Cottam Solar Project

Preliminary Environmental Information Report:
Chapter 17: Air Quality

Prepared by: Tetra Tech Limited
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Cottam
SOLAR PROJECT

Contents

Issue Sheet

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Preliminary Environmental Information Report:

Chapter 17: Air Quality

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17 Air Quality

17.1 Introduction

17.1.1 This chapter of the PEIR evaluates the effects of the Scheme as described in **Chapter 4 Development Proposal**, on air quality at nearby sensitive receptors during the construction, operation and decommissioning phases. The aim of this preliminary assessment is to predict the levels of air quality pollutants and assess them to determine whether there are any likely significant effects, taking account of relevant policy, guidelines and best practice.

17.1.2 This chapter is supported by the following Appendix:

- **Appendix 17.1 – 17.4**: Qualitative Dust Assessment and Construction Dust Management Plans (CDMPs)

17.1.3 This chapter includes the following elements:

- Policy Content
- Assessment Methodology and Significance Criteria
- Baseline Conditions
- Identification and Evaluation of Key Effects
- Cumulative/In-combination Effects
- Mitigation Measures
- Residual Effects
- References

17.2 Policy Context

17.2.1 This section provides an overview of the legislative and planning policy framework against which the Scheme will be considered for air quality. These policies identify the need for a site-specific air quality assessment to consider the impacts of construction, operational and decommissioning phase air quality pollution on local sensitive receptors.

Legislation

European Legislation

17.2.2 European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated and replaced previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- Directive 1999/30/EC – the First Air Quality "Daughter" Directive – sets ambient air limit values for nitrogen dioxide (NO2) and oxides of nitrogen (NOX), sulphur dioxide (SO2), lead (Pb) and particulate matter (PM);
- Directive 2000/69/EC – the Second Air Quality "Daughter" Directive – sets ambient air limit values for benzene (C6H6) and carbon monoxide (CO); and,
- Directive 2002/3/EC – the Third Air Quality "Daughter" Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone (O3) in ambient air.
- The 2008 Ambient Air Quality Directive (2008/50/EC) - The Directive sets limits for key pollutants in the air we breathe outdoors. These legally binding limit values are for concentrations of major air pollutants that impact public health, such as particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2). The directive also sets limit values for a range of other pollutants, such as ozone, sulphur dioxide and carbon monoxide.
- The 4th air quality daughter directive (2004/107/EC) – the Directive sets targets for levels in outdoor air of certain toxic heavy metals and polycyclic aromatic hydrocarbons. Both directives are introduced into the UK through the Air Quality Standards Regulations 2010.

17.2.3 The European Commission (EC) Directive Limits, outlined above, have been transposed in the UK through the Air Quality Standards Regulations. In the UK responsibility for meeting ambient air quality limit values is devolved to the national administrations in Scotland, Wales and Northern Ireland.

National Legislation

Air Quality Standards Regulations 2010 (as amended)

17.2.4 The consolidated EU directive referred to above is implemented into domestic law by the Air Quality Standards Regulations 2016[1]. The limit values (re ambient air quality) defined within those Regulations are legally-binding and apply across England, with the exception of the carriageway and central reservation of roads

where the public does not normally have access, on factory premises or at industrial locations (where health and safety provisions apply) and any locations where the public does not have access and there is no fixed habitation.

17.2.5 The Air Quality Standards Regulations 2010[2] (as amended) set legally binding limits for concentrations of certain air pollutants (i.e. "limit values"). This is with the intention of avoiding, preventing or reducing harmful effects on human health and the environment as a whole. To the extent that any concentrations exceed limit values, the Secretary of State is required to prepare an "air quality plan" with measures so as to achieve the limit value.

The UK Air Quality Strategy

17.2.6 The UK Air Quality Strategy[3] is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

17.2.7 For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates which should be aimed for; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations 2000.

Environmental Protection Act 1990

17.2.8 The Environmental Protection Act 1990[4] prescribes a statutory nuisance as air quality pollutants emitted from premises (including land), through smoke, fumes or gases, dust, steam or smell that is prejudicial to health or a nuisance.

17.2.9 Local Authorities are required to investigate any public complaints regarding air quality, and if they are satisfied that a statutory nuisance exists, or is likely to occur or recur, they must serve an abatement notice. A notice is served on the person responsible for the nuisance. It requires either simply the abatement of the nuisance or works to abate the nuisance to be carried out, or it prohibits or restricts the activity.

National Planning Policy

17.2.10 The following planning policy, legislation, guidance and standards are of particular relevance to air quality.

- Overarching National Policy Statement for Energy (EN-1) including draft revised NPS EN-1;

- National Policy Statement on Renewable Energy Infrastructure (EN-3) including draft revised NPS EN-3;
- National Planning Policy Statement for Electrical Networks (EN-5) including draft revised NPS EN-5;
- The National Planning Policy Framework (NPPF)[5];
- The National Planning Practice Guidance (PPG) (2019)[6]; and,
- The Clean Air Strategy (2019)[7].

17.2.11 The overarching NPS for Energy (EN-1) was adopted in July 2011 and sets out the overall national energy policy for delivering major energy infrastructure. Broadly similar provisions are contained in draft revised NPS EN-1.

17.2.12 Section 5.2.6 of EN-1 deals with effects from Air Quality and Emissions, and states;

"Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement (ES). The ES should describe:

- *any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project;*
- *the predicted absolute emission levels of the proposed project, after mitigation methods have been applied;*
- *existing air quality levels and the relative change in air quality from existing levels;*
- *and any potential eutrophication impacts."*

17.2.13 With regards to the decision-making process, EN-1 states that the project should not lead to a deterioration in air quality in an area or lead to a new area where air quality breaches any national air quality limits (see paragraph 5.2.9).

17.2.14 Where substantial changes in air quality levels are expected, even if this does not lead to any breaches of national air quality limits, any relevant statutory air quality limits should be taken into account. Additionally, where a project is likely to lead to a breach of such limits, appropriate mitigation measures should be secured (paragraphs 5.2.9 and 5.2.10).

17.2.15 Draft Overarching National Policy Statement for Energy (EN-1) September 2021 states in respect of Air Quality:

'Infrastructure development can have adverse effects on air quality. The construction, operation and decommissioning phases can involve emissions to air which could lead to adverse impacts on health, on protected species and habitats, or on the wider countryside and species. Levels for pollutants in ambient air are set out in the Air Quality Standards Regulations 2010 and reiterated in the Air Quality Strategy. The Secretary of State for Environment, Food and Rural Affairs is required to make available up to date information on air quality to any relevant interested party……Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the ES.'

17.2.16 The National Policy Statement on Electricity Networks Infrastructure 5 (EN-5) was adopted in July 2011. Whilst EN-5 principally covers above-ground electricity lines of 132 kV and above, paragraph 1.8.2 confirms that EN-5 will also be relevant if the electricity network constitutes an associated development for which consent is sought, such as a generating station. EN-5 is therefore relevant to the Development, as a grid connection is proposed, however, EN-5 does not reference any specific requirements regarding air quality.

<u>The National Planning Policy Framework (NPPF)</u>

17.2.17 The NPPF, revised July 2021, sets out the Government's planning policies for England, providing a framework within which local policies can be developed. The key principle of the NPPF is a presumption in favour of sustainable development. The NPPF principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. With regards to air quality, the NPPF states:

17.2.18 Paragraph 174:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

17.2.19 Paragraph 186:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the

cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

17.2.20 Paragraph 188:

"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

Planning Practice Guidance

17.2.21 The National Planning Policy Framework was published on 27 March 2012 and revised in 2018, 2019 and most recently 20 July 2021. It sets out the government's planning policies for England and how these are expected to be applied.

17.2.22 The relevant Guidance Category of Air Quality in the Planning Practice Guidance (PPG) web-based resource was updated by the Ministry for Housing, Communities and Local Government (MHCLG) on 1st November 2019 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance (Paragraph: 001 Reference ID: 32-001-20191101):

"The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2).

The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:

- *fine particulate matter (PM2.5);*
- *ammonia (NH3);*
- *nitrogen oxides (NOx);*
- *sulphur dioxide (SO2); and*

- *non-methane volatile organic compounds (NMVOCs).*

As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity."

17.3 Consultation

17.3.1 A summary of consultation is provided in Table 17.1.

Table 17.1: Summary of Consultation Responses

Date	Consultee and Response	Action
March 2022	PINS Scoping Opinion, Case Reference: EN010132 (Scoping Report Section 19) 3.14 Major Accidents and Disasters	
	Scoping Report paragraph 19.2.1 sets out a list of potential impacts from major accidents and disasters to/from the Proposed Development and where these will be assessed in other Chapters in the ES. Impacts include: • Fire and explosion The above impacts are proposed to be assessed in other chapters such as Human Health (Scoping Report paragraph 19.3.1), however, Human Health is also proposed to be assessed in other chapters, rather than a stand-alone chapter. The ES should not be a 'paperchase' and should clearly signpost where these impacts are assessed in other relevant chapters and where any relevant mitigation measures are secured.	Fire incident impact assessment will be undertaken using detailed air quality dispersion modelling to assess potential smoke effects on the residential receptors a major solar panel fire accident.
	PINS Scoping Opinion, Case Reference: EN010132 (Scoping Report Section 20) 3.15 Air Quality	
	The Scoping Report seeks to scope out detailed air quality modelling and assessment of effects from construction, although a qualitative dust assessment and a CEMP taking account of Institute of Air Quality Management (IAQM) guidance are proposed. Subject to confirmation that the proposed construction vehicle numbers alone or cumulatively with other proposals on relevant	An Outline CEMP has been produced for each of the Sites of: Cottam 1, 2 & 3; and West Burton 1, 2, 3, & 4. Assessment of construction vehicles scoped out of the ES.

	links (e.g. for Cottam Solar Project) will not exceed the relevant IAQMEPUK thresholds e.g. 100 HGV Annual Average Daily Traffic (AADT), the Inspectorate considers that the need for detailed construction air quality modelling and assessment can be scoped out.	
	Based on the nature of the development and subject to confirmation of the type and number of maintenance vehicles, the Inspectorate considers that operational traffic movements will be limited and that operational traffic air quality modelling may be scoped out.	Assessment of operational vehicles scoped out of the ES.

17.4 Assessment Methodology and Significance Criteria

Construction Assessment Methodology

Construction Phase Dust Assessment

17.4.1 The effects during the construction phase have the potential to result in dust nuisance complaints and surface soiling from deposition, as opposed to the risk of exceeding a custom and practice threshold for dust mass deposition of 200 mg m-2 day-1 averaged over the period of a month (Good practice guide: control and measurement of nuisance dust and PM_{10} form the extractive industries, Mineral Industry Research Organisation (MIRO)/AEA Technology plc, 25 February 2011). The effects will be direct as they occur as a result of activities associated with the Scheme, temporary as they will only potentially occur during construction activities, short-term because they will only arise at particular times when certain activities and meteorological conditions for creating the level of magnitude predicted combine and will be reversible.

17.4.2 Additional vehicle movements (particularly HGV movements) associated with the construction phase have the potential to generate exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$ on the local road network.

17.4.3 The effects identified for the construction phase and considered for the purpose of this assessment from (1) on-site construction activities and (2) the associated construction traffic outside of the Site boundary are as follows:

On-site construction Activities:

- Temporary generation of dust arising from construction works within the Site boundary leading to potential impacts on dust soiling and concentrations of particulate matter (as PM_{10}) and the study areas are set up as:

For human receptors:

- 350m of the boundary of the Site; or
- 50m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrances (s).

The study area for ecological receptors:

- 50m of the boundary of the Site; or
- 50m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrances (s).

Associated Construction Traffic outside of the Site Boundary

- At this stage of the proposed Scheme detailed traffic data as a result of any temporary vehicles operating on the local road network are not available. However, it is anticipated that the heavy-duty vehicle (HDV) movements on the local road network will not be greater than 100 annual average daily traffic (AADT) and the light duty vehicle (LDV) will not be greater than 500 AADT. As the Sites are not located within or adjacent to an AQMA, the traffic air quality impact can be scoped out, according to the "Indicative criteria for requiring an air quality assessment" in IAQM Guidance of Land-use planning & development control: Planning for air quality, June 2016[8].

17.4.4 Appropriate site-specific mitigation for the on-site construction activities will be recommended in accordance with the IAQM document (Guidance on the assessment of dust from demolition and construction, January 2017**Error! Bookmark not defined.**) for inclusion in the Outline Construction Environmental Management Plan.

17.4.5 Appropriate site-specific mitigation will be recommended in accordance with the IAQM document and included within the Construction Environmental Management Plan (CEMP) for the proposed Scheme, which will mitigate any potential adverse effects associated with the construction phase of the development. Following the implementation of the mitigation, it is expected there will be a 'negligible' impact as a result of the Scheme.

Construction Significance Criteria

Construction Dust Significance Criteria

17.4.6 The IAQM Guidance does not assign a significance criterion prior to the implementation of mitigation measures, instead it assigns a 'risk factor' to determine the level of site-specific mitigation measures which should be implemented as part of the Scheme.

17.4.7 Appropriate site-specific mitigation will be recommended in accordance with the IAQM document (Land-use planning & development control: Planning for air quality, January 2017) and included within the Construction Environmental Management Plan (CEMP) for the Scheme, which will mitigate any potential adverse effects associated with the construction phase of the development. Following the implementation of the mitigation, it is expected there will be a 'negligible' impact as a result of the development.

Operational Phase Assessment Methodology

17.4.8 The operational traffic associated with the scheme is expected to be very low, therefore, it is anticipated that the number of vehicle and heavy-duty vehicle (HDV) movements on the local road network will not be greater than the light duty vehicle (LDV) will not be greater than 500 AADT. As the Sites are not located within or adjacent to an AQMA, the traffic air quality impact can be scoped out, according to the "Indicative criteria for requiring an air quality assessment" in IAQM Guidance of Land-use planning & development control: Planning for air quality, January 2017[9].

17.4.9 The scheme does not include any fixed plant which may give rise to emissions, such as Combined Heat and Power (CHP) or boilers, therefore there are not emissions associated with the proposed scheme and the direct impacts on air quality are determined to be 'imperceptible'.

Fire Incident Impact Assessment

17.4.10 In general, major accidents or disasters, as they relate to the Scheme, fall into three categories:

- Events that could not realistically occur, due to the nature of the Scheme or its location;
- Events that could realistically occur, but for which the Scheme, and associated receptors, are no more vulnerable than any other development; and
- Events that could occur, and to which the Scheme is particularly vulnerable, or which the Scheme has a particular capacity to exacerbate.

17.4.11 'Accidents' are considered to be an occurrence resulting from uncontrolled developments in the course of construction and operation of a development (e.g. major emission or fire). As such, the potential impacts on local residents from a fire accident, such as solar panel, battery storage and sub-stations fire, will be considered and assessed. Particulate matter exposure is the key principle public health threat from short-term smoke exposure, therefore, detailed air dispersion modelling of particulate matter impact from smoke will be undertaken at the ES

stage to predict the short-term concentrations of PM_{10} and $PM_{2.5}$ at residential receptors at downwind locations likely to be affected by incidents including fire.

17.4.12 Detailed air quality dispersion modelling will be undertaken to generate background concentrations which are required to inform the assessment of Air Quality Impact from a Major Fire Accident.

17.4.13 An approved atmospheric dispersion modelling package (ADMS-Road) will be used in the Air Quality Impact Assessment of a Major Fire Accident, where, smoke levels and their associated air quality category (good to hazardous level) will be estimated using the modelled predicted particulate matter levels, and the potential smoke effects on residential and other sensitive receptors are assessed and mitigation measures are discussed where appropriate. (Major Accidents and Disasters are also dealt with in Chapter 20 of the PEIR).

Health effects of fire smoke exposures are assessed for the protection of human health. A guide of "Smoke Exposure from Wildland fires, interim Guidelines for Protecting community Health and wellbeing" Manitoba Health (January 26, 2021)[10], is used to estimate the smoke levels and air quality category (good to hazardous level) using the predicted particulate matter levels displayed in Table 17.3 which provides an approximated conversion between visibility through smoke as a visibility index provides a quick, alternative way to estimate smoke levels. Using landmarks at known distances, an experienced observer can provide a reasonable estimate of particle concentration.

17.4.14 Air quality is a measure of how clean or polluted the air is. For this assessment air quality has been divided into 5 categories from good (healthy) to hazardous using the particulate matter levels in air. Visibility affected by particulate matter is also discussed in Table 17.2 below.

Table 17.2: Estimating Smoke Levels from Particulate Matter Concentrations

Air Quality Category	Equivalent approx. $PM_{2.5}$ 1-3-hour average in $\mu g/m^3$	Visibility in km
Good	0-40	15 kms and up
Moderate/Unhealthy for Sensitive Groups	41-175	5-14 kms
Unhealthy	176-300	2.5-4 kms
Very Unhealthy	301-500	1.5-2 kms
Hazardous	over 500	Less than 1 km

Operational Phase Assessment Significance Criteria

17.4.15 The significance of the effects during the operational phase of the Proposed Development is based on the latest guidance produced by Environmental Protection UK (EPUK) and IAQM in January 2017. The guidance lays a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall significance of the air quality effects based on severity of air quality impacts.

17.4.16 Table 17.3 provides the criteria used for the classification of the magnitude of the air quality impacts during the Site construction, operational and decommissioning phases.

Table 17.3: Methodology for Assessing Magnitude of Effect

Magnitude	Description	Examples
Large	Impact resulting in a considerable change in baseline environmental conditions with severe undesirable/desirable consequences on the receiving environment.	• Air quality varies between the do minimum and do something by more than 10% of the air quality criterion (Emissions). • Substantial risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
Medium	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions	• Air quality varies between the do minimum and do something by 5 - 10% of the air quality criterion (Emissions). • Moderate risk that emissions will generates statutory nuisance complaints, resulting in formal action (Construction).
Small	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated.	• Air quality varies between the do minimum and do something by 1 - 5% of the air quality criterion (Emissions). • Slight risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
Imperceptible	Very low discernible change in baseline environmental conditions.	• Air quality varies between the do minimum and do something by less than 1-2%

		of the air quality criterion (Emissions). • Little or no cause for nuisance complaints to be made (Construction).
Neutral	No change in baseline conditions	• Air quality varies between the do minimum and do something by less than 0.5% of the air quality criterion (Emissions).

17.4.17 It is recognised that likely significant air quality impacts can operate over a range of geographical areas and therefore a geographical scale may be taken into account in determining the scale/magnitude of the likely significant impact.

Assessment of Sensitivity

17.4.18 Receptors can demonstrate different sensitivities to changes in their environment. For the purpose of this assessment, sensitivity will be determined as Very High, High, Medium, Low or Negligible, as detailed in Table 17.4 for both the construction and operational phase of the development.

Table 17.4: Methodology for Assessing Sensitivity of Receptor

Sensitivity	Definition
Very High	'Do Minimum' pollutant concentration are 110% and greater than 110% of the relevant Air Quality Objectives (AQO) (Emissions). Receptors of very high sensitivity to dust and odour, such as: hospitals and clinics, retirement homes, painting and furnishing, hi-tech industries and food processing (Construction). Densely populated areas – more than 100 dwellings within 20m of the development site (Construction).
High	'Do Minimum' pollutant concentration between 103 - 109% of the relevant AQO (Emissions). Receptors of high sensitivity to dust and odour, such as: schools, residential areas, food retailers, glasshouses and nurseries, horticultural land and offices (Construction). Densely populated areas – 10-100 dwellings within 20m of the development site (Construction).
Medium	'Do Minimum' pollutant concentration between 95 - 102% of the relevant AQO (Emissions). Receptors of medium sensitivity to dust and odour, such as: farms, outdoor storage, light and heavy industry (Construction). Suburban or edge of town areas (Construction).
Low	'Do Minimum' pollutant concentration between 75-90% of the relevant AQO (Emissions)

	All other dust/odour sensitive receptors not identified above (Construction). Rural/Industrial areas (Construction).
Negligible	Concentration less than 75% of the relevant AQO (Emissions) Receptor more than 350m away (construction)

Assessment of Significance

17.4.19 The level of significance is determined by combining the likely magnitude of impact with the sensitivity of the receptor during the construction and operational phases. Table 17.5 shows how the interaction of magnitude and sensitivity, results in the significance of an environmental impact. If the scale of the impact magnitude is negative, then the resulting impact is adverse. If the scale of the impact magnitude is positive, then the resulting impact is beneficial. If the impact is Moderate to Substantial then the change is considered to have a significant effect on the local air quality, whether positive or negative.

17.4.20 The table has been developed by the Applicant's consultants Tetra Tech, but the matrix combinations and terms used correlate with the significance matrix recommended by Land-Use Planning & Development Control: Planning for Air Quality (2017)[9].

Table 17.5: Criteria for Assessing the Significance of Air Quality Effects

Sensitivity of Receptor	Magnitude of Impact				
	Large	Medium	Small	Imperceptible	Neutral
Very High	Substantial	Substantial	Substantial	Moderate	Negligible
High	Substantial	Substantial	Moderate	Moderate	Negligible
Medium	Substantial	Moderate	Moderate	Slight	Negligible
Low	Moderate	Moderate	Slight	Negligible	Negligible
Negligible	Moderate	Slight	Negligible	Negligible	Negligible

17.4.21 For the purposes of this assessment, moderate or substantial effects are considered to be significant in terms of the EIA Regulations.

17.5 Baseline Conditions

17.5.1 This section provides a review of the existing air quality in the vicinity of the Site and the study areas discussed in Section 17.4.3 in order to provide a benchmark against which to assess potential air quality impacts of the Scheme. Baseline air quality in the vicinity of the application site has been defined from several sources, as described in the following sections.

Local Air Quality Management (LAQM)

17.5.2 The Scheme Sites are located in West Lindsey district. As required under Section 82 of the Environment Act 1995, West Lindsey District Council (WLDC) reviews and assesses air quality within its area of jurisdiction. The assessments have indicated that concentrations of air quality pollutants are not above the relevant AQOs at any locations of relevant public exposure within the district. Therefore, WLDC has not designated any Air Quality Management Areas (AQMAs).

17.5.3 In respect of any cumulative assessment, notably, some of the proposed Sites for the West Burton Solar Project, namely West Burton 4, West Burton Substation and parts of the cable route and grid connection at Cottam Power Station, are located within Bassetlaw District Council (BDC), who also review and assess air quality within its area of jurisdiction. The assessments have indicated that concentrations of air quality pollutants are not above the relevant AQOs at any locations of relevant public exposure within the district. Therefore, BDC has not designated any Air Quality Management Areas (AQMAs).

Air Quality Monitoring

17.5.4 Monitoring of air quality within WLDC has been undertaken through both automatic and non-automatic monitoring methods in 2019. Automatic methods consist of Automatic analysers continuously draw in ambient (outdoor) air and measure the concentration of the pollutant in the sampled air. Non-automatic Networks measure less frequently compared to automatic networks - either daily, weekly or monthly - and samples are collected by some physical means (such as diffusion tube or filter). These samples are then subjected to chemical analysis, and final pollutant concentrations calculated from these results. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the application site. WLDC publishes the monitoring data annually and at the time of this assessment the most recent available, representative monitoring data within WLDC was undertaken during 2019.

Automatic Monitoring

17.5.5 WLDC undertook automatic pollution monitoring during 2019 at 4 different locations. The closest monitoring location to the Scheme Site is named as GC, which is located at Gainsborough Cemetery. The most recent available, representative data is from 2019 which is presented in Table 17.6, and Figure 17.1.

Table 17.6: Monitored Annual Mean NO_2 Concentrations at Automatic Monitoring Locations

Site ID	Location	Site Type	Distance from Kerb of Nearest Road (m)	Inlet Height (m)	2019 NO_2 Annual Mean Concentration ($\mu g/m^3$)
GC	Gainsborough Cemetery	Industrial	N/A	3.0	7.5

17.5.6 As outlined in Table 17.7, GC monitoring location monitored annual average concentrations below the AQO for NO_2 (40 $\mu g/m^3$ annual mean) during 2019. Neither WLDC or BDC undertake any monitoring of PM_{10} or $PM_{2.5}$.

Non - Automatic Monitoring

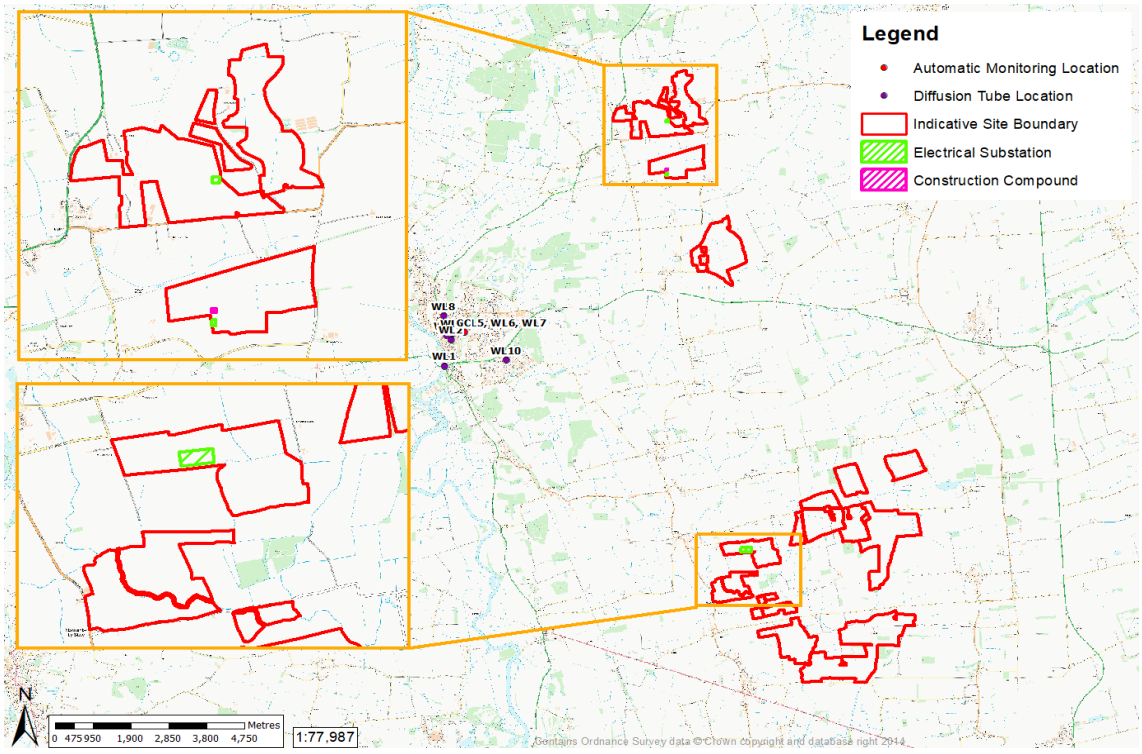
17.5.7 WLDC operated a network of 86 passive diffusion tubes during 2019. The most recently available, representative diffusion tube data is from 2019 which is presented in Table 17.7 and Figure 17.1.

Table 17.7: Monitored Annual Mean NO2 Concentrations at Diffusion Tubes

Site ID	Location	Site Type	Distance from Kerb of Nearest Road (m)	Inlet Height (m)	2019 NO_2 Annual Mean Concentration ($\mu g/m^3$)
WL1	3 Lea Road, Gainsborough	Roadside	8.6	2.8	22.8
WL2	58 Etherington Street, Gainsborough	Roadside	1.6	2.8	19.0
WL3	19 Spring Gardens, Gainsborough	Roadside	2.9	2.8	17.3
WL4	Heaton Street	Roadside	2.2	2.8	20.7
WL5, WL6, WL7	Gainsborough Cemetery, Gainsborough	Industrial	13.8	3.0	11.3
WL8	Cherry Tree, Gainsborough	Kerbside	0.2	2.8	14.7
WL10	Marshall Way, Gainsborough	Roadside	15.9	2.8	15.0

17.5.8 As indicated in Table 17.7, all diffusion tubes located within the Air Quality Assessment area monitored annual average NO_2 concentrations below the AQO for NO_2 (40 µg/m^3 annual mean) during 2019.

Figure 17.1: West Lindsey Monitoring Locations



Background Pollutant Mapping

17.5.9 The use of background concentrations within the modelling process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants include industrial, domestic and rail emissions within the vicinity of the study site. Several sources have been used to obtain representative background levels as discussed below.

17.5.10 The background concentrations used within the assessment have been determined with reference to the IAQM Guidance and Technical Guidance (TG) (16).

17.5.11 The IAQM Guidance states:

"A matter of judgement should take into account the background and future background air quality and whether it is likely to approach or exceed the value of the AQO."

17.5.12 Additionally, TG (16) states:

"Typically, only the process contributions from local sources are represented within an output by the dispersion model. In these circumstances, it is necessary to add an appropriate background concentration(s) to the modelled source contributions to derive the total pollutant concentrations."

17.5.13 All the Defra background concentrations detailed in Table 17.9 for 2019, show that the background levels are predicted to be below the relevant AQO within the study area.

17.5.14 The relevant background concentrations for this assessment are shown in Table 17.8 were obtained from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the application Site. Those background data was published by Defra in a data group named as "Background Maps 2018" for nitrogen oxide (NO_X), NO_2, PM_{10} and $PM_{2.5}$ in August 2020.

Table 17.8: Published Background Air Quality Levels (µg/m^3)

Council	Area	UK NGR (m)		2021 Predicted Background Concentration (µg/m$_3$)			
		X	Y	NO_X	NO_2	PM_{10}	$PM_{2.5}$
West Lindsey District	Cottam 1	491500	383500	9.02	7.03	15.50	8.41
West Lindsey District	Cottam 2 & 3	487500	393500	9.00	7.02	15.58	8.44

17.5.15 All the Defra background concentrations detailed in Table 17.8 for 2021, show that the background levels were predicted to be below the relevant AQO within the study area. It should be noted that using 2021 background data would produce a worst-case assessment as background data after 2021 would be less than 2021 data as Defra data includes the year-on-year decrease in the data base.

Assessment Locations

Discrete (Individual) Receptors

Receptors for Qualitative Dust Assessment and Construction Dust Management Plan (CDMP)

For human receptors:

- 350m of the boundary of the Site; or

- 50m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrances (s).
- The study area for ecological receptors:
- 50m of the boundary of the Site; or
- 50m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrances (s).

Receptors for Fire Impact Assessment

17.5.16 Considering the nature of a fire incident, a fire could be taking place anywhere within the Site and it would a short period before being extinguished, therefore, a set of generic receptor locations has been defined to assess the potential fire impacts on the fire downwind locations. Four sets of receptor locations have been selected to assess the smokes to spread 4 directions: south, north, east and west.

- Receptor Set 1: Receptor locations affected by west wind (coming from the west and blowing toward the east), A series of 20 receptors, which were spaced at 10 m intervals, are defined eastward away from the fire.
- Receptor Set 2: Receptor locations affected by east wind (coming from the east and blowing toward the west), A series of 20 receptors, which were spaced at 10 m intervals, are defined westward away from the fire.
- Receptor Set 3: Receptor locations affected by south wind (coming from the south and blowing toward the north), A series of 20 receptors, which were spaced at 10 m intervals, are defined northward away from the fire.
- Receptor Set 4: Receptor locations affected by north wind (coming from the north and blowing toward the south), A series of 20 receptors, which were spaced at 10 m intervals, are defined southward away from the fire.

17.5.17 Considering fire could occur at any location within the development, a set of generic receptor locations at Cottam 1 site has been selected to represent potential receptors at Cottam 1, 2 and 3.

17.5.18 The selected generic receptor locations are presented in Table 17.9 and Figure 17.2

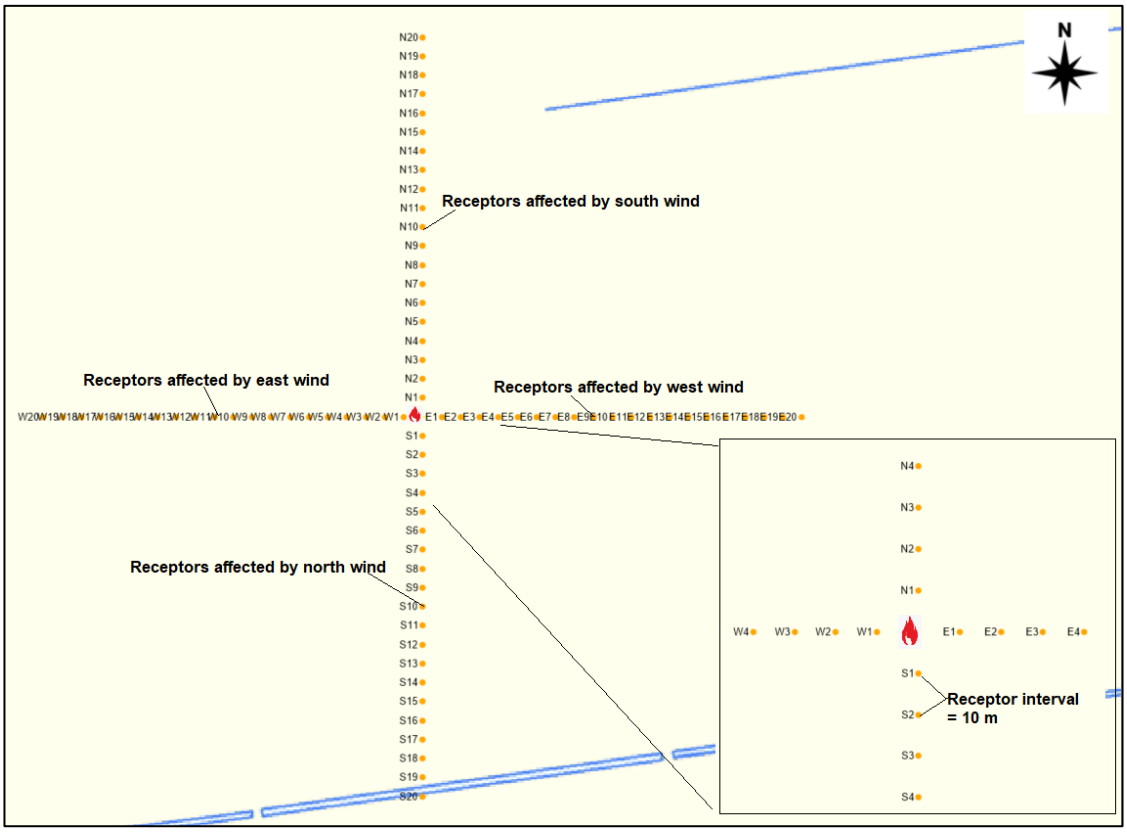
Table 17.9: Selected Sensitive Receptor Locations

Discrete Sensitive Receptor		UK NGR (m)	
		X	Y
E1	Affected by a West Wind	488310	382900
E2		488320	382900
E3		488330	382900

E4		488340	382900
E5		488350	382900
E6		488360	382900
E7		488370	382900
E8		488380	382900
E9		488390	382900
E10		488400	382900
E11		488410	382900
E12		488420	382900
E13		488430	382900
E14		488440	382900
E15		488450	382900
E16		488460	382900
E17		488470	382900
E18		488480	382900
E19		488490	382900
E20		488500	382900
W1	Affected by an East Wind	488290	382900
W2		488280	382900
W3		488270	382900
W4		488260	382900
W5		488250	382900
W6		488240	382900
W7		488230	382900
W8		488220	382900
W9		488210	382900
W10		488200	382900
W11		488190	382900
W12		488180	382900
W13		488170	382900
W14		488160	382900
W15		488150	382900
W16		488140	382900
W17		488130	382900
W18		488120	382900
W19		488110	382900
W20		488100	382900
N1	Affected by a South Wind	488300	382910
N2		488300	382920
N3		488300	382930
N4		488300	382940
N5		488300	382950
N6		488300	382960
N7		488300	382970
N8		488300	382980
N9		488300	382990

N10		488300	383000
N11		488300	383010
N12		488300	383020
N13		488300	383030
N14		488300	383040
N15		488300	383050
N16		488300	383060
N17		488300	383070
N18		488300	383080
N19		488300	383090
N20		488300	383100
S1	Affected by a North Wind	488300	382890
S2		488300	382880
S3		488300	382870
S4		488300	382860
S5		488300	382850
S6		488300	382840
S7		488300	382830
S8		488300	382820
S9		488300	382810
S10		488300	382800
S11		488300	382790
S12		488300	382780
S13		488300	382770
S14		488300	382760
S15		488300	382750
S16		488300	382740
S17		488300	382730
S18		488300	382720
S19		488300	382710
S20		488300	382700

Figure 17.2 Selected Sensitive Receptor Locations



17.6 Embedded Design Mitigation

17.6.1 The way that potential environmental impacts have been or will be avoided, prevented, reduced, or off-set through design and/or management of the Scheme are outlined below and will be taken into account as part of the assessment of the potential effects. Proposed environmental enhancements are also described where relevant. The mitigation measures for both the construction/decommissioning and operational phases, are outlined below.

Construction and Decommissioning

17.6.2 Measures to control construction and decommissioning dust as defined in IAQM's guidance will be adopted, where reasonably practicable. The appropriate site-specific mitigation measures will be determined through the construction phase dust assessment and included within the Framework CEMP via a construction dust management plan. This will be secured through a DCO Requirement.

17.6.3 Health and Safety on-site would be managed by the contractor during construction and decommissioning to mitigate the risk of fire.

Operational Phase

17.6.4 There is a potential fire risk associated with certain types of batteries such as lithium ion. The Scheme design includes cooling systems which are designed to regulate temperatures to within safe conditions to minimise the risk of fire. The battery technologies on which the design is based details the following with regards to fire protection:

17.6.5 The manufacturer undertakes extensive testing and analysis to assess fire risk:

- Do not install batteries where temperatures routinely approach or exceed 80°C – this is not the case with the Scheme;
- Do not install batteries near heating equipment or heat sources – this is not the case with the Scheme;
- Protect the installation area and equipment from flooding, which may cause electrical fires. The risk of flooding has been assessed as part of the draft Flood Risk Assessment in PEIR (**Chapter 10**) and mitigation measures to protect it from flooding have been recommended which will be developed as part of the detailed design; and
- Ensure that installation areas comply with appropriate local fire, electrical and building code requirements, including access to fire trucks in case of emergency. This would be the case with the Scheme.

17.6.6 Fire detection and suppression features will be installed to detect (e.g., multispectral infrared flame detectors) and suppress fire (e.g. water-based suppression systems) to minimise the effect of any fire. Batteries will be installed in single locked steel containers which would contain a fire and reduce the likelihood of fire spreading. The Scheme design will include adequate separation between battery banks to ensure that an isolated fire would not become widespread and lead to a major incident.

17.6.7 With the above embedded mitigation, any potential risk of fire and the resulting effects would be reduced as far as possible. However, an 'Outline Battery Fire Safety Management Plan' will be produced for the Scheme and submitted with the DCO application. This will be secured through a DCO Requirement.

17.7 Assessment of Effects

Construction Phase Dust

17.7.1 The potential effects during the construction phase include fugitive dust emissions from site activities, such as demolitions, earthworks, construction and trackout, have been assessed in accordance with guidance in the Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction, 2014'[12].

17.7.2 Construction activities could give rise to short term elevated dust and/or PM_{10} concentrations within the vicinity of the Site. This may arise from construction activities, vehicle movements, soiling of the public highway, or windblown stockpiles. Assessment of the potential effects of construction has been undertaken within 50m of the Site boundary, and 50m of roads within 500m radius of the Site.

17.7.3 The main emissions during construction works are likely to be dust and particulate matter generated during excavation, earth moving (particularly during dry months), or from construction materials.

17.7.4 The main potential effects of particulates/dust are:

- Visual – dust plume, reduced visibility, coating and soiling of surfaces leading to annoyance, loss of amenity, the need to clean surfaces;
- Physical and/or chemical contamination and corrosion of artefacts;
- Coating of vegetation and soil contamination; and,
- Health impacts due to inhalation, e.g. asthma or irritation of the eyes.

17.7.5 Factors, such as the amount of precipitation and other meteorological conditions, distance from the source, and the type of activity taking place, will also influence the amount of particulate matter generated.

17.7.6 The UK Air Quality Standards seek to control the health implications of respirable particulate matter PM_{10} (less than 10 micrometres (µm) in diameter). However, the majority of particles released from construction works will be greater than this in size. Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. There are no formal standards or criteria for nuisance caused by deposited particles, however, a deposition rate of 200mg/m^2/day is often presented as a threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast with adjacent clean areas, especially when

it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

17.7.7 Effects of construction dust impact on the human receptors and ecological receptors for Cottam Sites 1, 2 & 3 are presented in Table 17.10, Table 17.11, and Table 17.12 respectively.

Table 17.10 Impact Description of Construction Activities without Mitigation – Cottam 1

Source	Summary Risk of Impacts Prior to Mitigation		
	Dust Soiling	Health Effects of PM_{10}	Ecological
Demolition	N/A	N/A	N/A
Earthworks	Medium	Low	Medium
Construction	Medium	Low	Medium
Trackout	Medium	Low	Medium

Table 17.11 Impact Description of Construction Activities without Mitigation – Cottam 2

Source	Summary Risk of Impacts Prior to Mitigation		
	Dust Soiling	Health Effects of PM_{10}	Ecological
Demolition	N/A	N/A	N/A
Earthworks	Low	Low	N/A
Construction	Low	Low	N/A
Trackout	Low	Low	N/A

Table 17.12 Impact Description of Construction Activities without Mitigation – Cottam 3

Source	Summary Risk of Impacts Prior to Mitigation		
	Dust Soiling	Health Effects of PM10	Ecological
Demolition	N/A	N/A	N/A
Earthworks	Medium	Low	Low
Construction	Medium	Low	Low
Trackout	Medium	Low	Low

17.7.8 The effects during the construction works are predicted with regard to the potential for dust nuisance complaints and surface soiling events due to deposition, as opposed to the risk of exceeding any Air Quality Objective (AQO). All dust effects are considered to be direct, temporary, short-term and reversible in nature. The effects are determined to be direct as they occur as a result of activities associated with the Development, temporary as they will only potentially occur during the construction works, short-term because these will only arise at particular times when certain activities and meteorological conditions for creating the level of magnitude predicted combine, and reversible upon cessation of construction works.

17.7.9 The assessment of dust and/or PM_{10}, which is undertaken qualitatively using professional judgement, utilises the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction (January 2014) and Part 1 LA105 Air Quality of the Volume 11 Section 3 of the Design Manual for Roads and Bridges[11].

17.7.10 The Applicant's consultants Tetra Tech have adapted guidance from the IAQM 'Guidance on the Assessment of Dust from Demolition and Construction' published in 2014 [12]. In total, four stages are considered, namely demolition, earthworks, construction and trackout. For each of these phases, the significance of the potential dust is derived following the determination of a dust emission magnitude and the distance of activities to the nearest sensitive receptor, therefore the worst-case is assessed.

17.7.11 Following the implementation of the appropriate site-specific mitigation measures, the significance of the effects from dust and PM10 emissions associated with the construction works is considered to be negligible on all receptors. This is based on the IAQM Guidance. All effects are considered to be temporary, direct, adverse and short term.

Operational Phase

17.7.12 The operational fire incident impact assessment will be included in the ES.

Decommissioning Phase

17.7.13 Decommissioning phase impacts are likely to be similar to those considered during construction.

17.8 Cumulative/In-Combination Effects

17.8.1 The scheme does not include any fixed plant which may give rise to industrial emissions, such as Combined Heat and Power (CHP) or boilers, therefore cumulative effects from industrial emission impacts will be not assessed.

With regard to traffic air quality impact from the scheme, the Scoping Opinion concluded that "Subject to confirmation that the proposed construction vehicle numbers alone or cumulatively with other proposals on relevant links (e.g. for Cottam Solar Project) will not exceed the relevant IAQMEPUK thresholds e.g. 100 HGV Annual Average Daily Traffic (AADT), the Inspectorate considers that the need for detailed construction air quality modelling and assessment can be scoped out. Based on the nature of the development and subject to confirmation of the type and number of maintenance vehicles, the Inspectorate considers that operational traffic movements will be limited and that operational traffic air quality modelling may be scoped out."

17.8.2 However, the cumulative traffic air quality effects will be re-assessed by considering other NSIP projects in this locality for similar developments along with planning applications for the same in the ES. It is noted that there are a number of other NSIPs in this locality that are at a similar stage to this application; these have not yet attained permission but will be considered within the cumulative impact assessment in the ES. Details of the closest cumulative developments are provided in **Appendix 2.2** and **2.3** of the PEIR.

17.8.3 At this stage, it is anticipated that the cumulative vehicle numbers would not exceed the "Indicative criteria for requiring an air quality assessment" in IAQM Guidance of Land-use planning & development control: Planning for air quality, January 2017 and air quality modelling for cumulative traffic assessment will be not required.

17.9 Mitigation Measures

17.9.1 The site-specific construction dust mitigation has been detailed in the CDMP's in **Appendices 17.1 – 17.4**.

17.9.2 With regard to the mitigation measures for the decommissioning phase, it is anticipated that the dust and particulate matter emission impacts during the decommissioning will be less than the impacts during the constructions. Therefore, following the implementation of the appropriate site-specific mitigation measures identified for the construction phase, the significance of the effects from dust and PM_{10} emissions associated with the decommissioning works is considered to be negligible on all receptors.

17.9.3 A fire impact assessment report will detail the mitigation measures and actions to be taken in case of a fire occurring and presented in the ES at the DCO stage.

17.10 Residual Effects

17.10.1 Following the implementation of the appropriate site-specific mitigation measures identified during the construction, operation and decommissioning phases and during an occurrence of fire incident, the residual effects on both human receptors and ecological receptors are determined to be negligible.

17.11 References

[1] The Air Quality Standards Regulation (2016) https://www.legislation.gov.uk/uksi/2016/1184/contents/made
[2] The Air Quality Standards Regulation (2010) http://www.legislation.gov.uk/uksi/2010/1001/contents/made
[3] Defra (2019) The Air Quality Strategy.
[4] UK Legislation (1990). Environment Protection Act.
[5] CLG (2019) National Planning Policy Framework.
[6] CLG (2019) Planning Practice Guide
[7] Defra (2019). Clean Air Strategy.
[8] Institute of Air Quality Management (2016). Guidance on the assessment of dust from demolition and construction.
[9] Institute of Air Quality Management, (2017). Land-Use Planning & Development Control: Planning for Air Quality v1.2.
[10] Manitoba Health (2012). Smoke Exposure from Wildland Fires, Interim Guidelines for Protecting Community Health and Wellbeing.
[11] Highways Agency et al. (2019) Design Manual for Roads and Bridges LA 105 Air Quality.
[12] Institute of Air Quality Management (2014). Guidance on the assessment of dust from demolition and construction.