



# One Earth Solar Farm

**Volume 6.0: Environmental Statement [EN010159]**

**Volume 2: Aspect Chapters**

**Chapter 13: Air Quality**

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# Contents

<b>Glossary</b>	<b>2</b>
<b>List of Abbreviations and Acronyms</b>	<b>3</b>
<b>13. Air Quality</b>	<b>5</b>
13.1 Introduction	5
13.2 Relevant Legislation, Policy and Technical Guidance	6
13.3 Assessment Methodology and Significance Criteria	8
13.4 Baseline Conditions	21
13.5 Environmental Measures	26
13.6 Assessment of Likely Significant Effects	26
13.7 Summary	34

## Glossary

Term	Definition
<b>Exceedance</b>	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure.
<b>Objectives</b>	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides.
<b>Standards</b>	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal.

## List of Abbreviations and Acronyms

Term	Definition
AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AMCT	Annual Mean Concentration Target
AQAL	Air Quality Assessment Level
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
BDC	Bassetlaw District Council
BESS	Battery Energy Storage System
CEMP	Construction Environmental Management Plan
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
EFT	Emissions Factor Toolkit
EPUK	Environmental Protection UK
ES	Environmental Statement
EU	European Union
EV	Electric Vehicle
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HGV	Heavy Goods Vehicle
HMSO	His Majesty's Stationery Office
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit

Term	Definition
kph	Kilometres per Hour
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
LGV	Light Goods Vehicle
µg/m <sup>3</sup>	Microgrammes per cubic metre
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Nitrogen oxides (taken to be NO <sub>2</sub> + NO)
NPPF	National Planning Policy Framework
OEP	Office for Environmental Protection
OLEV	Office for Low Emission Vehicles
PERT	Population Exposure Reduction Target
PM <sub>10</sub>	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM <sub>2.5</sub>	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance

#### A.1.1.1.

## 13. Air Quality

### 13.1 Introduction

- 13.1.1 This Chapter of the Environmental Statement (ES) has been prepared by Logika and presents an assessment of the likely significant environmental effects of the Proposed Development upon Air Quality.
- 13.1.2 A description of the methods used in the assessment is set out in this Chapter. This is followed by a description of the relevant baseline conditions, future baseline conditions and sensitive receptors, together with an assessment of the likely significant effects of the Proposed Development during construction, operational and maintenance, and decommissioning. Consideration of the likely significant environmental effects has been undertaken throughout the design of the Proposed Development. Specific environmental measures relevant to Air Quality have been identified and have been considered as part of the assessment. To conclude, a summary of the assessment is presented. Details of the cumulative effects assessment is presented separately within **ES Volume 2, Chapter 18: Cumulative Effects [EN010159/APP/6.18]**.
- 13.1.3 As was defined by the Scoping Opinion (see **ES Volume 3, Scoping Opinion [EN010159/APP/6.23]**), the following are the likely significant effects considered within this chapter:
- > Construction dust;
  - > Onsite construction plant; and
  - > Construction traffic emissions.
- 13.1.4 This Chapter is supported by the following figures located within **ES Volume 3: Figures Supporting Volumes 1 and 2 [EN010159/APP/6.20]** and further detailed information contained within the following appendices located within **Volume 3: Technical Appendices Supporting ES Volumes 1 and 2 [EN010159/APP/6.21]**:
- > **ES Volume 3 [EN010159/APP/6.20]: Figures**
    - **Figure 13.1:** Study Area.
    - **Figure 13.2:** Existing Receptors.
    - **Figure 13.3:** Monitoring
    - **Figure 13.4:** 20 m Site Buffer
    - **Figure 13.5:** 50 m Trackout Buffer
  - > **ES Volume 3 [EN010159/APP/6.21]: Appendices**

- **Appendix 13.1:** Summary of Legislation, Policy and Technical Guidance
- **Appendix 13.2:** Construction Dust Assessment Procedure
- **Appendix 13.3:** EPUK & IAQM Planning for Air Quality Guidance
- **Appendix 13.4:** Modelling Methodology
- **Appendix 13.5:** Construction Dust Mitigation

## 13.2 Relevant Legislation, Policy and Technical Guidance

### > Legislation

- EU Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe<sup>1</sup> (now written into UK law)
- The Environmental Protection Act (1990)<sup>2</sup>
- Part IV of the Environment Act (1995)<sup>3</sup>
- The Clean Air Act (1993)<sup>4</sup>
- The Air Quality (England) Regulations (2000)<sup>5</sup>
- The Air Quality (England) (Amendment) Regulations (2002)<sup>6</sup>
- The Air Quality Standards Regulations (2010)<sup>7</sup>
- The Environment Act (2021)<sup>8</sup>

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<sup>1</sup> The European Parliament and the Council of the European Union (2008) Directive 2008/50/EC of the European Parliament and of the Council, Available: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0050>.

<sup>2</sup> Environmental Protection Act 1990 (1990), Available: <http://www.legislation.gov.uk/ukpga/1990/43/contents>.

<sup>3</sup> Environment Act (1995), HMSO, Available: <http://www.legislation.gov.uk/ukpga/1995/25/contents>.

<sup>4</sup> Clean Air Act 1993 (1993), HMSO, Available: <http://www.legislation.gov.uk/ukpga/1993/11/contents>.

<sup>5</sup> The Air Quality (England) Regulations 2000 Statutory Instrument 928 (2000), HMSO, Available: <http://www.legislation.gov.uk/uksi/2000/928/contents/made>.

<sup>6</sup> The Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002), HMSO, Available: <https://www.legislation.gov.uk/uksi/2002/3043/contents/made>.

<sup>7</sup> The Air Quality Standards Regulations 2010 Statutory Instrument 1001 (2010), HMSO, Available: [http://www.legislation.gov.uk/uksi/2010/1001/pdfs/uksi\\_20101001\\_en.pdf](http://www.legislation.gov.uk/uksi/2010/1001/pdfs/uksi_20101001_en.pdf).

<sup>8</sup> Environment Act 2021 (2021).

- The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023
- > Policy
  - Overarching National Policy Statement for Energy (EN-1) (2023)<sup>9</sup>
  - National Planning Policy Framework (2024)<sup>10</sup>
  - Environmental Improvement Plan (2023)<sup>11</sup>
  - Clean Air Strategy (2019)<sup>12</sup>
  - Air Quality Strategy (2007)<sup>13</sup>
  - Air Quality Strategy (2023)<sup>14</sup>
  - Reducing Emissions from Road Transport: Road to Zero Strategy (2018)<sup>15</sup>
  - National Air Quality Plan (2017) and Supplement (2018)<sup>16</sup>
  - Newark and Sherwood Amended Core Strategy (2019)<sup>17</sup>

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<sup>9</sup> Department for Energy Security & Net Zero (2023) Overarching National Policy Statement for Energy (EN-1). Available: [https://assets.publishing.service.gov.uk/media/64252f3b60a35e00120cb158/NPS\\_EN-1.pdf](https://assets.publishing.service.gov.uk/media/64252f3b60a35e00120cb158/NPS_EN-1.pdf)

<sup>10</sup> Department for Levelling Up, Housing and Communities (DLUHC) (2024) National Planning Policy Framework, [Online], Available: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>. <https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf>

<sup>11</sup> DEFRA (2023) Environmental Improvement Plan 2023, [Online], Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1133967/environmental-improvement-plan-2023.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133967/environmental-improvement-plan-2023.pdf).

<sup>12</sup> DEFRA (2019) Clean Air Strategy 2019, Available: <https://www.gov.uk/government/publications/clean-air-strategy-2019>.

<sup>13</sup> DEFRA (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA.

<sup>14</sup> DEFRA (2023) Air Quality Strategy: Framework for Local Authority Delivery, [Online], Available: <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england/air-quality-strategy-framework-for-local-authority-delivery>.

<sup>15</sup> DfT (2018) The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy.

<sup>16</sup> DEFRA (2018) Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations, Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/746100/air-quality-no2-plan-supplement.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/746100/air-quality-no2-plan-supplement.pdf).

<sup>17</sup> Newark and Sherwood District Council (2019) Amended Core Strategy. Available: <https://www.newark-sherwooddc.gov.uk/media/newark-and-sherwood/images-and-files/planning-policy/pdfs/core-strategy/ACS2019.pdf>



- Central Lincolnshire Local Plan (2023)<sup>18</sup>
- Bassetlaw Local Plan (2024)<sup>19</sup>
- Technical Guidance
- Planning Practice Guidance (2023)<sup>20</sup>, Air Quality (2019)<sup>21</sup>
- Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) Guidance: Land-Use Planning & Development Control: Planning for Air Quality (2017)<sup>22</sup>
- IAQM Guidance on the Assessment of Dust from Demolition and Construction (2024)<sup>23</sup>
- DEFRA Local Air Quality Management Technical Guidance (TG22) (2022)<sup>24</sup>
- Design Manual for Roads and Bridges (DMRB) (2024)<sup>25</sup>

### 13.3 Assessment Methodology and Significance Criteria

#### The Study Area

##### Construction Dust

- 13.3.1 The construction dust assessment considers the potential for effects within 250 m of the Order Limits boundary, or within 50 m of roads used by construction vehicles where they occur within 200 m of the Order Limits entrance. This is in line with IAQM guidance<sup>23</sup>.

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<sup>18</sup> Central Lincolnshire Joint Strategic Planning Committee (2023) Local Plan. Available: <https://www.n-kesteven.gov.uk/sites/default/files/2023-04/Local%20Plan%20for%20adoption%20Approved%20by%20Committee.pdf>

<sup>19</sup> Bassetlaw District Council (2024) Bassetlaw Local Plan. Available: <https://www.bassetlaw.gov.uk/media/gn1kjm1b/adopted-bassetlaw-local-plan-2020-2038.pdf>

<sup>20</sup> DLUHC (2023) 'Planning Newsletter'.

<sup>21</sup> Ministry of Housing, Communities & Local Government (2019) Planning Practice Guidance, Available: <https://www.gov.uk/government/collections/planning-practice-guidance>.

<sup>22</sup> Moorcroft and Barrowcliffe et al (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2, IAQM, London, Available: <http://iaqm.co.uk/guidance/>.

<sup>23</sup> IAQM (2024) Guidance on the Assessment of Dust from Demolition and Construction v2.2, [Online], Available: <http://iaqm.co.uk/guidance/>.

<sup>24</sup> DEFRA (2022) Review & Assessment: Technical Guidance LAQM.TG22 August 2022 Version, [Online], Available: <https://iaqm.DEFRA.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf>.

<sup>25</sup> Standards For Highways (2024) Design Manual For Roads and Bridges: LA 104 – Air quality. Available: <https://www.standardsforhighways.co.uk/tses/attachments/10191621-07df-44a3-892e-c1d5c7a28d90?inline=true>

## Construction Traffic

- 13.3.2 For road traffic, the study area is based on the criteria in the DMRB which considers there is a potential for air quality impacts from vehicle emissions “*on sensitive receptors within 200 m of a road*”. A distance of 200 metres is used as concentrations from the road source decrease rapidly with distance from the source and beyond this distance the road source contribution is not typically discernible.
- 13.3.3 The study area is illustrated in **ES Volume 3, Figure 13.1: Study Area [EN010159/APP/6.20]**.

## Establishing the Baseline

### Existing Baseline

- 13.3.4 Existing sources of emissions and baseline air quality conditions within the study area have been defined and identified using a number of approaches and sources:
- > any industrial sources that may affect the area have been identified using DEFRA’s Pollutant Release and Transfer Register<sup>26</sup>;
  - > any specific local sources have been identified through discussion with the host local authorities and through examination of their Air Quality Review and Assessment reports<sup>27 28 29</sup>;
  - > information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. Bassetlaw District Council (BDC) is the only local authority which carried out monitoring within the study area<sup>27</sup>;
  - > background concentrations as defined using DEFRA’s background maps<sup>30</sup>. These maps cover the whole of the UK on a 1x1 km grid and are based on air quality monitoring data, along with meteorological data for 2018. The background maps also predict concentrations up to the year 2030; and

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<sup>26</sup> DEFRA (2024) UK Pollutant Release and Transfer Register, [Online], Available: <http://prtr.DEFRA.gov.uk/map-search>.

<sup>27</sup> Bassetlaw District Council (2023) 2023 Air Quality Annual Status Report (ASR).

<sup>28</sup> Newark and Sherwood District Council (2023) 2023 Air Quality Annual Status Report (ASR).

<sup>29</sup> West Lindsey District Council (2023) Annual Progress Report 2023.

<sup>30</sup> DEFRA (2024) Local Air Quality Management (LAQM) Support Website, [Online], Available: <http://laqm.DEFRA.gov.uk/>.

- > whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide (NO<sub>2</sub>) in the study area has been identified using the maps of roadside concentrations published by DEFRA<sup>31 32</sup>. These are the maps used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to the required data quality standards, to identify and report exceedances of the limit value. The national maps of roadside PM<sub>10</sub> and PM<sub>2.5</sub> concentrations<sup>32</sup>, which are available for the years 2009 to 2022, show no exceedances of the limit values anywhere in the UK in 2022.

### Future Baseline

13.3.5 Future baseline air quality conditions within the study area have also been defined by considering the following:

- > background concentrations have again been defined using DEFRA's background maps, which predict concentrations up to the year 2030; and
- > future concentrations at specific receptor locations have been predicted using the ADMS-Roads dispersion modelling software, using traffic flow data provided by the Applicant and future trends in vehicular emissions from DEFRA's Emissions Factor Toolkit (EFT)<sup>30</sup>. Further details on the dispersion modelling are provided below in the Assessment Methodology.

### Identifying Receptors and Receptor Sensitivity

#### Construction Dust

- 13.3.6 The IAQM guidance<sup>23</sup> explains that residential properties, schools and care homes are 'high' sensitivity receptors to dust soiling, while public parks and places of work are 'medium' sensitivity receptors, with farmland being 'low' sensitivity. Residential properties, schools and care homes are classified as being of 'high' sensitivity for human health effects, while places of work and shops are classified as being of 'medium' sensitivity and public parks are of 'low' sensitivity.
- 13.3.7 The IAQM construction dust risk assessment approach does not require specific sensitive receptors to be identified; instead, the numbers of different types of receptors within given distance bands are counted. It considers the potential for impacts within 250 m of the Order Limits boundary, or within 50 m of roads used by construction vehicles within 250 m of the Order Limits, as shown in in **ES Volume 3, Figure 13.1: Study Area [EN010159/APP/6.20)]**.

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<sup>31</sup> DEFRA (2020) 2020 NO<sub>2</sub> projections data (2018 reference year), Available: <https://uk-air.DEFRA.gov.uk/library/no2ten/2020-no2-pm-projections-from-2018-data>.

<sup>32</sup> DEFRA (2024) UK Ambient Air Quality Interactive Map, [Online], Available: <https://uk-air.DEFRA.gov.uk/data/gis-mapping>.

## Construction Traffic

### Human Health

- 13.3.8 All of the air quality strategy objectives for human health, as set by the Government (see **Table 13.1**), apply at locations where members of the public are likely to be regularly present on a long-term basis such as at residential properties. Only the 1-hour NO<sub>2</sub> objective applies at retail, education, community properties and public realm spaces, as it is unlikely people will spend an extended period (i.e. 24 hours) in these locations. Offices and places of work are not covered by the national air quality objectives so are not considered to be sensitive to road traffic emissions.

### Ecological Impacts

- 13.3.9 As set out in the Scoping Opinion, the air quality impacts of emissions from construction traffic on sensitive ecological sites can be scoped out of further assessment if it can be demonstrated that significant effects are not likely to occur. This is by identifying the designated ecological site that have the potential to be impacted (i.e. those within 200 m of roads used by construction traffic).

## Assessment Methodology

### Assessment Criteria

#### Health Criteria

- 13.3.10 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000)<sup>5</sup> and the Air Quality (England) (Amendment) Regulations (2002)<sup>6</sup>.
- 13.3.11 The UK-wide objectives for NO<sub>2</sub> and PM<sub>10</sub> were to have been achieved by 2005 and 2004 respectively and continue to apply in all future years thereafter. Measurements across the UK have shown that the 1-hour mean NO<sub>2</sub> objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m<sup>3</sup><sup>24</sup>. Therefore, 1-hour NO<sub>2</sub> concentrations will only be considered if the annual mean concentration is above this level.
- 13.3.12 Measurements have also shown that the 24-hour mean PM<sub>10</sub> objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m<sup>3</sup><sup>24</sup>. The predicted annual mean PM<sub>10</sub> concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM<sub>10</sub>

objective. Where predicted annual mean concentrations are below  $32 \mu\text{g}/\text{m}^3$  it is unlikely that the 24-hour mean objective will be exceeded.

- 13.3.13 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. DEFRA explains where these objectives will apply in its Local Air Quality Management Technical Guidance<sup>24</sup>. The annual mean objectives for  $\text{NO}_2$  and  $\text{PM}_{10}$  are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for  $\text{PM}_{10}$  is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for  $\text{NO}_2$  applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.
- 13.3.14 DEFRA has recently set two new targets, and two new interim targets, for  $\text{PM}_{2.5}$  concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean  $\text{PM}_{2.5}$  concentration of  $10 \mu\text{g}/\text{m}^3$  by the end of 2040 (referred to as the annual mean concentration target or AMCT), with the interim target being a value of  $12 \mu\text{g}/\text{m}^3$  by the start of 2028<sup>33</sup>. The second set of targets relate to reducing overall population exposure to  $\text{PM}_{2.5}$ . By the end of 2040, overall population exposure to  $\text{PM}_{2.5}$  should be reduced by 35% compared with 2018 levels (referred to as the population exposure reduction target or PERT), with the interim target being a reduction of 22% by the start of 2028.
- 13.3.15 In November 2024 DEFRA published Interim Planning Guidance on the  $\text{PM}_{2.5}$  targets<sup>34</sup>. This states that:
- “The purpose of the targets is to improve air quality by reducing levels of  $\text{PM}_{2.5}$  across the country, therefore improving public health. While achievement of the targets will be assessed at relevant monitoring sites, the targets apply to ambient (outdoor) air throughout England. Applicants and Local Planning Authorities should therefore consider the impact of developments on air quality in all ambient air, whether a monitor is present or not.”*
- 13.3.16 In order to address the new targets, it is not sufficient to assess solely whether a scheme is likely to lead to an exceedance of a legal limit. Instead, developments need to implement appropriate mitigation measures from the design stage,

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<sup>33</sup> Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of  $10.4 \mu\text{g}/\text{m}^3$  would not exceed the  $10 \mu\text{g}/\text{m}^3$  target

<sup>34</sup> DEFRA (2024)  $\text{PM}_{2.5}$  Targets: Interim Planning Guidance available at: <https://uk-air.DEFRA.gov.uk/pm25targets/planning>

ensuring the minimum amount of pollution is emitted and that exposure is minimised.

13.3.17 Pending publication of the new guidance, DEFRA advises applicants to provide evidence that they have identified key sources of air pollution within the scheme and taken appropriate action to minimise emissions of PM<sub>2.5</sub> and its precursors as far as possible. More detailed assessment is expected for development closer to populations and/or that have higher emissions. DEFRA has posed two questions to be used as prompts to support the interim assessment process:

1. *“How has exposure to PM<sub>2.5</sub> been considered when selecting the development site?”*; and
2. *“What actions and/or mitigations have been considered to reduce PM<sub>2.5</sub> exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of PM<sub>2.5</sub> and its precursors?”*

13.3.18 EU Directive 2008/50/EC<sup>1</sup> sets limit values for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>, and is implemented in UK law through the Air Quality Standards Regulations (2010)<sup>7</sup>. The limit values for NO<sub>2</sub> and PM<sub>10</sub> are the same numerical concentrations as the UK objectives, but achievement of the limit values is a national obligation rather than a local one and concentrations are reported to the nearest whole number. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by DEFRA and DfT’s Joint Air Quality Unit (JAQU).

13.3.19 The relevant air quality criteria for this assessment are provided in **Table 13.1**.

*Table 13.1 Air Quality Criteria for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>*

Pollutant	Time Period	Value
NO <sub>2</sub>	1-hour Mean	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m <sup>3</sup>
PM <sub>10</sub>	24-hour Mean	50 µg/m <sup>3</sup> not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m <sup>3</sup> <sup>a</sup>
PM <sub>2.5</sub>	Annual Mean	20 µg/m <sup>3</sup> <sup>b</sup>

<sup>a</sup> A proxy value of 32 µg/m<sup>3</sup> as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM<sub>10</sub> objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM<sub>10</sub> objective are possible<sup>24</sup>.



<sup>b</sup> There is no numerical PM<sub>2.5</sub> objective for local authorities (see Paragraph **Error! Reference source not found.**). Convention is to assess against the UK limit value which is currently 20 µg/m<sup>3</sup>.

#### Construction Dust Criteria

- 13.3.20 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the IAQM has been used. Full details of this approach are provided in **ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure [EN010159/APP/6.21]**.

#### Road Traffic Screening Criteria

- 13.3.21 EPUK and the IAQM recommend a two-stage screening approach to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in **ES Volume 3, Appendix 13.3: EPUK & IAQM Planning for Air Quality Guidance [EN010159/APP/6.21]**, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m<sup>2</sup> of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.
- 13.3.22 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in **ES Volume 3, Appendix 13.3: EPUK & IAQM Planning for Air Quality Guidance [EN010159/APP/6.21]**) inside an AQMA are a change in flows of more than 25 Heavy Duty Vehicles (HDVs) or 100 Light Duty Vehicles (LDVs) per day; outside of an AQMA the thresholds are 100 HDVs or 500 LDVs. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance advises that *“the criteria provided are precautionary and should be treated as indicative”*, and *“it may be appropriate to amend them on the basis of professional judgement”*.
- 13.3.23 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also sometimes be used to identify the extent of the road network that requires assessment. Where the change in traffic on a given road link is less than the relevant screening threshold, it is unlikely that a significant impact would occur, and these links can be disregarded unless there are additional development-related emissions affecting receptors along the link.

### Ecological Screening Criteria

- 13.3.24 Natural England have published a guidance note<sup>35</sup> on the assessment of road traffic emissions under the Habitats Regulations, which references the Design Manual for Roads and Bridges (DMRB) screening criteria<sup>25</sup> for determining whether development traffic may cause a significant impact on the ecological sites. The criteria state that, on roads within 200 m of the receptors exceeding 1000 AADT, or 200 AADT for HDVs, a detailed assessment is likely to be required to determine whether impacts will result in significant effects.

### Construction

#### Construction Dust

- 13.3.25 The construction dust assessment considers the potential for impacts within 250 m of the Order Limits boundary, or within 50 m of roads used by construction vehicles. The assessment methodology is that provided by IAQM<sup>23</sup>. This follows a sequence of steps:
- > Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required.
  - > Step 2a determines the potential for dust to be raised from onsite works and by vehicles leaving the Site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation.
  - > Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts.
- 13.3.26 **ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure [EN010159/APP/6.21]** explains the approach in more detail.

#### Construction Traffic

- 13.3.27 The construction of the Proposed Development will lead to an increase in traffic on the local roads, which may affect air quality at existing sensitive properties. The main air pollutants of concern relating to traffic emissions are NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. An assessment of the construction impacts that the Proposed Development will have on concentrations of these pollutants has been carried out following the methodology presented below.
- 13.3.28 The first step in considering the road traffic impacts of the Proposed Development has been to screen traffic generation associated with the Proposed

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<sup>35</sup> Natural England (2018) Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. Available: <https://publications.naturalengland.org.uk/file/5431868963160064>



Development against the criteria set out in the EPUK/IAQM guidance<sup>22</sup>, as described in Paragraph 13.3.21 and detailed further in **ES Volume 3, Appendix 13.3: EPUK & IAQM Planning for Air Quality Guidance [EN010159/APP/6.21]**. Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of road traffic emissions, which has been required for this project.

- 13.3.29 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using DEFRA's Emission Factor Toolkit (EFT) (v12.0)<sup>30</sup>. Details of the model inputs and the model verification are provided in **ES Volume 3, Appendix 13.4: Modelling Methodology [EN010159/APP/6.21]**.
- 13.3.30 NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations have been predicted for the following scenarios:
- > base year (2022; which was the most recent year for which monitoring data were available for verification);
  - > the first year of construction (2027) without the development; and
  - > 2027 with the development.
- 13.3.31 As described in paragraph 13.3.24, the first step in considering the road traffic impacts on designated ecological sites is to screen the traffic generation against the screening criteria set out in Natural England's guidance note. Where impacts can be screened out there is no need to progress to a more detailed assessment.
- 13.3.32 Two Sites of Special Scientific Interest (SSSI) have been identified; Spalford Warren and Besthorpe Warren, which are both within 200 m of the A1133, to the south of the Order Limits.
- 13.3.33 As set out in **Table A13.4.2 in ES Volume 3, Appendix 13.4: Modelling Methodology [EN010159/APP/6.21]**, during construction the Proposed Development will generate 217 HDV AADT on the A1133, which passes within 200 m of the two SSSIs. However, these trips will originate at the Tarmac Besthorpe Sand and Gravel Quarry, located approximately 7 km south of the Order Limits, and will not be additional to the trips currently generated by the quarry. The HGV movements for the Tarmac Besthorpe Sand and Gravel Quarry are restricted under a Section 106 Agreement, such that all HGVs generated by the quarry with a gross laden weight of over 7.5 tonnes are prohibited from travelling through the village or Parish of Collingham and must access/exit the quarry via the A1133 situated north of the quarry access road<sup>36</sup>. As such the quarry traffic will already be using the A1133 where it passes the two SSSIs, meaning that the predicted traffic generation by the Proposed Development would not be expected to result in a net change of more than the 200 HDV AADT

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<sup>36</sup> Details as contained within the Scoping Report for the proposed planning application for the eastern extension of Besthorpe Quarry (Planning Application SC/3824). Available at: [www.nottinghamshire.gov.uk](http://www.nottinghamshire.gov.uk)

screening criterion. Consequently, these potential impacts can be screened out there is no need to progress to a more detailed assessment.

### Decommissioning

- 13.3.34 The potential sources of air quality impacts associated with the decommissioning phase of the Proposed Development are broadly similar to those during construction. However, given the 60-year operational life of the Proposed Development, decommissioning is not expected to occur until 2090, by which time the impacts of emissions from vehicles are expected to be much lower due to the electrification of the fleet. It can therefore be concluded that there will be no significant air quality effects associated with the decommissioning works.

### Significance Criteria

#### Magnitude of Impact

#### Construction Dust

- 13.3.35 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the IAQM has been used. The magnitude of impact associated with dust generated from the demolition and construction activities is determined during Step 2 of the method. Full details of this approach are provided in **ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure [EN010159/APP/6.21]**.

#### Construction Traffic

- 13.3.36 The approach developed jointly by EPUK and the IAQM has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. **Table 13.2** sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 13.2 Air Quality Impact Descriptors for Individual Receptors for All Pollutants <sup>a</sup>

Long-Term Average Concentration At Receptor In Assessment Year <sup>b</sup>	Change in concentration relative to AQAL <sup>c</sup>				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

<sup>a</sup> Values are rounded to the nearest whole number.

<sup>b</sup> This is the “Without Proposed Development” concentration where there is a decrease in pollutant concentration and the “With Proposed Development” concentration where there is an increase.

<sup>c</sup> AQAL = Air Quality Assessment Level, which may be an air quality objective, limit or target value, GLA target or an Environment Agency ‘Environmental Assessment Level (EAL)’.

## Defining the Effect

### Construction Dust

- 13.3.37 Dust generated by the Proposed Development during construction has the potential to cause direct, temporary, medium-term effects at a local and borough level (up to 250 m from the Order Limits boundary).
- 13.3.38 Guidance from the IAQM is that, with appropriate mitigation in place, the effects of construction dust will be ‘not significant’. The assessment thus focuses on determining the appropriate level of mitigation to ensure that effects will be ‘not significant’.

### Construction Traffic

- 13.3.39 Emissions of pollutants associated with the Proposed Development have the potential to cause direct, temporary, short-term air quality effects at a local level (refer to receptor locations in **Table 13.5** and **ES Volume 3, Figure 13.2: Existing Receptors [EN010159/APP/6.20]**, which define the study area).
- 13.3.40 There is no official guidance in the UK in relation to development control on how to assess the significance of effects. The approach developed jointly by EPUK / IAQM<sup>23</sup> has therefore been used.

- 13.3.41 It is important to differentiate between the terms impact and effect with respect to the assessment of air quality. The term impact is used to describe a change in pollutant concentration at a specific location. The term effect is used to describe an environmental response resulting from an impact, or series of impacts. Within this chapter, the air quality assessment has used published guidance and criteria to determine the likely air quality impacts at a number of sensitive locations (see **Table 13.5**). The overall significance of the air quality effects is then determined using professional judgement, giving consideration to various factors including the magnitude of the predicted impacts and the presence of any objective exceedances; full details of the EPUK/IAQM approach are provided in **ES Volume 3, Appendix 13.3: EPUK & IAQM Planning for Air Quality Guidance [EN010159/APP/6.21]**.

### Consultation

- 13.3.42 As set out in **ES Volume 1, Chapter 2: EIA Methodology [EN010159/APP/6.2]**, a number of consultation activities have been undertaken. **ES Volume 3, Appendix 2.2: ES Response to PINs Scoping Opinion [EN010159/APP/6.21]** summarises the EIA Scoping Opinion for the Proposed Development and where elements have been agreed to be scoped out of the EIA.
- 13.3.43 Any consultation elements which have been raised and addressed post-scoping, are detailed within the **Consultation Report [EN010159/APP/5.1]**.
- 13.3.44 No further specific technical consultations have been undertaken, which have informed the technical assessment as presented in this Chapter.

### Assumptions, Exclusions and Limitations

- 13.3.45 Construction activity is anticipated to commence in 2027 and will continue for a period of 2 years (24 months). The Proposed Development would be operational by 2030. At this stage phasing of works is unknown until a construction contractor has been appointed. The assessment assumes the maximum effect scenario of construction works happening across the whole Order Limits simultaneously for the full construction period, although this is unlikely. The air quality assessment has considered the peak of construction traffic in the first year of construction, as 2027, when vehicle emissions and background air quality concentrations are highest and assumes that dust will be generated across the Order Limits simultaneously. It is more likely that works would move across the Order Limits over this period, therefore, the air quality assessment is considered conservative.
- 13.3.46 As detailed in **ES Volume 2: Chapter 12: Transport and Access [EN010159/APP/6.12]**, during the operational phase, up to 10 LGV trips per day, on average, are predicted to cater for cleaning of modules and general Site maintenance. When longer term maintenance of battery units or modules is required, HGV access will be necessary with up to 12 HGV trips potentially per day. The number of vehicle trips occurring during this phase will be well below

the number of movements assessed for the construction phase and significantly below the overall IAQM guidance thresholds for when there is the potential for air quality to result in significant effects (see Road Traffic Screening Criteria subheading above for further details). As such, no further assessment is required. This was agreed with PINS during Scoping.

- 13.3.47 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.
- 13.3.48 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see **ES Volume 3, Appendix 13.4: Modelling Methodology [EN010159/APP/6.21]**). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2022) concentrations.
- 13.3.49 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and DEFRA as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions. Historic versions of DEFRA's EFT tended to over-state emissions reductions into the future. However, analyses of the more recent versions of DEFRA's EFT carried out by AQC<sup>37 38</sup> suggest that, on balance, these versions are unlikely to over-state the rate at which NO<sub>x</sub> emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NO<sub>x</sub> concentrations are most likely to decline more quickly in the future, on average, than predicted by previous versions of the EFT, especially against a base year of 2016 or later. Whilst such an analysis has not been undertaken by AQC for EFT v12.0, it is considered that using EFT v12.0 for future-year forecasts in this report provides a robust assessment, given that the model has been verified against measurements made in 2022.
- 13.3.50 Forecasts of future-year concentrations are usually based on measurements made during a recent year. They then take account of projected changes over time to factors such as the composition of the vehicle fleet and the uptake of other new technologies, as well as population increases etc. In early 2020, activity in the UK was disrupted by the COVID-19 pandemic. As a result,

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<sup>37</sup> AQC (2020) Performance of DEFRA's Emission Factor Toolkit 2013-2019, Available: <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=7fba769d-f1df-49c4-a2e7-f3dd6f316ec1>.

<sup>38</sup> AQC (2020) Comparison of EFT v10 with EFT v9, Available: <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=9d6b50e1-3897-46cf-90f1-3669c6814f1d>.



concentrations of traffic-related air pollutants fell appreciably<sup>39</sup>. While the pandemic may cause long-lasting changes to travel activity patterns, it is reasonable to expect a return to more typical activity levels in the future. Thus, 2020 is likely to present as an atypically low pollution year for roadside pollutant concentrations, as is 2021.

- 13.3.51 It is not currently possible to make robust predictions of the rate at which travel activity patterns will return to historically-normal levels; or the extent of any long-lasting changes to travel behaviour. The most robust approach to making future-year projections is thus to base these on measurements made during 2019, and to use activity forecasts made before the impact of the pandemic was understood, which is the approach that has been taken in this assessment.
- 13.3.52 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. One key assumption made in carrying out this assessment is that the Waddington meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in **ES Volume 3, Appendix 13.4: Modelling Methodology [EN010159/APP/6.21]**).

## 13.4 Baseline Conditions

- 13.4.1 Local authorities must regularly review air quality within their administrative boundaries<sup>24</sup> and declare an Air Quality Management Area (AQMA) in areas where the air quality objectives have not been achieved, as well as produce an action plan to improve air quality in these areas.
- 13.4.2 The nearest AQMA to the Order Limits was declared in 2001 for exceedances of the annual and 1-hour mean NO<sub>2</sub> objectives and is located in Lincoln city centre, approximately 11.1 km to the east of the eastern Order Limits boundary. The AQMA is outside of the study area and our Proposed Development is therefore not expected to affect air quality within the AQMA.

### Current Baseline Conditions

#### Local Air Quality Monitoring

- 13.4.3 BDC monitors air quality at numerous locations, of which one is located in proximity to the Order Limits, close to the A57 in Dunham, within the study area. The location of the monitor in relation to the Proposed Development is shown in

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<sup>39</sup> DEFRA Air Quality Expert Group (2020) Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK- Rapid evidence review, Available: [https://uk-air.DEFRA.gov.uk/assets/documents/reports/cat09/2007010844\\_Estimation\\_of\\_Changes\\_in\\_Air\\_Pollution\\_During\\_COVID-19\\_outbreak\\_in\\_the\\_UK.pdf](https://uk-air.DEFRA.gov.uk/assets/documents/reports/cat09/2007010844_Estimation_of_Changes_in_Air_Pollution_During_COVID-19_outbreak_in_the_UK.pdf).

**ES Volume 3, Figure 13.3: Monitoring [EN010159/APP/6.20]** and the measured annual mean NO<sub>2</sub> results for 2018 to 2022 are shown in **Table 13.3**.

- 13.4.4 West Lindsey District Council (WLDC) and Newark & Sherwood District Council (NSDC) also monitor air quality at numerous locations; these monitors are quite far outside of the study area and as such are not considered to be representative of conditions at or near the Order Limits.

*Table 13.3 Annual Mean NO<sub>2</sub> Monitoring (µg/m<sup>3</sup>) (2018-2022)*

Site ID	Site Type	Location	2018	2019	2020	2021	2022
22	Roadside	Dunham	24.1	23.5	17.6	18.1	17.2
<b>Objective</b>			<b>40</b>				

- 13.4.5 Measured annual mean NO<sub>2</sub> concentrations have been below the objective at the nearby NO<sub>2</sub> monitoring site in since at least 2018. Concentrations were also well below 60 µg/m<sup>3</sup>, which indicates that exceedances of the 1-hour mean objective are unlikely<sup>24</sup>. There was an overall downward trend in measured concentrations between 2018 and 2022.
- 13.4.6 While 2020 and 2021 results have been presented for completeness, they are not relied upon in any way as they are not representative of 'typical' air quality conditions due to the impact of the COVID-19 pandemic on traffic volumes and thus pollutant concentrations. Concentrations measured in 2022 are used as the baseline for the assessment presented in this ES chapter.
- 13.4.7 No monitoring of PM<sub>10</sub> or PM<sub>2.5</sub> concentrations is conducted by any of the host authorities, as this is not considered a pollutant of concern in the local area.

### Exceedances of the Limit Value

- 13.4.8 There are no AURN monitoring sites within the study area with which to identify exceedances of the NO<sub>2</sub> limit value. DEFRA's roadside annual mean NO<sub>2</sub> concentrations<sup>32</sup>, which are used to report exceedances of the limit value, do not identify any exceedances of the limit value in 2023 within the study area. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the Proposed Development by the time that it is operational.

### Background Concentrations

- 13.4.9 Estimated background concentrations in the study area have been determined for the baseline year 2022 using DEFRA's 2018-based background maps. The background concentrations are set out in **Table 13.4** and have been derived as described in **ES Volume 3, Appendix 13.4: Modelling Methodology [EN010159/APP/6.21]**. The background concentrations are all well below the objectives.

Table 13.4 Estimated Annual Mean Background Concentrations in 2022 ( $\mu\text{g}/\text{m}^3$ )

Year	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
2022	8.2 – 10.8	15.9 – 17.4	8.7 – 9.2
<b>Objective</b>	<b>40</b>	<b>40</b>	<b>20<sup>a</sup></b>

<sup>a</sup> The 20 $\mu\text{g}/\text{m}^3$  PM<sub>2.5</sub> objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

### Sensitive Receptors

- 13.4.10 Receptors have been identified to represent a range of exposures, including worst-case locations (these being at the façades of the residential properties closest to the sources). When identifying receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested and where there is a combined effect of several road links, and close to those roads where the traffic increases as a result of the Proposed Development will be greatest.
- 13.4.11 Ten worst-case receptor locations have been identified as receptors for the assessment. Selected receptor locations are described in **Table 13.5** and displayed in **ES Volume 3, Figure 13.2: Existing Receptors [EN010159/APP/6.20]**.
- 13.4.12 Selected receptors may be representative of air quality conditions at a number of properties; consideration has been given to how many sensitive locations each modelled receptor represents when considering the impacts of the Proposed Development and the overall significance of effects.

Table 13.5 Description of Existing Receptor Locations

Receptor	Description	Modelled Heights (m) <sup>a</sup>
R1	Willow Farm	1.5
R2	Hall Farm Cottage	1.5
R3	Whimpton House	1.5
R4	Grey Oak	1.5
R5	Field House Farm	1.5
R6	House adjacent to Roy Martin Gunsmith	1.5
R7	The Chase	1.5
R8	Old Police House	1.5



Receptor	Description	Modelled Heights (m) <sup>a</sup>
R9	Residence adjacent to A1133	1.5
R10	Grange Farm	1.5

<sup>a</sup> Modelled height of 1.5 m represents ground floor exposure. This provides a conservative assessment and impacts at receptors at first floor (and above).

13.4.13 Baseline concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> have been modelled at each of the existing receptor locations (see **ES Volume 3, Figure 13.2: Existing Receptors [EN010159/APP/6.20]**) and **Table 13.5** for receptor locations). The results for the existing (2022) baseline year are set out in **Table 13.6**. The modelled road components of nitrogen oxides (NO<sub>x</sub>) have been increased from those predicted by the model based on a comparison with local measurements (see **ES Volume 3, Appendix 13.4: Modelling Methodology [EN010159/APP/6.21]**) for the verification methodology).

*Table 13.6 Modelled Annual Mean Baseline NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations at Existing Receptors in 2022 (µg/m<sup>3</sup>)*

Receptor	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
R1	21.0	16.3	8.8
R2	23.9	16.5	8.9
R3	16.6	15.9	8.6
R4	12.0	15.7	8.5
R5	13.1	15.7	8.5
R6	14.3	16.0	8.6
R7	15.0	16.0	8.7
R8	11.1	15.8	8.6
R9	10.1	15.7	8.5
R10	11.0	15.4	8.3
<b>Objective</b>	<b>40</b>	<b>40</b>	<b>20 <sup>a</sup></b>

13.4.14 The predicted annual mean concentrations of NO<sub>2</sub> are all well below the objective in 2022. They are therefore also well below 60 µg/m<sup>3</sup> at every receptor in 2022, so it is unlikely that the 1-hour mean NO<sub>2</sub> objective will be exceeded (see Paragraph 13.3.11).

## Future Baseline Conditions

### Background Concentrations

- 13.4.15 Estimated background concentrations in the study area have also been determined for the future year (2027) baseline (Without Proposed Development). The concentrations are set out in **Table 13.7** and are all well below the objectives.

*Table 13.7 Estimated Annual Mean Background Concentrations in 2027 ( $\mu\text{g}/\text{m}^3$ )*

Year	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
2027	6.3 – 6.5	14.8 – 15.3	7.9 – 8.1
<b>Objective</b>	<b>40</b>	<b>40</b>	<b>20<sup>a</sup></b>

<sup>a</sup> The 20 $\mu\text{g}/\text{m}^3$  PM<sub>2.5</sub> objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

### Sensitive Receptors

- 13.4.16 Future baseline concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> have also been modelled at each of the existing receptor locations. The results for the future year (2027) baseline (Without Proposed Development) are set out in **Table 13.8**.

*Table 13.8 Modelled Annual Mean Baseline NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations at Existing Receptors in 2027 ( $\mu\text{g}/\text{m}^3$ )*

Receptor	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
R1	14.5	15.9	8.5
R2	16.2	16.1	8.6
R3	11.7	15.4	8.2
R4	9.0	15.3	8.1
R5	9.6	15.3	8.2
R6	10.4	15.5	8.3
R7	10.0	15.5	8.3
R8	8.2	15.4	8.2
R9	7.7	15.3	8.1
R10	8.1	14.9	8.0
<b>Objective</b>	<b>40</b>	<b>40</b>	<b>20<sup>a</sup></b>

- 13.4.17 The predicted annual mean concentrations of NO<sub>2</sub> are all well below the objective in 2027. They are therefore also well below 60 µg/m<sup>3</sup> at every receptor in 2027, so it is unlikely that the 1-hour mean NO<sub>2</sub> objective will be exceeded (see Paragraph 13.3.11).

## 13.5 Environmental Measures

- 13.5.1 The following specific environmental measures relevant to Air Quality have been identified and have been considered as part of the assessment. To ensure clarity as to how these Environmental Measures are secured, a **Commitments Register [EN010159/APP/7.15]** has been included within the submission (see **Volume 7: Other Documents**).

### Construction and Decommissioning

- 13.5.2 The Proposed Development incorporates an **Outline Construction Environmental Management Plan [EN010159/APP/7.4]** (oCEMP) and an **Outline Decommissioning Environmental Management Plan [EN010159/APP/7.6]** (oDEMP) to minimise emissions and sources of air pollution during the construction and decommissioning works. These documents include good design and best practice measures to ensure that adverse impacts to air quality are avoided, reduced or mitigated. These measures are considered to be included within the Proposed Development prior to the technical assessment.

### Operational and Maintenance

- 13.5.3 Similarly to the above, during operation the Proposed Development incorporates an **Outline Operational Environmental Management Plan [EN010159/APP/7.5]** (oOEMP)) which includes measures to minimise emissions during maintenance.

## 13.6 Assessment of Likely Significant Effects

### Construction Dust

- 13.6.1 The construction phase will give rise to a risk of dust impacts during, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway.
- 13.6.2 Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see **ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure [EN010159/APP/6.21]**), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

## Potential Dust Emission Magnitude

### Earthworks

- 13.6.3 The characteristics of the soil at the Order Limits have been defined using the British Geological Survey's UK Soil Observatory website<sup>40</sup>, as set out in **Table 13.9**. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

*Table 13.9 Summary of Soil Characteristics*

Category	Record
Soil Parent Material Grain Size	Mixed (Argillic <sup>a</sup> – Rudaceous <sup>b</sup> )
European Soil Bureau Description	Mixed
Soil Group	All (Light to Heavy)
Soil Texture	Sand, Silt and Clay

<sup>a</sup> grain size < 0.06 mm.

<sup>b</sup> grain size > 2.0 mm.

- 13.6.4 The Order Limits covers approximately 1,500 hectares. Dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). Based on the example definitions set out in **Table 13.2.1** in **ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure [EN010159/APP/6.21]**, the dust emission class for earthworks is considered to be large.

### Construction

- 13.6.5 The Proposed Development involves the construction of two Battery Energy Storage System (BESS) compounds, two onsite substations and the installation of solar arrays and other associated infrastructure. Dust will arise from vehicles travelling over unpaved ground. The construction will take place over a two-year period. Based on the example definitions set out in **Table 13.2.1** in **ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure [EN010159/APP/6.21]**, the dust emission class for construction is considered to be large.

<sup>40</sup> British Geological Survey (2023) UK Soil Observatory Map Viewer, Available: <http://mapapps2.bgs.ac.uk/ukso/home.html>.

## Trackout

- 13.6.6 The maximum number of heavy vehicles accessing the Site, which may track out dust and dirt, is currently unknown, therefore to be worst-case the dust emission class for trackout is considered to be large.
- 13.6.7 **Table 13.10** summarises the dust emission magnitude for the Proposed Development.

*Table 13.10 Summary of Dust Emission Magnitude*

Source	Dust Emission Magnitude
Earthworks	Large
Construction	Large
Trackout	Large

## Sensitivity of the Area

- 13.6.8 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the Order Limits. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM<sub>10</sub> concentrations.
- 13.6.9 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling. Residential properties are also classified as being of 'high' sensitivity to human health effects. There are more than 10 residential properties within 20 m of the Order Limits (see **ES Volume 3, Figure 13.4: 20m Site Buffer [EN010159/APP/6.20]**).
- 13.6.10 The IAQM guidance<sup>23</sup> explains that there is a risk of material being tracked 250 m from the Site exit. Construction vehicles will generally approach the Order Limits from the north west along the A57 and also from the south along the A1133, but will access the Order Limits at a number of locations. All of these potential access points have been considered. There are fewer than ten residential properties within 50 m of the roads along which material could be tracked (see **Figure 13.5 (ES Volume 3 [EN010159/APP/6.20])**).

## Sensitivity of the Area to Dust Soiling

- 13.6.11 Using the information set out in Paragraph 13.6.9 and **ES Volume 3, Figure 13.4: 20m Site Buffer [EN010159/APP/6.20]** alongside the matrix set out in **Table 13.2.3 in ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure [EN010159/APP/6.21]**, the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Using the information set out in Paragraph 13.6.10 and **ES Volume 3, Figure 13.5: 50m Trackout Buffer**

**[EN010159/APP/6.20]** alongside the same matrix, the area is of 'medium' sensitivity to dust soiling due to trackout.

### Sensitivity of the Area to Human Health Effects

- 13.6.12 The matrix in **Table 13.2.4** in **ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure [EN010159/APP/6.21]** requires information on the baseline annual mean PM<sub>10</sub> concentration in the area. The properties nearest the Order Limits are well away from busy roads and the existing annual mean PM<sub>10</sub> concentration is best described by the maximum background concentration from **Table 13.6** (17.4 µg/m<sup>3</sup>). Using the information set out in Paragraphs 13.6.9 and **ES Volume 3, Figure 13.4: 20m Site Buffer [EN010159/APP/6.20]** alongside the matrix in **Table 13.4.2** in **ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure [EN010159/APP/6.21]** the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information set out in Paragraph 13.6.9 and **ES Volume 3, Figure 13.5: 50m Trackout Buffer [EN010159/APP/6.20]** alongside the same matrix, the area surrounding roads along which material may be tracked from the Order Limits is also of 'low' sensitivity.

### Sensitivity of the Area to Ecological Effects

- 13.6.13 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no statutory designated ecological sites within 50 m of the Order Limits boundary or those roads along which material may be tracked. There are a small number of Local Wildlife Sites, which are considered to be of low sensitivity.

### Summary of the Area Sensitivity

- 13.6.14 **Table 13.11** summarises the sensitivity of the area around the proposed construction works.

*Table 13.11 Summary of Area Sensitivity*

Effects Associated With:	Sensitivity of the Surrounding Area	
	Onsite Works	Trackout
Dust Soiling	High	Medium
Human Health	Low	Low
Ecological	Low	Low

### Risk and Significance

- 13.6.15 The dust emission magnitudes in **Table 13.10** have been combined with the sensitivities of the area in **Table 13.11** using the matrix in **Table 13.2.6** in **ES Volume 3, Appendix 13.2: Construction Dust Assessment Procedure**

[EN010159/APP/6.21], in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in **Table 13.12**. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 10 (Step 3 of the assessment procedure).

*Table 13.12 Summary of Risk of Impacts Without Mitigation*

Source	Dust Soiling	Human Health	Ecological
Earthworks	High Risk	Low Risk	Low Risk
Construction	High Risk	Low Risk	Low Risk
Trackout	Medium Risk	Low Risk	Low Risk

13.6.16 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be ‘not significant’.

### Onsite Construction Plant

13.6.17 The IAQM guidance<sup>23</sup> states:

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

**13.6.18** The Proposed Development is large, and the majority of the Site area is more than 50 m from any sensitive receptors. The areas in which NRMM and site traffic will typically operate are thus likely to be located more than 50 m away from any sensitive properties. It is judged that there is no risk of significant effects at existing receptors as a result of onsite machinery emissions. Further details on construction plant are provided in **ES Volume 1, Chapter 5: Description of the Proposed Development [EN010159/APP/6.5]**

### Construction Traffic

#### NO<sub>2</sub>

13.6.19 Predicted annual mean concentrations of NO<sub>2</sub> in 2027 for existing receptors are set out in **Table 13.13** for both the “Without Proposed Development” and “With Proposed Development” scenarios. The impact at each receptor is also described using the impact descriptors given in **Table 13.3**.



*Table 13.13 Predicted Impacts on Annual Mean NO<sub>2</sub> Concentrations in 2027 (µg/m<sup>3</sup>)*

Receptor	Without Proposed Development	With Proposed Development	% Change <sup>a</sup>	Impact Descriptor
R1	14.5	15.1	1	Negligible
R2	16.2	16.9	2	Negligible
R3	11.7	11.9	1	Negligible
R4	9.0	9.1	0	Negligible
R5	9.6	9.8	0	Negligible
R6	10.4	10.6	0	Negligible
R7	10.0	10.2	0	Negligible
R8	8.2	8.3	0	Negligible
R9	7.7	7.8	0	Negligible
R10	8.1	8.2	0	Negligible
<b>Objective</b>	<b>40</b>		-	-

<sup>a</sup> % changes are relative to the objective and have been rounded to the nearest whole number

13.6.20 The annual mean NO<sub>2</sub> concentrations are well below the objective at all receptors and the predicted changes in concentrations all result in negligible impacts.

### PM<sub>10</sub>

13.6.21 Predicted annual mean concentrations of PM<sub>10</sub> in 2027 for existing receptors are set out in **Table 13.14** and for both the “Without Proposed Development” and “With Proposed Development” scenarios. The impacts at each receptor are also described using the impact descriptors given in **Table 13.2**.

*Table 13.14 Predicted Impacts on Annual Mean PM<sub>10</sub> Concentrations in 2027 (µg/m<sup>3</sup>)*

Receptor	Without Proposed Development	With Proposed Development	% Change <sup>a</sup>	Impact Descriptor
R1	15.9	16.0	0	Negligible
R2	16.1	16.2	0	Negligible



Receptor	Without Proposed Development	With Proposed Development	% Change <sup>a</sup>	Impact Descriptor
R3	15.4	15.5	0	Negligible
R4	15.3	15.3	0	Negligible
R5	15.3	15.3	0	Negligible
R6	15.5	15.5	0	Negligible
R7	15.5	15.5	0	Negligible
R8	15.4	15.4	0	Negligible
R9	15.3	15.3	0	Negligible
R10	14.9	14.9	0	Negligible
<b>Criterion</b>	<b>32 <sup>b</sup></b>		-	-

<sup>a</sup> % changes are relative to the objective and have been rounded to the nearest whole number

<sup>b</sup> While the annual mean PM<sub>10</sub> objective is 40 µg/m<sup>3</sup>, 32 µg/m<sup>3</sup> is the annual mean concentration above which an exceedance of the 24-hour mean PM<sub>10</sub> objective is possible, as outlined in LAQM.TG22. A value of 32 µg/m<sup>3</sup> is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM<sub>10</sub> objective, as recommended in EPUK & IAQM guidance.

13.6.22 The annual mean PM<sub>10</sub> concentrations are well below the objective at all receptors, with or without the Proposed Development. Furthermore, the annual mean PM<sub>10</sub> concentrations are below 32 µg/m<sup>3</sup> so it is unlikely that the 24-hour mean PM<sub>10</sub> objective will be exceeded at any receptor.

### PM<sub>2.5</sub>

13.6.23 Predicted annual mean concentrations of PM<sub>2.5</sub> in 2027 for existing receptors are set out in **Table 13.15** and for both the “Without Proposed Development” and “With Proposed Development” scenarios. The impacts at each receptor are also described using the impact descriptors given in **Table 13.2**.

Table 13.15 Predicted Impacts on Annual Mean PM<sub>2.5</sub> Concentrations in 2027 (µg/m<sup>3</sup>)

Receptor	Without Proposed Development	With Proposed Development	% Change <sup>a</sup>	Impact Descriptor
R1	8.5	8.5	0	Negligible
R2	8.6	8.6	0	Negligible
R3	8.2	8.3	0	Negligible
R4	8.1	8.1	0	Negligible
R5	8.2	8.2	0	Negligible
R6	8.3	8.3	0	Negligible
R7	8.3	8.3	0	Negligible
R8	8.2	8.2	0	Negligible
R9	8.1	8.1	0	Negligible
R10	8.0	8.0	0	Negligible
<b>Objective</b>	<b>10 <sup>b</sup></b>		-	-

<sup>a</sup> % changes are relative to the objective and have been rounded to the nearest whole number

<sup>b</sup> The PM<sub>2.5</sub> target should be met by 2040

- 13.6.24 The annual mean PM<sub>2.5</sub> concentrations are well below the AMCT target to be met by 2040 at all receptors, with or without the Proposed Development.
- 13.6.25 DEFRA have set out in their Interim Planning Guidance<sup>34</sup> two questions designed to consider whether a development supports the AMCT and PERT PM<sub>2.5</sub> targets.
- 13.6.26 The first question is *“How has exposure to PM<sub>2.5</sub> been considered when selecting the development site?”*. Exposure to PM<sub>2.5</sub> has been considered in the design of the Proposed Development as the Order Limits are in a rural area away from large populations of people.
- 13.6.27 The second question is *“What actions and/or mitigations have been considered to reduce PM<sub>2.5</sub> exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of PM<sub>2.5</sub> and its precursors?”*. Emissions during the construction phase will be managed through the use of appropriate mitigation measures as set out in the oCEMP, such as dust water suppression, vehicle wheel washing and avoiding activities that generate

unnecessarily high levels of dust. Emissions during the operation phase are considered to be negligible.

- 13.6.28 It is considered that the development complies with the requirements to deliver achievement of the AMCT and PERT by 2040 as appropriate action has been taken to minimise emissions of PM<sub>2.5</sub> and its precursors as far as is reasonably practicable.

### Significance of Effects

- 13.6.29 The air quality effects of emissions from construction traffic are judged to be 'not significant', as pollutant concentrations at all worst-case existing receptors will be well below the relevant objectives and the impacts are all predicted to be negligible.

## 13.7 Summary

- 13.7.1 **Table 13.16** sets out a summary of the likely significant environmental effects considered.



Table 13.16 Summary of Significant Environmental Effects

Receptor	Environmental Measures	Description of the Effect	Direct / Indirect	Duration	Geographic Scale	Nature of Effect	Significant / Not Significant	Mechanism
Construction								
Residential Receptors	CEMP and Dust Management Plan	Construction Dust Soiling and Human Health Effects	Direct	Short Term	Local	Negligible	Not Significant	Approval CEMP and DEMP
Residential Receptors	CEMP	Onsite Plant Emission Human Health Effects	Direct	Short Term	Local	Negligible	Not Significant	CEMP
Residential Receptors	CEMP	Traffic Emission Human Health Effects	Direct	Short Term	Local	Negligible	Not Significant	Approval CEMP
Decommissioning								
Residential Receptors	DEMP	Construction Dust Soiling and Human Health Effects	Direct	Short Term	Local	Negligible	Not Significant	Approval DEMP
Residential Receptors	CEMP	Onsite Plant Emission Human Health Effects	Direct	Short Term	Local	Negligible	Not Significant	Approval DEMP
Residential Receptors	DEMP	Traffic Emission Human Health Effects	Direct	Short Term	Local	Negligible	Not Significant	Approval DEMP



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