

Heckington Fen Solar Park

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Chapter 15: Air Quality

Applicant: Ecotricity (Heck Fen Solar) Limited

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CHAPTER 15: AIR QUALITY

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15 AIR QUALITY

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15.1 EXECUTIVE SUMMARY

15.1.1 This Air Quality Chapter as part of the Environmental Statement (ES) focuses on the potential air quality effects at existing sensitive receptors during the construction and decommissioning phase. Air quality effects during the operational phase have been scoped out of the assessment as agreed in the Scoping Opinion and Section 42 consultation. Potential air quality effects from a fire at the Battery Energy Storage System (BESS) are addressed in Chapter 18: Miscellaneous Issues- Major Accidents and Disasters section (doc ref: 6.1.18) and as such are not considered further in this chapter.

15.1.2 The Proposed Development is not located within or near an Air Quality Management Area and monitored concentrations in the vicinity of the Proposed Development are consistently below the relevant Air Quality Objectives (as detailed in the tables forming part of Appendix 15.1 (document reference 6.3.15.1) and discussed in this chapter).

15.1.3 Predicted construction traffic flows have been screened against Environment Protection UK (EPUK) and Institute of Air Quality Management (IAQM) guidance and considered to be not significant.

15.1.4 In addition, dust and non-road mobile machinery (NRMM) emissions during the construction phase will be controlled via an Outline Construction Environmental Management Plan (CEMP) and as such are considered to be negligible with the inclusion of mitigation and therefore the effects are not significant (an Outline CEMP (document reference 7.7) is submitted alongside the ES providing the likely structure of the CEMP to be produced prior to the date of final commissioning).

15.1.5 Similarly, predicted construction traffic flows, as well as dust and NRMM emissions are considered during the decommissioning phase and effects are expected to be not significant.

15.1.6 There are not expected to be any significant cumulative and in combination effects with any other schemes on the shortlist for this ES as detailed in Appendix 2.3 (document reference 6.3.2.3).

15.1.7 There are expected to be no significant effects to air quality as a result of the Proposed Development.

15.2 INTRODUCTION

15.2.1 This Chapter considers the likely significant effects to air quality as a result of the Proposed Development. The focus is on the potential effects to air quality which would be generated by the Proposed Development at existing sensitive receptors during the construction and decommissioning phases of the Proposed Development.

15.2.2 As agreed in the Scoping Opinion and Section 42 consultation, and with reference to **Chapter 14- Transport and Access** (document reference 6.1.14), due to the limited number of vehicle movements associated with the operation of the Proposed Development, expected to be 1-2 movements daily on average to the Energy Park for equipment maintenance, transportation of sheep and maintenance of Ecological Enhancement Areas, no further consideration is made to the operational phase within this ES Chapter. Potential air quality effects from a fire at the Battery Energy Storage System (BESS) are addressed in Chapter 18: Miscellaneous Issues- Major Accidents and Disasters section (doc ref: 6.1.18) and as such are not considered further in this chapter.

15.3 ASSESSMENT APPROACH

Methodology

Study Area

15.3.1 The study area covers a wide zone of influence (i.e. 5km from the EIA Assessment Area).

Legislation, Policy and Guidance Context

15.3.2 The Air Quality Chapter has been prepared with consideration of the following documents:

- National Policy Statement (NPS) EN-1 (2011)¹ and draft NPS (2021)²;
- National Policy Statement (NPS) EN-3 (2011)³ and draft NPS EN-3 (2021)⁴;
- The Air Quality Standards Regulations 2010⁵, and the Air Quality Standards (Amendment) Regulations 2016⁶;
- The Environment Act 1995⁷;
- The Environment Act 2021⁸;
- The Air Quality strategy for England, Scotland, Wales and Northern Ireland⁹;
- The National Planning Policy Framework (NPPF) 2021¹⁰;
- Planning Practice Guidance (PPG)¹¹;
- Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction¹²;

¹ DECC (2011) Overarching National Policy Statement for Energy [online] (Last accessed: 28/04/2022), Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf

² Department for Business, Energy and Industrial Strategy (2020) Draft Overarching National Policy Statement for Energy - [online] (Last accessed: 28/04/2022), Available at

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015233/en-1-draft-for-consultation.pdf

³ DECC (2011) National Policy Statement for Renewable Energy Infrastructure [online] (Last accessed: 28/04/2022), Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/37048/1940-nps-renewable-energy-en3.pdf

⁴ Department for Business, Energy and Industrial Strategy (2020) - [online] (Last accessed: 28/04/2022), Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015236/en-3-draft-for-consultation.pdf

⁵ The Stationery Office (2010) Statutory Instrument 2010, No 1001, The Air Quality Standards Regulations 2010, London

⁶ The Stationery Office (2010) Statutory Instrument 2016, No 1184, The Air Quality Standards (Amendment) Regulations 2016, London

⁷ The Stationery Office (1995) The Environment Act 1995 (Part IV), London

⁸ The Stationery Office (2021) The Environment Act 2021, London

⁹ Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – [online] (Last accessed: 28/04/2022), Available at: www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1

¹⁰ Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework, Department for Communities and Local Governments, London

¹¹ Ministry of Housing, Communities & Local Government (2019) Planning Practice Guidance, London

¹² Institute of Air Quality Management (2016) Guidance on the assessment of dust from demolition and construction v1.1 – [online], (Last accessed: 28/04/2022), Available at: iaqm.co.uk/text/guidance/construction-dust-2014.pdf

- Environmental Protection UK (EPUK), and IAQM Land-Use Planning & Development Control: Planning for Air Quality¹³;
- Defra Local Air Quality Management Technical Guidance LAQM.TG(22)¹⁴;
- Central Lincolnshire Local Plan (2017)¹⁵; and
- South East Lincolnshire Local Plan (2019)¹⁶.

Further detail on the requirements set out in these documents is given in **Appendix 15.1-Legislation, Policy and Guidance Documents** (document reference 6.3.15.1).

Methodology during the Construction Phase

15.3.3 The impacts of vehicle emissions (nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5})) associated with the construction of the Proposed Development (which comprises the Energy Park, cable route corridor and National Grid Bicker Fen Substation extension) have the potential to effect existing sensitive receptors located at the roadside of the proposed construction traffic routes, which will mainly run along the A17 for the anticipated 30 months of construction.

15.3.4 For the construction of the cable route corridor the Applicant has a preferred option of utilising the existing track off the A17, which was built for the Triton Knoll development. Also, there is an additional access point from the A17 approximately 1.3 km north.

15.3.5 The EPUK/IAQM guidance sets out thresholds for traffic generation that have the potential to cause impacts to air quality at which point a detailed assessment of road traffic impacts should be undertaken. As the Proposed Development is not within or close to an Air Quality Management Area (AQMA) the criteria considered for this assessment are as follows:

- Change of light duty vehicles (LDV) flows of more than 500 annual average daily traffic (AADT); and
- Change of heavy-duty vehicles (HDV) flows of more than 100 AADT.

15.3.6 Exhaust emissions of oxides of nitrogen (NO_x), PM₁₀ and PM_{2.5} from Non-Road Mobile Machinery (NRMM) associated with construction sites may have a significant effect on local air quality. These emissions have been screened in line with LAQM.TG(22).

15.3.7 In addition, dust emissions associated with construction activities may impact local air quality concentrations. However, the **Construction Dust Risk Assessment**, as included in Appendix D- Outline CEMP (document reference 7.7), will be used to inform mitigation measures within the Outline Construction Environmental Management Plan (document reference 7.7) to minimise dust emission during the construction phase and control impacts to a negligible level. On that basis, there is no further consideration of construction dust emissions within this ES Chapter.

¹³ Environmental Protection UK and Institute of Air Quality Management (2017), Land-Use Planning & Development Control: Planning For Air Quality v1.2 – [online] (Last accessed: 28/04/2022), Available at: [REDACTED]

¹⁴ Defra (2022) Local Air Quality Management Technical Guidance (TG22) – [online] (Last accessed: 28/04/2021), Available at: [REDACTED]

¹⁵ Central Lincolnshire (2017) Central Lincolnshire Local Plan – [online] (Last accessed: 28/04/2022), Available at: <https://www.n-kesteven.gov.uk/EasySiteWeb/GatewayLink.aspx?aId=54815>

¹⁶ South East Lincolnshire (2019) South East Lincolnshire Local Plan – [online] (Last accessed: 28/04/2022), Available at: [REDACTED]

Methodology during the Decommissioning Phase

15.3.8 At this stage it is assumed that the number of construction vehicles during the decommissioning phase will be no greater than during construction.

15.3.9 The Proposed Development is expected to be decommissioned in 40 years (2067), by which time it is expected that baseline air quality conditions will be much improved due to enhanced vehicle technology and emerging national policy to reduce vehicle emissions. Therefore, effects to air quality during the decommissioning of the Proposed Development are not considered further.

Methodology for Determining Key Receptors

15.3.10 Existing sensitive receptors at the roadside of the construction traffic routes, have the potential to be affected by an increase in emissions NO₂, PM₁₀ and PM_{2.5} from construction traffic for the duration of the construction phase, anticipated to be approximately 30 months.

15.3.11 High sensitivity receptors include residences, healthcare, schools and childcare facilities located along the proposed construction routes as well as the Build-A-Future East Heckington (educational facility) at Elm Grange, on the southern boundary, adjacent to the A17. Commercial and industrial uses are a consideration; however, they are considered to be low sensitivity receptors.

15.3.12 There are no international designated ecological sites within 200m of the proposed construction routes, therefore there are no likely significant effects to national sensitive habitats or species. The closest ecological designation is South Forty Foot Drain, which is a Local Wildlife Site (LWS), which is a wildlife-rich area with high local conservation value, but it is a non-statutory designation with no legal protections. Construction traffic numbers are expected to be below the threshold to cause a likely significant effect (cumulative additional vehicle movements of greater than 1000 per day).

Assessment of significanceConstruction

15.3.13 With reference to the EPUK/ IAQM guidance, if none of the criteria indicating the possibility of impacts to air quality are met, then there should be no requirement to carry out a detailed air quality assessment and the effect to air quality can be considered negligible and unlikely to have a significant effect.

15.3.14 LAQM.TG(22) guidance states that, with the application of suitable control measures and site management, exhaust emissions from on-site NRMM are:

"unlikely to make a significant impact on local air quality. In the vast majority of cases they will not need to be quantitatively assessed".

Scoping criteria

15.3.15 This Air Quality chapter considers the following potential effects:

- Air quality effects at sensitive receptors located at the roadside of proposed construction routes for the duration of the construction phase.

Limitations to the Assessment

15.3.16 The following assumptions and limitations have been considered:

- It has been assumed that construction phase mitigation measures included in the Outline CEMP (document reference 7.7) and Outline CTMP (document reference 7.10) will be effectively implemented and, as such, no significant effects will arise from construction activities; and
- The ability to predict likely significant air quality effects is dependent upon the traffic flow predictions made by the Transport Consultants for the Proposed Development. It has been assumed that construction traffic flows and routing are robust.

15.3.17 Consultation A summary of consultation prior to issue of the Preliminary Environmental Information Report (PEIR) in June 2022, outlines matters raised within the Scoping Opinion and how these have been addressed through the ES in relation to Air Quality.

Table 15.1: Scoping Opinion Response

Consultee	Details of Consultee response	How is matter addressed	Location of response in this chapter / other specified documents
<p>PINS Scoping Opinion</p>	<p>The Scoping Report states that impacts on air quality would be mitigated through the Outline Construction Environmental Management Plan (Outline CEMP) (document reference 7.7). This mitigation should be agreed with the Local Environmental Health Officer, where possible. In the absence of detailed information regarding projected HGV movements, the Inspectorate does not consider that assessment of construction air quality effects can be scoped out. The ES must provide up to date information on the anticipated construction programme and the predicted number of HGV movements to confirm that relevant thresholds for air quality assessment are not exceeded (e.g. as set out by the EPUK/ IAQM guidance) or provide a</p>	<p>As detailed within this ES Chapter, predicted construction traffic flows have been screened against the EPUK/ IAQM criteria for detailed assessment of >500 LDVs and > 100 HDVs per day outside of an AQMA.</p>	<p>Paragraph 15.5.4 of this chapter.</p>

	detailed air quality impact assessment.		
	The Inspectorate does not agree that emissions from NRMM can be scoped out as no information has been provided on the type, number and location of such machinery within the Proposed Development site. An assessment of effects should be provided unless robust justification is provided to demonstrate that such machinery would not give rise to significant air quality effects.	All NRMM will adhere to European regulations (EU 2016/1628) demonstrating compliance with emission limits as included within the Outline CEMP (document reference 7.7).	Outline CEMP (document reference 7.7).
	The Inspectorate agrees that operational vehicle emissions may be scoped out from further assessment, subject to the description of development demonstrating that vehicle numbers are sufficiently low as to not trigger the thresholds for an air quality assessment.	Operational vehicle numbers have been confirmed to be below the EPUK/ IAQM criteria for detailed assessment of >500 LDVs and > 100 HDVs per day outside of an AQMA.	Paragraph 15.3.7 of this chapter.
	The Scoping Report states that this is to be mitigated through the Outline Construction Environmental Management Plan (Outline CEMP (document reference 7.7)). The Inspectorate agrees that this matter can be scoped out providing the ES can demonstrate the effectiveness of such measures.	A Construction Dust Risk Assessment has been carried out in Appendix D- Outline CEMP (document reference 7.7) to inform mitigation measures included in the Outline CEMP (document reference 7.7).	Appendix D- Outline CEMP (document reference 7.7).
	The Scoping Report references that NO ₂ monitoring is proposed but does not reference PM ₁₀ or PM _{2.5} , the Applicant should agree whether further monitoring of these pollutants is required with	A construction dust risk assessment has been carried out in Appendix D- Outline CEMP (document reference 7.7) to inform the mitigation measures to be included in the Outline CEMP (document reference 7.7). This	Appendix D- Outline CEMP (document reference 7.7).

	the Local Planning Authority.	considers the risk of dust emissions from trackout, which is considered to be a low risk before mitigation and reducing to negligible with proposed mitigation implemented. Also, the highest risk of dust soiling was from earthworks and considered to be a medium risk before mitigations measures are implemented, reducing to negligible with proposed mitigation. On this basis, monitoring of PM is not required.	
North Kesteven District Council	AQ can be scoped out of ES for operational phase.	Operational vehicle numbers have been confirmed to be below the EPUK/ IAQM criteria for detailed assessment of >500 LDVs and > 100 HDVs per day outside of an AQMA.	Paragraph 15.3.7 of this chapter.
	Will the Air Quality assessment limit the assessment to any sensitive receptor which is 50m from the Site? Clarification needed.	The assessment has not been limited to receptors within 50 m of the Site. Definition of key receptors has been included in this ES Chapter in terms of potential impacts from construction traffic.	Paragraph 15.3.10 – 15.3.12 of this chapter.
	The effects of dust generation from HGV movements during construction through monitoring of PM _{2.5} at appropriate sensitive receptor locations should be in the ES.	A construction dust risk assessment has been carried out in Appendix D- Outline CEMP (document reference 7.7) to inform the mitigation measures to be included in the Outline CEMP (document reference 7.7). This considers the risk of dust emissions from trackout, which is considered to be a low risk before mitigation and reducing	Appendix D- Outline CEMP (document reference 7.7).

		to negligible with proposed mitigation implemented.	
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15.3.18 In addition, **Table 15.2**, outlines a summary of Section 42 consultation responses since the PEIR.

Table 15.2: Summary of Section 42 Consultation Responses since PEIR

Consultee	Details of Consultee response	How is matter addressed	Location of response
North Kesteven County Council	15.3.6 NKDC agrees that in principle there is sufficient information in the PEIR and the proposed ES chapters to allow this matter to be secured through a Requirement which considers matters such as wind directions, location of receptors, typical dust dispersion, travel distances etc	A construction dust risk assessment has been carried out in Appendix D- Outline CEMP (document reference 7.7) to inform the mitigation measures to be included in the Outline CEMP (document reference 7.7).	Appendix D- Outline CEMP (document reference 7.7)
	15.3.14 The applicant should take account of any advice from LWT in relation to any heightened sensitivities from dust etc on the South Forty Foot Drain	South Forty Foot Drain has been considered within the construction dust risk assessment in Appendix D- Outline CEMP (document reference 7.7).	Appendix D- Outline CEMP (document reference 7.7)
	15.4.11 NKDC notes and accepts the conclusion in this section in that the 1-hour mean NO ₂ objective is unlikely to be exceeded at these locations	Noted in this chapter.	Paragraph 15.4.11 of this chapter
	Table 15.4 pushes the NRMM assessment to CEMP even though PINS asked for information to be provided. The applicant notes 'further information	The Outline CEMP (document reference 7.7) will be produced alongside the ES.	Outline CEMP (document reference 7.7).

	<p>on NRMM will be included within the Outline CEMP (document reference 7.7). All NRMM will adhere to European regulations (EU 2016/1628) demonstrating compliance with emission limits'. The Outline CEMP (document reference 7.7) needs to be presented in the ES draft rather than deferring to a Requirement. NKDC does agree however that dispersion modelling is not required in relation to predicted construction traffic flows.</p>		
	<p>15.5.6 NKDC agrees that Air Quality impacts are not likely to be significant on the basis of predicted two way vehicle trips.</p>	<p>As detailed within this ES Chapter, predicted construction traffic flows have been screened against the EPUK/ IAQM criteria for detailed assessment of >500 LDVs and > 100 HDVs per day outside of an AQMA.</p>	<p>Paragraph 15.5.4 of this chapter</p>
	<p>15.7.6 NKDC agrees that EPUK/IAQM thresholds for the potential impact to air quality are not likely to be exceeded in combination with Vicarage Grove Solar Farm.</p>	<p>In-combination effects are considered.</p>	<p>Section 15.7 of this Chapter</p>
<p>Public comment – statutory consultation</p>	<p>Dirt, dust, fumes and noise associated with traffic around Bicker Fen was noted in a</p>	<p>Chapter 14- Transport and Access (document reference 6.1.14) considers traffic</p>	<p>Construction related traffic is considered in section 15.5 below.</p>

	consultation response.	around Bicker Fen. Construction traffic volumes are predicted to be below the EPUK/IAQM criteria for detailed assessment of >500 LDVs and >100 HDVs per day outside of an AQMA.	
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15.4 BASELINE CONDITIONS

Site Description and Context

15.4.1 A baseline air quality review has been undertaken to determine existing air quality within the vicinity of the Proposed Development with reference to the following:

- Air quality monitoring data from local authority Annual Status Reports (ASR)^{17,18,19,20}; and
- Background pollution maps from the Department for Environment, Food and Rural Affairs (Defra) Local Air Quality Management (LAQM) website²¹.

Local Air Quality Monitoring

15.4.2 The Proposed Development is located approximately 11.3 km west of its nearest Air Quality Management Area (AQMA), 'Haven Bridge AQMA' which is located in Boston Borough Council's (BBC) administrative area. AQMAs are areas the local authority is required to declare where the Air Quality Objectives (AQO) are likely to be or are exceeded. The Haven Bridge AQMA has been declared for exceedances of the annual mean nitrogen dioxide (NO₂) AQO. BBC are required to produce an Air Quality Action Plan (AQAP) to ensure actions are taken at a local level to improve air quality in the area.

15.4.3 The Proposed Development is partly located within North Kesteven District Council's (NKDC) administrative area and partly within BBC's. The Proposed Development is also located in close proximity to the administrative areas of East Lindsey District Council (ELDC), South Kesteven District Council (SKDC) and South Holland District Council (SHDC).

15.4.4 Automatic monitoring is currently undertaken by SHDC, but not by NKDC, SKDC or BBC. Monitoring data for ELDC is currently unavailable and as such the number of monitoring sites that are in operation within the ELDC administrative area is unknown at this stage.

15.4.5 SHDC operate two automatic monitoring stations within its administrative area, the closest of which is CM1 which is located 16.2 km away from the Proposed Development. Recent monitoring data from 2015 to 2020 for automatic monitoring station CM1 is detailed in **Table 15.3** and a visual representation of the location of the automatic monitoring station is shown in **Figure 15.1- Air Quality Monitoring Locations in the vicinity of the Proposed Development** (document reference 6.2.15).

15.4.6 The pollutant concentrations recorded in 2020 are not considered to be representative of "normal" air quality conditions due to government enforced lockdowns during the COVID-19 pandemic. Whilst it is expected that as a result of the COVID-19 pandemic behaviours will change in the future, the impact of this on air quality long-term

¹⁷ North Kesteven District Council (2021) Annual Status Report 2021- [online], (Last accessed: 28/04/2022), Available at: https://www.n-kesteven.gov.uk/_resources/assets/attachment/full/0/123975.pdf

¹⁸ Boston Borough Council (2021) Annual Status Report 2021 - [online], (Last accessed: 28/04/2022), Available at: [REDACTED]

¹⁹ South Kesteven District Council (2021) Annual Status Report 2021- [online], (Last accessed: 28/04/2022), Available at: <http://www.southkesteven.gov.uk/CHttpHandler.ashx?id=26527&p=0>

²⁰ South Holland District Council (2020) Annual Status Report 2020 - [online], (Last accessed: 28/04/2022), Available at: [REDACTED]

²¹ Defra (2020) Background Pollution Maps - 2018 - [online], (Last accessed: 28/04/2022), Available at: uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

is currently unknown and therefore the use of 2020 data will be omitted from any analysis but has been included for information.

Table 15.3: Automatic Monitoring Data ($\mu\text{g}/\text{m}^3$)

Automatic Monitoring Station and Distance (km) from Proposed Development (approx.)	Air Quality Objective (AQO)	2015	2016	2017	2018	2019	2020
NO₂							
CM1 (SHDC), Spalding Monkhouse School, 16.2 km, Urban Background	Annual mean ($\mu\text{g}/\text{m}^3$)	10.5	12.7	10.8	9.4	9.3	8.5
	Number of hours with concentrations >200 $\mu\text{g}/\text{m}^3$	0	0	0	0	0	0
PM₁₀							
CM1 (SHDC), Spalding Monkhouse School, 16.2 km, Urban Background	Annual mean ($\mu\text{g}/\text{m}^3$)	15.4	13.5	11.8	13.1	13.7	10.8
	Number of days with concentrations > 50 $\mu\text{g}/\text{m}^3$	1	2	0	1	0	0

15.4.7 **Table 15.3** shows that there has been no exceedance of the Air Quality Objectives (AQO) between 2015 – 2019.

15.4.8 A network of diffusion tubes is utilised by BBC, NKDC, SKDC and SHDC to monitor annual mean NO₂ concentrations across their administrative areas.

15.4.9 There are no diffusion tubes located in the immediate vicinity of the Proposed Development, however there are two diffusion tubes located between approximately 2.5 km and 4.5 km away from the Proposed Development, with one situated in NKDC’s administrative area and the other in SHDC’s.

15.4.10 **Table 15.4** provides the latest annual mean NO₂ concentrations at the nearest diffusion tube locations to the Proposed Development for the years 2019 and 2020. The locations of the diffusion tubes are illustrated in **Figure 15.1- Air Quality Monitoring Locations in the vicinity of the Proposed Development** (document reference 6.2.15).

Table 15.4: Diffusion Tube Monitoring Data ($\mu\text{g}/\text{m}^3$)

Diffusion Tube ID	Diffusion Tube Name	Site Type	Distance from Proposed Development (km)	2019	2020
Heckington (NKDC)	Heckington	Kerbside	4.3	17.3	14.6
SH 11 (SHDC)	A52 Donington	Roadside	2.5	15.5	-

15.4.11 As noted above, monitoring data for 2020 has been included for information only. There have been no exceedances of the annual mean NO_2 objective of $40 \mu\text{g}/\text{m}^3$ at either diffusion tube in 2019, which is the only year with representative monitoring data available at these locations. The location with the highest NO_2 concentration in 2019 was Heckington, located approximately 4.3km from the Order Limits at the intersection between B1394 Station Road and B1394 Boston Road, monitoring $17.3 \mu\text{g}/\text{m}^3$ or 43% of the annual mean objective. As such it is considered likely that no exceedances of the NO_2 annual mean objective will be experienced in the vicinity of the Proposed Development.

15.4.12 The 1-hour mean objective for NO_2 is $200 \mu\text{g}/\text{m}^3$ and should not be exceeded more than 18 times within a year. In line with Local Air Quality Management Technical Guidance LAQM.TG(22)¹⁴, exceedances of the 1-hour mean NO_2 objective are unlikely to occur where the annual mean concentration is below $60 \mu\text{g}/\text{m}^3$. Concentrations at nearby diffusion tubes shown in **Table 15.2** therefore show that the 1-hour mean NO_2 objective is unlikely to be exceeded at these locations.

Defra Predicted Concentrations

15.4.13 The background concentrations have been obtained from the national maps published by Defra²². These estimated concentrations are produced on a 1km by 1km grid basis for the whole of the UK. The Proposed Development falls into multiple grid squares. The minimum and maximum predicted concentrations at the Proposed Development for NO_2 , PM_{10} and $\text{PM}_{2.5}$ are provided in **Table 15.5** for 2022, the current year, and 2025 to 2027, the expected construction phase.

Table 15.5: Estimated annual mean background concentrations ($\mu\text{g}/\text{m}^3$)

Year	Background		
	NO_2	PM_{10}	$\text{PM}_{2.5}$
2022	6.4 – 7.6	15.2 – 16.0	8.2 – 8.7
2025	5.8 – 6.7	14.9 – 15.6	7.9 – 8.3
2026	5.8 – 6.6	14.9 – 15.6	7.9 – 8.3
2027	5.7 – 6.5	14.9 – 15.6	7.9 – 8.3

15.4.14 It can be seen that the modelled background NO_2 concentrations are below the objective levels for NO_2 , PM_{10} and $\text{PM}_{2.5}$ in 2022, and 2025 to 2027.

Implications of Climate Change

15.4.15 **Chapter 13- Climate Change** (Document reference 6.1.13) considers the potential effects of the Proposed Development on emissions of greenhouse gases (GHGs),

²² Defra (2018) Background Pollution Maps – [online], (Last accessed: 28/04/2021), Available: <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>

and both the vulnerability of the Proposed Development to climate change and the implications of climate change for the predicted effects of the project, as assessed by the other topic specialists ('in-combination climate effects').

15.4.16 Climate change can have an impact on air quality and air quality can have an impact on climate change. These interactions are complex and not fully quantifiable at a local level.

15.4.17 Higher summer time temperatures and increased solar radiation will increase the formation of ozone and other reactive compounds in the air, affecting the concentrations of both NO₂ and PM. The net effect may be an increase in background concentrations of NO₂ and PM.

15.4.18 NO_x is an indirect greenhouse gas affecting atmospheric concentrations of ozone, methane and PM in the atmosphere. Increasing concentrations of ozone and methane leads to global warming. The effect of PM (also known as aerosols) is more complex with different components having either warming or cooling effects on the climate. For example, black carbon, a pollutant from combustion (including road transport) and particulate nitrate (formed from NO_x emissions) contributes to the warming of the Earth, while particulate sulphates cool the earth's atmosphere. In addition, PM can affect cloud formation, which also affects the climate.

15.4.19 Climate change is a long-term process and the impact of emissions depends on the atmospheric lifetime of the emitted species. Compared to greenhouse gases, many substances that affect air quality have short atmospheric lifetimes. PM for example has a substantial impact but are short-lived and reductions in emissions affect the radiation balance rapidly, in contrast to any reductions in, for example, carbon dioxide.

15.4.20 Limits on direct emissions of both NO_x and PM set at an international level to control air quality, will also be beneficial for climate change. Emissions have reduced substantially over recent decades and are likely to continue to do so.

15.4.21 Changes in atmospheric composition and their impact on climate change are uncertain and it is not possible to quantify them at the local level. Therefore, these effects have not been considered further in this chapter.

15.5 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

Construction

15.5.1 The impacts of vehicle emissions (NO₂, PM₁₀ and PM_{2.5}) associated with the construction of the Proposed Development have the potential to effect existing sensitive receptors located at the roadside of the proposed construction route, along the A17, for the anticipated construction period of 30 months.

15.5.2 The Transport Consultants for the project have provided traffic flows for the construction phase of the Proposed Development. As detailed in **Chapter 14- Transport and Access** (document reference 6.1.14) of this ES, construction vehicles will be routed along the A17 to the Proposed Development Access.

15.5.3 All vehicle movements during the construction phase will be controlled by the **Outline Construction Traffic Management Plan (CTMP)** (document reference 7.10).

15.5.4 With reference to **Table 14.7** in **Chapter 14- Transport and Access** (document reference 6.1.14), there is predicted to be 89 LDV AADT and 29 HDV AADT construction vehicles on any one road link during the 30-month construction period.

15.5.5 When screened against the EPUK/ IAQM criteria for the potential of effects to air quality, predicted construction traffic flows are below the screening criteria for detailed assessment. On this basis and in line with EPUK/ IAQM guidance, the effect to air quality is considered to be **not significant**.

15.5.6 Dust emission and NRMM emissions during the construction phase will be controlled by mitigation measures included in an Outline CEMP (document reference 7.7). On that basis, there are expected to be **no likely significant effects** to air quality at existing sensitive receptors.

Operation

15.5.7 As agreed in the Scoping Opinion and Section 42 consultation, and with reference to **Chapter 14- Transport and Access** (document reference 6.1.14), due to the limited number of vehicle movements associated with the operation of the Proposed Development, expected to be 1-2 movements daily on average to the Energy Park for equipment maintenance, transportation of sheep and maintenance of Ecological Enhancement Areas, no further consideration is made to the operational phase within this ES Chapter.

15.5.8 Potential air quality effects from a fire at the Battery Energy Storage System (BESS) are addressed in **Chapter 18: Miscellaneous Issues- Major Accidents and Disasters** (doc ref: 6.1.18).

Decommissioning

15.5.9 At this stage it is assumed that the number of construction vehicles during the decommissioning phase will be no greater than during construction.

15.5.10 The Proposed Development is expected to be decommissioned in 40 years (2067), by which time it is expected that baseline air quality conditions will be much improved due to enhanced vehicle technology and emerging national policy to reduce vehicle emissions. Therefore, effects to air quality during the decommissioning of the Proposed Development are not considered further.

15.6 MITIGATION AND ENHANCEMENT

Mitigation by Design

15.6.1 An Outline CTMP (document reference 7.10) and Outline CEMP (document reference 7.7) will be used to control activity during the construction phase, and as such emissions to air will be mitigated.

15.6.2 The Outline CTMP (document reference 7.10) seeks to manage construction traffic movements during the construction phase to minimise environmental effects, including to air quality.

15.6.3 The Outline CEMP (document reference 7.7) sets out the mitigation measures to reduce the impact of dust emissions on sensitive receptors. It outlines the mitigation measures from the IAQM guidance to reduce air quality affects, suitable for the risk level associated with the Proposed Development.

15.7 CUMULATIVE AND IN-COMBINATION EFFECTS

15.7.1 In line with **Section 14.6 in Chapter 14- Transport and Access** (document reference 6.1.14), it is not considered likely that there will be any cumulative effects from

construction traffic associated with the Proposed Development and other developments located within Lincolnshire due to the distance located from the Proposed Development.

15.7.2 The closest cumulative development is the Vicarage Drove Solar Farm (Ref B/21/0443) which is within BBC area and was approved by their planning committee. This solar farm sits next to the area of land proposed for the Bicker Fen Substation, with part of the Vicarage Drove site within the current Proposed Development boundary. The Proposed Development boundary crosses this land at this point as it may be necessary to run the off-site cable through the same fields to gain access to the south-west section of the Bicker Fen Substation whereby the extension is proposed.

15.7.3 This application was granted consent in February 2022 and has been granted 4 years in which to commence the construction. Therefore, construction of the development at Vicarage Drove would need to start by February 2026.

15.7.4 Furthermore, Land west of Cowbridge Road is a proposed solar farm development that is awaiting a planning decision. There are also two further solar farm sites, Land at Ewerby Thorpe and Land at Little Hale Fen, which have both gone through screening. To date neither application has progressed, but there is the potential for either or both to come forward as a possible development. Whilst there is potential for an overlap in construction phases, at this stage there is not sufficient information on any of the above mentioned sites to undertake a cumulative assessment of air quality effects. However, it is assumed that through the planning process appropriate mitigation measures will be implemented to minimise emissions to air as far as possible.

15.7.5 As the construction of the of the Proposed Development is likely to take place in 2026/27 there is the potential for construction of Vicarage Drove Solar Farm and the Off-site Grid Connection cable and Bicker Fen Substation extension taking place at the same time. It is expected that the cable route will be an open trench which is infilled shortly after the cable is laid. The extension at Bicker Fen Substation would an extension to the 400kV busbar, disconnectors, circuit breakers, earth switch, cable sealing ends and control building within the substation extents, a perimeter road is also proposed.

15.7.6 To determine a worst case scenario, it is assumed that the construction of Vicarage Drove Solar Farm and the Proposed Development would take place at the same time. An Air Quality Assessment was not submitted with the Vicarage Drove Solar Farm planning application. However, a planning condition for states that a CEMP must be produced to minimise dust emissions during the construction of Vicarage Drove Solar Farm, therefore no likely significant effects are expected due to dust or NRMM emission at local receptors. In addition, construction traffic for Vicarage Drove Solar Farm is expected to be routed along the National Grid access off Bicker Road as noted at 6.25 of the Planning, Design and Access Statement – “The construction traffic route will be via the A52 Donington Road and then utilising an existing haul road on private land connecting directly to Ing Drove passing through Cowbridge Road, Bicker Drove and then onto Vicarage Drove. A secondary operational access is also located at the north of the site off Bicker Drove”. Therefore, depending on the final construction traffic routing for construction of the Heckington Fen cable route corridor, there may be a combined road traffic impact to air quality. However, it is considered unlikely that the EPUK/IAQM thresholds for the potential impact to air quality would be exceeded on any one link with existing sensitive receptors. Therefore, the effect to air quality is considered to be insignificant. This will remain under review.

15.8 SUMMARY

Introduction

15.8.1 This Air Quality ES Chapter focuses on the potential air quality effects at existing sensitive receptors during the construction phase.

Baseline Conditions

15.8.2 The Proposed Development is not located within or near to an Air Quality Management Area (AQMA).

15.8.3 Monitored concentrations in the vicinity of the Proposed Development show pollutant concentrations have been below the Air Quality Objectives (AQO) for the last five years of representative monitoring data.

Likely Significant Effects

15.8.4 Predicted construction traffic flows have been screened against Environment Protection UK (EPUK) and Institute of Air Quality Management (IAQM) guidance and considered to be not significant.

15.8.5 In addition, dust and non-road mobile machinery emissions during the construction phase will be controlled via an **Outline Construction Environmental Management Plan (CEMP)** (document reference 7.7) and as such are considered to be negligible and therefore the effects are not significant.

Mitigation and Enhancement

15.8.6 Construction phase emissions to air will be controlled by an **Outline CEMP** (document reference 7.7) and **Outline Construction Traffic Management Plan (CTMP)** (document reference 7.10).

Cumulative and In-combination Effects

15.8.7 There are not expected to be any significant cumulative and in combination effects.

Conclusion

15.8.1 It is concluded that the proposed package of mitigation will ensure that the Proposed Development is acceptable and that there will be **no adverse significant effects** to air quality.

15.8.2 **Table 15.6** provides a summary of effects, mitigation and residual effects.

Table 15.6: Summary of Effects, Mitigation and Residual Effects

Receptor/ Receiving Environment	Description of Effect	Nature of Effect *	Sensitivity Value **	Magnitude of Effect **	Geographical Importance ***	Significance of Effects ****	Mitigation/ Enhancement Measures	Residual Effects ****
Construction								
Existing sensitive receptors located on construction routes	Potential increase in concentrations of NO ₂ , PM ₁₀ and PM _{2.5} as a result of additional construction traffic movements	Temporary/ Direct	Not Applicable	Not Applicable	Local	Negligible	Outline CTMP (document reference 7.10)	Negligible (not significant)
Existing sensitive receptors in the vicinity of the construction works	Potential increase in concentrations of NO ₂ , PM ₁₀ and PM _{2.5} as a result of NRMM	Temporary/ Direct	Not Applicable	Not Applicable	Local	Negligible	Outline CEMP (document reference 7.7)	Negligible (not significant)
Existing sensitive receptors within 350 m of the construction works	Potential impact to human health and amenity from dust emissions	Temporary/ Direct	Not Applicable	Not Applicable	Local	Negligible	Outline CEMP (document reference 7.7)	Negligible (not significant)
Operation								
N/a								

Receptor/ Receiving Environment	Description of Effect	Nature of Effect *	Sensitivity Value **	Magnitude of Effect **	Geographical Importance ***	Significance of Effects ****	Mitigation/ Enhancement Measures	Residual Effects ****
Decommissioning								
N/a								
Cumulative and In-combination								
Existing sensitive receptors located on construction routes	Construction of cumulative site (Vicarage Drove Solar Farm) at the same time as offsite grid route and Bicker Fen Substation – Potential increase in concentrations of NO ₂ , PM ₁₀ and PM _{2.5} as a result of additional construction traffic movements	Temporary/ Direct	Not Applicable	Not Applicable	Local	Negligible	Outline CTMP (document reference 7.10)	Negligible (not significant)
Existing sensitive receptors in the vicinity of the construction works	Construction of cumulative site (Vicarage Drove Solar Farm) at the same time as offsite grid route and Bicker Fen Substation - Potential increase in concentrations of NO ₂ , PM ₁₀ and	Temporary/ Direct	Not Applicable	Not Applicable	Local	Negligible	Outline CEMP (document reference 7.7)	Negligible (not significant)

Receptor/ Receiving Environment	Description of Effect	Nature of Effect *	Sensitivity Value **	Magnitude of Effect **	Geographical Importance ***	Significance of Effects ****	Mitigation/ Enhancement Measures	Residual Effects *****
	PM _{2.5} as a result of NRMM							
Existing sensitive receptors within 350 m of the construction works	Construction of cumulative site (Vicarage Drove Solar Farm) at the same time as offsite grid route and Bicker Fen Substation - Potential impact to human health and amenity from dust emissions	Temporary/ Direct	Not Applicable	Not Applicable	Local	Negligible	Outline CEMP (document reference 7.7)	Negligible (not significant)