluminium will be used in the framework. If it is not and it is replaced with more UK sourced steel, then that is a substantial CO2 saving. However, until there is documentary evidence over the choice and sourcing of the metals, the aluminium figure has to remain in.	Aluminium has been assumed to be sourced in China, as a worst case, so the embodied carbon for this has been revised for the updated design and ICE v4 figures, taking into account this comment in this chapter through an analysis of the data presented in Technical Appendix A15.1: Lifecycle Greenhouse Gas Evaluation [EN010162/APP/6.4.15.1].
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	There is another infrastructure item that appears not to have made the CO2 calculations. Deer fencing requires deer fencing poles which will no doubt be pile driven into the ground. Paragraph 75 of Appendix A04.1 confirms that the poles will support galvanised wire mesh with the likely pole height of at least circa 2.5m. As previously stated, where exact specifications are not known, then the Applicant should adopt the worst case scenarios. The IEMA Guidelines advising on assessing greenhouse gas emissions allows the exclusion of certain CO2 emitters where their emissions are less than 1% of total emissions. In those instances, it must be clearly stated that that has been done. Certain CO2 production has been excluded in this report and where it has, this is mentioned. The Deer fence poles are not a major contributor but there is no mention of their exclusion. Furthermore, they are part of one of the Applicant' sub group's- Fencing and Gates, which requires a full assessment.	This has been reviewed and deer fencing has now been considered within the analysis provided in this chapter. Deer fencing poles are assumed to be wooden, as is typical.
Norwell and Norwell Woodhouse Parish Council	Page 7 of Appendix A15.1 attempts to calculate the CO2 emissions for the deer fencing. The Applicant states that the emission factor is 1689.5kg per kilometre to arrive at 253 tonnes. As previously stated, the Council do not have Version 3 of ICE but the newer version 4 (V4).	This has been reviewed and deer fencing has now been considered within the analysis provided in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025	It would be surprising if version 3 gave figures per kilometre as opposed to per tonne. Deer fencing can vary in height. The weight of the deer fencing proposed would be circa 163 tonnes of galvanised steel. The V4 embodied carbon figure to create this is 2710kgCO2e per tonne of metal, resulting in a minimum CO2 emission of 443 tonnes, not 253. This brings the expected CO2 saving down to 843,613 tonnes.	Deer fencing poles are assumed to be wooden, as is typical.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	As for the wooden poles, the worst case scenario would be for 3m treated wooden poles. For 1.8m high fencing, manufacturers suggest a gap between poles of 3m. For the 150km of predicted deer fencing, this would need 50,000 poles. Weight calculations vary according to pole circumference. A reasonable figure, based on manufacturers' specifications, would be 18kg per 3m pole. The projected weight of the poles would therefore be 900 tonnes.	This has been reviewed and deer fencing has now been considered within the analysis provided in this chapter. Deer fencing poles are assumed to be wooden, as is typical.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	ICE V4 cannot assist with the CO2 cost with machining these poles. It would not be insignificant. The nearest V4 category is Timber-Closed Panel timber frame system with an embodied carbon coefficient of 0.452kg per kg of wood. This would result in a further 406 tonnes of CO2 in pole manufacture. Clearly, these 900 tonnes of wood had also not been included in the CO2 transport emissions for Fencing and Gates (150 tonnes). The Applicants assign 240km as the mean round trip travel distance for fencing. Adding the 900 tonnes of wood to the 163 tonnes of wire mesh and the 63 tonnes of security fencing results in a minimum transport CO2 cost for fencing of 65 tonnes, not 9.	This has been reviewed and deer fencing has now been considered within the analysis provided in this chapter. Deer fencing poles are assumed to be wooden, as is typical.
Norwell and Norwell Woodhouse Parish Council	The sub-total at 6.2.13 can now be reduced further following the conclusions at 6.20-6.21, resulting in a new sub-total of 843,151 tonnes of carbon avoidance.	This has been reviewed and deer fencing has now been considered within the analysis provided in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025		Deer fencing poles are assumed to be wooden, as is typical.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Applicant uses a CO2 factor of 1550kg per tonne of steel, supposedly drawn from ICE V3. ICE V4 does not include this figure for any steel grade. Steel containers are either made of corten steel, galvanised steel or a mixture of both. The most appropriate ICE category appears to be organic coated steel sheets which attracts an emission factor of 2.88kg CO2 per kilogramme of steel, meaning the containers produce 230 tonnes of CO2 as opposed to the Applicant's 124 tonnes.	The CO_2 factor for steel was sourced from the ICE V3.0 'Steel, Section', with a factor of 1.55 kg/CO_2e. This has been updated to 'finished cold-rolled coil steel', as the best estimate of kg CO_2e from the ICE database, with an emissions factor of 2.57 kg/CO_2e.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	As for the substation construction, it is not known what grade steel is intended. The assumption is made that it will need to be coated. Taking the worst case scenario, the same grade as above will be adopted. This means that the 2800 tonnes of substation construction steel would cause 8064 tonnes of CO2. This brings the running total down to 839,321 tonnes of CO2 avoided. The same miscalculation has been made with the BESS storage containers. It assumes each container will be capable of storing 4MWh and therefore 220 of them will be required.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory	The Applicant states that containers will have heat exchangers but it very unclear where the production emissions for these 371 pieces of the infrastructure have been included.	The heat exchangers are an in-built section of the BESS, and are considered within its embodied carbon calculation.

Consultee	Summary of Consultation Response	Applicant Response
Consultation Response 2025		
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The illustrative design parameters (Table 5.9 Chapter 5) put the number of BESS storage containers as 371. Adopting this figure and the applicant's assumption that each container will weigh 2 tonnes, then that is a total of 742 tonnes of steel which will either be corten steel, galvanised steel or a mixture of both. Applying the same emissions factor as above from V4 for their manufacture, that provides an estimate of 2137 tonnes of CO2 as opposed to 682 from the Applicant.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	There is a further miscalculation with regard to the transportation emissions for the substations. On page 14 in table A15.1, the total weight of all the substations is given as 2.8 tonnes. However, one is told on page 6 that 2800 tonnes of steel are required for these builds. The associated emissions are therefore not 0.1 tonnes of CO2 but 162 tonnes, according to ICE V4.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	There is an adjustment needed for the CO2 embodied in the replacement panel supports. The Applicant's figures are shown at Table A15.1.2.6 in TA A15.1. The Applicant totals the combined steel and aluminium panel support production emissions at 226,318 tonnes whereas that figure has now been shown that it would be 464,800 tonnes if the correct V4 emission factor is used.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Applicant then provides too high a figure for the original framework transportation emissions in this table, the correct one being 178,014, not 182,161. Adjusting the combined production emissions figure and using the correct transport figure brings about a net increase of 23,433 tonnes of CO2.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Transformers have been included in the steel total. It is recognised that these pieces of equipment contain other materials, some of which would attract a higher emissions factor.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Transformer production emissions are based by the Applicant on 510 tonnes of steel. When it comes to transporting them, 1020 tonnes of transformers travel by sea but then only 500 leave the port for the site. It is not intended to correct this error as it is not known which of the 3 figures is right.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council	For the purposes of decommissioning, the lower figure will be used. This totals 46,434 tonnes of steel and using the Applicant's emission factor, it would attract 46 tonnes of decommissioning CO2 emissions	These figures have been reviewed, along with changes to the design

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025	The decommissioning transportation CO2 impact would no longer be 184 tonnes but 2228. Total steel decommissioning would then be 2274 tonnes of CO2.	parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Production omissions are included for 255 tonnes of oil for the transformers. This oil does not appear in the transportation CO2 calculations.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The weight figures for the transformers are confusing and It is not clear whether the oil is included in any of the figures. If it not, then calculated separately for a distance of 150km, this would cause a further 9 tonnes of CO2 emissions.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory	Transformer oil does not appear in the decommissioning calculations either. Clearly, this material will be disposed of in a different way to the transformer metals. Staff working for the Applicant have however helpfully verbally confirmed at a public consultation that it will most likely use mineral oil. Mineral oil is not listed separately in ICE V4. However, all the liquid	The oil type used within the transformers will be confirmed at detailed design stage, but mineral oil has been presented as a worst case within this chapter.

Consultee	Summary of Consultation Response	Applicant Response
Consultation Response 2025	refined hydrocarbon fuels that it does list have an emissions factor around 3 tonnes of CO2 per tonne of oil refined. The verbal confirmation that mineral oil will be relied upon. This oil a distillate obtained during fuel refinement and distillates have an associated emissions factor of 3.226 tonnes of CO_2 per tonne, leading to a total of 823 tCO2e.	
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Applicant states that on page 8 of A15.1 that the construction compounds will need 36,000 tonnes of aggregate. The decommissioning phase assumes a removal of the same amount.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The transport to site shows 40,050 tonnes. This is assumed to be the total weight of the aggregate for the construction compounds plus the 4050 tonnes of grit for the access tracks.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council	The Council feel that the total aggregate needs to be reviewed. It will not just be required for the construction compounds and access tracks. However, it is possible that the compound access tracks have been included in 1125 tonnes of aggregate required for each compound.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025		
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Presumably though more aggregate will be required as a base for the new asphalt substation roads. And it might be considered prudent to include the asphalt and road building embodied carbon.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	For some reason, the 239 tonnes of copper and 900 tonnes of wood have not been included. However, the related CO2 decommissioning emissions for these two materials are also not large enough to be hugely significant. The same applies to the CO2 linked to the stakes for 50,000 trees/shrubs and tree guards.	This has been reviewed, with wood from fencing and copper now considered within the analysis provided in this chapter. Deer fencing poles are assumed to be wooden, as is typical.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory	With the guards likely to be made from HDPE and the stakes softwood, the probable total CO2 emissions linked to these items is under 100 tonnes. And of course there is a carbon capture element for the trees.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter. Forestry is a renewable business (i.e. new trees will be grown in place of the felled ones - and in any scenario the felled ones would ultimately have died and

Consultee	Summary of Consultation Response	Applicant Response
Consultation Response 2025		decomposed somehow, and been replaced by new trees), and so the relevant carbon associated with the wood is only the carbon for working, treating and transporting it.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Not all the errors are damaging to the carbon avoidance figures. In Table A15.1.2.7, page 25 of Appendix A15.1 the Applicant states the mass of the batteries to be decommissioned is 1,760,000 tonnes. This obviously is incorrect. The actual weight would be 38,218, including the replacement batteries. This error is repeated on page 27.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The decommissioning of the batteries is reduced to 813 tonnes (not 37477) and decommissioning transportation CO2 is reduced to 1834 tonnes (not 84,480). This is the largest miscalculation and changes the carbon avoidance up to 931495 tonnes.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory	There is another positive error in that recycling the aggregate has been counted twice – in operational waste and decommissioning waste. The correction leads to an increase in carbon avoidance of 468 tCO2e.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
Consultation Response 2025		
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The decommissioning of the deer fence poles is not included but this was to be expected as they did not appear in any of the other calculations. Disposal should be achievable within a 50km radius so a mean round trip distance should be 100km. The conversion closed loop factor for wood is 6.41061kgCO2e per tonne. Assuming they would not be going to landfill, this results in an emission total of 6 tonnes with a transport CO2 emission total of 21 tonnes.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Page 18 of the Appendix A15.1 introduces a figure for waste transport of 2,002,800 tonnes.km with a 50km average transporting distance. This means the Applicant is estimating 40,056 tonnes of waste. Therefore this waste tonnage is virtually all aggregate along with 5 tonnes of wood.	These figures have been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Chapter 16 also assumes no wasted copper, or tin for the cabling when it is cut to length. This is also contradicted in the same paragraph 144. Virtually all the 40,056 tonnes seem to consist of recycled aggregate (page 16). However, on page 39 of Chapter 16, the Applicant confirms they are expecting waste in paper, cardboard, wood, packaging, metals, chemicals, fuels, oil and welfare facility waste.	These figures have been reviewed, along with changes to the design parameters, and a revised commentary is provided in this chapter. Section 16.7, Waste, in Chapter 16 [EN010162/APP/6.2.16] has been updated to reflect the latest estimates of waste arising from the Development during the construction and operation phases.

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Table A15.1.2.4 provides the expected workforce assumed numbers – 400 workers on average for 500 days. With the only calculated waste for site removal being aggregate, there is an in- built assumption that these 200,000 person days create no waste.	These figures have been reviewed, along with changes to the design parameters, and a revised commentary is provided in this chapter and Section 16.7, Waste, of Chapter 16 [EN010162/APP/6.2.16]. An estimate for the waste per worker has been included.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Given that arriving at accurate waste estimates is not reliable, the CO2 cost relating to 180 tonnes of worker related waste is likely to be less than 50 tonnes of CO2.	This is noted.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Council believe that more detail is required in the ES. This will probably have to be a worst case assessment as opposed to no assessment, as in the PEIR.	The approach to carbon associated with waste has been reviewed, along with changes to the design parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council	The Applicant states they intend to install 417 tonnes of cabling which will require removal upon decommissioning. However, the cabling does	These figures have been reviewed, along with changes to the design

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025	not figure in that data set. That said, the decommissioning CO2 costs for the cabling only comes to 22 tCO2e	parameters, and a revised analysis is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The final transportation emissions relate to those on the Chinese mainland. Such emissions are classed as Scope 3 emissions in the UK Government's GHG Conversion Factors. The most likely source of the panels is the Xinjiang province and this was confirmed by staff working for the Applicant on 31st January 2025.	This is noted.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	It will be assumed that the southern Chinese port of Shenzhen is the main destination on the mainland and that the overwhelming majority of the journey from the chosen sample town of Turpan (part of the Chinese rail freight northern network, close to Xinjiang) will be by rail. An HGV delivery mileage of the panel containers to the rail freight depot from Xinjiang is estimated as 300km. Using Chinese rail infrastructure mapping, the rail distance is estimated at 3,700km. Transporting 64,442 tonnes (110% of 58584 tonnes) of panels on this journey would cause 4638 tCO2e for HGV emissions and 6,626 tonnes for rail freight (using the GHG 2024 Conversion factors). This totals 11,264 tonnes of CO2. This is a conservative figure as the HGV distances are likely to be much higher.	These figures have been reviewed, along with changes to the design parameters, and a revised commentary is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council	The final material not included in the Applicant's estimates is thermal sand. This will be required to encase the underground cables, in order to dissipate the heat more efficiently. The Applicant has helpfully	These figures have been reviewed, along with changes to the design

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025	provided their calculations for total cable distance - 15km of 33kV, 30km of 132kV cabling and 1km of 400kV cabling.	parameters, and a revised analysis is provided in this chapter. This is noted.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Applicant states that trenches can be as wide as 30m. However, the Applicant's staff have been spoken to and they have stated that 8m to 10m would be the most common for the 3 phase medium voltage runs. Trenching in the array compounds will be less wide but staff have explained that some higher voltage trenches could easily be 15-20m wide. For calculations, a conservative average trench width of 5m will be used for 33kv cabling, 10m for the 132kv and 8m for the 400kv. If more details are provided about trench width, then this issue will be revisited.	ES Chapter 5, Development Description, [EN010162/APP/6.2.5] provides further detail on expected widths of cable trenches.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	For every metre length of sand encased cabling, the assumption will be made that 0.4m3 of sand by volume will be required. This provides a rough total volume of sand required as circa 15,000m3, weighing 240,000 tonnes	These figures have been reviewed, along with changes to the design parameters, and a revised commentary is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory	This appears to be the first mention of waterproof ducting as a construction material. It does not appear in the emissions tables. There is no mention of how many kilometres of it are needed or its relationship with the thermal sand. It is assumed that it will be some form of plastic which will have a significant embodied carbon factor. But	The embodied carbon associated with the plastic included in the cables is considered in this chapter.

Consultee	Summary of Consultation Response	Applicant Response
Consultation Response 2025	without more information, it is impossible to factor in this material. Clearly more information is required.	
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The embodied carbon for that sand will be 1792 tonnes. Using the same transportation distance the Applicant adopted for aggregate, that equates to 24,000,000 tonnes.km which has a carbon emissions factor of 5,760 tonnes of CO2. It should be quite easy for the Applicant to come up with a different figure as they have all the technical specifications. However, our rough calculations would not have been necessary had the Applicant included thermal sand and ducting in their calculations from the outset.	These figures have been reviewed, along with changes to the design parameters, and a revised commentary is provided in this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Methane is the second most important greenhouse gas contributor to climate change following carbon dioxide. In fact, methane's ability to trap heat in the atmosphere is stronger than that of carbon dioxide. Nitrous Oxide is the third greenhouse gas measurable using the aforementioned conversion factors. The presentation of their impact is by showing the CO2 equivalence. The UK Government's GHG Conversion factors require companies to report emissions for all the three gasses.	This is noted.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	By mass, CO2 is by far the most significant harmful emission. However, the burning of fossil fuels in transportation also releases methane (CH4) and nitrous oxide (N2O) which are both greenhouse gasses.	This is noted.

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The Council have completed a series of calculations for the onsite fuel consuming machinery and the transportation elements of this development. Using the aforementioned conversion factors, it has been possible to total the consumption in tonnes of petrol, diesel and marine diesel. From there, the total CO2 equivalent emissions of CH4 and N2O can be calculated. The final total is 6673 tonnes of CO2 equivalence.	Fuel consumption for plant, machinery, and generators is assessed for construction and decommissioning within TA A15.1: Lifecycle Greenhouse Gas Evaluation (EN010162/APP/6.4.15.1). The emissions factor in kg of CO2e represents all emissions including CH_4 and N_20.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The combined effects of the revision of CO2 avoidance through aggregate power generation, and this review of the CO2 emissions that are a consequence of deploying the materials required for the development, is that the recalculated projected carbon avoidance over 40 years is 905,762 tonnes, not 1,594,744. This represents a 76% over-inflation of the benefits. Appendix C shows that all the recalculations correct wrong conversion factors, omitted infrastructure or incorrect data, or mathematical errors - not exclusions following the 1% IEMA guidelines.	This is noted. Amendments to the analysis have been made in response to consultation comments as well as to changes to the design parameters, as set out this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	No CO2 emissions resulting from painting, machining, factory welding, pressure treating the 50,000 wooden poles, cable ducting, metal fastenings and the use of chemicals for the wood have been included.	This is noted. Amendments to the analysis have been made in response to consultation comments as well as to changes to the design parameters, as set out this chapter.

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	There is also a large Scope 3 CO2 emission caused by the freight depot and container port handling machinery, and the quay cranes loading and unloading the shipping containers in port.	This is noted. Amendments to the analysis have been made in response to consultation comments as well as to changes to the design parameters, as set out this chapter.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	The focus of the assessment is on the damage to the fronts of panels from sharp projectiles. It concludes that there would be negligible impact on water bodies and therefore a negligible significance of effect. It is surprising to learn from Appendix A15.1 that the Applicant expects 90% of the panels to last the full 40 years. The Council would wish there to be an evidence based affirmation of this assumption.	There are no panels of current designs that are yet 40 years old, so there is no evidence base for the assumption. It is made on the basis that the life expectancy is 40 years, but that not all panels will achieve that. There is a range of possible causes of a panel not lasting its expected lifetime, with physical damage being one of them.
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	An asserted national advantage is its contribution to energy security for the UK.	This is correct.

Consultee	Summary of Consultation Response	Applicant Response
Norwell and Norwell Woodhouse Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	Internationally, the Applicant predicts a positive impact on climate change (section 15.4 of Chapter 15) which is an international benefit.	Updated predictions are made in this chapter.
National Fire Chiefs Council PEIR – Phase 2 Statutory Consultation Response 2025	Grid scale Battery Energy Storage Systems (BESS) are a fundamental part of the UK's move toward a sustainable energy system.	This is noted.
Kneesall, Kersall and Ompton Parish Council PEIR – Phase 2 Statutory Consultation Response 2025	We would like to stress we are open to renewable and sustainable energy.	This is noted.
Newark & Sherwood District Council	In respect of Climate change, we note that under the heading Assessment of Potential Effects Paragraph 15.4 presents a summary of emissions produced by the proposed development, alongside the	This is noted.

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025	emission savings, measured in 'Tonnes of Carbon Dioxide Equivalent' (tCO2e).	
Newark & Sherwood District Council PEIR – Phase 2 Statutory Consultation Response 2025	NSDC welcome the benefits to be achieved by the proposed development, which would bring about predicted net emissions saved of – 1,594,744 (tCO2e).Whilst it is noted that the assessment assumes a worst-case scenario in the (for example, importation of steel for the PV frames from China) notwithstanding the net emissions saved, there is still a substantial amount of emissions predicted to be produced by the proposed development at a figure of 2,623,573 (tCO2e). NSDC would encourage the Applicant to consider how emission types generated (across the construction, operation, and decommissioning phases) could be reduced from the 'worst case scenario' currently presented.	Opportunities to reduce the emissions generated by the Development will be undertaken where practicable, for example, manufacturing sheet steel into the mounting structures within Work no. 1, powered by renewable energy generated (EN010162/APP/6.2.5). Other energy conservation measures such as switching off engines of trucks while they are waiting to access the site or unloading have already been considered and are secured within the outline Construction Environmental Management Plan (EN010162/APP/6.4.5.3).The worst case scenario presented is to ensure that all potential impacts of the Development are assessed accordingly, in the absence of being able to secure specific, further emission reduction opportunities until detailed design stage.
Newark & Sherwood District Council	It is noted at Paragraph 15.5 (Mitigation Measures and Residual Effects) that the Applicant is considering various measures to further reduce possible carbon emissions. This includes sourcing steel for the solar PV mounting structures UK based suppliers, including those that	It has been assumed within this chapter that the Development components, e.g. solar PV modules, PV framework, and BESS cells, will be produced in China

Consultee	Summary of Consultation Response	Applicant Response
PEIR – Phase 2 Statutory Consultation Response 2025	use electrical arc furnaces rather than fossil fuel fired furnaces, amongst other potential measures. Such possible measures are welcomed, but details of how the Applicant would commit to and deliver such additional measures are required, including how they would be secured as part of the DCO.	and delivered via sea from China, to ensure a worst case scenario is presented. As outlined within section 15.5, only the PV mounting framework has the potential to be produced in the UK, but the potential emissions savings have not been included in the assessment as the mitigation cannot be committed to at this stage.

15.1.3 Legislation, Policy and Guidance

11 This section outlines the legislation, planning policy and professional guidance relevant to the Climate Change assessment. Note that this section does not identify legislation or policy that sets targets or planning policy in relation to climate change per se, only that which may affect whether and how the assessment is carried out. The Planning Statement [EN010162/APP/5.4] provides an assessment of compliance with relevant planning policy, including climate-related policies.

15.1.3.1 Legislation

12 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[2] require, at Schedule 4, point 5(f), the ES to contain "*A description of the likely significant effects of the development on the environment resulting from… the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.*"

15.1.3.2 National Planning Policy

13 Three National Policy Statements (NPS) are relevant for the Development:

- Overarching NPS for energy (NPS EN-1)[3];
- NPS for renewable energy infrastructure (NPS EN-3)[4]; and
- NPS for electricity networks infrastructure (NPS EN-5)[5].

14 Consultation drafts of the NPSs have been issued (April 2025) in response to changing climate change policy, however, the content of these with respect to the topic covered in this chapter is materially unchanged from the adopted versions, and hence the adopted versions are referred to elsewhere in this chapter.

15 NPS EN-1 notes, at paragraph 4.10.1, that "*If new energy infrastructure is not sufficiently resilient against the possible impacts of climate change, it will not be able to satisfy the energy needs as outlined in Part 3 of this NPS*." It references, at paragraph 4.10.3, the UK Climate Projections, which should be referenced in the assessment of climate resilience. Paragraph 5.3.4 notes that, "*All proposals for energy infrastructure projects should include a GHG assessment as part of their ES*". Paragraph 5.3.7 notes that "*Steps taken to minimise and offset emissions should … consider the creation and preservation of carbon stores and sinks including through woodland creation,*

[2] HMSO (2017). The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. [Online]. Available at: https://www.legislation.gov.uk/uksi/2017/572/schedule/4 (Accessed on 05/03/2025).
[3] Department for Energy Security and Net Zero (2023). Overarching National Policy Statement for Energy (EN-1). [Online]. Available at: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf. (Accessed 05/03/2025).
[4] Department for Energy Security and Net Zero (2023). National Policy Statement for Renewable Energy Infrastructure (EN-3). [Online]. Available at: https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3.pdf. (Accessed 05/03/2025).
[5] Department for Energy Security and Net Zero (2023). National Policy Statement for Electricity Networks Infrastructure (EN-5). [Online]. Available at: https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf. (Accessed 05/03/2025).

hedgerow creation and restoration, peatland restoration and through other natural habitats."

16 NPS EN-3 re-states some of the points made in EN-1 and notes, at paragraph 2.4.11, that, "*Solar photovoltaic (PV) sites may also be proposed in low lying exposed sites. For these proposals, applicants should consider, in particular, how plant will be resilient to:*

- *increased risk of flooding; and*
- *impact of higher temperatures*."

17 NPS EN-3 re-states some of the points made in EN-1, focusing on the potential effect of flooding, storms and temperatures on overhead lines. Paragraph 2.3.2 notes that "*applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to: … earth movement or subsidence caused by flooding or drought (for underground cables)…*".

15.1.3.3 Local Planning Policy

18 These policies have not affected the assessment of effects of/on the Development from climate change, but are relevant in an assessment of whether the Development complies with local planning policy, in relation to climate change. They are included here at the request of Newark and Sherwood District Council in its response to Scoping (see section 15.1.2).

19 Newark and Sherwood District Council, Core Policy 10: Climate Change, states that the council will work with partners and developers to "*promote energy generation from renewable and low-carbon sources, including community-led schemes, through supporting new development where it is able to demonstrate that its adverse impacts have been satisfactorily addressed*" and "*Mitigate the impacts of climate change through ensuring that new development proposals minimise their potential adverse environmental impacts during their construction and eventual operation*"[6].

20 Newark and Sherwood District Council, Policy DM4: Renewable and Low Carbon Energy Generation, states that planning permission will be granted for renewable and low carbon energy developments where benefits are not outweighed by adverse impacts on landscape, heritage, amenity, highway safety, ecology, or aviation[7].

[6] Newark and Sherwood District Council (2019). Amended Core Strategy. [Online]. Available at: https://www.cartogold.co.uk/newark_sherwood/text/Amended-Core-Strategy-document.pdf. (Accessed 05/03/2025).
[7] Newark and Sherwood District Council (2013). Allocations and Development Management Development Plan Document. [Online]. Available at: https://www.newark-sherwooddc.gov.uk/media/nsdc-redesign/documents-and-images/your-council/planning-policy/supplementary-planning-information/allocations-and-development-management-dpd/Allocations-and-Development-Management-Development-Plan-Document.pdf. (Accessed 05/03/2025).

15.1.3.4 Guidance

21 The assessment has been informed by the following good practice guidance:

- Department for Levelling Up, Housing and Communities Planning Practice Guidance for Climate Change[8];
- Institute of Environmental Management and Assessment (IEMA) EIA Guide to: Climate Change Resilience and Adaptation[9] (the IEMA Guidelines); and
- IEMA Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition [10].

15.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

22 The assessment areas outlined below have been evaluated in relation to the Development:

- The influence of the Development on climate change; and
- The resilience of the Development to climate change;
- A summary of effects on environmental receptors sensitive to climate change (see section 15.4.3).

15.2.1 Influence of the Development on Climate Change

23 In order to undertake an assessment of significance, the net change in emissions of Greenhouse Gases (GHG) resulting from the Development on climate change is estimated within TA A15.1 – Lifecycle Greenhouse Gas Evaluation (Lifecycle GHG Evaluation) [EN010162/APP/6.4.15.1].

24 GHG emissions, measured in tonnes of carbon dioxide (CO_2) equivalent (tCO_2e), have been calculated across the construction, operation, and decommissioning phases to ensure the whole project lifecycle is considered. The approach highlights areas of the Development likely to generate the largest amount of GHG emissions, to identify priority areas for mitigation.

25 The potential sources of GHG emissions associated with the Development are summarised in Table 15.2.

[8] DLUHC (2019). Climate Change. [Online]. Available at: https://www.gov.uk/guidance/climate-change. (Accessed on 22/12/2024).
[9] Institute of Environmental Management and Assessment (IEMA) (2020). IEMA EIA Guide to: Climate Change Resilience and Adaptation [Online]. Available at: iema-eia-climate-change-resilience-june-2020.pdf
[10] Institute of Environmental Management and Assessment (IEMA) (2022). Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition [Online]. Available at: TR010056-001649-Climate Emergency Planning and Policy - Appendix A - IEMA Guide- Assessing Greenhouse Gas Emissions and Evaluating their Significance, Version 2, Feb 2022.pdf

Table 15.2 Potential sources of GHG emissions

Source	Activity	Emission Source
Production	The production phase represents the raw materials and manufacturing process for the products required to construct the Development. This includes any transport required to create the required product. This stage is expected to be the highest contributor to GHG emissions.	Embodied GHG emissions from energy use in extraction and production. GHG emissions from vehicle use.
Construction	Transportation of the products required to facilitate the construction of the Development, where this is not included in embodied GHG emissions. This may require shipment over large distances, e.g., solar panels sourced from China. Transportation of construction workers. On-site construction activity including emissions from construction compounds.	Fuel and energy consumption from plant, vehicles, generators, and the transportation of materials and workers.
	Land use change.	The change in stored or released carbon due to land change.
	Disposal of any waste generated by the construction processes. Water use and waste water generation.	Lifecycle emissions associated with sourcing water and treatment of waste water. Emissions from the storage and recycling, incineration or landfilling of waste
Operation	Transportation and use of materials and workers for routine maintenance and any replacement or repair of damaged or inefficient equipment.	Embodied GHG emissions from energy use in extraction and production for replacement equipment. GHG emissions from energy consumption, water storage, treatment of waste water, and

Source	Activity	Emission Source
		food and drink waste. GHG emissions from vehicle use.
	Grazing sheep within the Work no. 1 (Solar PV) areas.	Methane emissions and water usage in CO_2e from grazing sheep and lambs.
Decommissioning	On-site decommissioning activity involving fossil-fuel-powered vehicles and plant. Transportation of materials and workers, and recycling/disposal of waste materials using fossil-fuel-powered vehicles and plant.	Fuel and energy consumption from plant, vehicles, generators, and the transportation of materials and workers. GHG emissions from disposal and transportation of waste.
	Disposal of any waste generated by the decommissioning processes. Water use and waste water generation.	Lifecycle emissions associated with sourcing water and treatment of waste water. Emissions from the storage and recycling, incineration or landfilling of waste.

26 The climate change projections used with this assessment are based on the global model UKCP18[11] which presents a range of GHG emissions scenarios. The data used is the most appropriate available for this assessment; however, it is noted that they are estimates only, and are generally based on regional effects (e.g., England), rather than local.

27 The lifecycle GHG evaluation assessment was conducted using key emission factors from the below sources:

- Greenhouse Gas Reporting: Conversion Factors 2024[12]; and

[11] Met Office (2018). UK Climate Projections 2018 (UKCP18). [Online]. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp. (Accessed 05/03/2025).
[12] Department for Business, Energy & Industrial Strategy, Greenhouse Gas Reporting: Conversion Factors, 2024. Available at: Greenhouse gas reporting: conversion factors 2024 - GOV.UK. (Accessed 05/03/2025).

- Inventory of Carbon and Energy (ICE) Database[13].

28 In line with the IEMA Guidelines, activities from the Development that do not significantly change the result of the assessment have been excluded from the lifecycle GHG evaluation if they are less than 1% of total emissions, and all exclusions are equal to or less than 5% of total emissions. This includes:

- CCTV and lighting poles – these features of the development would be mounted on steel or aluminium poles. The quantities of these materials will be minimal in comparison to the steel/aluminium used elsewhere in the Development, and would be substantially less than the uncertainty in the totals, and therefore does not require including.

15.2.1.1 Assumptions and Limitations

29 A Lifecycle GHG Evaluation has been undertaken on the basis of the information available at the time of assessment. The Lifecycle GHG Evaluation uses appropriate industry benchmarks, and conservative assumptions on materials, design, assembly, earthworks and use of components to provide a robust assessment of likely GHG emissions.

30 The response to the net zero by 2050 target, resulting in potential future improvements in the carbon intensity of energy generation, emissions from transport, and other factors, will impact the final GHG emissions from the Development. However, the impact of these changes is difficult to predict, becoming increasingly unclear in the long term. As a result, present day values have been used, which typically represent a conservation approach.

31 The following principal assumptions have been used (with all assumptions stated in TA A15.1 [EN010162/APP/6.4.15.1]):

- Construction phase: It has been assumed that the Development components, e.g. solar PV modules, PV framework, and BESS cells, will be produced in China and delivered via sea from China and Heavy Goods Vehicles (HGV) from a port up to 240 km away;
- Construction phase: It is assumed that generators will consume 16.5 litres of fuel per day and run for 6 hours a day, 26 days a month over the 2 year construction period. Plant and machinery is assumed to consume 5,000 litres of diesel per week across the 2 year construction period;
- Construction phase: emissions from workers traveling to site and workers water use on-site have been calculated based on 400 workers on-site for 2 years. It is assumed each worker travels 60 km to and from site with an average of 1.5 workers per car and requires 90 litres of water per day;
- Operational phase: it is assumed that the following percentage of components will be replaced during the operational phase of the Development: 5% of transformers, 10% of PV panels, 10% of panel supports, 150% of PV inverters, 150% of BESS inverters, 150% of BESS cells;
- Operational phase: Operational emissions from the maintenance of the Development are based on a single on-site warehouse estimated to

[13] Circular Ecology (2024). Embodied Carbon - The ICE Database v4, 2024. Available at: https://circularecology.com/embodied-carbon-footprint-database.html. (Accessed 05/03/2025).

have a continuous electricity draw of 10 kW, supplied by the national grid, amounting to 87,600 kWh per year;

- Operational phase: It is estimated that there will be 60 full time employees, with approximately 30 attending the site on any given day, for 300 days of the year. It is assumed that each worker will travel for an average of 60 km, with an average of 2 workers per car, totalling 225,000 km across the year. Each employee is estimated to use 90 L of water a day;
- Operational phase: BESS Savings – the BESS would be charged from electricity generated by the Development's solar PV and, in addition, the BESS would be charged from the grid when there is excess, cheap electricity available, i.e., not from gas at peak times of day. The purpose of the BESS is to ensure that excess electricity can be used at times when it is needed. The emissions savings from the BESS are calculated with the knowledge that gas is used to generate electricity only in times of peak demand, when other sources (renewables, nuclear, import from abroad) are insufficient. Electricity from the BESS would be supplied in preference to turning on/up the gas fired power stations, helping keep power prices down and minimising climate change effects. As a result, exports from the BESS directly replace export from gas-fired generation;
- Operational phase: Solar PV Savings - Solar PV sites typically employ a strategy referred to as 'overplanting', where more capacity is deployed relative to the grid connection size. This allows the system to more efficiently use the grid and BESS capacity available to it, which is often the primary constraint for development. It is beneficial for the project and beneficial for consumers, who get more energy without higher grid network investments being required;
- Decommissioning phase: GHG emissions have been assessed using the same parameters as the construction phase. Decommissioning phase emissions are therefore anticipated to be an overestimation considering the UK's commitment to reduce domestic emissions to net zero by 2050. It is expected that GHG emissions will continue to decline due to a combination of national government carbon budgets, local carbon reduction targets, decarbonisation of industry, energy supply and transportation.

15.2.1.2 Carbon Avoidance Assumptions

32 A worst-case approach is taken in this chapter when assessing the carbon avoidance from Solar PV generation. The level of carbon savings depends predominantly on the embodied carbon of the grid electricity that is displaced by the electricity generated by the Development. The embodied carbon in the grid is highest when electricity is from non-renewable sources, such as oil and gas. The higher the embodied carbon in the grid is, the more carbon savings the solar PV will generate by displacing it.

33 Due to the levels of low carbon generation assumed to be coming online from projects like this Development, the grid is predicted to become extremely decarbonised over the next few decades. The carbon intensity of the grid in 2024 was reported to be 0.20705 $kgCO_2e/kWh$[12]. A decade later in 2034, this is predicted to be 0.0295 $kgCO_2e/kWh$, representing an 86% drop in carbon intensity.

34 In order to assess a worst-case scenario, the predicted, and rapidly decreasing, levels of carbon intensity in the grid have been applied to our assessment, resulting in a carbon avoidance which is lower than might be expected. For the avoidance of doubt, the project will continue to supply low carbon electricity, but in a future grid where all energy is low carbon, the carbon savings are minimal.

35 To reflect the significance of assessing the solar PV carbon avoidance in this way, an alternative approach has also been presented. This approach uses the latest measured grid carbon intensity figure from 2024 throughout its assessment, representing a scenario where all or most low carbon electricity proposals do not proceed. The comparison is presented in section 15.4, in tables 15.6 through 15.10. As expected, this approach shows extremely high carbon savings from the solar PV. This approach has been taken in the assessment of other solar projects for which DCO applications have been made and approved, but arguably this approach does not reflect the expected continued decarbonisation of the electricity grid as an evolving baseline.

36 The assessment of carbon avoidance from the BESS is calculated with the knowledge that the stored electricity from the BESS will be used at times of peak demand. As a result, the assessment in this chapter uses the grid's evening peak carbon intensity, which is currently associated with gas fired powered stations, as described in section 15.2.1.2 above. For the same reasons that the savings from the Solar PV are reducing over the life of the Development, the evening peak carbon intensity is likely to reduce over time, as our reliance on gas fired power stations reduces. No data is available to predict the rate at which the peak supply will be decarbonised, and as a result, the current value has been used throughout the operational phase of the Development. The assessment applies the lowest reported embodied carbon figure for Combined Cycle Gas Turbines (CCGT), 0.365 $kgCO_2e/kWh$[14]. CCGTs are more efficient than single cycle gas turbines, which are most often used at peak times, and therefore, a worst-case approach has been undertaken based on the data available.

15.2.1.3 Significance Criteria

37 The receptor for the lifecycle GHG evaluation is the global climate, and its sensitivity to increases in GHG emissions is defined as 'high'. This reflects the severe consequences of global climate change and the cumulative contribution of GHG emissions sources. Additional contributions to GHG emissions could hinder the UKs ability to reach its climate targets.

38 The significance of the Development's contribution to GHG emissions is assessed in line with IEMA guidance, which describes five levels of significance. These levels are designed to "*not necessarily refer to the magnitude of GHG emissions being carbon neutral (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change, aligning project*

[14] Houses of Parliament (2011). Carbon Footprint of Electricity Generation. [Online]. Available at: https://www.parliament.uk/globalassets/documents/post/postpn_383-carbon-footprint-electricity-generation.pdf. (Assessed 11/06/2025).

emissions with a science-based 1.5°C compatible trajectory, and achieving net zero by 2050". Each level is outlined below.

39 The IEMA Guidelines plots different levels of significance against five levels of net zero compatibility. The significance level for 'business as usual' and 'do minimum' has been decided within this assessment using professional judgement. These are:

- Business as usual – the development is not compatible with the UK's net zero trajectory and GHG impacts are not mitigated. Classed as a major significant adverse effect;
- Do minimum – the development is not compatible with the UK's net zero trajectory and GHG are partially mitigated. Classed as a moderate significant adverse effect;
- Compatible with the budgeted, science base 1.5% trajectory – The development may have residual emissions but is doing enough to align with and contribute to the relevant transition scenario. Classed as a minor non-significant effect;
- Achieves emissions mitigation that goes substantially beyond the reduction trajectory – the development has minimal residual emissions and plays a part in achieving the rate of transition required by nationally set policy commitments. Classed as a negligible non-significant effect; and
- Causes GHG emissions to be avoided – the development actively reverses the risk of severe climate change. Classed as a major beneficial significant effect.

15.2.2 Resilience of the Development to Climate Change

40 This Climate Change Resilience (CCR) review section identifies methodology employed to determine changes in climate factors which could cause a potential risk to the Development. Assumptions and limitations are identified, as well as the significance criteria employed.

41 The historic and future baseline conditions for the Development site were determined with use of historic climate data obtained from the Met Office website[15] and UK Climate Projections 2018 (UKCP18)[11]. Launched in 2018, UKCP18 now provides the most up to date assessment of how the climate of the UK may change over this century, with a user interface which allows access to a range of UKCP data.

42 UKCP18[11] uses scenarios for future greenhouse gas emissions called Representative Concentration Pathways (RCPs). The RCPs attempt to capture a range of potential alternative futures and outcomes linked to global temperature increases and include a wide variety of assumptions on socioeconomic development and commitments to emissions reductions.

43 The RCPs are used in combination with probabilistic projections to provide low, central and high changes across the UK, corresponding to five probability levels (5%, 10%, 50%, 90%, and 95%).

[15] Met Office (2025). Location-specific Long-term Averages. [Online] Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcrtstfry (Accessed 05/03/2025).

44 In line with IEMA guidelines, the higher emissions scenario (RCP8.5 in latest UKCP18 projections) at the 50th percentile will be utilised in this assessment. The UKCP18 projection period up to 2080 will be assessed, covering the expected operational life of the Development.

45 Taking into account the nature and location of the Development site, the following climate-related parameters are considered to have the potential to affect the Development and the surrounding environment:

- Temperature
- Wind speed;
- Rainfall (flooding, flash flooding, drought);
- Sea level; and
- Cloud amount.

46 Variation in other climatic factors would not have the potential to substantially affect the Development.

47 Effects related to rainfall and sea level are considered in ES Chapter 9, Water Resources, [EN010162/APP/6.2.9] including in TA A9.1, Flood Risk Assessment, [EN010162/APP/6.4.9.1] and are not considered explicitly in this chapter.

15.2.2.1 Assumptions and Limitations

48 The CCR review has been informed by the following principal assumptions:

- That mitigation measures would be implemented effectively; and
- Any assumptions associated with the climate change projects within UKCP18[11].

49 The CCR review has the following limitations:

- With the exception of assessments relevant to drainage assets and flood risk (which are reported in ES Chapter 9, Water Resources, [EN010162/APP/6.2.9] and TA A9.1, Flood Risk Assessment [EN010162/APP/6.4.9.1]), the assessment is largely qualitative;
- There is inherent uncertainty in climate change projections. This study has been quantified using UKCP18[11], the latest set of probabilistic climate projections for the UK, however the probabilities presented and the estimated ranges are based on a set of modelling, statistical and dataset choices with expert judgement playing an important role. As some potential influences on future climate are not yet known some choices could change as the science develops;
- There is limited methodological guidance on the assessment of individual risks; and
- There is often uncertainty in the relationship between changes in climate hazards and the respective response in terms of asset performance. This uncertainty has been assessed qualitatively.

15.2.2.2 Significance Criteria

50 The CCR of the Development is assessed based on the probability of a hazard occurring and the potential impact if it does.

51 The likelihood of an event is measured on a five-point scale, from very unlikely to very likely:

- Very unlikely – the event is likely not to occur at all, but may occur once during the Development's lifetime;
- Unlikely – the event occurs once during the lifetime of the Development;
- As likely as not – the event occurs a small number of times, e.g. twice, during the lifetime of the Development;
- Likely – the event occurs several times, e.g. four times, during the lifetime of the Development; and
- Very likely – the event occurs numerous times, e.g. annually, during the lifetime of the Development.

52 The potential hazard impact of the event occurring is measured on a five point scale, from minimal to catastrophic:

- Minimal – an incident such as a minor cut/abrasion or damage to the Development infrastructure which required minimal treatment or repair. This results in minimal disruption to works or operation. No financial and/or environmental loss is incurred;
- Minor - an incident requiring first aid treatment or damage to the Development infrastructure which requires repair. This results in a disruption to works or operation for 3 days or less. Slight financial and/or environmental loss is incurred;
- Moderate - an incident requiring medical treatment or damage to the Development infrastructure which requires significant repair. This results in a disruption to works or operation for one to two weeks. Considerable financial and/or environmental loss is incurred;
- Major – an incident which results in disabling injuries for over two weeks, or significant damage to Development infrastructure which requires full replacement. This results in a disruption to works or operation for over two weeks. A severe financial and/or environmental loss is incurred; and
- Catastrophic – an incident which results in single or multiple deaths, or irreparable damage to Development infrastructure which as a result cannot be replaced. This results in a disruption to works or operation for an extended period. A devastating financial and/or environmental loss is incurred.

Table 15.3 Climate Change Resilience Significance

Measure of Likelihood	**Measure of Consequence**				
	Catastrophic	**Major**	**Moderate**	**Minor**	**Minimal**
Very likely	Very high	Very high	High	Medium	Very low
Likely	Very high	High	Medium	Low	Very low
As likely as not	High	Medium	Medium	Low	Very low
Unlikely	Medium	Medium	Low	Very low	Very low
Very unlikely	Low	Low	Low	Very low	Very low

53 The CCR takes into account all temporary and permanent works within the Order Limits, throughout the construction, operational, and decommissioning period. The CCR will mostly be associated with the operational phase of the Development and how the design has developed to incorporate resilience to climate change.

54 Extreme weather is a feature of the baseline climate, and this has been considered in the outline Construction Environment Management Plan (outline CEMP, provided in TA A5.3 [EN010162/APP/6.4.5.3]) to ensure that the Development is prepared for climate related events during the construction phase. This includes pro-active measures such as covering materials when stored on site.

15.3 BASELINE CONDITIONS

15.3.1 Lifecycle GHG Evaluation

55 The "Do Nothing" scenario (as described in Chapter 2, EIA [EN010162/APP/6.2.2]), has been used as the baseline for GHG emissions.

56 For simplicity, and as a worst-case approach, the baseline climate impacts of the activities and use of land within the Order Limits has been assumed to be climate-neutral, i.e., having no net emissions or increasing stores of carbon. This is likely to be a worst-case approach given the effect of agriculture on the climate, as referred to in Chapter 8, Ecology and Biodiversity [EN010162/APP/6.2.8].

57 The baseline scenario includes assumptions about the emissions from the generation of electricity that would be supplied to the electrical grid in the absence of the Development. These are built into the assessment as savings in carbon emissions were the Development to go ahead, and are referenced in the data provided in TA A15.1 [EN010162/APP/6.4.15.1].

58 As a result of the above, there is no explicit calculation of GHG emissions for the baseline scenario, with any substantial emissions in the baseline scenario being represented as savings in the Development scenario.

15.3.2 Climate Change Resilience

59 This section presents the current baseline and the future climate projections used within the CCR assessment.

15.3.2.1 Current Climate

60 The State of the UK Climate 2023[16] provides the latest report on observed climate data for the UK. Key findings include:

- The UK's climate continues to change. Recent decades have been warmer, wetter and sunnier than the 20th century;
- 2023 was the second warmest year on record for the UK in the series from 1884, with only 2022 warmer. 2023 was 0.83 degrees above the 1991–2020 average and 1.66 degrees above 1961–1990;
- February, May, June and September 2023 were all ranked in the top-ten warmest months for the UK in the monthly series from 1884;
- For the second successive year, 2023 was the warmest year for UK near-coast sea-surface temperature (SST)in a series from 1870;
- The most recent decade (2014–2023) has been 2% wetter than 1991–2020 and 10% wetter than 1961–1990; and

[16] Kendon (2023). State of the UK Climate 2023. [Online] Available at: https://rmets.onlinelibrary.wiley.com/doi/epdf/10.1002/joc.8553. (Accessed: 05/03/2025).

- March, July, October and December 2023 were all top-ten wettest months in the UK monthly rainfall series from 1836; the first year this has happened for four separate months.

15.3.2.2 Future Climate

61 Climate projections show that trends over the 21st century in the UK are towards warmer and wetter winters and hotter, drier summers, with an increase in frequency and intensity of extremes.

62 The climate parameters considered most relevant to the assessments referenced within this chapter are:

- Temperature;
- Wind Speed;
- Precipitation;
- Sea Level; and
- Cloud Amount.

63 Variation in other climatic factors would not have the potential to substantially affect the Development.

64 Temperature:

- This section is based on prediction presented in the UKCP18 Key Results 2022[17];
- Observations show an annual warming in the UK in recent decades with more warning predicted in the summer than in the winter. In summer there is a pronounced north/south contrast, with greater increases in maximum summer temperatures over the southern UK;
- Projected changes to annual mean temperature for the East Midlands under RCP 8.5, are outlined in Table 15.4.

Table 15.4 – Predicted Temperature Change in the East Midlands relative to 1981-2000 under RCP8.5 (50th percentile change)

Variable	Time Horizon (relative to 1981-2000)	Temperate change
Mean annual temperature (°C)	2030-2049	+ 1.4
	2040-2059	+ 1.8
	2050-2069	+ 2.2
	2060-2079	+ 2.8

- The nearest Met Office climate station to the Order Limits is Waddington, 18 km east of the Order Limits and considered to be representative of the Order Limits, where the average minimum and maximum temperatures peak in July at 12.6°C and 21.6°C, respectively, for the

[17] Met Office (2022). UK Climate Projections Headline Findings. [Online]. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v4_aug22.pdf (Accessed on 05/03/2025).

period 1971-2000[18]. Based on the projections in Table 15.4, these temperatures could rise to 15.4°C and 26.9°C by 2060.

65 Wind Speed:

- This section is based on prediction presented in the UKCP18 Factsheet: Wind[19]; and
- Global projections over the UK show an increase in near surface (10 m height) wind speeds for the second half of the 21st Century for the winter season which is accompanied by an increase in frequency of winter storms.

66 Precipitation:

- This section is based on prediction presented in the UKCP18 Headline Findings[17];
- Between a period of 2009 and 2018, winters in the UK have been on average 5% wetter than 1981-2010, and 12% wetter than 1961-1990. Summers in the UK have also been wetter, by 11% and 13% respectively;
- An increase in total rainfall from extremely wet days (exceeded the 99th percentile of 1961-1990 rainfall) increased by 17% between 2008 and 2017. This represents the UK overall, however changes are not significant for most of southern and eastern England;
- Rainfall in the UK is predicted to reduce in the summer, but rainfall events are likely to increase in their intensity. Rainfall is predicted to increase in the winter and autumn period; and
- Rainfall patterns across the UK are not uniform and vary on seasonal and regional scales and will continue to vary in the future.

67 Sea level rise:

- This section is based on the prediction presented in the UKCP18 Marine Climate Change Report[20];
- Sea level for a particular region generally differs from the global mean. Local sea level is affected by ocean circulation and by geographical variations in the temperature and/or salinity of the water column. Sea level around the UK rose approximately 1 millimetre/year (mm/year) in the 20th century, corrected for land movement; and
- Long-term future predictions for sea level rise by 2100 are based on major cities around the UK, including Belfast, Cardiff, Edinburgh, and London. London, the closest to the Development, predicts a 29-80 cm sea level rise under the low emission scenario, and a 53-115 cm sea level rise under the high emission scenario. London is the most adversely effected city out of those considered.

[18] Met Office (2025). Cranwell Location-specific long-term averages. [Online] Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages/gcrtstfry. (Accessed 26/03/2025).
[19] Met Office (2021). UKCP18 Factsheet: Wind. [Online]. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-wind_march21.pdf. (Accessed 05/03/2025).
[20] Met Office (2022). UKCP18 Marine Climate Change. [Online]. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-infographic-headline-findings-marine.pdf. (Accessed 05/03/2025).

68 Storm surges (which are related to worst-case, short-term increases in sea level):

- This section is based on predictions presented in the UKCP18 Marine Report[20]; and
- The UKCP18 model suggests a small contribution from storm surge changes, however it is unsure whether they will become more or less severe. There is no evidence to suggest there will be a significant change in future storm surges as a result of atmospheric contributions.

69 Cloud Amount:

- This section is based on predictions presented in the UKCP User Interface tool[21], using RCP8.5 and the 25 km Grid Cell centred at 487500E 362500N, which is most representative of the Development location;
- Cloud cover is a key meteorological factor influencing the amount of solar radiation reaching the Earth's surface; and
- The predicted cloud cover change under is shown in Table 15.5.

Table 15.5 – Predicted cloud cover change for grid square 487500,E 362500N, relative to 1981-2010 under RCP8.5.

Time Horizon (relative to 1981-2010)	**Cloud cover change (based on most probable event)**
2030-2058	- 2.5%
2040-2068	- 3%
2050-2078	- 3.5%

15.3.2.3 Greenhouse Gas Emissions

70 The Digest of United Kingdom Energy Statistics (DUKES) provides yearly reports on UK energy sources, the latest release being DUKES 2024[22], providing an overview of 2023. 46.4% of UK electricity generation was from renewables, as wind and solar generation reach record highs. However, fossil fuels (oil, coal, natural gas) are still generating a significant portion of electricity within the UK, making up 36% of overall electricity generation in 2023[23].

[21] UK Climate Projections User Interface (2025). UK Climate Projections User Interface. [Online]. Available at: https://ukclimateprojections-ui.metoffice.gov.uk/ui/home. (Accessed 05/03/2025).
[22] Department for Energy Security and Net Zero (2024) *Digest of UK Energy Statistics (DUKES) 2024*. Available at: https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2024. (Available 05/03/2025).
[23] International Energy Agency (2024). United Kingdom. [Online]. Available at: https://www.iea.org/countries/united-kingdom/electricity. (Accessed 05/03/2025).

15.4 ASSESSMENT OF POTENTIAL EFFECTS

15.4.1 Influences of the Development on Climate Change

71 The predicted impact of the Development on climate change, across production, construction, operation, and decommissioning, is summarised below. The full assessment can be viewed within TA A15.1, Lifecycle Greenhouse Gas Evaluation [EN010162/APP/6.4.15.1].

72 The reasoning behind the inclusion of Tables 15.7 and 15.9 is outlined within Section 15.2.1.2.

Table 15.6 – Summary of Emissions Produced (Worst-Case Scenario)

Development Phase	**Total Emissions ($teCO_2e$)**
Production Emissions – Material	1,855,637
Production Emissions – Transport	74,983
Construction Emissions – Waste	1,533
Construction Emissions – Other	3,619
Operational Emissions	1,256
Operational Emissions – Waste Transport	405
Sheep – Methane	43,421
Sheep – Water	51
Equipment Replacement	749,328
Decommissioning – Waste	25,020
Decommissioning – Waste Transport	15,707
Decommissioning – Other	4,245
Total	**2,775,205**

Table 15.7 – Summary of Emissions Savings (with 2024 grid carbon intensity baseline for solar PV)

Development Phase	**Total Emissions ($teCO_2e$)**
Land Use Change	44,218
Solar PV Generation	6,503,763
BESS	3,246,690
Total	**9,794,671**

Table 15.8 – Summary of Emissions Savings (Worst-Case Scenario)

Development Phase	**Total Emissions ($teCO_2e$)**
Land Use Change	44,218
Solar PV Generation	692,648
BESS	3,246,690
Total	**3,983,556**

Table 15.9 - Summary of Net Emissions (with 2024 grid carbon intensity baseline for solar PV)

Total Emissions	**Total Emissions ($teCO_2e$)**
Total Emissions Produced	2,775,205
Total Emissions Saved	(-) 9,794,671
Net Emissions	**(-) 7,019,466**

Table 15.10 – Summary of Net Emissions (Worst-Case Scenario)

Total Emissions	**Total Emissions ($teCO_2e$)**
Total Emissions Produced	2,775,205
Total Emissions Saved	(-) 3,983,556
Net Emissions	**(-) 1,208,351**

73 The Development will result in a net reduction in emissions by 1,208,351 $teCO_2e$, helping contribute to the UKs Net Zero targets.

74 In accordance with the criteria in section 15.2.1.2, the Development "*causes GHG emissions to be avoided – the development actively reverses the risk of severe climate change. Classed as a major beneficial significant effect.*"

15.4.2 Resilience of the Development to Climate Change

75 Solar photovoltaic (PV) cells are designed to capture the suns energy and are purposely located in open locations to maximise efficiency. As a result, PV cells are built to withstanding extreme climatic conditions. However, if there are significant changes in climatic variables, including temperature, wind speed, precipitation, and cloud level, solar developments have the potential to be impacted. Extreme events, such as storms, could physically damage panels and as a result, their efficiency.

76 The potential climate risks to the Development are outlined in Table 15.11, including the consequence of hazard, and resulting risk rating, following implementation of the mitigation as described.

77 Although not covered in Table 15.11, cloud cover is predicted to reduce by -3.5% by 2078 under RCP8.5. This reduction in cloud cover would have a

beneficial effect on the amount of electricity produced by the Development. This would add to the beneficial effect of carbon savings assessed in the Lifecycle GHG Evaluation, although the effect would be greater later in the operational phase, when carbon savings from operation of the solar PV are less (because the baseline is largely decarbonised later in the operational phase). As a result of this, and the uncertainty associated with the scale of effect, it is assessed as a beneficial but not significant effect on climate change.

78 Construction is anticipated to take place between 2027 and 2029. The extent of climate change between now and 2029 will be small, and would not lead to any potentially significant effects on the resilience of the Development. Construction is therefore not considered within Table 15.9.

79 As noted in section 15.2.2, effects associated with increased rainfall, increased flooding and sea level rise are considered in ES Chapter 9, Water Resources, [EN010162/APP/6.2.9] and TA A9.1, Flood Risk Assessment [EN010162/APP/6.4.9.1], and are not assessed in Table 15.11.

Table 15.11: Climate Change Resilience Assessment

Climate Hazard	Trend of Hazard	Likelihood of Hazard	Effect on Development	Mitigation Measure	Consequence of Hazard	Risk Rating
Operation (c. 2029 to 2069)						
High temperatures	The temperature in the East Midlands is predicted to increase by 2.8% by 2079 under RCP8.5, as compared to the 1981-2000 baseline.	Very Likely	Adverse effects on temperate sensitive infrastructure, e.g. BESS. The UK Government[24] suggests that silicon panels begin to lose efficiency at temperatures above 23°C (standard tests for panels are usually undertaken at 25°C). The rate at which efficiency declines per °C above 23°C is known as the temperature coefficient, typically ranging from 0.3% to 0.5%[25]. In a worst-case scenario, with a	Changes in average, and peak, temperatures will be taken into account in procurement and design strategies pre-construction. These will be documented in the Fire Safety Management Plan (FSMP; an outline of which is provided as TA A5.4) [EN010162/APP/6.4.5.4], which will be finalised pre-construction and submitted to Newark and Sherwood District Council for approval in consultation with the Nottinghamshire Fire and Rescue Service.	Minimal	Very Low

[24] UK Government (2023) *How well do we understand the impacts of weather conditions on the UK's renewable wind and solar energy supplies?* Available at: https://www.gov.uk/government/publications/renewable-energy-and-the-effects-of-wind-and-solar-droughts/how-well-do-we-understand-the-impacts-of-weather-conditions-on-the-uks-renewable-wind-and-solar-energy-supplies-html (Accessed 26/03/2025).
[25] Solar Plus (2024) How Temperature Impacts Solar Cell Efficiency. Available at: https://www.solarnplus.com/how-temperature-impacts-solar-cell-efficiency/?utm_source=chatgpt.com. (Accessed 26/03/2025).

Climate Hazard	Trend of Hazard	Likelihood of Hazard	Effect on Development	Mitigation Measure	Consequence of Hazard	Risk Rating
			0.5% temperature coefficient, a temperature increase from 23°C to 33°C would result in a 5% drop in efficiency. This efficiency loss is considered minimal, especially given the limited number of hours when temperatures reach this level.			
Increase in wind speed and storm intensity	Near surface wind speed is predicted to increase in the second half of the 21st century in the winter season, and an increase in winter storms.	Very Likely	Damage to Development infrastructure, principally the solar PV modules, as a result of extreme winds.	The mounting structure of the PV modules will be designed to withstand predicted wind speeds, with wind modelling used to predict the maximum forces on the PV modules, and push-pull testing of the mounting poles (when driven into the ground) used to ensure that the resistance to movement of the mounting poles is sufficient to resist at least the expected wind speeds.	Minimal	Very Low
Decommissioning (c. 2069)						

Climate Hazard	Trend of Hazard	Likelihood of Hazard	Effect on Development	Mitigation Measure	Consequence of Hazard	Risk Rating
High temperature	The temperature in the East Midlands is predicted to increase by 2.8% by 2079 under RCP8.5, as compared to the 1981-2000 baseline.	Very Likely	Adverse effects on plant and infrastructure required for decommissioning. Risk of overheating for workers.	No specific mitigation is proposed, however, it is reasonable to assume that the plant and infrastructure (e.g., roads) that will be needed for decommissioning will be developed and maintained in response to climate change over the period between now and c. 2069. It is assumed, therefore, that these would be suitable for use in the climate at that time. The contractor responsible for decommissioning is assumed to be subject to health and safety laws in 2069 that are comparable to those in place today, which require risk assessments to be carried out and safe working practices to be identified. This would likely include not working in extreme heat, as well as other measures for working in warm conditions such as	Minimal	Very Low

Climate Hazard	Trend of Hazard	Likelihood of Hazard	Effect on Development	Mitigation Measure	Consequence of Hazard	Risk Rating
				taking regular breaks, drinking sufficient fluids, etc.		
Increase in wind speed and storm intensity	Near surface wind speed is predicted to increase in the second half of the 21st century in the winter season, and an increase in winter storms.	Very Likely	Risk to workers due to debris and dust.	No specific mitigation is proposed, however, the contractor responsible for decommissioning is assumed to be subject to health and safety laws in 2069 that are comparable to those in place today, which require risk assessments to be carried out and safe working practices to be identified. This would likely include not working in storm conditions, as well as other measures for working in windy conditions such as securing loose items, wearing suitable PPE, checking weather forecasts in advance, etc.	Minimal	Very Low

15.4.3 Effects of Future Climate Change Scenario on Environmental Receptors Sensitive to Climate Change

80 Where appropriate, altered climate scenarios are considered in other chapters where environmental receptors have the potential to be impacted by the Development differently. The effects of climate change, where these may be non-zero, are summarised in Table 15.12.

Table 15.12: Climate Change Effects on Environmental Receptors

Chapter	Receptor	Climate Change Effect	Effect on Receptor
Chapter 8, Ecology and Biodiversity [EN010162/APP/6.2.8] (section 8.5.13)	Protected species, habitats	Increase in temperature	Climate change is affecting the phenology, distribution and populations of many species and the ways in which these changes might interact with the Development are extremely difficult to predict with certainty. The uncertainties in climate models at the local scale, as well as the difficulties in predicting how species and ecosystems respond to climate change, makes a meaningful assessment of the Development under future climate change scenarios impractical.
Chapter 9, Water Resources [EN010162/APP/6.2.9]	Population, buildings and infrastructure	Increase in precipitation and flooding	The increases in precipitation and in the extent and depths of flood water with climate change are included in the assessment reported in Chapter 9, Water Resources, and TA A9.1, Flood Risk Assessment. The assessment of the potential effects of the Development in this future baseline are assessed as being negligible.

81 The predicted change in climate parameters over the operational period of the Development (c. 2029 to 2069) is limited. Therefore, the baseline for environmental receptors is anticipated to change slightly during this period and the effect of the Development on that altered baseline is negligible.

82 Nevertheless, the potential for climate change impacts on environmental receptors under an altered-climate scenario is considered within the relevant technical chapters, 8 [EN010162/APP/6.2.8] and 9 [EN010162/APP/6.2.9].

83 As a result, no additional significant effects are assessed as occurring as a result of climate change during the operational phase of the Development.

15.5 MITIGATION MEASURES AND RESIDUAL EFFECTS

84 The Development will reduce GHG emissions associated with energy production, providing a beneficial effect on climate change. Measures to maximise this benefit include maximising the electrical output of the Development, and minimising the carbon footprint of, principally, its construction. Whether any such measures are achievable would depend on financial viability, which in turn depend on market conditions at that time.

85 As one such potential measure, the Applicant expects to achieve substantial reductions in carbon footprint (relative to that assessed in this chapter) through procurement of the solar PV mounting structures, by:

- Sourcing steel for the solar PV mounting structures from UK-based suppliers, avoiding the carbon footprint from shipping steel internationally;
- Sourcing steel from manufacturers that use electrical arc-furnaces rather than fossil-fuel-fired furnaces;
- Transporting the steel to site as sheet steel, which requires fewer heavy goods vehicles; and
- Use on-site manufacturing of the sheet steel into the mounting structures, using on-site-generated solar power for the equipment for this.

86 This is anticipated to lead to reductions in embodied carbon emissions of approximately 285,561 teCO_2e, which accounts for only the first two of the above bullet points. This mitigation cannot be committed at this stage, however, and hence a worst case scenario has been assessed, assuming manufacture in and transport from China, using blast furnaces.

87 This chapter identified that all potential adverse effects in relation to climate change are associated with the resilience of the Development to a future climate, however, all such effects are assessed as being of Very Low risk, following the mitigation proposed.

15.6 CUMULATIVE EFFECTS

88 In order to reduce greenhouse gas emissions by 2050, the UK Government has set ambitious targets. The Development, along with other renewable energy schemes, will provide a significant reduction of the net GHG emissions within the UK (in line with the assessment criteria in section 15.2.1) by replacing fossil fuel electricity production with lower-carbon renewable energy.

89 The Development, in conjunction with other UK renewable energy schemes, contributes to this fundamental shift in the UKs energy supply. This shift has a significant positive environmental impact in line with the assessment criteria in section 15.2.1, and will contribute to the UK's legally binding emission reduction targets.

15.7 STATEMENT OF SIGNIFICANCE

90 The predicted future climatic baseline conditions have a Very Low risk of affecting the Development due to the design measures.

91 In relation to carbon emissions savings, the Development will have a **major significant beneficial effect**. When considered cumulatively with UK-wide renewable energy development, it will have a **major and significant beneficial effect** by actively reversing the risk of severe climate change relative to the baseline scenario.