The Sizewell C Project

6.3 Volume 2 Main Development Site

Chapter 12 Air Quality

Revision: 1.0

Applicable Regulation: Regulation 5(2)(a)

PINS Reference Number: EN010012

May 2020

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Contents

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None provided.

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12. Air Quality

12.1 Introduction

12.1.1 This chapter of **Volume 2** of the **Environmental Statement** (**ES**) presents the assessment of air quality effects arising from the construction and operation of the Sizewell C power station at the main development site (referred to throughout this Volume as the 'proposed development'). This includes an assessment of potential impacts, the significance of effects, the requirements for mitigation and the residual effects.

12.1.2 Detailed descriptions of the main development site, the proposed development and the different phases of development are provided in **Chapters 1** to **4** of this Volume of the **ES**. A description of the anticipated activities for the decommissioning of the Sizewell C power station, including a summary of the types of environmental effects likely to occur is provided in **Chapter 5** of this volume. A glossary of terms and list of abbreviations used in this Chapter is provided in **Volume 1**, **Appendix 1A** of the **ES**.

12.1.3 This assessment has been informed by data from other assessments as follows:

- Transport Chapter **(Volume 2**, **Chapter 10**) of the **ES** provides the traffic flows.
- Terrestrial Ecology and Ornithology Chapter (**Volume 2**, **Chapter 14**) provides information on the location and sensitivities of habitat receptors considered in the assessment.
- Amenity and Recreation Chapter (**Volume 2**, **Chapter 15**) provides information on sensitive amenity and recreation receptors included in the assessment.

12.1.4 This assessment has been informed by data presented in the following technical appendices:

- **Appendix 12A** Construction Dust Assessment.
- **Appendix 12B** Transport Emissions Assessment.
- **Appendix 12C** Combustion Activity Impact Assessment for Air Emissions.
- **Appendix 12D** Off-site Development Assessment.
- **Appendix 12E** Baseline Monitoring Report.

- **Appendix 12F** Campus Combined Heat and Power Emissions Assessment.

12.1.5 **Appendix 12B** of this volume presents the methods for, and quantification of air quality impacts from all transport modes associated with the Sizewell C Project, including road traffic and operational rail emissions from areas within and outside of the main development site and associated developments study areas This chapter (**Chapter 12**) reports the air quality effects at receptors within the main development site study area and wider transport network. The air quality effects from transport emissions at receptors specific to the study areas of the associated developments are considered within the respective volumes (**Chapter 5** of **Volumes 3** to **9**). **Volume 10 Chapter 3** provides a summary of the project-wide effects across the transport network.

12.1.6 **Chapter 25** of this volume details the assessment of radiological gaseous emissions.

12.1.7 A standalone ES was prepared for the Sizewell B relocated facilities works for submission with the hybrid planning application under the Town and Country Planning Act 1990 (East Suffolk Council application ref. DC/19/1637/FUL). The Sizewell B relocated facilities ES (included in **Volume 1, Appendix 2A**) scoped out the assessment of air quality effects, as Sizewell B relocated facilities works on their own were not considered likely to result in significant effects on air quality. However, the assessment presented within this chapter does account for the construction works and traffic associated with Sizewell B relocated facilities, as these form part of the Sizewell C Project.

12.2 Legislation, policy and guidance

12.2.1 **Volume 1**, **Appendix 6H** identifies and describes legislation, policy and guidance of relevance to the assessment of the potential air quality impacts associated with the Sizewell C Project across all ES volumes.

12.2.2 This section provides an overview of the specific legislation, policy and guidance of relevance to the main development site assessment.

a) International

12.2.3 International legislation set out in **Volume 1**, **Appendix 6H** is relevant to the whole of England, including this assessment. The requirements of the European Ambient Air Quality Directive (Ref. 12.1), Medium Combustion Plant Directive (MCPD) (Ref. 12.2) and Industrial Emissions Directive (IED) (Ref. 12.3) are described therein.

b) National

i. Legislation

12.2.4 This assessment has been prepared with due regard to the requirements of the Air Quality Standards Regulations 2010 (Ref. 12.4), Environment Act 1995 (Ref. 12.5), Environmental Protection Act 1990 (Ref. 12.6) and Environmental Permitting (England and Wales) Regulations 2016 (Ref. 12.7), which are further described in **Volume 1, Appendix 6H**.

ii. Policy

12.2.5 The Overarching National Policy Statement for Energy (NPS EN-1) (Ref. 12.8) and the National Policy Statement for Nuclear Power Generation (NPS EN-6) (Ref. 12.9) set out requirements for air quality associated with the development of major energy infrastructures. Other relevant national policy documents include the National Planning Policy Framework (Ref. 12.10) and the associated Planning Practice Guidance, the UK Marine Policy Statement (Ref. 12.11), and the Government's 25 Year Environment Plan (Ref. 12.12). The requirements set by these documents, as relevant to the air quality assessment, are discussed in detail in **Volume 1**, **Appendix 6H**.

c) Regional

12.2.6 **Volume 1**, **Appendix 6H** summarises the requirements of the Suffolk Local Transport Plan (LTP) (Ref. 12.13), as relevant to the air quality assessment. No regional policy over and above that described in **Volume 1**, **Appendix 6H** is deemed relevant to the assessment for this site.

d) Local

12.2.7 **Volume 1**, **Appendix 6H** summarises the requirements of Suffolk Coastal District Council (SCDC) Local Plan Core Strategy and Development Management Polices (Ref. 12.14), and SCDC Final Draft Local Plan (Ref. 12.15), as relevant to the air quality assessment. No local policy over and above that described in **Volume 1**, **Appendix 6H** is deemed relevant to the air quality assessment for this site.

e) Guidance

12.2.8 The statutory and good practice guidance described in **Volume 1**, **Appendix 6H** is relevant to the air quality assessment of the proposed development. Other technical documents that have been used to inform the adopted assessment method presented within this Chapter include the following:

- United States Environmental Protection Agency AP42 (Ref. 12.16) which provides emission factor estimation methods for quantifying the potential emissions from certain industrial processes, including construction activities and materials handling.
- The Air Quality Standards Regulations (Ref. 12.4) limit particulates concentrations in ambient air for the protection of human health, including PM_{10} and $PM_{2.5}$.
- The Institute of Air Quality Management (IAQM) guidance on construction dust (Ref. 12.17) describes the risk assessment for particulate emissions, from construction dust generating activities, including PM_{10} and the coarse dust fraction (dust soiling). However, there are no specific guidelines relating to the assessment of $PM_{2.5}$. Instead the IAQM guidance (Ref. 12.17) references $PM_{2.5}$ as follows:

  "*The most common impacts are dust soiling and increased ambient PM_{10} concentrations due to dust arising from activities on the site. Dust soiling will arise from the deposition of dust in all size fractions. The ambient dust relevant to health outcomes will be that measured as PM_{10}, although most of this will be in the coarse ($PM_{2.5-10}$) fraction, rather than the $PM_{2.5}$ fraction. Research undertaken in the USA suggests that 85% to 90% by weight of the fugitive dust emissions of PM_{10} from construction sites are $PM_{2.5-10}$ and 10% to 15% are in the $PM_{2.5}$ fraction.*"

12.2.9 The annual mean $PM_{2.5}$ air quality standard value is considerably less that of the annual mean PM_{10} air quality standard value, and therefore, it is considered reasonable that where PM_{10} emissions from earthmoving activities and other construction activities (excluding combustion activities) do not exceed the annual mean air quality standard, the associated $PM_{2.5}$ emissions from the same activities would not exceed the $PM_{2.5}$ annual mean air quality standard. $PM_{2.5}$ is therefore not specifically considered within the assessment, instead PM_{10} is used as a surrogate.

12.2.10 There are no statutory limits for dust deposition levels, however guideline threshold levels provided in IAQM guidance have been derived for dust soiling impacts and potential ecological effects, as summarised in **Table 12.1**.

Table 12.1: Dust deposition threshold levels.

Substance	Environmental Assessment Level (µg/m^3).	Averaging Period.	Indicative Guideline.
Amenity dust soiling (dry Frisbee gauge equivalent).	200mg/m^2/day.	4 weeks.	Complaints possible (Ref. 12.17).
	200mg/m^2/day.	Monthly mean.	Site Action Level (Ref. 12.17).
Deposited dust	500mg/m^2/day.	Annual mean.	Not significant effects (Ref. 12.18).

Substance	Environmental Assessment Level (µg/m^3).	Averaging Period.	Indicative Guideline.
(ecological effects).			

12.2.11 Where legislative ambient air quality limits or objectives are not specified for the pollutant species potentially released from the proposed development, environmental assessment levels, published in the Environment Agency's risk assessments for specific activities: environmental permits guidance (Ref. 12.19) have been used to assess potential effects on the health of the general population or on certain ecological receptors. The environmental assessment levels for pollutants that could be emitted from the proposed development are presented in **Table 12.2**.

Table 12.2: Environmental assessment levels.

Substance	Environmental assessment level (µg/m^3).	Averaging period.	Reference
Carbon Monoxide (CO).	30,000	Hourly mean.[a]	Environment Agency Environmental Assessment Levels (Ref. 12.19).

Notes: (a) for the protection of human health

12.3 Methodology

a) Scope of the assessment

12.3.1 The generic environmental impact assessment (EIA) methodology is detailed in **Volume 1**, **Chapter 6**.

12.3.2 The full method of assessment for air quality that has been applied for the Sizewell C Project is detailed in **Volume 1, Appendix 6H**.

12.3.3 This section provides specific details of the air quality methodology applied to the assessment of the proposed development and a summary of the general approach to provide appropriate context for the assessment that follows. The scope of assessment considers the impacts of the construction and operation of the proposed development, specifically associated with the following emissions:

- Construction dust and emissions from non-road mobile machinery (NRMM).
- Non-mobile plant emissions associated with the proposed campus combined heat and power (CHP) plant option, only oxides of nitrogen

(NOx), nitrogen dioxide (NO_2) and carbon monoxide (CO) are assessed.

- Non-mobile plant emissions from the diesel fuelled power generation plant, only oxides of nitrogen (NOx), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and carbon monoxide (CO) are assessed.
- Traffic emissions during the construction early year (2023) and peak year (2028), and operational year (2034) scenarios. As detailed in **Volume 1**, **Appendix 6H**, only oxides of nitrogen (NO_x and NO_2), and particulate matter (PM_{10} and $PM_{2.5}$) are assessed.

12.3.4 Pollutants emitted during operation of the proposed development that have the potential to have an adverse effect on air quality have been assessed within **Appendix 12C** of this volume. These include NO_x, NO_2, SO_2, particulate matter and CO.

12.3.5 In addition, **Appendix 12D** provides details of the environmental screening exercise of the potential air quality effects arising from the construction and operation of the proposed off-site developments, including the off-site sports facilities at Leiston, fen meadow compensation areas to the south of Benhall and to the east of Halesworth and marsh harrier habitat improvement area at Westleton (if required).

12.3.6 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA scoping opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019 (see **Volume 1**, **Appendix 6A**).

12.3.7 Comments raised in the EIA scoping opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Volume 1**, **Appendices 6A** and **6C**.

12.3.8 While not formally scoped out at the EIA scoping stage, further consideration has been given to the potential air quality effects of emissions from shipping delivering construction materials to site. Defra Local Air Quality Management Technical Guidance TG16 (Ref. 12.20) states a screening threshold of 5,000 large ship movements per year where there is relevant exposure within 250 metres of berths over which an assessment of potential impact may be required. As outlined in **Chapter 3** of this volume, there is estimated to be approximately 30 Abnormal Indivisible Load (AIL) deliveries over four annual campaigns, resulting in a total of approximately 120 beach landings within the course of the construction period. The volume of ship movements to site is therefore significantly below the screening threshold for potential air quality effects outlined in the Defra guidance and therefore no further consideration of shipping effects on air quality has been undertaken. During operation, the volume of ship

movements would be even less (approximately once every five years, as set out in **Chapter 4**).

12.3.9 As discussed in **Appendix 12C**: Combustion Activities, during start-up of the reactors, emissions of formaldehyde and carbon dioxide can be liberated from the nuclear auxiliary building stack (the main stack) and emissions of ammonia can occur from the steam relief valves. These are listed in ES Volume 2 **Appendix 4C** (Operational Gaseous Emissions). As the emissions only occur during start-up (assumed to occur twice a year) and only for a few hours at that time, and are released from a 70m high stack, these have been screened out as having insignificant effects on air quality and have not been assessed further in this assessment.

b) Consultation

12.3.10 The scope of the assessment has also been informed by ongoing consultation and engagement with statutory consultees throughout the design and assessment process. Consultation on the assessment methodology and conclusions has been undertaken with Suffolk County Council and East Suffolk Council (formerly Suffolk Coastal District Council). A summary of consultation relating to the air quality assessment is provided in **Volume 1**, **Appendix 6H**.

c) Study area

12.3.11 The study area for the main development site assessment of air quality effects considers receptors with the potential to be affected by a particular pollutant source based on the distance of the source to the receptor, as defined within the relevant guidance, and described within the appendices to this chapter. For example, the effects of construction dust are more limited in distance than the effects of emissions from point sources. The study area therefore extends to communities and sensitive ecological receptors local to the main development site boundary, including Sizewell and Leiston, and the communities and sensitive ecological receptors along the proposed transport routes, as described within the appendices to this chapter, and as agreed with statutory consultees. The study area has been defined such that potential in-combination effects at receptors form different sources are captured within the assessment.

12.3.12 Receptors within the study area are selected on the basis of their proximity to emission sources, as follows:

- Construction dust – inclusive of a 350m buffer from the main development site and 50m buffer from public roads used by construction traffic within 500m of the locations for entering or leaving construction sites. Full details are provided in **Appendix 12A**.

- Non-mobile plant – receptors up to 10km from the main development site for the power generation plant and campus CHP facility. Full details for the power generation plant are provided in **Appendix 12C** and full details for the proposed Campus CHP are provided in **Appendix 12F**.

- Road traffic-related pollutants – inclusive of 200m from the individual road links comprising the affected road network including the A12 between Ipswich and Lowestoft, the B1122, the main site access and other minor roads. Full details are provided in **Appendix 12B** and its associated figures.

- Rail traffic related pollutants – inclusive of 200m from individual rail links comprising the affected rail network including the existing Saxmundham to Leiston branch line, the adjoining section of the main line and any new build sections of railway. Full details are provided in **Appendix 12B**.

12.3.13 Sensitive receptors for the assessment of construction dust and non-mobile plant emissions, and those transport emissions receptors local to the main development site are presented in **Figure 12.1**. Receptors for transport emissions are presented in **Figures 12B1-7** to **Appendix 12B**.

d) Assessment scenarios

12.3.14 The assessment scenarios for the proposed development cover the construction phase and operational phase of the proposed development. The assessment scenarios are as follows:

- Construction: consideration of ambient air quality and dust impacts during the five construction phases of the proposed development as detailed in the construction dust assessment in **Appendix 12A**. During peak construction, the campus will be occupied, with a gas fuelled CHP engine running up to 21 hours per day. Methodology for the assessment of emissions from the CHP is covered in the non-mobile plant sub-sections within this chapter and the results are detailed in **Appendix 12F**. The construction programme is described in **Chapter 3** of this volume.

- Operation: the operational phase of the proposed development. The assessment considers the combustion derived pollutant emissions from non-mobile plant associated with the operation of the Sizewell C power station in 2034. Diesel generators to be installed and used during the operational phase of the proposed development are assessed for three scenarios – commissioning, routine testing and the loss of off-site power scenario when they are required for the safe shutdown of the

power station. In addition, it is proposed that the campus CHP would be retained during the operational phase.

- Transport: the assessment considers impacts of changes to the volume and composition of traffic on the affected road and rail networks, both with and without the proposed development, inclusive of associated developments, as appropriate.

e) Assessment criteria

12.3.15 As described in **Volume 1**, **Appendix 6H**, the EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors.

i. Construction dust

12.3.16 The assessment of construction dust effects is determined by considering the magnitude of impacts and sensitivity of receptors that could be affected in order to classify effects.

12.3.17 The significance of effects for construction phase dust emissions and exhaust emissions from the use of NRMM are determined using professional judgement based on the risk of dust impacts and the appropriateness of embedded mitigation to control emissions of dust and exhaust emissions from NRMM identified within the **Code of Construction Practice** (**CoCP)** (Doc Ref. 8.11). A detailed description of the assessment methodology used to assess the potential effects on air quality arising from dust during the construction period is provided in **Volume 1**, **Appendix 6H**. A summary of the assessment criteria used in the construction dust assessment is presented in the following sub-sections. This assessment also accounts for the effects of NRMM on air quality.

Sensitivity

12.3.18 The risk levels used to describe the potential for adverse effects occurring from emissions of construction dust is based on criteria set out in IAQM guidelines (Ref. 12.17).

12.3.19 The descriptors used to classify the potential sensitivity of receptors is the first step in establishing the risks to air quality using the classification shown in **Table 12.3**.

Table 12.3: Assessment of sensitivity of receptors for air quality.

Sensitivity	Human perception of dust soiling effects.	PM_{10} health effects.	Ecological dust deposition effects.
High	Enjoy a high level of amenity; appearance/aesthetics/value of property would be diminished by soiling; and receptor expected to be present continuously/ regularly for example residential/museums/car showrooms/commercial horticulture.	Public present for 8 hours per day or more, for example residential properties, schools, care homes.	International/national designation and the designated feature is sensitive to dust soiling effects, for example Special Area of Conservation (SAC) for acid heathlands, or lichens, vascular species on Red Data List (Joint Nature Conservations Committee).
Medium	Enjoy a reasonable level of amenity; appearance/ aesthetics/value of property could be diminished by soiling; receptor not expected to be present continuously/ regularly for example parks/places of work.	Only workforce present (no residential or high sensitivity receptors) 8 hours per day or more.	Important plant species - unknown sensitivity to dust soiling; national designation which may be sensitive, for example Site of Special Scientific Interest (SSSI) with dust sensitive feature.
Low	Enjoyment of amenity not reasonably expected; appearance/aesthetics/ value of property not diminished by soiling; receptors are transient/present for limited period of time; for example playing fields, farmland, footpaths, short-term car parks* and roads. *subject to typical usage, could be high sensitivity.	Transient human exposure, for example footpaths, playing fields, parks.	Local designation where feature may be sensitive to dust soiling, for example local nature reserve.

Magnitude

12.3.20 The descriptors used to classify the potential magnitude of emissions from construction and demolition activities is the next step in establishing the risks to air quality, as shown in **Table 12.4**. The term heavy duty vehicle (HDV) in **Table 12.4** is used as an extension of heavy good vehicles (HGVs) to include consideration of other heavy vehicles, for example buses and/or coaches.

Table 12.4: Dust emission magnitude classification.

Magnitude	Demolition	Earthworks	Construction	Trackout
Large	Total building Volume greater than 50,000m^3, potentially dusty construction material (for example concrete) on-site crushing and screening, demolition activities greater than 20m above ground.	Site area greater than 1ha, potentially dusty soil type (for example clay), greater than 10 heavy earth moving vehicles at once, bunds greater than 8m high, total material moved greater than 100,000t.	Total building Volume greater than 100,000m^3, on-site concrete batching, sandblasting.	Greater than 50 HDV's (greater than 3.5t) peak outward movements per day, potentially dusty surface material (for example high clay content), unpaved road length greater than 100m.
Medium	Total building Volume 20,000–50,000m^3, potentially dusty construction material, demolition activities 10–20m above ground.	Site area 0.25–1ha, moderately dusty soil type (for example silt), 5–10 heavy earth-moving vehicles at once, bunds 4–8m high, total material moved 20,000–100,000t.	Total building Volume 25,000–100,000m^3, potentially dusty materials for example concrete, on-site concrete batching.	10–50 HDV (greater than 3.5t) peak outward movements per day, moderately dusty surface material (for example, high clay content), unpaved road length 50–100m.
Small	Total building Volume less than 20,000m^3, construction material with low potential for dust (for example metal/timber), demolition activities less than 10m above ground, demolition during wetter months.	Site area less than 0.25, large grain soil type (for example sand), less than 5 heavy earth moving vehicles at once, bunds less than 4m high, total material moved less than 20,000t.	Total building Volume less than 25,000m^3, low dust potential construction materials for example metal/timber.	Less than 10 HDV (greater than 3.5t) peak outward movements per day, surface material low dust potential, unpaved road length less than 50m.

Effect definitions

12.3.21 The risk definitions for effects of dust emissions are shown in **Table 12.5** to **Table 12.7**.

Table 12.5: Risk of dust impacts – demolition.

Sensitivity of area.	Potential dust emission magnitude without applied mitigation.		
	Large	Medium	Small
High	High risk.	Medium risk.	Medium risk.
Medium	High risk.	Medium risk.	Low risk.
Low	Medium risk.	Low risk.	Negligible risk.

Table 12.6: Risk of dust impacts – earthworks, construction.

Sensitivity of area.	Potential dust emission magnitude without applied mitigation.		
	Large	Medium	Small
High	High risk.	Medium risk.	Low risk.
Medium	Medium risk.	Medium risk.	Low risk.
Low	Low risk.	Low risk.	Negligible risk.

Table 12.7: Risk of dust impacts – trackout.

Sensitivity of area.	Potential dust emission magnitude without applied mitigation.		
	Large	Medium	Small
High	High risk.	Medium risk.	Low risk.
Medium	Medium risk.	Low risk.	Negligible risk.
Low	Low risk.	Low risk.	Negligible risk.

12.3.22 The risk definitions for dust emissions as shown in **Table 12.5** to **Table 12.7** can then be used to determine whether the effect is 'significant' or 'not significant'. As a general rule, high and medium risks are considered to be significant and low and negligible risks are considered to be not significant. However, professional judgement is also applied, where appropriate.

ii. Transport emissions

12.3.23 A summary of the assessment descriptors used in the transport emissions assessment is presented in the following sub-sections. These descriptors apply to both emissions from road or rail vehicles.

Sensitivity

12.3.24 The approach used to define the sensitivity of individual receptors, and of the study area as a whole, is set out in **Appendix 12B** of this volume. The sensitivity of receptors was considered in the definition of the Air Quality Strategy (AQS) (Ref. 12.21) objective values and therefore no additional subdivision of human health or ecological receptor sensitivities is necessary. The assessment of impacts is therefore based on the magnitude of change and the absolute concentration of pollutants in the air resulting from traffic associated with the proposed development.

Magnitude

12.3.25 The magnitude of impact from transport emissions is based on IAQM (Ref. 12.22) suggested magnitude descriptors.

12.3.26 The descriptors for the assessment of magnitude are shown in **Table 12.8**.

Table 12.8: Magnitude of change and effect descriptors for individual receptors fromtransport emissions

Magnitude of change descriptor.	Substance	Annual mean concentration (µg/m^3).	Justification
High	NO_2 and PM_{10}.	Increase/decrease >4.	Change in concentration relative to air quality objective value of >10% (Ref. 12.22).
	$PM_{2.5}$	Increase/decrease >2.5.	
Medium	NO_2 and PM_{10}.	Increase/decrease 2 to 4.	Change in concentration relative to air quality objective value of between 6% and 10% (Ref. 12.22).
	$PM_{2.5}$	Increase/decrease 1.4 to 2.5.	
Low	NO_2 and PM_{10}.	Increase/decrease 0.8 to 1.9.	Change in concentration relative to air quality objective value of between 2% and 5% (Ref. 12.22).
	$PM_{2.5}$	Increase/decrease 0.5 to 1.3.	
Very low.	NO_2 and PM_{10}.	Increase/decrease 0.4 to 0.7.	Change in concentration relative to air quality objective value of 1% (Ref. 12.22).
	$PM_{2.5}$	Increase/decrease 0.3 to 0.4.	
Imperceptible	NO_2 and PM_{10}.	Increase/decrease <0.4.	Change in concentration relative to air quality objective value of <1% (Ref. 12.22).
	$PM_{2.5}$	Increase/decrease <0.3.	

Effect definition

12.3.27 The definitions of effect of transport emissions for air quality at individual receptors are shown in **Table 12.9** and **Table 12.10**.

Table 12.9: Effect descriptors for annual mean NO_2 and PM_{10}.

Annual mean pollutant concentration at receptor in assessment year (µg/m^3).	Magnitude of impact.				
	Imperceptible	Very low	Low	Medium	High
≤30.2	Negligible	Negligible	Negligible	Minor	Moderate
30.2–<37.8	Negligible	Negligible	Minor	Moderate	Moderate
37.8–<41.1	Negligible	Minor	Moderate	Moderate	Major
41.1–<43.8	Negligible	Moderate	Moderate	Major	Major
≥43.8	Negligible	Moderate	Major	Major	Major

Table 12.10: Effect descriptors for annual mean $PM_{2.5}$.

Annual mean pollutant concentration at receptor in assessment year (µg/m^3).	Magnitude of impact.				
	Imperceptible	Very low	Low	Medium	High
≤18.9	Negligible	Negligible	Negligible	Minor	Moderate
18.9–<23.6	Negligible	Negligible	Minor	Moderate	Moderate
23.6–<25.6	Negligible	Minor	Moderate	Moderate	Major
25.6–<27.4	Negligible	Moderate	Moderate	Major	Major
≥27.4	Negligible	Moderate	Major	Major	Major

12.3.28 Following the classification of an effect as presented in **Table 12.9** and **Table 12.10** at each individual receptor, professional judgement is used to determine the overall effect. A clear statement is made as to whether the overall effect of transport related impacts on air quality is 'significant' or 'not significant'. Major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant.

iii. Non-mobile plant

12.3.29 A summary of the assessment descriptors used in the assessment of back up diesel generators and the campus CHP are presented in the following sub-sections.

Sensitivity

12.3.30 As with transport emissions, the approach used to define the sensitivity of individual receptors, and of the study area as a whole, is set out in **Appendix 12C** of this volume. The sensitivity of receptors was considered in the definition of the AQS (Ref. 12.21) objective values and therefore no additional subdivision of human health or ecological receptor sensitivities is necessary. The assessment of impacts is therefore based on the magnitude of change and the absolute concentration of pollutants in the air resulting from the proposed development.

Magnitude

12.3.31 The assessment uses the Environment Agency Environmental Permitting Regulations (EPR) risk assessment screening criteria for NO_x, NO_2, SO_2, particulate matter and CO for comparison of process contributions with AQS (Ref. 12.21) objectives to identify when the impact of an emission is small enough not to require additional assessment. The first stage of screening criteria used to identify imperceptible changes are the magnitude of:

- short-term process contributions are less than=10% of the AQS; and
- long-term process contributions are less than=1% of the AQS.

12.3.32 The second stage of screening considers the process contributions in the context of the existing background pollutant concentrations. The predicted environmental concentration is considered acceptable without more detailed assessment where the magnitude of:

- short-term process contributions less than 20% of the short-term AQS minus twice the long-term background concentration; and
- long-term predicted environmental concentration (process contributions + background concentration) less than 70% of the AQS.

12.3.33 The impact of non-mobile plant emissions on ecological receptors with statutory designation, e.g. SSSI, has been evaluated using the Environment Agency criteria (as above) for short-term and long-term AQS for ecological receptors. For short-term impacts, where the magnitude of process contributions are over 100% of the AQS, the Environment Agency

guidance indicates that an impact of this magnitude may require more detailed assessment to inform the definition of the effect.

12.3.34 The impact of non-mobile plant emissions on ecological receptors with statutory designation, through deposition of nutrient nitrogen or acidity, has been evaluated using the Environment Agency criterion of 1% of the long-term AQS, as described above. The impact of point source emissions on non-statutory designations (e.g. local wildlife sites) have been evaluated using the Environment Agency criterion of requiring the magnitude of the process contributions be no greater than the short-term and long-term AQS for ecological receptors.

Effect definitions

12.3.35 The evaluation of the significance of air quality effects on human receptors has been based on the Environment Agency's risk assessment method, which indicates that where AQS objectives or target values for human health (as defined in **Volume 1**, **Appendix 6H**) are likely to be breached as a result of the process contributions, or where installation releases constitute a major proportion of the standard or objective, such releases are likely to be considered unacceptable and therefore have a significant effect. Where the process contributions is below the screening criteria outlined above, the effect at the individual receptor is considered to be not significant.

12.3.36 The air quality effects on ecological receptors with statutory designation can be assumed to be not significant without the need for more detailed assessment, where the magnitude of impact does not exceed the defined magnitude of impact criteria. Where a criterion is exceeded, the effect on the receptor should be determined by a suitably qualified ecologist. The determination of significance of effect of air quality impacts on ecological receptors with statutory designation is described in the ecology assessment (**Chapter 14** of this volume).

f) Assessment methodology

12.3.37 The methodology for the assessment of changes in air pollutant concentrations is set out in detail within **Volume 1, Appendix 6H**. The general approach is described below.

12.3.38 The changes in air quality conditions are considered at receptors that are representative of worst case changes that could occur at other sensitive receptors located nearby. The representative receptors (shown on **Figure 12.1**) are predominantly those closest to the boundary of the site or the affected transport network and therefore the magnitude of change in air pollutant concentrations or deposition rates will be greatest at the representative receptor locations, compared to other sensitive receptors

further from the main development site boundary or affected transport network. Operational non-mobile plant emissions are evaluated at receptors where peak impacts are predicted to occur from the dispersion of emissions; these may be further from the main development site boundary due to the heights of the stacks used.

12.3.39 Details on establishing the baseline conditions are set out in **section 12.4** below and **Appendix 12E**.

i. Construction dust

12.3.40 The assessment in **Appendix 12A** of this volume details the assessment of likely changes in emissions of particulate matter (PM_{10} and dust) due to construction activities and NRMM emissions, and of NO_x due to NRMM emissions from haul road vehicle movements on sensitive ecological receptors.

12.3.41 There is a potential that proposed construction activities (earthworks, construction works, including emissions from NRMM, and track out of dusty materials onto public roads) give rise to perceptible changes in dust deposition rates and to changes in concentrations of particulate matter (PM_{10}) in air. Taking into account the sensitivity of receptors to these changes, the effectiveness of embedded mitigation measures set out in the **CoCP** is considered based on the professional judgement of a suitably qualified and experienced person. Where the risk of a significant effect is identified, additional site specific mitigation measures would be proposed so that there are no likely significant residual effects.

ii. Transport emissions

12.3.42 The transport emissions assessment in **Appendix 12B** of this volume details the technical dispersion modelling method and predicted air pollutant concentrations resulting from HDVs, LDVs (light duty vehicles) and rail traffic for all scenarios of the Sizewell C Project on the wider transport network. The traffic model included data for all associated developments and the main development site, therefore the study area extends from Lowestoft to Ipswich for the Sizewell C Project. However, the roads likely to be affected by the proposed development include roads in the vicinity of the main development site. Traffic emissions are assessed for an 'Early year' (2023) and 'Peak year' (2028) scenario for the Sizewell C Project as well as the operational year (2034).

12.3.43 The predicted impacts within the study area for the proposed development are considered in this chapter for the future baseline and with development scenarios for the construction years of 2023, 2028 and for the operational year of 2034.

12.3.44 Traffic data for the construction phase assessment year in 2023 is based on traffic flow for a typical day during the 'early years' construction scenario which includes construction workers and HDVs travelling to the proposed development as well as other associated development sites.

12.3.45 Traffic data for the peak construction year in 2028 is based on two scenarios, a 'typical' day and the 'busiest' day. These include traffic using the proposed development and other associated developments, and construction traffic for the main development site. Busiest day traffic data includes additional HDV movements.

12.3.46 Traffic data for operational year in 2034 includes traffic generated by the operation of the proposed development.

iii. Non-mobile plant emissions

12.3.47 The impacts from operational phase back-up diesel generators have been assessed using the Environment Agency's risk assessment methodology and are described in detail in **Appendices 4C** and **12C** of this volume. Emissions to air from the point sources have been determined through consideration of emission levels that can be achieved from the selected diesel generator technology. Emissions have been modelled, using the proprietary dispersion model ADMS5.2, to determine the likely worst-case process contributions at sensitive receptor locations. These have been added to the background pollutant concentrations to determine the overall predicted environmental concentration at sensitive receptor locations, which have then been assessed against the AQS.

12.3.48 The process contributions at designated ecological habitat sites and the associated deposition rates for nutrient nitrogen and acid deposition have also been established. These have been compared with the critical levels and critical loads associated with the habitat type present at the point of impact. Further details are provided in **Appendix 12C** of this volume.

12.3.49 Emissions of pollutants that could occur from the nuclear auxiliary building stack have been scoped out of requiring detailed assessment using the Environment Agency's risk assessments for specific activities: environmental permits guidance.

12.3.50 The assessment of impacts from the proposed CHP unit during the construction and operational phases of Sizewell C Project, follows the same approach as the back-up diesel generators, whereby ADMS5.2 is used to determine worst-case process contributions at sensitive receptor locations. To represent a conservative assessment, the emissions are assessed as if the engine was running 24 hours per day, although it would not run for more than 21 hours per day. Flue and emissions parameters are tabulated in **Table 12.11**.

Table 12.11: Flue and emissions parameters.

Source name	Location (x, y)	Exhaust flow rate (Nm^3/s)	Exhaust diameter (m)	Exhaust height (m)	Exit temperature (^oC)	Emission rates (mg/Nm^3)
Combined heat and power engine.	645251, 264539	2.0	0.45	12.8	120	NOx (250) CO (1000)

g) Assumptions and limitations

12.3.51 The assumptions and limitations associated with construction dust risk assessment, transport emissions assessment and combustion activities assessment are set out in the relevant appendices to this chapter.

12.3.52 This assessment assumes the air quality objectives will remain unchanged during the periods assessed.

12.3.53 The following limitations have also been identified:

- The inherent uncertainties associated with predictive modelling of air quality impacts, which include the estimation of emissions from sources based on published data. The level of uncertainty associated with dispersion modelling is considered within each assessment.
- Meteorological data used in predictive modelling has been sourced for a nearby representative meteorological station (Wattisham) and the most recent ten years' data has been used so that meteorological conditions representative of conditions experienced in the study area have been assessed, as outlined in **Appendix 12B** and **12C**. However, as with all dispersion modelling, this uses past weather conditions to determine the level of effect; it is not possible to predict the actual future meteorological conditions.

12.4 Baseline environment

12.4.1 This section presents a description of the baseline environmental characteristics within the study area.

12.4.2 Further detail can be found in **Appendices 12A**, **12B** and **12C** of this volume.

a) Current baseline

i. Receptor

12.4.3 The representative receptors for the different air quality assessments are listed in **Table 12.12** (human health impacts and amenity dust soiling impacts) and **Table 12.13** (ecological impacts) and their locations are illustrated on **Figure 12.1**. Details for all receptors potentially affected by emissions from transport, including those on the wider road network, are set out in **Appendix 12B** of this volume.

Table 12.12: Representative receptor locations for main development site air quality impacts on human health and amenity.

Receptor ID.	Description	Screened in for potential impacts from:		
		Construction dust.	Road / rail.	Non-mobile plant*.
LE1	Residential B1122 Station Rd, Leiston.		C & O	C
LE2	Residential B1122 Abbey Rd, Leiston.	C	C & O	C
LE3	Residential Abbey Farm Lodge, Leiston.	C	C & O	C
LE4	Residential B1122, Theberton (South).		C & O	C
LE5	Residential B1122 Leiston Rd, Theberton.		C & O	C
LE6	Residential B1122 Leiston Rd, Theberton.		C & O	C
LE7	Residential Common Farm, Lover's Ln, Leiston.	C	C & O	C
LE8	Residential B1119 Waterloo Ave, Leiston.		C & O	C
LE9	Residential B1122 High St, Leiston.		C & O	C
LE10	Residential B1069 Haylings Rd, Leiston.		C & O	C
LE11	Residential B1122 High St, Leiston.		C & O	C
LE12	Residential King George's Ave, Leiston.		C & O	C
LE13	Residential Sizewell Gap, Sizewell.		C & O	C
LE14	Residential A1094 Aldeburgh Rd, Friston.		C & O	C
LE15	Historical Leiston Abbey.	C	C & O	
LE16	School Pro Corda, Leiston Abbey.	C	C & O	
LE17	Residential Old Abbey Farm, Leiston.	C	C & O	O
LE18	Residential Aldhurst Farm Cottage.		C & O	
LE19	Residential Abbey Road Cottages.	C	C & O	
LE20	Residential Wood Farm Cottages, Westward Ho.		C & O	
LE21	Residential Buckleswood Road.		C & O	

Receptor ID.	Description	Screened in for potential impacts from:		
		Construction dust.	Road / rail.	Non-mobile plant*.
LE22	Residential Harling Way, Leiston.		C & O	
LE23	Residential Fishers Farm.		C & O	
LE24	Residential Phoenix Cottage.		C & O	
LE25	Residential The Round House.	C	C & O	O
LE26	Residential Old Abbey Farm care home, Leiston.	C	C & O	O
LE27	Residential Potter's Farm, Leiston.	C	C & O	
LE28	Residential Abbey Cottage, Leiston.	C	C & O	O
LE29	Residential Eastbridge village.	C	C & O	
LE30	Residential Sizewell.	C	C & O	O
LE31	Residential Home Farm, Sizewell.	C	C & O	O
LE32	Residential Sandy Ln, Leiston.	C	C & O	
LE33	Residential Common Farm Cottages, Lover's Lane.	C	C & O	
LE34	Residential Caravan Park, Leiston.	C	C & O	
LE35	Residential Valley Rd, Leiston.	C	C & O	
LE36	Residential King George's Ave, Leiston.	C	C & O	
LE37	Residential Crown Farm, Leiston.	C	C & O	O
LE38	Residential Crown Lodge Lover's Lane.	C	C & O	O
LE39	Residential Halfway Cottages – Sizewell Gap, Leiston.	C	C & O	O
LE40	Commercial Eastlands Industrial Estate.	C	C & O	
LE41	Residential Keeper's Cottage.	C	C & O	O
LE42	Residential SZC Accommodation Campus.	C	C	
LE43	Residential Common Cottages, Lover's Lane.	C	C & O	O
LE44	Recreational Sizewell Sports and Social Club.	C	C & O	O
LE45	School Leiston Primary School.	C	C & O	O
LE46	Residential Caravan Park – Land to the east of the Eastlands Industrial Estate.	C	C	
LE47	Recreational Suffolk Coast Path/Sizewell beaches.	C	C & O	O
LE48	Recreational Kenton Hills Path, car park (Lover's Lane).	C	C & O	O
LE49	Recreational Sandlings Walk Path.	C	C & O	O
LE50	Recreational Diverted Bridleway 19.	C		

Receptor ID.	Description	Screened in for potential impacts from:		
		Construction dust.	Road / rail.	Non-mobile plant*.
LE51	Recreational Sustrans route 42.	C		

Table notes: 'C' denotes receptor of construction phase impacts, 'O' denotes receptor of operation phase impacts.
* Including diesel generators and CHP

Table 12.13: Representative ecological receptor locations for main development site air quality impacts.

Receptor ID.	Description	Screened in for potential impacts from:		
		Construction Dust.	Road/ rail.	Non-mobile plant.
E1	Alde-Ore and Butley Estuaries, Special Protection Area (SPA), Special Area of Conservation (SAC) & Ramsar.			C & O
E2	Minsmere – Walberswick Heaths and Marshes SAC, SPA, Ramsar, SSSI.	C	C & O	C & O
E3	Orfordness to Shingle Street SAC.			C & O
E4	Sandlings SPA.	C	C & O	C & O
E5	Sizewell Marshes SSSI.	C	C & O	C & O
E6	Leiston Aldeburgh SSSI.	C		C & O
E7	Leiston Common County Wildlife Site (CWS).	C		C & O
E8	Aldringham to Aldeburgh Disused Railway CWS.	C		C & O
E9	Dower House CWS.			C & O
E10	Suffolk Shingle Beaches CWS.	C		C & O
E11	Reckham Pits CWS.	C		C & O
E12	Sizewell Levels and Associated Areas CWS.	C		C & O
E13	Southern Minsmere Levels – Dunwich Forest & Kenton Hills CWS.	C		C & O
E14	Aldhurst Farm habitat creation scheme*.	C	C & O	
E15	Marsh harrier**/reptile habitat within EDF Energy estate.	C	C & O	
E16	Ash Wood Priority habitat.	C		

Table notes: 'C' denotes receptor of construction phase impacts only, 'O' denotes receptor of operation phase impacts only

* Habitat created as part of the Aldhurst Farm habitat creation scheme is considered to form part of the existing baseline environment. It also forms compensation for the permanent loss of land at Sizewell Marshes.

** Permanent marsh harrier habitat exists on land at the northern edge of the EDF Energy Estate and is being further improved.

ii. Air quality

12.4.4 The baseline pollutant levels for these assessments have been determined through a review of data held on the Defra background pollutant database (Ref. 12.23), the UK Air Pollution Information System (Ref. 12.24), measurement data obtained from the 2016-2017 and 2019-2020 monitoring campaigns, and data contained within the East Suffolk Council local air quality management reports (Ref. 12.25).

12.4.5 Additional measurements from baseline NO_2 are reported in **Appendix 12E**. The results of these measurements have been used in the calibration of the model used to calculate baseline values in the **Transport Emissions Assessent** (**Appendix 12B**) of this voluime.

12.4.6 Defra projected background mapping (Ref. 12.23) indicates that the current air quality in the study area is well below the relevant air quality objectives. Background pollutant concentrations at human and ecological receptors within the study area range from 7.3 to 24.7 µg/m^3 for NO_2, 12.3 to 18.2 µg/m^3 for PM_{10}, and 8.3 to 11.0 µg/m^3 for $PM_{2.5}$. Background pollutant concentrations at specific human and ecological receptors are presented in the transport emissions assessment and combustion impact assessment (**Appendices 12B** and **12C**) respectively of this volume.

12.4.7 There are two air quality management areas (AQMAs) within the wider transport emissions assessment study area (detailed in **Appendix 12B** of this volume), one in Stratford St Andrew and one in Woodbridge. There is potential for air quality effects on AQMAs from transport emissions associated with the Sizewell C Project, and the effects on these AQMAs are also considered within this chapter. Receptors in the AQMAs are therefore assessed in the transport emissions assessment (**Appendix 12B** of this volume). Within both AQMAs the extent of poor air quality is limited to the annual mean concentration of NO2 at road facing facades of a small number of residential buildings and council measurement data (Ref. 12.25) confirms that the objective value is achieved more widely within Stratford St Andrews and Woodbridge.

12.4.8 The baseline dust deposition rate in the vicinity of the site has been monitored over a period of 12 months during 2016–17, using passive deposition gauges to determine the existing dust environment at eight sites, representing baseline conditions on the site boundary and at specific receptor locations.

12.4.9 The rate of dust deposition is affected by meteorological conditions, industrial and agricultural activities and road traffic. As the site is coastal, the sea also contributes to current dust deposition rates in the form of salt

spray and sand. The predominant land use around the main development site is open arable farmland, and farming activities are expected to contribute to a baseline rate of dust deposition. Agricultural activities are seasonal, and some, such as ploughing and harvesting, are likely to periodically generate larger amounts of fugitive dust due to disturbance of the soil or organic matter. Trackout of mud and soil onto the road network can lead to vehicles spreading fugitive dust beyond the field boundaries.

12.4.10 A summary of dust deposition rates from monitoring are detailed in **Table 12.14**. The Table also shows the IAQM guidance (Ref. 12.17) recommended site action level (four-week average) for construction dust deposition. The site action level is used as an indicator above which additional mitigation or control measures may need to be applied to avoid potential impacts on sensitive receptors.

12.4.11 The results indicate some variation, with several higher deposition rates recorded during the monitoring period, likely to be the result of localised sources or activities near the monitor, such as vehicle movements. Of particular note is the peak baseline deposition rate at Location 4 (see **Table 12.14**) that was higher than the recommended site action level. The monitoring indicates a general trend for lower dust deposition rates during the wetter, winter months and an increase in the summer months, with winter and summer seasonal averages of 24mg/m^2/day and 40mg/m^2/day respectively (over the eight sites).

Table 12.14: Baseline dust deposition monitoring (2016–17).

Location	Deposited dust (mg/m^2/day).		
	Max. 4-week average.	Min. 4-week average.	Mean
1 – West of site access.	137	13	53
2 – Northwest of campus.	66	6	25
3 – North of borrow pit.	46	10	27
4 – Campus / site access hub.	327	11	53
5 – Minsmere – Walberswick Heaths and Marshes SAC, SPA and SSSI.	42	3	19
6 – Secondary site access.	93	5	39
7 – Temporary construction area / Sizewell Marshes SSSI.	55	5	23
8 – Lover's Lane / Sizewell Marshes SSSI.	57	9	26
Recommended site action level.	200 (4-week average).		

b) Future baseline

i. Receptors

12.4.12 Committed developments with the potential to introduce new receptors within the study area have been reviewed and considered within the assessment, as appropriate. Details of these developments are provided in **Volume 10** (Doc Ref. 6.11). Representative receptors for these developments in the vicinity of the main development site from an air quality perspective are presented in **Table 12.15**.

Table 12.15: Committed developments in the vicinity of the main development site

Application Reference	Description	Representative receptor
DC/14/3227/FUL	Erection of two dwellings at Chapel Road, Eastbridge	LE29
DC/17/1617/FUL DC/14/3166/OUT	Redevelopment for 18 dwellings at Abbey Road, Leiston	LE2 and LE19
DC/16/0527/OUT	Erection of 20 dwellings at Carr Avenue, Leiston	LE35
DC/15/2817/FUL	Erection of two dwellings at Heath View, Leiston	LE36

ii. Air quality

12.4.13 Future projected background pollutant concentrations have been considered within the baseline determination of the combustion activities assessment, and as part of the modelled factors for the transport emissions assessment years described in **Appendices 12B** and **12C** of this volume.

12.4.14 For the year 2023, background pollutant concentrations at human and ecological receptors within the study area range from 6.1 to 21.3 µg/m^3 for NO_2, 11.5 to 17.4 µg/m^3 for PM_{10}, and 7.6 to 10.3 µg/m^3 for $PM_{2.5}$.

12.4.15 For the year 2028, background pollutant concentrations at human and ecological receptors within the study area range from 5.6 to 19.4 µg/m^3 for NO_2, 11.2 to 17.2 µg/m^3 for PM_{10}, and 7.4 to 10.1 µg/m^3 for $PM_{2.5}$.

12.4.16 For the year 2034, background pollutant concentrations at human and ecological receptors within the study area range from 5.4 to 18.7 µg/m^3 for NO_2, 11.3 to 17.3 µg/m^3 for PM_{10}, and 7.4 to 10.1 µg/m^3 for $PM_{2.5}$.

12.4.17 No changes are expected in land use in the surrounding area and it is expected that the future baseline rates of dust deposition are likely to be similar to current levels.

12.4.18 CO concentrations across the study area are well below the annual mean air quality objective value of 30,000µg/m^3 and SO_2 concentrations are well below the lowest objective value, for the 24-hour mean, of 125 µg/m^3.

12.4.19 The air quality objectives are likely to be achieved at the AQMAs in the near future and measurement data for Stratford St Andrews in recent years has already begun to report annual mean concentrations of NO_2 that are below the objective value.

12.5 Environmental design and mitigation

12.5.1 As detailed in **Volume 1**, **Chapter 6**, a number of primary mitigation measures have been identified through the iterative EIA process and have been incorporated into the design and construction planning of the proposed development. Tertiary mitigation measures are legal requirements or are standard practices that would be implemented as part of the proposed development.

12.5.2 The assessment of likely significant effects of the proposed development assumes that primary and tertiary mitigation measures are in place. For air quality, these measures are identified below, with a summary provided on how the measures contribute to the mitigation and management of potentially significant environmental effects.

a) Primary mitigation

12.5.3 The following mitigation measures have been embedded into the design of the proposed development:

i. Traffic emissions

- Use of two off-site park and ride facilities to reduce construction worker traffic to site and a park and ride facility at LEEIE, as well as the use of an accommodation campus and caravan park to further reduce travel to site, reduced car parking and public rights of way improvements, which would help reduce transport related emissions.
- Use of an off-site freight management facility, which would help manage freight arrivals and reduce on-site queuing and engine idling.
- Minimising freight movements on roads through the provision of the beach landing facility, Saxmundham to Leiston branch line upgrades, rail siding at LEEIE, and the green rail route.

ii. Non-mobile plant emissions

- Diesel generator stack heights set as high as could be achieved under the design envelope for the power station and emissions of nitrogen oxides controlled through primary means.
- An accommodation campus energy centre, comprising a CHP plant with an optimised stack height to minimise ground-level air quality impacts balanced against the visual impacts of taller stacks.

iii. Construction dust

- Site access located as far as practicable from sensitive receptors, to minimise impacts from transport-related emissions, including vehicle exhaust emissions and fugitive dust emissions from trackout of mud onto the road.

b) Tertiary mitigation

i. Construction dust

12.5.4 Details of tertiary mitigation measures that would be employed across the Sizewell C Project sites are provided in the **CoCP** (Doc Ref. 8.11). These include but are not limited to the following 'general measures':

- Hard-surfaced roadways used as far as practicable, to minimise trackout and dust raising from vehicle movements within the construction site.
- Use of earth bunds with grassing/seeding, including a bund along the length of the southern temporary construction area boundary (5m height), and early planting to supplement existing vegetation and hedging, to screen sensitive boundaries from fugitive dust from construction activities.
- Deposited dust and materials to be monitored and controlled through additional mitigation as necessary to avoid trackout of material into adjacent construction zones.
- Wheel wash-facilities would be installed at strategic points within the main development site, and maintained for the duration of earthworks and excavations, to minimise tracked out materials from high risk to lower risk areas.
- Concrete batching plant located as far as practicable from sensitive receptors, to minimise emission impacts.

- Mobile crushing and screening plant located as far as practicable from sensitive receptors, to minimise emission impacts.
- Use of modular (pre-fabricated) buildings, as far as practicable, for temporary accommodation and site facilities during construction phase to minimise dust raising during the construction and final removal and reinstatement phase.
- Haulage contractors will ensure that all road vehicles will comply with the requirements of Euro V emission standards (98/69/EC) as a minimum, unless otherwise agreed with the local authority.
- Use of non-road mobile machines as far as practicable that meet the Stage IV engine standards of the NRMM Emission Standards Directive to minimise NOx and particulate emissions on site.

12.5.5 Furthermore, an **outline Dust Management Plan** (oDMP) included within **Appendix 12A**, sets the approach to dust mitigation that the contractors would be required to implement. The contractors would prepare Construction Environmental Management Plans including Dust Management Plans, in accordance with the **CoCP** (Doc Ref. 8.11) and the associated **oDMP**, both of which accompany the DCO application.

ii. Non-mobile plant emissions

12.5.6 Where batching cement plant or mobile crushing plant is employed at sufficient scale to require an environmental permit to be in place for the facility, dust and particulate emissions to air will be regulated by the local authority under the Environmental Permitting Regulations (Part B Activities) and controlled in accordance with an environmental permit to be issued for such operation.

12.5.7 Combustion emissions to air from stationary generators, where employed during the construction of the proposed development, and from the Sizewell C Project operational plant, such as the emergency diesel generators, will be regulated by the Environment Agency under the Environmental Permitting Regulations and controlled in accordance with an environmental permit to be issued for such operation.

12.5.8 The accommodation campus energy centre would be designed, maintained and operated in accordance with Medium Combustion Plant Directive (MCPD) requirements.

iii. Traffic emissions

12.5.9 During construction, a **Construction Workforce Travel Plan** (Doc Ref.8.8), **Construction Traffic Management Plan** (Doc Ref. 8.7) and delivery

management system would be implemented to reduce and manage the effects of traffic generated by the proposed development.

12.6 Assessment

12.6.1 This section presents the findings of the air quality assessment for the construction and operation of the proposed development. The effects associated with off-site developments on air quality, including off-site sports facilities, fen meadow compensation areas south of Benhall and east of Halsworth, and a marsh harrier habitat improvement area at Westleton (if required), have been screened out from detailed assessment as described in **Appendix 12D** of this volume.

a) Construction

i. Construction dust

12.6.2 The scale of potential for construction activities without embedded mitigation to generate dust within the proposed development has been categorised as 'large' by IAQM classification on earthworks area alone. There are 'high sensitivity' receptors within the IAQM screening distance of the main development site, although not all of these would result in a classification of 'high risk' of unmitigated dust emission impacts.

12.6.3 The IAQM guidance on mitigation for 'medium risk' and 'high risk' sites is very similar, with high risk sites generally recommended to have a greater level of monitoring and stakeholder engagement. Therefore, a precautionary approach has been applied, with dust mitigation measures recommended by IAQM for a 'high risk' sites being adopted in the **CoCP** (Doc Ref. 8.11) for the main development site, even if actual risks are lower within a particular phase of works.

12.6.4 Those construction activities with potential for a high risk of dust soiling, human health particulate impacts or ecological deposition have been identified for the main development site across the construction phase, as described within **Appendix 12A** of this volume, and summarised in **Table 12.16**. In the table, the study area is split into zones, shown in **Figure 12.2**, and described as follows:

- Zone A: the main construction area, including the area in which the main power station platform would be constructed (including the cut off wall); the foreshore area, including construction of, and presence of the permanent sea defences, and the marine delivery infrastructure, including beach landing facility.

- Zone B: the construction contractor area, including the common user facilities, concrete batching plant, prefabrication facilities, construction contractors' compounds and rail head (including the green rail route extension and train holding area to the east of Abbey Road).
- Zone C: the borrow pit and spoil storage areas, including spoil storage area adjacent to green rail route extension to the east of Abbey road.
- Zone D: site access hub, parking, offices and accommodation campus.
- Zone E: Land to the east of Eastlands Industrial Estate, substation and construction phase electrical cable route.
- Zone F: location of the Sizewell B relocated facilities, the National Grid substation, and the preliminary access route for the early years.

12.6.5 Five phases of construction have been considered for the dust impact assessment:

- Phase 1: site establishment and preparation for earthworks.
- Phase 2: main earthworks.
- Phase 3: main civil construction works.
- Phase 4: mechanical and electrical installation.
- Phase 5: commissioning and land restoration.

12.6.6 Phase 4 has been screened out of the assessment for dust impacts, as these activities are unlikely to have the potential for dust generation. During Phase 4 there will be overlap of Phase 3 works, such as concrete batching and use, and backfilling against structures; however, for the purposes of defining mitigation, such measures that are identified for control of activities within Phase 3 are assumed to be continued until cessation of the activities.

Table 12.16: Highest screened risk of dust impacts from unmitigated activities over whole construction period.

Impact	Zone	Highest identified risk (with construction phase).			
		Demolition	Earthworks	Construction	Trackout
Dust soiling.	A	Negligible	Low risk (1–5).	Low risk (1–3).	Low risk (1–5).
	B	Low risk (5).	Low risk (1,2,5).	Low risk (1–5).	Low risk (1–5).
	C	Medium risk (2).	**High risk (1–5)**.	Negligible	**High risk (1–5)**.
	D	Medium risk (5).	**High risk (1,5)**.	**High risk (2)**.	**High risk (1–5)**.

Impact	Zone	Highest identified risk (with construction phase).			
		Demolition	Earthworks	Construction	Trackout
	E	Medium risk (5).	**High risk (1–5)**.	Low risk (1).	**High risk (1–5)**.
	F	Low risk (1).	Low risk (1).	Low risk (1).	**High risk (1)**.
Human health.	A	Negligible	Low risk (1–5).	Low risk (1–3).	Low risk (1–5).
	B	Low risk (5).	Low risk (1,2,5).	Low risk (1–5).	Low risk (1–5).
	C	Medium risk (2).	Medium risk (1–5).	Negligible	Medium risk (1–5).
	D	Medium risk (5).	Medium risk (1,5).	Medium risk (2).	Medium risk (1–5).
	E	Medium risk (5).	Medium risk (1–5).	Low risk (1).	Medium risk (1–5).
	F	Low risk (1).	Low risk (1).	Low risk (1).	Medium risk (1).
Ecological	A	Negligible	**High risk (1–5)**.	**High risk (1–3)**.	**High risk (1–5)**.
	B	Medium risk (5).	Medium risk (1,2,5).	Medium risk (1–5).	Medium risk (1–5).
	C	Medium risk (2).	Low risk (1–5).	Negligible	Low risk (1–5).
	D	Negligible	Negligible	Negligible	Negligible
	E	Negligible	Low risk (1–5).	Negligible	**High risk (1)**.
	F	Medium risk (1).	Medium risk (1).	Medium risk (1).	Medium risk (1).

Dust soiling

12.6.7 The assessment of activities without mitigation has identified a high risk of dust soiling impacts, principally associated with earthworks and trackout activities in Zones C and E for the duration of the construction. Earthworks and trackout activities in Zone D during phases 1 and 5, and construction activities during phase 2, without mitigation, also represent a high risk of dust soiling impact, along with trackout in Zone F.

12.6.8 Mitigation within certain areas, such as for trackout impacts in Zone A and Zone C, may reduce the risks from the site as a whole and therefore reduce the level of mitigation required for the same activities within Zone D, subject to ongoing monitoring.

12.6.9 The activities undertaken within Zones A, B and F would be located sufficiently far away from sensitive properties such that the risk of dust soiling impacts from activities within these zones would be negligible.

Human health (particulate matter) effects

12.6.10 The construction dust assessment has identified the potential for a medium risk of human health (PM_{10}) impacts from unmitigated construction activities, principally within Zones C, D and E. No high risk of human health impacts, as a result of construction activities, has been identified within the construction dust assessment.

12.6.11 Within the risk assessment methodology, the sensitivity of a receptor area to construction dust PM_{10} impacts is dependent on both the baseline concentration of PM_{10} and the proximity of receptors to the construction activity. The assessment has identified a low or medium risk of impact from any of the construction phases within any of the defined zones, as even with the dust impact of the proposed development, the lowest screening categories are not exceeded. It is recognised that there is potential for long-term dust generating activities to increase this baseline level within a receptor area, such that the screening sensitivity level and thus the assigned level of risk could increase.

12.6.12 The highest identified level of risk of any impact defines the requirement for mitigation. The need for site-specific mitigation is defined by the need to mitigate the higher risk of dust soiling impacts at receptors, rather than the lower risk of significant PM_{10} impact. However, it is recognised that such mitigation would also lessen the risk of potential PM_{10} impact.

12.6.13 Zone C would represent a long-term potential source of dust generating activities, as the main earthworks and stockpiling activities would take place within this zone, in addition to crushing/screening activities. Activity specific mitigation in Zone C is discussed in **section 12.7** of this chapter.

Ecological effects

12.6.14 The assessment of construction activities without mitigation has identified a high risk of ecological impacts, principally associated with earthworks, construction and trackout activities in Zone A, for the duration of construction, and from trackout in Zone E during Phase 1.

12.6.15 The activities undertaken within Zones B, C, D and F would be located sufficiently far away from sensitive ecological receptors such that the risk of dust deposition impacts from activities within these zones would be negligible.

12.6.16 The assessment of NRMM emissions of NO_x on ecological receptors has determined that the maximum impact at the identified receptors would result in annual mean and daily mean concentrations of NO_x below the threshold for significance, and level of nitrogen deposition and acid deposition below the threshold for significance. The effects of NRMM NO_x emissions on ecological receptors are therefore expected to be **not significant**.

Effects with mitigation

12.6.17 The initial risk assessment indicates that many of the activities within the identified zones and phases of construction represent a low or medium risk of dust impact, and therefore with the application of the proposed high risk mitigation (as described in the **Appendix 12A** of this volume), dust

impacts at the identified receptors as a result of these activities would be expected to be **not significant.**

12.6.18 The risk screening assessment has also identified a high risk of dust impacts that could occur without adequate dust controls from certain activities, in particular from dust-raising on haul roads or trackout of materials onto public roads, and from surface level earthworks and stockpiling and spoil management (as set out in **Table 12.16**). Following further review of the specific activities, taking into consideration site-specific factors, such as the materials dust potential, the duration of activities, existing screening and local conditions, it is considered that the proposed embedded mitigation (as set out in the **CoCP**) would be effective in reducing dust soiling and ecological impacts at the identified receptors for the activities identified.

12.6.19 However, the likelihood of concurrent dust generating activities from several activities on specific receptors, and the long construction activity period, could result in an increase in receptor sensitivity or an increase over the baseline dust level. Therefore activity-specific mitigation would be required in order to reduce the effect from certain high risk activities on receptors, as summarised in **Table 12.17**. With activity-specific mitigation in place the effects are assessed as **not significant**.

Table 12.17: Further assessment of high-risk dust raising activities for activity-specific mitigation detailed in the outline Dust Management Plan (Appendix 12A).

Zone	Generic activity.	Phase	Activity details.	Embedded mitigation – oDMP ID1. (see Appendix 12A)	Assessment of risk.	Activity-specific mitigation?
A	Earthworks	1	Surface stripping, loading and drop operations, temporary stockpiling.	G4.1, G4.4, G4.5	Potentially low moisture retention properties of some material, close proximity to sensitive ecological receptor (E2), surface level works with limited screening.	Yes
		2, 3	Excavation of main construction area, sea defences.	G4.2	Materials would be wet at excavation and there would be minimal double handling within zone.	No
		5	Removal and reinstatement.	G4.5	Short/medium-term activity; pre-existing screening of receptors; material dust potential would be readily mitigated by wet suppression.	No
	Trackout	1–5	Dry, spilled or base materials subject to repeated traffic movement (internal haul routes).	G6.3	Long-term residual dust emissions within 50m of receptor (E2) with potential for impacts over several growing seasons.	Yes
	Construction	2, 3	Concrete use.	G5.1	Materials will be damp at point of use; majority of works undertaken below surrounding ground level.	No
B	None identified.					
C	Earthworks	1, 5	Surface stripping, loading and drop operations; restoration and landscaping.	G4.1, G4.4, G4.5	Short/medium - term activity; pre-existing screening of receptors; material dust potential would be readily mitigated by wet suppression.	No
		1–5	Stockpiling and reclamation.	G4.3	Long-term activities; minimal screening at maximum height; specific concern of local consultees.	Yes

Zone	Generic activity.	Phase	Activity details.	Embedded mitigation – oDMP ID1. (see Appendix 12A)	Assessment of risk.	Activity-specific mitigation?
		2	In situ lime treatment of peats and clays in borrow pits.	A1.1	Mostly sub-ground level activity with moist or wet base-screened out; lime treatment restricts use of water suppression, emissions within 20m of receptor (LE25), near-restoration level activity to be assessed.	Yes
	Trackout	1–5	Dry, spilled or base materials subject to repeated traffic movement (internal haul routes).	G6.3	Long-term residual dust emissions within 20m of receptor (LE25) with potential for impacts over several growing seasons.	Yes
D	Trackout	1–5	Dry, spilled materials subject to repeated traffic movement.	G6.3	Short-term localised activities associated with construction phase. Long-term residual trackout via access road, with sources from other zones that are controlled at point of exit; readily mitigated by proposed measures.	No
	Construction	2	Access hub and campus construction.	G5.1	Short-term localised activities; mostly modular construction, construction limited to concrete footings; pre-existing screening of receptors.	No
	Earthworks	1, 5	Surface stripping, loading and drop operations; restoration & landscaping.	G4.1, G4.4, G4.5	Short-/medium-term activity; pre-existing screening of receptors; material dust potential would be readily mitigated by wet suppression.	No
E	Earthworks	1, 5	Surface stripping, loading and drop operations, bund creation; restoration and landscaping.	G4.1, G4.4, G4.5	Short-/medium-term activity; pre-existing screening of receptors; material dust potential would be readily mitigated by wet suppression.	No
	Earthworks	1–5	Stockpiling and reclamation of aggregates.	G4.3	Site layout such that active aggregate stockpiling and transfer activities are central to site, and more than 100m from sensitive receptors; pre-existing screening of receptors.	No

Zone	Generic activity.	Phase	Activity details.	Embedded mitigation – oDMP ID1. (see Appendix 12A)	Assessment of risk.	Activity-specific mitigation?
	Trackout	1–5	Dry, spilled materials subject to repeated traffic movement – HDVs.	G6.3	Short-term localised activities associated with construction phase. Long-term residual trackout via access route to Zone B; no nearby concurrent activities; dust source readily mitigated by proposed measures. (Cumulative impact on SPA with East Anglia 1 North & East Anglia 2 considered within **Volume 2**, **Chapter 14**).	No
F	Demolition	1	Sizewell B facilities relocation, stripping and demolition of buildings.	G3.1, G3.2, G3.3.	Limited spatial overlap with other sources; receptor screened by existing trees and vegetation; short-term activity.	No

ii. Non-mobile plant emissions

Human health effects

12.6.20 Results for CHP modelling at human receptors within the main development site domain are presented in tables displayed in **Appendix 12F** of this volume. The results show that annual mean NO_2 concentrations at all receptors have an imperceptible magnitude of change, except LE42, where a low magnitude of change is predicted. Hourly mean NO_2 results at most receptors are predicted to have an imperceptible magnitude of change, with the exception of LE3, LE17, LE26, LE28, LE3c and LE17c which would have a very low magnitude of change. A high magnitude of change in hourly NO_2 is predicted at LE42, although the total concentration at this receptor would be 19.1µg/m^3, which is less than 10% of the air quality objective value and would therefore be **not significant**. CHP modelling results show that 8-hour rolling mean CO concentrations at all receptors all have an imperceptible magnitude of change. The air quality effects are determined to be **not significant** at all receptors.

12.6.21 Concentrations of annual mean and hourly mean NO_2, and 8-hourly rolling mean CO at all receptors are substantially lower than the air quality objectives.

Ecological effects

12.6.22 Results for CHP modelling at ecological receptors are presented in tables displayed in **Appendix 12F** of this volume**.** The annual mean NO_x concentrations at all ecological receptors are less than 1% of the critical level (30µg/m^3) at all sites.

12.6.23 The daily mean NO_x concentrations at all ecological receptors are less than 10% of the critical level (75µg/m^3) at all sites.

12.6.24 The background deposited nitrogen and deposited acid concentrations are high for those receptors where backgrounds are available. The contribution to deposited nitrogen from CHP emissions is less than 1% of the critical load at the worst-affected receptor. The contribution to acid deposition from CHP emissions is less than 1% of the critical load at the worst-affected receptor.

12.6.25 The air quality effects are determined to be **not significant** at all receptors.

iii. Transport emissions

Human health effects

12.6.26 The transport emissions assessment (see **Appendix 12B** of this volume) reports the combined impacts of emissions from road and rail vehicles in each scenario at 183 representative receptor locations. At all of these locations there is a reduction in the long and short term concentrations of NO_2, PM_{10} and $PM_{2.5}$ relative to the 2018 baseline scenario. The magnitude of the future improvement in air quality is likely to be greatest in the air quality management areas, but at all locations the magnitude of reduction to future baseline concentrations are greater than the corresponding impacts of the proposed development.

12.6.27 At properties in Sizewell village (LE13) the predicted magnitude of impacts relative to future baseline conditions is greater in the early year construction scenario of 2023 than in the peak construction or operational scenarios. The magnitude of the change to annual mean concentration of NO_2 is predicted to increase by 0.4 µg/m^3 due to emissions from vehicles on the pulic highway and the use of the haul route. This very low magnitude increase would raise the annual mean concentration of NO_2 to 10.9 µg/m^3, remaining well below the objective value of 40 µg/m^3 and is a negligible effect at this receptor. The effect of increased concentrations of particulate matter are also negligible at this receptor.

12.6.28 Within Leiston the magnitude of impacts during the construction scenarios are low to imperceptible in magnitude at all receptors. The largest increases occurring for the peak construction scenario of 2028, at the junction of Sizewell road and High Street (LE9) where a low magnitude increase of 1.7 µg/m^3 to the annual mean concentration of NO_2 is predicted and on the B1122 near junction with Waterloo Avenue (LE1) where the corresponding increase is 1.9 µg/m^3. The effect on air quality at all receptors within Leiston are negligible.

12.6.29 At properties near to the B1122 (Abbey Road) and the railway vehicle movements, such as residential properties on Abbey Road (LE2), Leiston Abbey (LE15) and the Sizewell C Accommodation Campus (LE42), the peak construction scenario change in annual mean nitrogen dioxide concentration is very low to imperceptible in magnitude and the impacts for particulate matter from transport emissions are imperceptible. These impacts represent a negligible effect at these receptors.

12.6.30 The largest predicted impacts occur away from the main development site at locations that would benefit most from the rerouting of baseline traffic flows in the peak construction scenario. Within the villages of Stratford St Andrews and Farnham (SX5, SX6, SX7 and SX15) are predicted to

experience a 'minor' or 'moderate' beneficial effect at a small number of properties due to a medium (SX6) to high (SX7, SX15) magnitude reduction in annual mean NO_2 concentration. During the operational scenario a smaller number of properties are predicted to experience a high (SX7 and SX15) magnitude reduction in annual mean $PM_{2.5}$ concentration under the operational scenario. These effects are minor or moderate at the individual properties, but occur at receptors that already experience concentrations of NO_2 and particulate matter that meets the objective values by a large margin.

12.6.31 Overall, the impact of transport emissions in all modelled scenarios during construction would have a negligible effect at most receptor locations, with only a limited number of receptors experiencing a 'minor' or 'moderate' beneficial effect. The air quality effects for the study area as a whole resulting from traffic associated with the construction of the proposed development are predicted to be **not significant** for all sensitive receptors within the study area.

Ecological effects

12.6.32 Results of the transport emissions modelling show that predicted concentrations of NO_x, maximum nutrient nitrogen deposition and maximum acid deposition are highest in the current baseline, represented by the 2018 reference case scenario when compared against the future baseline scenarios without the proposed development traffic. It is predicted that during construction of the proposed development, NO_x concentrations will be lower than the predicted current baseline.

12.6.33 The largest transport contribution of nutrient nitrogen deposition and acid deposition occurs for the 2028 peak construction scenarios. Locations where these values are highest are as a result of the ecological site being immediately adjacent to modelled roads. In these cases, it is important to acknowledge that this value is only representative of the portion of the ecological site immediately adjacent to the road. It is also important to acknowledge that predicted pollutant concentrations with the construction of the proposed development in any future year are lower than those predicted to currently occur at the ecological sites. An assessment of the significance of effects on ecological sites is presented in **Chapter 14 Terrestrial Ecology and Ornithology** of this volume.

iv. In-combination effects of construction dust, non-mobile plant and transport emissions

12.6.34 For human health receptors, combined effects from construction dust, CHP and transport emissions have the potential to have adverse effects on receptors close to the accomodation campus. At receptors further from the

site, effects on air quality at roadside receptors is only expected to result from transport emissions.

12.6.35 **Table 12.18** reports the combined change in pollutant concentration resulting from construction dust, non-mobile plant and transport emissions during peak construction compared to the future baseline (2028) for sensitive areas near the main development. The receptor in each area with the largest change is reported.

Table 12.18: Change in in-combination construction source pollutant concentrations compared to future baseline (2028) at sensitive areas near the main development site

Area	Change in NO_2 ($\mu g/m^3$)	NO_2 magnitude of change descriptor	Change in PM_{10} ($\mu g/m^3$)	PM_{10} magnitude of change descriptor	Change in $PM_{2.5}$ ($\mu g/m^3$)	$PM_{2.5}$ magnitude of change descriptor	ID where largest change occurs
Sizewell Village	0.1	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE13
Sandy Lane	0.2	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE32
Lovers Lane	1.7	Low	0.0	Imperceptible	0.1	Imperceptible	LE38
Leiston central	1.9	Low	0.2	Imperceptible	0.3	Very Low	LE1
Abbey Road	0.9	Low	0.1	Imperceptible	0.2	Imperceptible	LE3
Abbey Lane	0.1	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE18c
Campus	1.7	Low	0.0	Imperceptible	0.0	Imperceptible	LE42
Road to Eastbridge from Abbey Road	0.2	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE25
Theberton	0.1	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE4
Stratford St. Andrew AQMA	-7.4	High Beneficial	-1.3	Low Beneficial	-2.2	Medium Beneficial	SX6
Woodbridge AQMA	1.0	Low	0.1	Imperceptible	0.2	Imperceptible	WBG 20

v. Inter-relationship effects

12.6.36 Inter-relationship effects with air quality for amenity and recreation and ecological receptors are considered within **Chapters 14** and **15** of this volume, respectively. Inter-relationship effects on human health receptors are considered further in **Chapter 28** of this volume and in **Volume 10**, **Chapter 2**.

b) Operation

i. Non-mobile plant

12.6.37 The full results of the non-mobile plant assessment are provided in **Appendix 12C** of this volume**.**

Long-term human health effects – commissioning

12.6.38 The maximum annual average process contribution from back up diesel generators predicted for NO_2 at any receptor during the commissioning scenario modelled is 0.6µg/m^3. This process contribution represents 1% of the relevant AQS objective, and therefore can be considered **not significant** in accordance with the Environment Agency's screening criteria. As all other receptor locations are predicted to have lower process contributions, the effects of NO_2 emissions from combustion activities are **not significant** at all receptors.

12.6.39 There are no long-term average assessment criteria for the assessment of SO_2 impacts.

12.6.40 The maximum annual average PM_{10} process contributions from back up diesel generators at any receptor is 0.02µg/m^3. This process contributions represents 0.1% of the relevant AQS objective and therefore can be considered **not significant**. Effects at all receptor locations are therefore considered to be **not significant**. The same predicted concentrations have also been used to conservatively assess $PM_{2.5}$, and therefore the maximum annual average process contributions predicted for $PM_{2.5}$ is also 0.02µg/m^3. This also represents 0.1% of the $PM_{2.5}$ AQS target, and, therefore, the effects can also be considered to be **not significant** at all receptors.

Long-term human health effects – routine testing

12.6.41 The maximum annual average process contributions from back up diesel generators for NO_2 under the routine operation scenario is expected to be approximately a third of the predicted impact from the commissioning scenario at any receptor, and, therefore, also can be considered **not significant.**

12.6.42 The maximum predicted annual average PM_{10} (and $PM_{2.5}$) process contributions under the routine operation scenario is expected to be approximately a third of the commissioning scenario at any receptor and, therefore, also **not significant.**

Long-term human health effects – Loss of Off-site Power scenario

12.6.43 No long-term effects resulting from the back up diesel generators are assessed for the loss of off-site power scenario as this is only predicted to last for a short period (likely to be less than 24 hours) if ever it took place.

Short-term human health effects – commissioning

12.6.44 The maximum predicted hourly (as 99.8th percentile) NO_2 process contributions from back up diesel generators for the commissioning scenario is estimated to be a maximum of 85% of the AQS objective. At the second stage of screening, the process contributions represents 91% of the short-term AQS minus twice the long-term background concentration, however, it is considered unlikely that the diesel generators will be tested at exactly those times during which meteorological conditions are most unfavourable as evaluated in the assessment and, therefore, the results presented in this assessment are considered to be very conservative. It is therefore considered that the short-term effects of NO_2 from the diesel generators would be **not significant.**

12.6.45 The maximum predicted 15-minute SO_2 process contributions from back up diesel generators (as the 99.9th percentile of 15-minute averages) at residential receptors during commissioning was 26.3µg/m^3, which represents 10% of the relevant AQS objective, which is below the threshold for significance for short-term impacts and, therefore, is it considered **not significant.**

12.6.46 The maximum hourly process contributions from from back up diesel generators (as the 99.73th percentile of hourly averages) of SO_2 during the commissioning phase was 15.9µg/m^3, which represents 5% of the relevant AQS objective and is below the threshold for significance for short-term impacts and therefore is it considered **not significant**. The maximum 24-hour average SO_2 process contributions (as the 99.18th percentile of 24-hour averages) was 6.0µg/m^3, which represents 5% of the relevant AQS and therefore is not considered to represent a risk of exceedance of the AQS objective and can be considered **not significant.**

12.6.47 The maximum predicted 24-hour average process contributions from back up diesel generators of PM_{10} (as the 90.41th percentile of 24-hour averages) was 1.4µg/m^3, which represents 3% of the relevant AQS objective and is therefore below the 10% threshold for significance of short-term impacts, as defined in the Environmental Agency's risk assessment

guidance. Impacts at all receptors are, therefore, considered **not significant.**

12.6.48 The maximum predicted hourly average CO process contributions from back up diesel generators from the commissioning scenario was 65.6µg/m^3, which represents 0.2% of the relevant environmental assessment levels and is therefore below the 10% threshold for significance of short-term impacts, as defined in the Environment Agency's risk assessment guidance. Impacts at all receptors are, therefore, considered **not significant.**

12.6.49 The maximum eight-hourly CO process contributions from back up diesel generators during commissioning activities was 28.6µg/m^3, which represents 0.3% of the relevant AQS objective and is therefore below the 10% threshold for significance of short-term impacts, as defined in the Environment Agency's risk assessment guidance. Impacts at all receptors are, therefore, considered **not significant.**

Short-term human health effects – routine testing

12.6.50 The maximum (as 99.8th percentile) hourly NO_2 process contribution from back up diesel generators under the routine operation scenario is expected to be approximately a quarter of the process contributions from the commissioning scenario at any receptor. It is therefore only just over the second stage screening criteria of 20% of the AQS objective minus twice the long-term background at 22%, and, therefore, can be considered **not significant.**

12.6.51 The maximum predicted 15-minute, hourly or 24-hourly average SO_2 process contributions from back up diesel generators under the routine operation scenario are all predicted to be lower than the respective predicted impacts from the commissioning scenario at any receptor and, therefore, also can be considered **not significant.**

12.6.52 The maximum predicted 24-hourly average PM_{10} process contribution from back up diesel generators under the routine operation scenario is expected to be lower than the respective predicted impact from the commissioning scenario at any receptor and, therefore, also can be considered **not significant.**

12.6.53 The maximum predicted hourly or eight-hourly average CO process contribution from back up diesel generators under the routine operation scenario is expected to be lower than the respective predicted impact from the commissioning scenario at any receptor and therefore also can be considered **not significant**.

Short-term human health effects – Loss of Off-site Power scenario

12.6.54 The maximum predicted short-term NO_2 process contributions from back up diesel generators (as the 99.8th percentile of hourly averages) at any human health receptor under a loss of off-site power scenario is 256.8µg/m^3. This represents 128% of the hourly NO_2 AQS objective. When the process contribution is compared to the relevant AQS objective minus twice the long-term background concentration, it represents 136% of the AQS objective. The emissions of NO_2 during a loss of off-site power scenario, therefore, have the potential to be **significant.**

12.6.55 Short-term effects of the loss of off-site power event have been assessed for each of the 8,760 hours of the assessment year, in order to account for the meteorological conditions which could lead to the worst case impacts. However, it is very unlikely that a loss of off-site power event would occur when these worst case meteorological conditions are present and therefore the results presented in this assessment are conservative. The use of the 99.8th percentile in the AQS objective permits exceedance of the 200µg/m^3 objective value for up to 18 hours per year. As this scenario represents emergency shutdown of the United Kingdom European Pressurised Reactors (UK EPR™'s), it is not possible to state how long an actual loss of off-site power event would last but it is likely to be less than 24 hours.

12.6.56 The maximum 15-minute SO_2 process contribution from back up diesel generators (as the 99.9th percentile of 15-minute averages) at any human health receptor under a loss of off-site power scenario is 31.7µg/m^3. This represents12% of the relevant AQS objective and therefore is just over the threshold for insignificance. All other receptors experience lower process contributions, and therefore it is considered that the effects are **not significant.**

12.6.57 The maximum hourly process contribution (as the 99.73th percentile of hourly averages) of SO_2 from back up diesel generators predicted to occur during the loss of off-site power scenario is 22.6µg/m^3, which represents 6% of the relevant AQS objective and is below the 10% threshold for insignificance and can be considered **not significant**. All other receptors receive lower impacts.The maximum 24-hour average process contribution (as the 99.18th percentile of 24-hour averages) of SO_2 predicted to occur during the loss of off-site power scenario is 9.3µg/m^3, which represents 7% of the relevant AQS objective. All other receptors experience lower impacts, and, therefore, it is considered the effects are **not significant.**

12.6.58 The maximum 24-hour process contribution of PM_{10} (as the 90.41th percentile of 24-hour averages) from back up diesel generators predicted to occur during the loss of off-site power is 2.4µg/m^3, which represents 5% of the relevant AQS objective and is therefore below the 10% threshold for

significance of short-term impacts, as defined in the Environment Agency's risk assessment guidance. Impacts at all receptors are, therefore, considered **not significant.**The maximum hourly CO process contribution predicted to occur during the loss of off-site power event was 77.1µg/m^3, which represents 0.3% of the relevant environmental assessment levels and is therefore below the 10% threshold for significance of short-term impacts, as defined in the Environment Agency's risk assessment guidance. Impacts at all receptors are, therefore, considered **not significant**.

12.6.59 The maximum 8-hourly CO process contribution from back up diesel generators predicted to occur during the loss of off-site power event 43.3µg/m^3, which represents 0.4% of the relevant AQS objective and is therefore below the 10% threshold for significance of short-term impacts, as defined in the Environment Agency's risk assessment guidance. Impacts at all receptors are, therefore, considered **not significant.**

Long-term ecological effects – commissioning

12.6.60 The maximum annual average NO_x process contribution from back up diesel generators predicted to occur represents 45% of the critical level during the Commissioning period. When combined with the background concentrations it represents 71% of the critical level, and, therefore, is just over the second stage of the Environment Agency's screening criteria of 70% at 71%.

12.6.61 The maximum annual average SO_2 process contribution from back up diesel generators predicted to occur represents 2.3% of the critical level during the Commissioning period. When combined with the background concentrations it represents 22% of the critical level, and, therefore, is below the second stage of the Environment Agency's screening criteria of 70%. Long-term effects on critical loads of acid and nitrogen at ecological receptors are presented in **Appendix 12C** and discussed in **Chapter 14** of this volume.

Long-term ecological effects – routine testing

12.6.62 The maximum annual average process contribution from back up diesel generators for NO_x and SO_2 under the routine operation scenario is expected to be approximately a third of the predicted impact from the commissioning scenario at any receptor. Long-term effects on critical loads of acid and nitrogen at ecological receptors are presented in **Appendix 12C** and discussed in **Chapter 14** of this volume.

Long-term ecological effects – Loss of Off-site Power scenario

12.6.63 No long-term effects are assessed for the loss of off-site power scenario as this is only predicted to last for a short period (likely to be less than 24 hours) if ever it took place.

Short-term ecological effects – commissioning

12.6.64 No short-term effects are assessed for the commissioning scenario, as there are no commissioning activities that could lead to emissions from the diesel generators over a 24-hour period.

Short-term ecological effects – routine testing

12.6.65 The maximum daily average process contribution for NO_x from back up diesel generators represents 428% of the critical level at Sizewell Marshes SSSI, although the assessment is conservative in the modelling of operational timescales, and the likelihood of an exceedance occurring through coincidence of operation of the diesel generators and the meteorological conditions leading to the worst-case conditions, is low. A number of other ecological sites in close proximity to the diesel generators also experience process contributions that show an exceedance of the daily critical level (Minsmere and Walberswick Heaths and Marshes, Suffolk Beaches, Sizewell Levels and Minsmere South Levels). It is reasonable to consider that the short-term (24-hour) mean for NO_x is of less importance than the annual mean, as vegetation exposed to levels of NO_x above the critical level will be more likely to recover from that exposure if the exceedance is for a short duration. Authors from the Centre for Ecology and Hydrology in a recent book on nitrogen (Ref. 12.26), NO_x concentrations and vegetation, states that 'UN/ECE Working Group on Effects strongly recommended the use of the annual mean value, as the long-term effects of NO_x are thought to be more significant than the short-term effects'. The significance of the predicted effect on the ecological receptors has been considered in **Chapter 14 Terrestrial Ecology and Ornithology** of this volume and the report to inform an appropriate assessment under the Habitats Regulations (the **Shadow Habitats Regulations Assessment** report (Doc Ref. 5.10)).

Short-term ecological effects – Loss of Off-site Power scenario

12.6.66 No short-term effects are assessed for the loss of off-site power scenario, as the long loss of off-site power scenarios, lasting up to 24 hours are only predicted to occur once in the lifetime of a fleet of nuclear sites.

In-combination effects of the CHP and diesel generators

12.6.67 As the CHP is to be retained following completion of the construction phase, there is potential for in-combination effects of the CHP plant emissions and the diesel generator emissions during the operational phase. The pollutants that this would affect include NO_x and CO only.

12.6.68 Based on the predicted impacts of emissions from each source outlined earlier in this chapter, the distance between the diesel generators and CHP plant emission stacks and the dispersion patterns of emissions from each source, the in-combination operational effects of the diesel generators and the CHP plant emissions are considered to be **not significant** for both NO_x and CO emissions at all the receptors included in the non-mobile plant assessment.

ii. Transport emissions

Human health effects

12.6.69 The descriptors for effects of predicted changes in NO_2, PM_{10} and $PM_{2.5}$ on individual receptors in 2034 scenario are all 'negligible'. It is predicted that there will be a 'low', 'very low' or 'imperceptible' magnitude of change due to the absolute concentrations predicted at the receptors within the study area being well below the relevant air quality objective value. These magnitude of change descriptors can be attributed to all receptors within the study area for the operational scenarios, with the exception of those described in the following paragraph.

12.6.70 The largest predicted impacts occur away from the main development site at locations that would benefit most from the rerouting of baseline traffic flows in the operational scenario. Within the villages of Stratford St Andrews and Farnham (SX5, SX6, SX7 and SX15) are predicted to experience a 'minor' or 'moderate' beneficial effect at a small number of properties due to a medium (SX6) to high (SX7, SX15) magnitude reduction in annual mean NO_2 concentration. During the operational scenario a smaller number of properties are predicted to experience a high (SX7 and SX15) magnitude reduction in annual mean $PM_{2.5}$ concentration under the operational scenario. These effects are minor or moderate at the individual properties, but occur at receptors that already experience concentrations of NO_2 and particulate matter that meets the objective values by a large margin.

12.6.71 Overall, the impact of transport emissions in all modelled scenarios will have a 'negligible' effect at most receptor locations with only a limited number of receptors experiencing a 'minor' or 'moderate' beneficial effect. The air quality effects for the study area as whole resulting from traffic associated with the

operation of the proposed development are predicted to be **not significant** for all sensitive receptors within the study area.

Ecological effects

12.6.72 Results of the transport emissions modelling as detailed in **Appendix 12B** of this volume show that predicted concentrations of NO_x, maximum nutrient nitrogen deposition and maximum acid deposition are greatest in the predicted current baseline, represented by the 2018 reference case scenario. It is predicted that during operation of the proposed development, NO_x concentrations will be lower than predicted current baseline.

12.6.73 Minsmere – Walberswick Heaths and Marshes SAC, SPA, Ramsar and Sizewell Marshes/levels SSSI will experience a maximum contribution of pollutants from proposed development traffic of less than 1% of critical levels. Concentrations of NOx and nutrient nitrogen deposition for Sandlings SPA are predicted to be marginally above 1% of critical levels. This is as a result of the ecological site being immediately adjacent to modelled roads. In these cases it is important to acknowledge that this value is only representative of the portion of the site immediately adjacent to the road. It is also important to acknowledge that predicted pollutant concentrations with the proposed development in operation are lower than those that currently occur at ecological sites.

iii. In-combination effects of non-mobile plants and transport emissions

12.6.74 For human health receptors, combined effects from the CHP and transport emissions have the potential to have adverse effects on receptors close to the accomodation campus. At receptors further from the site, effects on air quality at roadside receptors is only expected to result from transport emissions.

12.6.75 **Table 12.19** reports the combined change in pollutant concentration resulting from non-mobile plant and transport emissions compared to the future baseline (2034) for sensitive areas near the main development. The receptor in each area with the largest change is reported.

Table 12.19: Change in in-combination operational source pollutant concentration compared to future baseline (2034) at sensitive areas near the main development site

Area	Change in NO_2 ($\mu g/m^3$)	NO_2 magnitude of change descriptor	Change in PM_{10} ($\mu g/m^3$)	PM_{10} magnitude of change descriptor	Change in $PM_{2.5}$ ($\mu g/m^3$)	$PM_{2.5}$ magnitude of change	Receptor ID where largest change occurs
Sizewell Village	0.0	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE30
Sandy Lane	0.1	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE32
Lovers Lane	0.1	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE7c
Leiston central	0.3	Imperceptible	0.0	Imperceptible	0.1	Imperceptible	LE1
Abbey Road	0.4	Very Low	0.0	Imperceptible	0.1	Imperceptible	LE3
Abbey Lane	0.0	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE18
Campus (assumed unoccupied)	0.0	Low	0.0	Imperceptible	0.0	Imperceptible	LE42
Road to Eastbridge from Abbey Road	0.2	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE25
Theberton	0.1	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	LE4
Stratford St. Andrew AQMA	-6.9	High Beneficial	-1.3	Low Beneficial	-2.3	Medium Beneficial	SX6
Woodbridge AQMA	0.0	Imperceptible	0.0	Imperceptible	0.0	Imperceptible	WBG 13

iv. Inter-relationship effects

12.6.76 Inter-relationship effects with air quality for ecological receptors and amenity and recreation, are considered within **Chapters 14** and **15** of this volume, respectively. Inter-relationship effects on human health receptors are considered further in **Chapter 28** of this volume and in **Volume 10, Chapter 2.**

12.7 Mitigation and monitoring

12.7.1 Primary and tertiary mitigation measures which have already been incorporated within the design of the proposed development are detailed in **section 12.5** of this chapter.

12.7.2 Where other mitigation is required to reduce or avoid a significant effect, this is referred to as secondary mitigation. This section describes the proposed secondary mitigation measures for air quality and also describes any monitoring required of specific receptors/resources or for the effectiveness of a mitigation measure.

a) Mitigation

i. Construction dust

12.7.3 Zones A and C are identified as featuring activities that would have the potential for significant, in-combination, residual effects without activity-specific mitigation, as identified in **Table 12.16**. Additional mitigation of these activities has therefore been proposed, as detailed in the 'activity-specific measures' of the outline Dust Management Plan (oDMP) in **Appendix 12A** of this volume. These measures would be implemented through compliance with the **CoCP** (Doc Ref. 8.11).

12.7.4 In order to demonstrate the likely efficacy of the proposed activity-specific mitigation, a detailed assessment of the residual dust impacts of the identified activities has been carried out. The detailed assessment methodology and assumptions are provided in **Appendix 12A** of this volume.

12.7.5 No further measures are proposed to mitigate construction dust impacts on the main development site.

ii. Non-mobile plant emissions and transport emissions

12.7.6 No further mitigation to that described in **section 12.5** is proposed to mitigate non-mobile plant and transport emission impacts.

b) Monitoring

12.7.7 Monitoring is proposed for meteorological conditions, and dust and particulate emissions from certain activities, as summarised in **Table 12.20** and would be implemented through the **CoCP** (Doc Ref. 8.11). No further monitoring is proposed to mitigate construction dust impacts on the main development site.

Table 12.20: Proposed monitoring and inspection measures.

Zones	Reference activity.	oDMP ID.	Mitigation measure.
Monitoring and inspection.			
A–F	All	M5.1	Regular site inspections would be carried out to ensure compliance with the oDMP and monitoring results and corrective actions would be recorded in a log book, to be made available to the local authority on request. Site inspections would be increased in frequency during periods of prolonged dry or windy conditions.
		M5.2	All dust and air quality complaints, and corrective actions, would be recorded in a log book, to be made available to the local authority on request.
A, C, E	All	M5.3	Weather conditions would be reviewed prior to works to be undertaken within 50 metres (m) of sensitive boundaries in Zones A and E and within 100m of sensitive boundaries in Zone C to determine the need for additional mitigation.
A–F	All	M5.4	Baseline and activity-specific dust and particulates monitoring would be carried out according to the requirements identified within the risk assessment.
A, C.	Haulage	M5.5	Regular monitoring of on-site haul roads within 50m of sensitive boundaries during prolonged dry or windy conditions to determine the need for additional mitigation, such as use of boundary misting.
A, C.	Haulage	M5.6	Regular inspection of haul routes would be made, with repairs as required, to ensure surfaces are maintained.

12.8 Residual effects

12.8.1 The assessment presented in this chapter indicates that there are unlikely to be any significant effects on human health receptors due to construction dust emissions, transport emissions, or other on-site emissions with appropriate mitigation in place.

12.8.2 The potential for significant effects from the off-site developments (marsh harrier habitat improvement area west of Westleton, fen meadow compensation areas to the south of Benhall and to the east of Halesworth,

and off-sports sports facilities at Leiston) have been screened out of the assessment (refer to **Appendix 12D** of this volume for further detail).

12.8.3 In an emergency resulting in loss of off-site power, safe shutdown of the reactors would require the operation of the diesel generators for which the worst-case modelling results predict short-term NO_2 concentrations that exceed the short-term air quality standard (200µg/m^3). Potentially significant short-term NO_2 effects at human health receptors could occur in the event that the operation of the diesel generators conincides with meteorological conditions that lead to exceedance of the air quality strategy objective (99.8th percentile of hourly averages, or the exceedance of the hourly standard no more than 18 times per year) , although the duration of any such event would be dependent on the duration of loss of off-site power. However such an event would be expected to occur about once in the lifetime of a fleet of nuclear sites and therefore the potential for air quality effects from this source is considered to be not significant.

12.8.4 The assessment of the significance of air quality effects on ecological receptors is presented in **Chapter 14 Terrestrial Ecology and Ornithology** of this volume.

12.8.5 A summary of the air quality assessment on human health and residual effects is presented in **Table 12.21** and **Table 12.22** below.

Table 12.21: Summary of effects for the construction phase.

Receptor	Impact	Primary or tertiary mitigation.	Assessment of effects.	Additional mitigation.	Residual effects.
Residential Properties	Potential amenity or health impacts from generation of particulate matter from construction activities.	As proposed in CoCP (Doc Ref. 8.11) based on risk assessment.	Low to negligible risk.	Some activity specific mitigation, as detailed in Table 12.16	Low to negligible risk (Not significant).
Residential Properties	Emissions from additional road vehicle movements.	Construction of park and rides, two village bypass, Sizewell link road, freight management facility, green rail route, rail and highway improvements, beach landing facility, accommodation campus and caravan park on the main development site. Measures set out within the Construction Traffic Management Plan and Construction Workforce Travel Plan.	Negligible	None required.	Negligible (Not significant).
Residential Properties	Emissions from non-mobile plant sources	An accommodation campus energy centre, comprising a CHP plant with an optimised stack height to minimise ground-level air quality impacts balanced against the visual impacts of taller stacks.	Not significant	None required.	Not significant.

Table 12.22: Summary of effects for the operational phase.

Receptor	Impact	Primary or tertiary mitigation.	Assessment of effects.	Additional mitigation.	Residual effects.
Residential Properties.	Emissions from combustion sources	Diesel generator stack heights set as high as could be achieved and emissions of nitrogen oxides controlled through primary means. An accommodation campus energy centre, comprising a CHP plant with an optimised stack height to minimise ground-level air quality impacts balanced against the visual impacts of taller stacks.	Not significant.	None required.	Not significant.

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