The Sizewell C Project

6.3 Volume 2 Main Development Site

Chapter 12 Air Quality

Appendices 12A - 12F
Part 2 of 2

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VOLUME 2, CHAPTER 12, AIR QUALITY, APPENDICES 12A - 12F

Documents included in Part 2 are:

APPENDIX 12C: COMBUSTION ACTIVITY IMPACT ASSESSMENT FOR AIR EMISSIONS

APPENDIX 12D: OFF-SITE DEVELOPMENTS ASSESSMENT

APPENDIX 12E: BASELINE MONITORING REPORT

APPENDIX 12F: CAMPUS COMBINED HEAT AND POWER EMISSIONS ASSESSMENT

VOLUME 2, CHAPTER 12, APPENDIX 12C: COMBUSTION ACTIVITY IMPACT ASSESSMENT FOR AIR EMISSIONS

AECOM

Sizewell C Combustion Activity Impact Assessment for Air Emissions

January 2020

60578253

Prepared for: NNB Generation (SZC) Company Ltd

Prepared by: AECOM

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1. INTRODUCTION

AECOM Infrastructure & Environment UK Ltd (hereafter referred to as “AECOM”) was commissioned by NNB Generation (SZC) Company Ltd (SZC Co.) to assess the potential environmental impacts of anticipated emissions to air from the Combustion Activity Environmental Permit Installation associated with the proposed Sizewell C nuclear power station.

The proposed Sizewell C nuclear power station will include two UK European Pressurised Reactors (EPRs™) supported by up to twelve backup diesel generators (DGs), with an aggregated thermal input exceeding 50MWth. An environmental permit is therefore required under Schedule 1, Part 2, Chapter 1, Section 1.1, Part A(1)(a) of the Environmental Permitting (England and Wales) Regulations 2016 for the operation of the combustion activities (CA) (referred to as the “Combustion Activity Permit”). This assessment has been prepared in order to support the environmental permit application process for the DGs that comprise the listed CA, hereafter referred to as the “installation” and also to support the environmental impact assessment reported in the **Environmental Statement** (**ES**) (Doc Ref. Book 6). The assessment sits within the appendices to **Volume 2, Chapter 12** of the **ES** as it is also relevant to the impact assessment of the air quality effects associated with the Sizewell C Project as it provides results from the assessment of pollutant emissions arising from CAs at the main development site.

The anticipated impacts on air quality resulting from the emissions to air from the installation’s point sources have been determined using the Environment Agency’s Risk Assessment for Specific Activities: Environmental Permits[1]. The pollutants have been assessed through detailed dispersion modelling, using the proprietary model Atmospheric Dispersion Modelling System (ADMS5[2]). Emissions to air from the installation point sources have been modelled to determine the likely worst-case Process Contributions (PCs). These have been added to the background pollutant concentrations to determine the overall predicted environmental concentration (PEC) at sensitive receptor locations, which have then been assessed against air quality standards.

An assessment of the potential impacts at sensitive designated habitat sites, including depositional impacts, has also been undertaken.

2. ASSESSMENT METHODOLOGY

The Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland[2] defines Air Quality Objectives for several of the most commonly emitted pollutants from industrial point sources. These objectives must be achieved on a national scale by a set date – typically this was set at 2010 - and thereafter. These so-called “criteria pollutants” include nitrogen dioxide (NO_2), sulphur dioxide (SO_2), particulates (as PM_{10} and $PM_{2.5}$) and carbon monoxide (CO) that will be emitted from the installation. The objectives can be regarded as legislative limits that cannot be exceeded and apply to outdoor locations where people are regularly present.

There is an additional hourly mean Environmental Assessment Level (EAL) for carbon monoxide, published in the Environment Agency’s Risk Assessment Guidance, which has also been used in the assessment.

The AQS defines Critical Levels for the protection of vegetation and ecosystems for NO_x (as NO_2) and SO_2. The term “Critical Levels” refers to the concentrations of a pollutant in the atmosphere above which adverse effects on receptors, such as plants and/ or ecosystems may occur. They refer to the direct effects of atmospheric pollutants on vegetation.

[1] Environment Agency and Defra. 2016. Risk Assessments for Specific Activities: Environmental Permits. Available at https://www.gov.uk/government/collections/risk-assessments-for-specific-activities-environmental-permits

[2] Defra. 2007. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

The AQS objectives, EALs and Critical Levels relevant to the potential combustion emissions from the installation are shown in **Table 2-1**.

Table 1-1: AQS objectives, Environmental Assessment Level and Critical Levels

POLLUTANT	AQS ($\mu g/m^3$)	AVERAGING PERIOD
Nitrogen Dioxide (NO_2)	200 40	1-hour 99.8th percentile Annual average
Oxides of Nitrogen (as NO_2)	75 30	Daily average v Annual average v
Carbon Monoxide (CO)	30,000 10,000	1-hour 100th percentile Maximum daily 8-hour running average
Sulphur Dioxide (SO_2)	266 350 125 20 10	15-min 99.9th percentile 1-hour 99.7th percentile 24-hour 99.2nd percentile Annual average v – Higher plants Annual average v – Lichens and bryophytes
Particulate matter (PM_{10})	50 40	24-hour 90.4th percentile Annual average
Particulate matter ($PM_{2.5}$)	20	Annual average (by 2015)

Notes: (V) For the protection of vegetation and ecosystems. Other standards are for the protection of human health.

For most habitat sites, Critical Loads are also specified for nutrient nitrogen and acid deposition impacts. Critical Loads are determined for the protection of specific habitat features within the habitat sites, and therefore the Critical Loads applied for the assessment can vary across the habitat site being assessed, dependent on the different habitat features present. The various habitat features identified within the habitat sites applicable to the assessment are described in **Appendix A** of this document.

Background Concentrations

As the emissions from the installation will be mixed into the ambient air, the assessment must consider the contribution from the installation in addition to the background pollutant levels. The process contributions (PCs) from the installation must therefore be added to an appropriate background concentration to give the predicted environmental concentrations (PECs). It is the PEC that is then compared with the appropriate AQS objective, Critical Level or EAL to ensure that air quality is not being significantly affected.

The pollutant concentrations in the vicinity of the installation have been determined through a review of data held on the Defra background pollutant database[3] and East Suffolk Council's (ESC) (previously Suffolk Coastal District Council) local air quality management reports[4].

ESC has no automatic monitoring stations within the vicinity of the installation, with the closest monitor located at Woodbridge approximately 25 kilometres (km) south-west, and within an Air Quality Management Area (AQMA). This monitor is therefore not considered representative of background concentrations in the vicinity of the installation.

[3] http://uk-air.defra.gov.uk

[4] East Suffolk Council and Waveney District Council. July 2018. 2018 Air Quality Annual Status Report (ASR).

ESC also deploys numerous diffusion tubes within the district, however due to the distance of the installation from the monitoring sites, it is not considered that any of the available diffusion tube data would be representative of background concentrations in its vicinity.

The pollutant concentrations of criteria pollutants for the installation's location (including NO_2, SO_2, PM_{10}, $PM_{2.5}$ and CO) for use in the assessment, have therefore been obtained from the Defra background pollutant database, in which pollutant concentrations are averaged over 1km^2 grids across the UK and projected for future compliance purposes. As it is anticipated that the installation will be undergoing peak construction in 2028, this year has been assumed for the background concentrations during commissioning activities. The installation will not be operational until 2034, and therefore this year has been assumed for routine operational activities.

The data has been taken from the closest 1km grid square (NGR 647500, 264500) from the Defra mapping as the centre of the installation (from 2017 base mapping). Data for NO_2, PM_{10} and $PM_{2.5}$ is available from 2018 to 2030 and therefore data for 2028 has been used for commissioning activities and 2030 has been used for operational activities (that being the last year of data available, so assumed to be the same for 2034 when operation commences). Data for SO_2 and CO has not been updated since 2001. Defra considers that background concentrations of SO_2 are unlikely to have significantly reduced since 2001 in non-industrial areas, and therefore adjustment factors for future years are not provided. However, appropriate adjustment factors[5] have been applied to the 2001 CO concentration for the estimation of background concentrations in 2028/2034, as appropriate (it should be noted that the adjustment factors only go up to 2025, and therefore this has been used for 2028/2034 concentrations).

A review of the background concentrations within the installation's vicinity has shown that the concentrations are consistent within the area of potential influence of the installation's emissions, and therefore it is considered appropriate to use only background concentrations from this one point for the assessment of impacts at all human health receptors.

The pollutant concentrations for the criteria pollutants from the Defra database, as used in the assessment, are summarised in **Table 2-2**.

The pollutant concentrations of NO_x and SO_2 at the habitat sites identified for the assessment have also been taken from the Defra background maps for at the location of the individual habitat sites, due to their wider distribution than the human health receptors in the vicinity of the installation. Although not presented here, these values have been used in the results tables presented in **Section 5.2** of this chapter.

Table 1-2: Defra background concentrations for 2028 and 2034 in the vicinity of the installation

POLLUTANT	2028 BACKGROUND CONCENTRATIONS (µg/m^3)	2034 BACKGROUND CONCENTRATIONS (µg/m^3)
Nitrogen Dioxide (NO_2)	5.9	5.8
Oxides of Nitrogen (NO_x)	7.7	7.5
Carbon Monoxide (CO)	92.1	92.1
Sulphur Dioxide (SO_2)	4.0	4.0
Particulates (PM_{10})	12.3	12.3

[5] LAQM TG(03). 2001 Year Adjustment Factors Spreadsheet. Available at http://laqm.defra.gov.uk/documents/Background-maps-user-guide-v1.0.pdf

POLLUTANT	2028 BACKGROUND CONCENTRATIONS (µg/m^3)	2034 BACKGROUND CONCENTRATIONS (µg/m^3)
Particulates ($PM_{2.5}$)	7.7	7.5

Notes: Taken from Grid Reference: 647500, 264500

Previous versions of this report had made reference to background monitoring undertaken on behalf of SZC Co. in 2010, however it is now considered that this monitoring data is out of date (as it originated from 2010), and therefore reference to the use of this data has now been removed. All background data used in the assessment therefore has been obtained from the Defra background maps.

AQS objectives and EALs are set for both short and long term averaging periods. It is unrepresentative to add the worst-case short term PC to the worst case short term pollutant concentration, since it is highly unlikely that the two will coincide at the same event. Therefore, the pollutant concentration added to the short term PC is typically a multiple of the annual average concentration, rather than the short-term concentration over the equivalent averaging period.

Screening Assessment Methodology and Significance Criteria

According to the Environment Agency's risk assessment guidance methodology, it is possible to identify emissions that result in "insignificant" impacts and those emissions where further assessment is not required, based on the contribution to the appropriate AQS objective, EAL or Critical Level for each pollutant. Screening of the emissions is achieved using the simplified dispersion factors contained within the risk assessment guidance, which are applied through the effective stack height of the emission source and are used to estimate the ground level concentration per unit release of pollutant. The effective stack height is based on the relative height of the stack against buildings and structures in the vicinity of that stack.

Due to the relatively low effective stack height of the emission sources at the installation, it is considered unlikely that the Environment Agency's risk assessment access database tool would screen out any emissions from requiring detailed dispersion modelling. Furthermore the screening stage using the Environment Agency's risk assessment tool was not deemed appropriate because of the distance of sensitive receptors, including human habitation and nature conservation sites, to the installation and the number of operational scenarios to be assessed. Detailed dispersion modelling has therefore been used as a precautionary approach, to predict the PCs for the assessment of potential impacts.

Human Health Significance Criteria

The Environment Agency's risk assessment screening criteria for significance of the emissions have been applied to the outcome of the dispersion modelling. The predicted PCs have been compared with the appropriate AQS or EAL to determine the significance of the pollutant emission.

The total pollutant emission is defined in the Environment Agency's risk assessment guidance as having an insignificant impact where:

- PC less than 1% of the AQS or EAL, or the PEC less than 70% of the AQS or EAL for long term releases;
- PC less than 10% of the AQS or EAL, or the PC is less than 20% of the AQS minus twice the long term background concentration, for short term releases.

The Environment Agency's risk assessment guidance indicates that where EU Air Quality Limits, national air quality objectives or target values are likely to be breached as a result of contributions from an installation, or where installation releases constitute a major proportion of the standard or objective, such releases are likely to be considered unacceptable.

Ecological Receptors Significance Criteria

For European sites (Special Protection Areas (SPA), Special Areas of Conservation (SAC) or Ramsar sites) an assessment is made as to whether the installation is *"likely to have a significant effect"*, and whether this could lead to an *"adverse effect on site integrity".*

For Sites of Special Scientific Interest (SSSIs) the assessment needs to determine whether the installation is "*likely to damage*" the site.

The Environment Agency's risk assessment guidance screening criteria for significance of the emission have been applied to the outcome of the dispersion modelling for both European and SSSIs. The predicted PCs have been compared with the appropriate Critical Level to determine the significance of the pollutant emission.

The total pollutant emission is defined in the Environment Agency's risk assessment guidance as being insignificant where:

- PC less than 1% of the Critical Level, or the PEC less than 70% of Critical Level for long term releases;
- PC less than10% of the Critical Level for short term releases.

For all other nature conservation sites, i.e. County Wildlife Sites (CWS), the assessment needs to determine whether the installation will result in *"significant pollution"* i.e. where Critical Levels are exceeded. Therefore if the long and short term PC is less than 100% of the relevant standard, it is considered to be **not significant**.

The assessment against Critical Loads has been carried out in accordance with AQTAG06 '*Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air.*'[6] However, it should be noted that this does not provide definitive advice on interpreting the likely effects on different habitats of changes in air quality.

As with Critical Levels of atmospheric pollutants it has been agreed between the Environment Agency and Natural England, that PCs of less than 1% of the Critical Load for pollutant deposition (nitrogen and acid) can be considered to be insignificant, and that PCs greater than 1% have the potential to be significant, depending upon the context.

3. ASSESSMENT CRITERIA

Point Source Emissions to Air

The twelve DGs will comprise eight Emergency Diesel Generators (EDGs), with an approximate thermal input rating of 23.1 MWth each, and four 10.5 MWth Ultimate Diesel Generators (UDGs), giving a total aggregated thermal input rating for the combustion plant of nominally 227 MWth. The two UK EPRs™ will have six installed DGs for each unit, which equates to four EDGs and two UDGs per EPR unit (referred to as EPR Unit 1 (southern unit) and EPR Unit 2 (northern unit)).

Emission rates for the DGs, including pollutant releases to air and exhaust gas flow rates and temperatures, are indicative. This information is based on the current understanding of the emissions

[6] Environment Agency. 2014. AQTAG06 Technical guidance of detailed modelling approach for an appropriate assessment for emissions to air.

sources and their potential locations within the power station, recognising that the design is only conceptual at this stage and therefore may be subject to change as the design develops.

A discussion on the selected stack height is provided in **Appendix D** of this document.

Chapter III Article 29 of the Industrial Emissions Directive[7] details the aggregation rules for CA with a total rated thermal input of 50MW or more. Specifically relevant to the CA installation is the requirement for *"separate combustion plants which are installed in such a way that, taking technical and economic factors into account, their waste gases could in the judgment of the competent authority, be discharged through a common stack, are to comply with the EU-wide emission limit values and monitoring requirements laid down in Annex V of the IED"*.

It is considered that the DGs could not be aggregated to release their emissions via a common stack. Each DG must be capable of operating entirely independently and a shared stack would potentially restrict this ability if the stack were to be compromised in any way. As such, for the purpose of nuclear safety, each DG must have a separate, independently operated stack. It is therefore considered that the emission limit values defined within the Industrial Emissions Directive are not applicable to the CA installation.

In addition, it is considered that the plant does not fall under the scope of the Medium Combustion Plant Directive[8], as the generators will have a defined nuclear safety role under a nuclear licence issued by the Office for Nuclear Regulations, and therefore are considered to be "*Excluded Generators*" as defined in Schedule 25B of the Environmental Permitting Regulations 2016.

Therefore in the absence of defined emission limit values for the specific CA installation activities, it has been conservatively assumed, for the purposes of assessment, that the emissions will be at emission limit values that have been taken from environmental benchmark values for emissions to air for a compression ignition engine running on liquid fuel, published in Annex 1 of the Environment Agency's Environmental Permitting Regulations sector guidance for CA, where available. Other emission limit values have been derived from design data or from Sulphur Content of Liquid Fuel Regulations 2007. For clarity, the source for each pollutant's emission concentration is described below:

- NO_x (as NO_2): emission concentrations based on current design information, provided by the equipment supplier;
- SO_2: emission concentrations calculated based on the Sulphur Content of Liquid Fuel Regulations 2007 maximum sulphur content in diesel of 0.1%;
- CO: Annex 1 of the Environment Agency's Environmental Permitting Regulations sector guidance for CA for Compression Ignition Engines, in the absence of other appropriate guidance;
- PM: Annex 1 of the Environment Agency's Environmental Permitting Regulations sector guidance for Combustion Activities for Compression Ignition Engines, in the absence of other appropriate guidance.

The relevant stack and emission parameters for the installation are provided in **Table 3-1**, with the conceptual locations shown in **Figure 12C.1**. The sources have been denoted A1 - A12.

[7] European Parliament. 2010. Directive 2010/75/EU on Industrial Emissions (Integrated Pollution Prevention and Control).

[8] European Parliament. 2015. Directive (EU) 2015/2193 on the Limitation of Emissions of Certain Pollutants in the Air from Medium Combustion Plants.

Table 3-1: Emission inventory

SOURCE REF.	GRID REF (X, V)	STACK HEIGHT (m)	STACK DIAMETER (m)	VOLUME FLOW (Nm^3/s)	ACTUAL FLOW (Am^3/s)	EFFLUX VELOCITY (m/s)	TEMP (ºC)	SUBSTANCE	RELEASE CONC (mg/Nm^3)	RELEASE RATE (g/s)
A1 EDG	647224, 264307	27.2	1.1	15.99[1]	27.50	28.9	375	NO_x	1,918	30.7
A2 EDG	647243 ,264307									
A4 EDG	647224, 264133							SO_2	66	1.1
A5 EDG	647243, 264133									
A7 EDG	647224, 264074							PM	50	0.8
A8 EDG	647243, 264074									
A10 EDG	647224, 263900							CO	150	2.4
A11 EDG	647243, 263900									
A3 UDG	647259, 264307	27.2	1.1	3.75[1]	7.85	8.3	515	NO_x	1,143	4.3
A6 UDG	647259, 264132							SO_2	0.3	0.001
A9 UDG	647259, 264074							PM	6	0.02
A12 UDG	647259, 263900							CO	194	0.73

[1] Normalisation based on actual flows at 12% oxygen and 8% H_2O. Normalised to standard temperature and pressure, dry gas at 15% oxygen reference conditions.

It should be noted that although the actual stack heights provided are 27.2 metres (m), due to a parapet around the DG building roof which is higher than the stacks, the stacks have actually been modelled at the height of the parapet (28.2m).

Figure 12C.1: Conceptual design stack locations

Emission rates from the EDGs are approximately four times greater than those from the UDGs, due to the larger thermal input. Initial model runs showed that the level of impact at receptors is typically doubled for the EDG operation compared to the UDG operation. Therefore, only EDG emissions have been modelled in the assessment scenarios below, in order to provide a worst case assessment. EDGs and UDGs would not operate concurrently.

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 Table 1.2 Operational gaseous emissions from main stack 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.

Operating Scenarios Assessed

A number of potential commissioning and operating scenarios covering short-term and longer-term operation of the installation have been developed based on planned running hours.

All hours quoted for testing durations are estimates, based on a combination of operational feedback experience from the operation of EDFs Sizewell B and Civaux (France) nuclear power stations and represent the most relevant comparison to the UK EPR™ units planned for Sizewell C.

It is essential that the EDGs and UDGs be tested for as long a duration (and as often) as necessary in order to guarantee their availability to perform their designated nuclear safety function, therefore it is possible that these hours may be exceeded during the installation's operational lifetime. In the context of the environmental permit exceedance of the proposed operational hours would be considered non-routine operation.

It is anticipated that Unit 1 and Unit 2 DGs will be commissioned separately, with each Unit taking approximately one year to commission. It is therefore anticipated that commissioning of Unit 1 and Unit 2 will occur in consecutive years. The foreseeable commissioning scenarios that have been modelled are summarised in **Table 3-2**.

Following commissioning, during the operational life of the power station, the DGs will only operate in the event of a power failure, to ensure the safe shutdown of the UK EPRs™.

To ensure the DGs remain fully operational, these critical safety systems will also undergo testing on a routine basis during the life-time of the power station. Operational impacts have therefore been assessed for emergency backup operation (referred to as loss of off-site power event) and for annual routine testing operations. The operational scenarios assessed are summarised in **Table 3-3**.

Further explanation of the individual modelled scenarios is provided in the following section.

Table 3-2: Scenarios for modelling - commissioning

SCENARIO	DURATION OF IMPACTS	MODELLING SCENARIO	OPERATIONAL SCENARIO BEING SIMULATED	PLANNED ACTUAL OPERATION	JUSTIFICATION FOR WORST CASE ASSESSMENT
Commissioning EPR Unit 1	Short-term (hourly)	Operation of 4 x Unit 1 EDGs continuously throughout the year.	Loss of off-site power event testing	All Unit 1 EDGs will be tested simultaneously to simulate a scenario. Loss of off-site power testing is expected to have a maximum run time of 3 hours.	Assessed as continuous operation in case the 3 hours of loss of off-site power testing coincides with the meteorological conditions which lead to maximum short term impacts.
	Long-term (annual)	Operation of 1 x Unit 1 EDG continuously throughout the year, with pro-rata emission rates.	Commissioning	Each of the 4 Unit 1 EDGs will be run for 242.5 hours during commissioning. Each of the 2 UDGs will be run for 738 hours. This is an aggregated total of 2,446 hours operation for the 12 months of commissioning.	It is not anticipated more than 1 DG will be operational at any one time during the commissioning period, other than the loss of off-site power commissioning test stipulated above.
Commissioning EPR Unit 2	Short-term (hourly)	Operation of 1 x Unit 1 EDG continuously throughout the year and Operation of 4 x Unit 2 EDGs continuously throughout the year.	Routine Testing Unit 1 Loss of off-site event testing Unit 2	It is anticipated that only 1 DG on Unit 1 would be undergoing routine annual testing during the loss of off-site power commissioning of Unit 2 DGs.	Assessed as continuous operation in case the 5 hours of routine testing on Unit 1 and 3 hours of testing on Unit 2 coincides with the meteorological conditions which lead to maximum short-term impacts.
	Long-term (annual)	Operation of 1 x Unit 2 EDG continuously throughout the year, with pro-rata emission rates.	Commissioning	Each of the 4 Unit 2 EDGs will be run for 242.5 hours during commissioning. Each of the 2 UDGs will be run for 738 hours. This is an aggregated total of 2,446 hours operation for the 12 months of commissioning.	It is not anticipated more than 1 DG will be operational at any one time during the commissioning period, other than the loss of off-site power commissioning test stipulated above.

Table 3-3: Scenarios for Modelling - Operation

SCENARIO	DURATION OF IMPACTS	MODELLING SCENARIO	OPERATIONAL SCENARIO BEING SIMULATED	PLANNED ACTUAL OPERATION	JUSTIFICATION FOR WORST CASE ASSESSMENT
Routine testing	Short-term (hourly)	Operation of 1 EDG continuously throughout the year.	Routine testing	Each DG will be run for 24 hours following a maintenance outage and 60 hours per year for routine testing.	Assessed as continuous operation in case operation coincides with the meteorological conditions which lead to maximum short term impacts.
	Long-term	Operation of 1 EDG continuously throughout the year, with pro-rata emission rates.	Routine testing	Routine testing is anticipated to be carried out for 60 hours per year for each of the 12 DGs, with an aggregated total of 720 operation hours per year.	It is not anticipated that more than 1 DG will undergo routine testing at any one time.
Loss of off-site power event	Short-term (hourly)	Operation of 4 x Unit 1 EDGs throughout the year and, Operation of 4 x Unit 2 EDGs throughout the year.	Loss of off-site power event testing	A loss of off-site power event represents emergency back-up operation only, and therefore is only applicable to short term impacts.	Assessed as continuous operation in case operation coincides with the meteorological conditions which lead to maximum short term impacts.

Commissioning Scenarios

Loss of off-site power event testing – short-term impacts:

During commissioning, each EPR Unit's DGs will be tested for operation of the loss of off-site power event scenario, and therefore short-term impacts have been assessed assuming all 4 EDGs on the Unit being commissioned are operating concurrently.

Unit 1 and Unit 2 are anticipated to be commissioned in consecutive years and therefore the loss of off-site power scenario will be tested individually on each Unit. It is anticipated that only 1 DG on Unit 1 could be undergoing annual testing (maximum of 5 hours duration) during the loss of off-site power commissioning of Unit 2 DGs.

Although a loss of off-site power testing scenario is only anticipated to last for 3 hours for any one test (the test lasting for two hours, with an additional hour for start-up/ shut-down), it has been assumed for modelling purposes that the emissions occur continuously throughout the year, to enable the particular meteorological conditions conducive to producing transient peaks in ground level concentrations to be appropriately considered.

The actual duration of loss of off-site power events cannot be easily determined, however, the frequencies of loss of off-site power events can be predicted and allocated to a significant range of durations. Frequency predictions are given on an 'per reactor year' basis, as they are based on the frequency over one year for a single reactor, no matter what the operational regime is. A review of the frequency of loss of off-site power scenarios for the Hinkley Point C site and the Sizewell C site has been carried out[9] and concluded that the frequency of the main conceived loss of off-site power events for the Sizewell C site are as follows:-

- short loss of off-site power (less than 2 hours) – 3.72×10^{-2} per reactor year;
- long loss of off-site power (between 2 and 24 hours) – 4.99×10^{-3}per reactor year;

To put these numbers into context for the Sizewell C CA installation, the above frequencies are considered to translate as:

- short loss of off-site power - expected to occur a limited number of times during the lifetime of the plant; and
- long loss of off-site power - expected to occur about once in the lifetime of a fleet of nuclear sites.

Further assessments of the potential frequency of loss of off-site power events for the Sizewell C site are anticipated prior to the submission of the final CA permit application, and a full explanation of the loss of off-site power events, duration and anticipated frequencies will be provided within the wider CA environmental permit application.

Commissioning – long-term impacts:

During Unit 1 commissioning, it is not anticipated that more than one DG will be in operation at any one time, except for the short term loss of off-site power testing described above.

As such, maximum long-term concentrations have been determined assuming that one EDG is operational continuously throughout the year, with the emission rates pro-rated to take account of the fact that the DGs will only be operational for a total of 2,446 hours during the commissioning period.

[9] EDF Energy, NNB Generation Company. 2016. Site Specific Short and Long Loop Frequency Updates for HPC and SZC EPRs. Document reference: HPC-UKX-NNBOSL-U0-GEV-RET-100000

This has been achieved using the time varying source emissions tool within ADMS, factoring the emission rate to 28% (i.e. (2,446 ÷ 8,760) x 100) of the specified emission rate in **Table 3-1**.

Although ADMS can simulate time varying sources in other ways, for instance by entering diurnal or monthly profiles of emissions, it is not considered that sufficient information on planned running times of the DGs is available at this stage of the Sizewell C Project to be able to ensure that the meteorological conditions assessed in the scenario reflect those that may occur when the DGs are operational. It is also important that the operating times of the DGs are not restricted under the permit based on any such assessment. It is considered that due to the short times of any run scenario, and the infrequency of testing, that the likelihood of it occurring at a time when poor meteorological conditions could lead to increased impacts is low. Therefore the potential for predicted annual average impacts to be increased as a result is considered unlikely. Sensitivity analysis has been undertaken through the use of 5 years of met data from Wattisham.

It is also emphasized that emissions have been based on the operation of EDGs only, whereas the UDGs have been shown to lead to lower levels of impacts. In addition, the commissioning times for the UDGs (738 hours x 2 UDGs equates to a total of 1,476 hours) are greater than commissioning times for the EDGs (242.5 hours x 4 equates to a total of 970 hours per EPR Unit).

The method outlined above is considered appropriate for assessment purposes. However, the alternative approach of turning the DGs on and off at different times has been considered as part of the sensitivity analysis presented in **Appendix D** of this document.

The results reported in **Section 5** of this chapter therefore represent the worst-case impacts relating to the commissioning of Unit 1 and Unit 2.

Routine Testing Scenario

The routine test scenario presents the likely potential impacts to be expected as a result of the ongoing DG testing which will be scheduled throughout the lifetime of the power station. It is not anticipated that more than one DG will be in operation at any one time, during routine testing operations.

For the assessment of short-term impacts, 60 hours per year operation for each DG has been assumed, however this is indicative and could vary up or down in terms of duration, depending on a number of factors including:

- planned technical specification test runs;
- unplanned technical specification test runs;
- planned maintenance return to service test runs; and
- unplanned maintenance return to service test runs.

Long term impacts have been based on pro-rated emission rates, to take account of the fact that the DGs will only be operational for a total of 720 hours per year. This has been achieved using the time varying source emissions tool within ADMS, factoring emissions to 8% (i.e. (720 ÷ 8,760) x 100) of the specified emission rate in **Table 3-1**.

Loss of Off-site Power Event

The loss of off-site power event represents the routine operation of the DGs following an emergency operation of the EPR units in order to enable their safe shut down. It is considered necessary to assess short-term impacts only, as this is not a routine mode of operation for the power station.

4. DETAILED DISPERSION MODELLING

Model Description

Dispersion modelling has been used to provide a detailed assessment of the impact on the environment from the installation combustion emissions.

The model calculates the predicted ground level concentrations arising from the emissions to atmosphere, based on Gaussian approximation techniques. The predicted concentrations can then be compared with the appropriate AQS objective, EAL or Critical Level to determine the significance of the predicted impact.

The model that has been employed is the new generation model ADMS5, which has been developed for UK regulatory use.

ADMS5.2 is a commercially available model that employs a more accurate approximation of boundary layer heights than older models such as the Industrial Source Complex. Its use for assessing the dispersion of emissions from point sources has been extensively validated and is therefore considered appropriate in this assessment.

The degree of turbulence in the atmosphere affects the rate at which pollutants from point sources are dispersed in the environment. The more unstable the atmosphere, the greater the degree of mixing. While this is in principle the desired effect for the release of pollutants through stacks at elevated heights, this can also lead to localised peak concentrations if the plume is rapidly brought to ground level.

Various parameters can affect the degree of dispersion from a source, and these are accounted for in the development of the modelling scenarios as detailed in the following sections. The presence of elevated or complex terrain in the vicinity of the source can affect the flow pattern of the wind field, which can in turn bring a plume to ground more rapidly. Buildings of sufficient height located close to the emission sources can affect dispersion, inducing downwash in the emitted plume and entraining pollutants towards ground level.

ADMS5 utilises site-specific hourly sequential meteorological data to enable a realistic assessment of dispersion from point sources to be conducted for weather conditions that are directly applicable to the site.

Modelled Emissions

Emissions have been modelled for the release scenarios detailed in **Section 3.2** of this chapter, at the emission parameters shown in **Table 3-1**.

Emissions of nitrogen oxides (NO_x) from industrial point sources are typically dominated by nitric oxide (NO), with emissions from combustion sources typically in the ratio of NO to NO_2 of 9:1. However, it is nitrogen dioxide that has specified AQS objectives due to its potential impact on human health. In the ambient air, NO is oxidised to NO_2 by the ozone (O_3) present, and the rate of oxidation is dependent on the relative concentrations of NO_x and O_3 in the ambient air.

For the purposes of detailed modelling, and in accordance with Environmental Agency technical guidance[10] for worst case scenarios it is assumed that 70% of emitted NO_x is oxidised to NO_2 in the long-term and 35% of the emitted NO_x is converted to NO_2 in the local vicinity of the site in the short-term.

Emissions of total NO_x expressed as NO_2 have been modelled in the assessment and the predicted ground level concentrations factored to take account of the above assumptions. In reality this

[10] Environment Agency Air Quality Management Assessment Unit. (2005). Conversion Ratios for NO_X and NO_2.

conversion rate is likely to overestimate localised NO_2 concentrations arising from combustion sources and a lower NO_x to NO_2 conversion rate is more likely in the area around the emission source.

Sensitive Receptors and Modelled Domain

Human Health Receptors

ESC has carried out a review and assessment of local air quality within the vicinity of the installation, which resulted in the designation of three AQMAs for NO_2 under the Local Air Quality Management regime, largely as a result of vehicle emissions. Two of the AQMAs are located over 25km south-west of the installation in Woodbridge and Felixstowe and the other is 8km west of the installation in Stratford St Andrew. Due to the distance of the installation from the declared AQMAs it is considered very unlikely they would be impacted by emissions from the installation.

The assessment for Environmental Permitting compliance has been based upon the predicted impacts at identified receptor locations, in order to carry out a worst case assessment for human health impacts. It can be seen from the contour plots provided in **Appendix B** of this document that maximum modelled impacts are predicted to occur very close to the installation itself, where there is no long term and limited short term occupation by sensitive human receptors, given that the majority of the surrounding land comprises the SZC Co. Sizewell site, or is owned by SZC Co. and therefore does not have public access. It is therefore considered this approach is appropriate, rather than identifying maximum off-installation impacts at any location.

The AQS objectives apply to the "*quality of the air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present*"[11]. The specific human health receptors included in the dispersion modelling assessment are identified in **Table 4-1**, with their locations shown in **Figure 12C.2**. These include residential and transient receptors.

Transient receptors are considered to be sensitive human receptors using public rights of way (R1, R2 and R8), and are therefore defined as locations where people are unlikely to be present for extended time periods. These receptors have therefore only been included in the assessment of the 15 minute average SO_2 impacts given the likely time period of exposure at such receptors, and it is considered that this represents a worst case assessment.

[11] Defra. (2009). Local Air Quality Management Technical Guidance LAQM.TG(09).

Table 4-1: Human health receptors included within the model

EIA RECEPTOR I.D	CA PERMIT RECEPTOR I.D	NAME	TYPE OF RECEPTOR	GRID REFERENCE	LOCATION RELATIVE TO INSTALLATION
LE30	R1	Sizewell Village	Residential	647480, 262850	1km south
LE31	R2	Holme Farm Sizewell	Residential	647155, 262420	1.4km south
LE49[1]	R3	Sandlings Walk Path	Transient	647209, 264572	180m north
LE47	R4	Suffolk Coast Path/ Beach	Transient	647600, 264000	300m west
LE25	R5	The Round House	Residential	645420, 265240	2.2km north-west
LE17	R6	Old Abbey Farm	Residential	645065, 264190	2.2km west
LE26	R7	Old Abbey Farm – Care Home	Residential	645030, 264080	2.2km west
N/A	R8	Leiston Common	Transient	645990, 263625	1.5km west
LE41	R9	Keepers Cottage	Residential	646290, 263455	1km south-west
LE28	R10	Abbey Cottage	Residential	644900, 264415	2.3km west
LE37	R11	Crown Farm	Residential	645930, 262455	1.9km south-west
LE38	R12	Crown Lodge, Lover's Lane	Residential	645815, 262550	2.0km south-west
LE39	R13	Halfway Cottages	Residential	646290, 262350	1.8km south-west

[1] It should be noted that the Sandlings Walk Path will be closed during construction and commissioning activities, and therefore the receptor is only relevant for the Operational assessment.

Figure 12C.2: Location of sensitive human health receptors in the vicinity of the installation

Ecological Receptors

The specific Habitat receptors included in the dispersion modelling assessment are identified in **Table 4-2**. These receptors are within the appropriate screening distances detailed in the EA's Risk Assessment Guidance of 10km for internationally designated sites (i.e. SACs, SPAs and Ramsar sites) (shown in **Figure 12C.3**), and 2km for locally and nationally designated sites (i.e. SSSIs and non-designated CWS) (shown in **Figure 12C.4**).

Table 4-2: Ecological receptors included within the model

RECEPTOR I.D	NAME	TYPE OF RECEPTOR[1]	GRID REFERENCE[2]	LOCATION RELATIVE TO INSTALLATION
E1	Alde-Ore and Butley Estuaries	SAC, SPA and Ramsar	643321, 258097	5km south-west
E2	Minsmere - Walberswick Heaths and Marshes	SAC, SPA, Ramsar and SSSI	647473, 264520	Adjacent – north
E3	Orfordness to Shingle Street	SAC	646214, 254433	8km south
E4	Sandlings	SPA	646677, 262459	1km south-west
E5	Sizewell Marshes	SSSI	646994, 264422	Adjacent – west
E6	Leiston Aldeburgh	SSSI	647613, 262001	1.7km south
E7	Leiston Common	CWS	645988, 263626	1.5km west
E8	Aldringham to Aldeburgh Disused Railway Line (assessed as E6)	CWS	647613, 262001	1.7km south
E9	Dower House (assessed as E6)	CWS	647613, 262001	1.7km south
E10	Suffolk Shingle Beaches	CWS	647622, 263768	Adjacent – south-east
E11	Reckham Pits Wood	CWS	646532, 263708	1km west
E12	Sizewell Levels and Associated Areas	CWS	647392, 264551	Adjacent – west
E13	Minsmere South Levels	CWS	647103, 264879	Adjacent – north

Notes:
1. SSSI = Site of Special Scientific Interest, SAC = Special Area of Conservation, SPA = Special Protection Area, CWS = County Wildlife Site
2. Taken as the nearest point to the installation

The grid references for the habitat sites detailed in **Table 4-2** have been taken as the closest points of the habitat site to the installation (and are approximate). These points have been used for the assessment of impacts against Critical Levels for atmospheric NO_x, in order to provide a worst case assessment since, based on the isopleths shown in **Appendix B** of this document, peak impacts occur at the closest points of the designated sites to the installation.

As discussed in **Section 2** of this chapter, the assessment of depositional impacts takes into account the relevant interest features within each habitat receptor and compares predicted impacts against Critical Loads for the individual features therein, and therefore requires more detailed assessment. **Table 4-2** has therefore been broken down further in **Appendix A** of this document to detail the spatial distribution of the different habitat features within the identified habitat sites, with specific receptor points for each feature present, also being identified. The locations of these additional assessment points (defined as locations E1a, E1b, E1c, for example) are shown on **Figures 12C.3 and 12C.4**.

Further details about the ecological receptors listed in **Table 4-2** are provided in **Appendix A** of this document, including:

- descriptions of the cited interest features (i.e. qualifying features) for the internationally-designated sites within 10km (**Table A1**);
- descriptions of the cited interest features for the nationally-designated sites within 2km (**Table A2**);
- descriptions of the cited interest features for the non-statutory designated sites (i.e. CWSs) within 2km (**Table A3**);
- Critical Loads for nitrogen deposition for the constituent habitats of the designated sites (**Table A4**);
- Critical Loads for acid deposition for the relevant constituent habitats of the designated sites (**Table A5**); and
- data sources used for the habitat mapping (**Table A6**).

Modelling Domain

The dispersion model has been developed using a receptor grid (71 x 71 points) extending 1km from the installation. The grid resolution therefore provides output at 29m intervals from the source, considered appropriate for the stack heights of 27.2m to capture worst case ground level concentrations. When specified receptor points are used within the model, the results predicted at the receptor are unaffected by grid resolution.

Meteorology

The dispersion of emissions from a point source is largely dependent on atmospheric stability and turbulent mixing in the atmosphere, which in turn are dependent on wind speed and direction, ambient temperature, cloud cover and the friction created by buildings and local terrain.

Actual measured hourly-sequential meteorological data is available for input into dispersion models, and it is important to select data as representative as possible for the site that is modelled. This is usually achieved by selecting a meteorological station as close to the site as possible, although other stations may be used if the local terrain and conditions vary considerably, or if the station does not provide sufficient data.

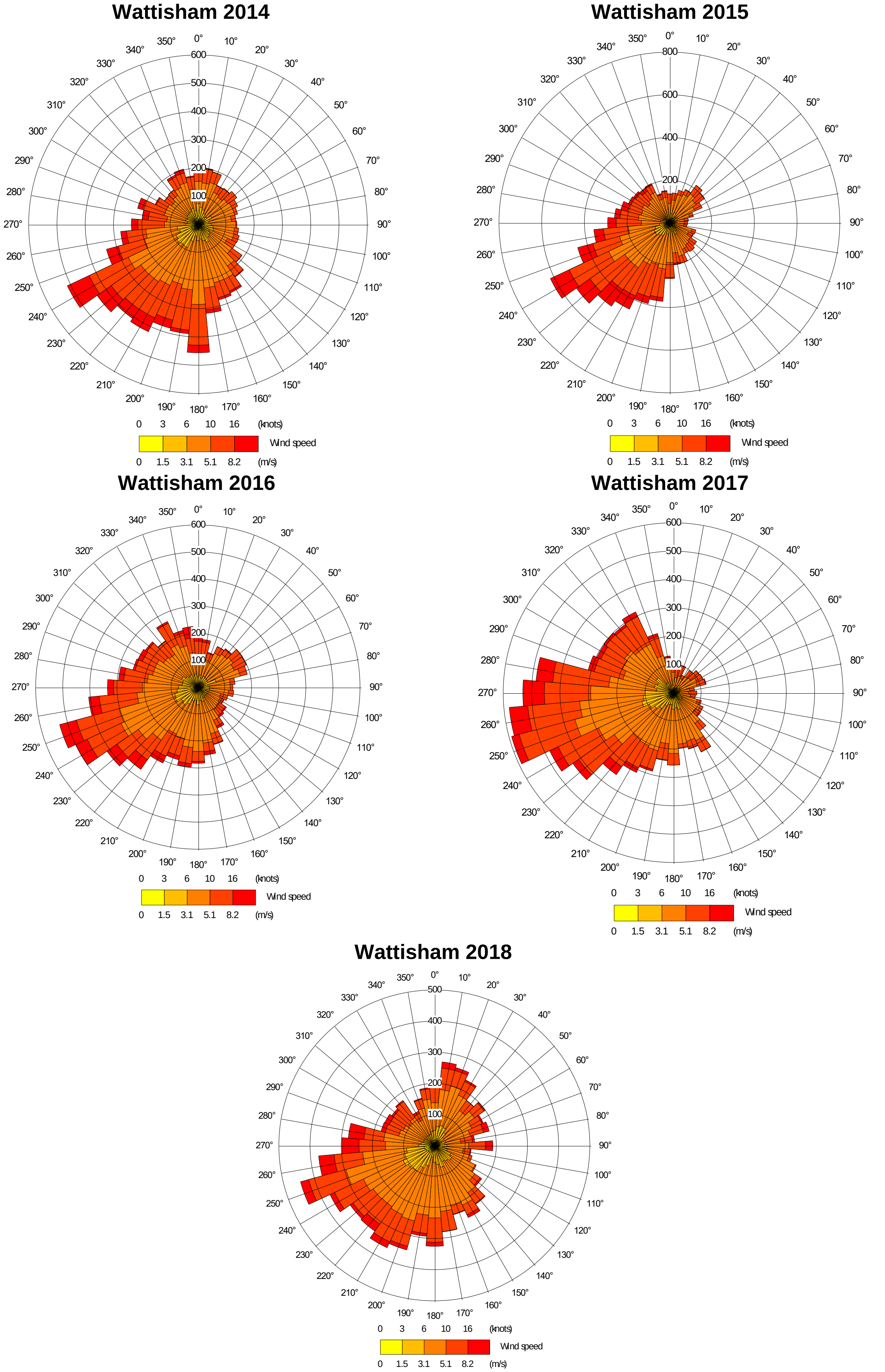
In addition, the Met Office produces numerical weather prediction hourly sequential weather data. For the Sizewell C site, meteorological data for Wattisham (2014-2018) has now been used. Wattisham meteorological site is located approximately 46km south-west of the installation, at a flat airfield in a largely rural area.

A surface roughness of 0.2m was selected for the meteorological data, which is representative of the minimum surface roughness associated with agricultural land, and therefore is considered to be appropriate for the area surrounding the Wattisham meteorological site.

The effects of meteorology on predicted results are considered as part of the sensitivity analysis presented in **Appendix D** of this document.

Example wind roses for the Wattisham site are provided in **Figure 12C.5**.

Figure 12C.5: Example wind rose data



Building and Terrain Effects

The presence of buildings or structures near to the emission points can have a significant effect on the dispersion of emissions from sources. The wind field can become entrained into the wake of buildings, which causes the wind to be directed to ground level more rapidly than in the absence of a building. If an emission is entrained into this deviated wind field, this can give rise to elevated ground-level concentrations. Building effects are typically considered where a structure of height greater than 40% of the stack height is situated within 8 to 10 stack heights of the emissions source.

The buildings associated with the installation which are considered to be of sufficient height and massing to potentially impact on the dispersion of emissions from the DGs have been identified from site plans. Parameters representing the buildings included in the model are shown in **Table 4-3** and a plan showing the buildings used in the ADMS simulations is shown in **Figure 12C.6** (with the point sources shown in red, buildings shown in green and the installation boundary shown in dark green).

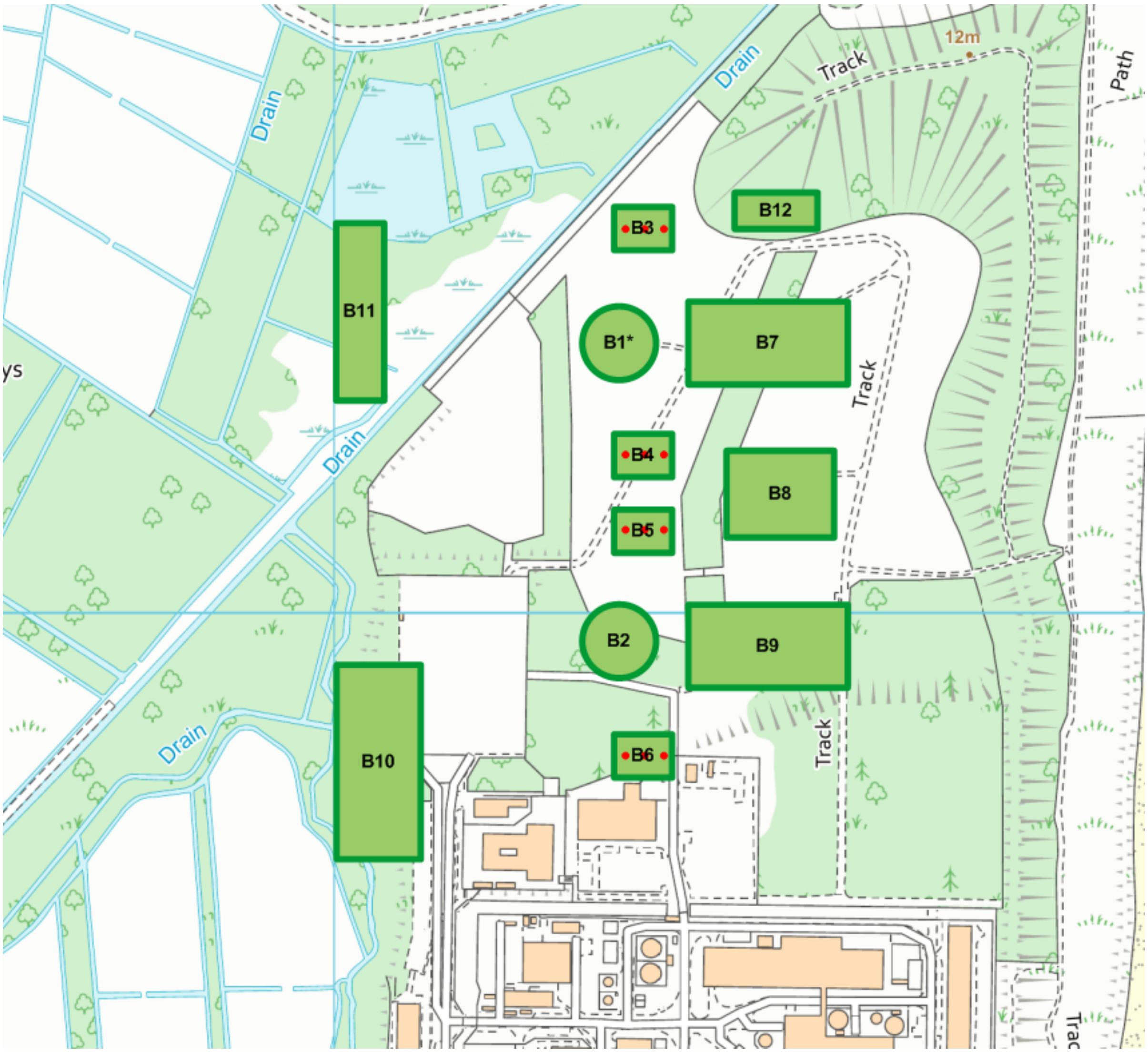
Table 4-3: Buildings incorporated into the model

BUILDING	GRID REFERENCE[1]	HEIGHT (m)	LENGTH (m)	WIDTH (m)	ANGLE[2]
B1	647220, 264209	64	57	Circular	
B2	647220, 263979	64	57	Circular	
B3	647243, 264307	28.2[3]	44.6	34.5	90
B4	647243, 264132	28.2[3]	44.6	34.5	90
B5	647243, 264074	28.2[3]	44.6	34.5	90
B6	647243, 263900	28.2[3]	44.6	34.5	90
B7	647335, 264209	46	123	64	90
B8	647344, 264092	36	67	83	180
B9	647335, 263975	46	123	64	90
B10	647034, 263885	25	150	65	180
B11	647020, 264233	16	37	137	90
B12	647341, 264311	13	64	28	90

Notes: [1] As the building centre.
[2] The angle between the building length and grid north.
[3] The height of the parapet around the building roof.

Within the model, the main building for each emission point has been specified as the building on which the emission point is located.

Figure 12C.6: Visualisation of buildings included in the ADMS model



The installation site is located on the coast and in a relatively rural area. A surface roughness of 0.3m (representative of the maximum surface roughness for agricultural areas, and in line with the surface roughness selected for the meteorological data) has therefore been used to represent the local area, although different values have been used in the model testing. In addition, due to the coastal location of the development site a site specific surface roughness file has been prepared, in order to take account of the lower surface roughness over the sea (0.001m). The use of this file has been tested as part of the model testing.

Site-specific terrain data has not been used in the model, as typically terrain data will only have a marked effect on predicted concentrations where hills with gradient of more than 1 in 10 are present in the vicinity of the source, which is not the case at this site.

The coastline module option in ADMS was not implemented for the purposes of this study, as the use of this module has also not been validated by the Environmental Agency for regulatory use. Also, the additional meteorological parameters, such as the difference in temperature between the sea surface temperature and the near surface temperature over land, or the sea surface temperature and surface temperature over land were not available. In addition, guidance document AG4, issued by Ireland's Environmental Protection Agency[12] states that coastal fumigation needs consideration if a tall stack

[12] Environmental Protection Agency (EPA). Air Dispersion Modelling from Industrial Installations Guidance Note AG4. Office of Environmental Enforcement. 2010.

(greater than 65m) is located in a coastal region. Given the DG stacks are only 27.2m tall it is not considered that they would be subject to significant coastal (or shoreline) fumigation.

In addition, as detailed in **Section 4.4** of this chapter, it is considered only necessary to consider coastal fumigation where tall stacks are present (greater than 65m). As the DG stacks are only 27.2m tall it is not considered that they would be subject to significant coastal fumigation.

Sensitivity analysis of the ADMS model to a number of the input parameters, including the use of different meteorological years, different surface roughness and inclusion of buildings has been carried out. The reported results are considered to represent the realistic worst-case assessment.

5. PREDICTED RESULTS

The PC and PEC have been compared with the appropriate air quality objectives to identify whether the contribution from the installation could result in the AQS objectives, EAL or Critical Levels being exceeded, or where results indicate there is a significant risk of the objectives being exceeded (i.e. where the PEC is approaching the AQS objectives, EAL or Critical Level).

The model used to generate the worst-case results, reported below, contained the following conservative assumptions:

- emissions at Industrial Emissions Directive emission limit values or benchmark levels where these are not available, when average emissions are likely to be below these values;
- emissions from the EDGs have been used to generate the worst case model results, when emissions from UDGs are lower than those of the EDGs;
- assumption that 70% of NO_x emissions are converted to NO_2 in the stack vicinity in the long-term and 35% conversion in the short-term;
- assumption that 100% of particulate emissions are PM_{10}/ $PM_{2.5}$ or smaller;
- worst case meteorological data for each pollutant species and averaging period; and,
- inclusion of buildings within the model.

The model files have been used to generate isopleth diagrams as seen in **Appendix B** of this document, showing the predicted maximum ground level concentrations of pollutants at grid points around the installation. This modelling output has confirmed that the maximum ground level concentrations occur beyond the installation boundary, and worst case impacts at sensitive receptors have been taken directly from the model output.

Isopleths have only been presented for those pollutants where impacts are predicted to exceed the Environmental Agency's screening criteria, or for pollutant species deemed to be of most relevance (i.e. NO_2).

Predicted Results – Human Health Receptors

The maximum predicted ground level PCs of pollutants at receptor locations have been compared against the appropriate AQS or EAL to assess whether the potential impacts are predicted to be insignificant, or whether the potential for any significant impact exists.

The results tables presented use a Red, Amber Green colour coding system, as follows:

- Green = PC/ PEC can be screened as insignificant (PC / AQS or EAL = less than1% of long term impacts and less than 10% for short term impacts or PEC / AQS or EAL = less than 70% of long term impacts or PEC – 60% background concentration / AQS or EAL less than 20% for short term impacts);
- Amber = Not screened as insignificant, but no exceedance of an AQS or EAL predicted;
- Red = PCs/ PECs indicate an exceedance of an AQS or EAL.

Oxides of Nitrogen – Annual Average (Long-Term) Impacts:

The annual average results for the predicted concentrations of NO_2 at each receptor, and for each operational scenario assessed are shown in **Table 5-1**.

Commissioning Impacts

The maximum annual average PC predicted for NO_2 at any receptor during the commissioning scenarios modelled is 0.6μg/m^3, which occurs at R9 (Keepers Cottage). This PC represents 1% of the relevant AQS objective, and therefore can be considered **insignificant** in accordance with the Environmental Agency's screening criteria. When the PC is added to the local pollutant concentration of 5.9μg/m^3 it results in a PEC of 6.5μg/m^3, representing 16% of the AQS objective.

Predicted impacts at all other human health receptors are lower than the worst case impacts described above.

Taking into consideration the conservative assumptions used in the assessment, which includes the assessment of EDG emissions only, when UDG emissions lead to lower impacts and occur over a greater number of hours than EDG emissions during the commissioning period, it is considered unlikely that the PC from the installation would result in or contribute to an exceedance of the annual average NO_2 AQS objective at any identified receptor during commissioning.

Operation – Routine Testing Impacts

During routine operation, the maximum annual average PC predicted for NO_2 at any receptor is 0.2μg/m^3, which occurs at R9 (Keepers Cottage). This is lower than the impacts predicted for the commissioning period, due to the reduction in operation hours from 2,446 during commissioning to 720 during routine testing operation.

The PC represents less than 1% of the relevant AQS objective, and is therefore below the screening criteria for insignificance. When the PC is added to the local pollutant concentration of 5.8μg/m^3 it results in a PEC of 6.0μg/m^3, representing 15% of the AQS objective.

Predicted impacts at all other receptors are lower than the worst case impacts described above. It is therefore considered very unlikely that the PCs from the installation would result in or contribute to an exceedance of the annual average NO_2 AQS objective at any identified receptor during routine operation.

An isopleth figure showing the maximum annual average NO_2 PCs during routine testing operation is provided in **Figure 12C.7** in **Appendix B** of this document.

Table 5-1: Predicted annual average (long-term) PCs for NO_2 at all identified receptors and operating scenarios (highest result shown in bold)

RECEPTOR	AQS (µg/m³)	COMMISSIONING PC (µg/m³)	COMMISSIONING PC / AQS	COMMISSIONING BC (µg/m³)	COMMISSIONING PEC / AQS	ROUTINE TESTING PC (µg/m³)	ROUTINE TESTING PC / AQS	ROUTINE TESTING BC (µg/m³)	ROUTINE TESTING PEC / AQS
R1 Sizewell Village	40	0.5	1%	5.9	16%	0.1	<1%	5.8	15%
R2 Holme Farm Sizewell	40	0.3	1%	5.9	16%	0.1	<1%	5.8	15%
R5 The Round House	40	0.2	<1%	5.9	15%	0.06	<1%	5.8	15%
R6 Old Abbey Farm	40	0.2	<1%	5.9	15%	0.05	<1%	5.8	15%
R7 Old Abbey Farm Care Home	40	0.2	<1%	5.9	15%	0.05	<1%	5.8	15%
R9 Keepers Cottage	**40**	**0.6**	**1%**	**5.9**	**16%**	**0.2**	**<1%**	**5.8**	**15%**
R10 Abbey Cottage	40	0.1	<1%	5.9	15%	0.04	<1%	5.8	15%
R11 Crown Farm	40	0.3	<1%	5.9	15%	0.08	<1%	5.8	15%
R12 Crown Lodge	40	0.3	<1%	5.9	15%	0.08	<1%	5.8	15%
R13 Halfway Cottages	40	0.3	<1%	5.9	15%	0.09	<1%	5.8	15%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

Notes: R1, R2 and R8 are excluded from the assessment of annual mean impacts as these represent transient human receptors using recreational facilities for short-term periods only.

Oxides of Nitrogen – Hourly (Short-Term) Impacts:

The hourly average (as the 99.8th percentile) NO_2 PCs at each receptor, and for each operational scenario assessed, are shown in **Table 5-2**.

Commissioning Impacts

Maximum predicted NO_2 PCs for the commissioning scenarios are estimated to be a maximum of 85% of the AQS (at R9 Keepers Cottage). When the PC is compared to the AQS minus twice the long-term background concentration it represents 91% of the AQS and therefore indicates that an exceedance of the AQS during commissioning activities is unlikely.

Predicted impacts at all other human health receptors are lower than the worst case impacts described above, and therefore exceedances at any receptor are similarly considered unlikely.

It is considered unlikely that the DGs will be tested at exactly those times during which meteorological conditions are most unfavourable as evaluated in this assessment and therefore the results presented in this assessment are conservative.

Operation – Routine Testing Impacts

Maximum predicted NO_2 PCs during the routine operating scenario is estimated to be a maximum of 21% of the AQS (R9 Keepers Cottage). When the PC is compared to the AQS minus twice the long-term background concentration it represents 22% of the AQS and therefore indicates that an exceedance of the AQS during routine testing activities is unlikely.

Predicted impacts at all other human health receptors are lower than the worst case impacts described above, and therefore exceedances at any receptor are similarly considered unlikely.

It is considered unlikely that the DGs will be tested at exactly those times during which meteorological conditions are most unfavourable as evaluated in this assessment and therefore the results presented in this assessment are conservative.

Loss of Off-site Power Event Impacts

The maximum short-term NO_2 PC at any human health receptor is 256.8$\mu g/m^3$ (as the 99.8th percentile of hourly averages), which occurs at R9 Keepers Cottage during the loss of off-site power event. This represents 128% of the hourly NO_2 AQS objective. When the PC is compared to the AQS minus twice the long-term background concentration it represents 126% of the AQS and therefore represents a risk of exceedance of the AQS objective.

R1 Sizewell Village receives the second highest short-term NO_2 PC of 198.2$\mu g/m^3$. When the PC is compared to the AQS minus twice the long-term background concentration it represents 105% of the AQS, and therefore also represents a risk of exceedance of the AQS objective. All other receptors show that the risk of exceedance of the AQS objective is unlikely.

Short-term impacts of the loss of off-site power event have been assessed assuming continuous operation over 8,760 hours, 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 allows for the exceedance of the AQS for 18 hours per year. As this scenario represents emergency shutdown of the EPR's, it is not possible to state how long an actual loss of off-site power event would last.

An isopleth figure showing the dispersion of hourly NO_2 concentrations during the routine testing scenario is provided in **Figure 12C.8** in **Appendix B** of this document.

Table 5-2: Predicted hourly averages (short-term) (as the 99.8th percentile) process contributions for NO_2 at all identified receptors and operating scenarios (highest result shown in bold)

RECEPTOR	AQS (µg/m³)	COMMISSIONING				OPERATION – ROUTINE TESTING				LOSS OF OFF-SITE POWER EVENT			
		PC (µg/m³)	PC / AQS	BC (µg/m³)	PC /AQS - BC	PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC	PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC
R1 Sizewell Village	200	120.8	60%	11.8	64%	28.9	14%	11.6	15%	198.2	99%	11.6	105%
R2 Holme Farm Sizewell	200	87.9	44%	11.8	47%	21.9	11%	11.6	12%	144.3	72%	11.6	77%
R5 The Round House	200	93.6	47%	11.8	50%	20.3	10%	11.6	11%	148.3	74%	11.6	79%
R6 Old Abbey Farm	200	79.9	40%	11.8	42%	17.2	9%	11.6	9%	113.8	57%	11.6	60%
R7 Old Abbey Farm Care Home	200	77.4	39%	11.8	41%	17.8	9%	11.6	9%	112.2	56%	11.6	60%
R9 Keepers Cottage	**200**	**170.6**	**85%**	**11.8**	**91%**	**41.6**	**21%**	11.6	**22%**	**256.8**	**128%**	**11.6**	**136%**
R10 Abbey Cottage	200	72.5	36%	11.8	39%	15.5	8%	11.6	8%	105.6	53%	11.6	56%
R11 Crown Farm	200	93.7	47%	11.8	50%	20.6	10%	11.6	11%	145.7	73%	11.6	77%
R12 Crown Lodge	200	88.2	44%	11.8	47%	21.8	11%	11.6	12%	151.7	76%	11.6	81%
R13 Halfway Cottages	200	98.7	49%	11.8	52%	23.6	12%	11.6	13%	162.4	81%	11.6	86%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

BCs for short-term impacts are based on twice the annual average BC.

Sulphur Dioxide – 15 Minute Average (Short-Term) Impacts:

The 15-minute average (as the 99.9th percentile) SO_2 PCs at each receptor, and for each operational scenario assessed, are shown in **Table 5-3**.

<u>*Commissioning Impacts*</u>

The maximum short-term SO_2 PC (as the 99.9th percentile of 15-minute averages) at residential receptors during commissioning occurs at R9 Keepers Cottage. The highest PC was 26.3μg/m³, which represents 10% of the relevant AQS, which is below the threshold for insignificance for short-term impacts. When the PC is compared to the AQS minus twice the long-term background concentration it represents 10% of the AQS and therefore it is considered very unlikely that an exceedance of the AQS would occur during commissioning operations.

All other receptors receive lower impacts, and therefore it is considered highly unlikely that an exceedance of the AQS would occur at any identified receptor.

<u>*Operation – Routine Testing Impacts*</u>

The maximum short-term SO_2 PC (as the 99.9th percentile of 15-minute averages) during routine operational testing occurs at R9 Keepers Cottage. The highest PC was 6.0μg/m³, which represents 2% of the relevant AQS and can therefore be considered **insignificant** according to the Environment Agency's Risk Assessment guidance.

Assessment of the predicted concentrations at the transient receptors is considered appropriate for this averaging period, and no exceedance of the AQS is predicted at these locations, with PCs of 7% of the AQS minus twice the long-term background concentration being predicted during operational scenario.

<u>*Loss of Off-site Power Event Impacts*</u>

The maximum short-term SO_2 PC (as the 99.9th percentile of 15-minute averages) is predicted to occur during the loss of off-site power event and is predicted at R1 Sizewell Village. The highest PC was 31.7μg/m³, which represents 12% of the relevant AQS.

All other receptors receive lower impacts, and therefore it is considered highly unlikely that an exceedance of the AQS would occur at any identified receptor.

No exceedance of the AQS is predicted at the transient receptors, with a maximum PC representing 31% of the AQS minus twice the long-term background concentration being predicted during the loss of off-site power event.

Given the worst case assumptions used in the assessment, based on the above results it is therefore considered unlikely that operation of the installation would lead to a breach of the 15-minute AQS for SO_2 for any of the operational scenarios assessed.

Table 5-3: Predicted 15 minute averages (short-term) (as the 99.9th percentile) process contributions for SO_2 at all identified receptors and operating scenarios (highest result shown in bold)

RECEPTOR	AQS (µg/m³)	COMMISSIONING				OPERATION – ROUTINE TESTING				LOSS OF OFF-SITE POWER EVENT			
		PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC	PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC	PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC
R1 Sizewell Village	**266**	18.4	7%	7.9	7%	4.7	2%	7.9	2%	27.2	10%	7.9	11%
R2 Holme Farm Sizewell	266	15.6	6%	7.9	6%	3.9	1%	7.9	2%	25.1	9%	7.9	10%
R3 Sandlings Walk Path[1]	***266***	*NA*	*NA*	*NA*	*NA*	***17.3***	***7%***	***7.9***	***7%***	***79.2***	***30%***	***7.9***	***31%***
R4 Suffolk Coastal Path/ Beaches	*266*	*34.2*	*13%*	*7.9*	*13%*	*12.5*	*5%*	*7.9*	*5%*	*44.2*	*17%*	*7.9*	*17%*
R5 The Round House	266	16.2	6%	7.9	6%	3.7	1%	7.9	1%	20.6	8%	7.9	8%
R6 Old Abbey Farm	266	11.6	4%	7.9	4%	2.8	1%	7.9	1%	15.8	6%	7.9	6%
R7 Old Abbey Farm Care Home	266	10.7	4%	7.9	4%	3.1	1%	7.9	1%	15.9	6%	7.9	6%
R8 Leiston Common	*266*	*18.9*	*7%*	*7.9*	*7%*	*6.4*	*2%*	*7.9*	*2%*	*23.5*	*9%*	*7.9*	*9%*
R9 Keepers Cottage	**266**	**26.3**	**10%**	**7.9**	**10%**	**6.0**	**2%**	**7.9**	**2%**	**31.7**	**12%**	**7.9**	**12%**
R10 Abbey Cottage	266	11.0	4%	7.9	4%	2.7	1%	7.9	1%	16.1	6%	7.9	6%
R11 Crown Farm	266	15.7	6%	7.9	6%	3.4	1%	7.9	1%	24.6	9%	7.9	10%
R12 Crown Lodge	266	15.2	6%	7.9	6%	3.7	1%	7.9	1%	24.5	9%	7.9	9%
R13 Halfway Cottages	266	16.5	6%	7.9	6%	4.2	2%	7.9	2%	28.1	11%	7.9	11%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration.

BCs for short-term impacts are based on twice the annual average BC.

[1] Sandlings Walk path will be closed during commissioning activities.

Sulphur Dioxide – Hourly Averages (Short-Term) Impacts:

The hourly average (as the 99.73th percentile) SO_2 PCs at each receptor, and for each operational scenario assessed, are shown in **Table 5-4**.

Commissioning Impacts

The maximum short-term PC of SO_2 (as the 99.73th percentile of hourly averages) during the commissioning scenarios occurs at R9 Keepers Cottage. The highest PC was 15.9$\mu g/m^3$, which represents 5% of the relevant AQS and is below the threshold for insignificance and therefore indicates that an exceedance of the hourly AQS for SO_2 is unlikely during commissioning operations at any receptor location.

Operation – Routine Testing Impacts

The maximum short-term SO_2 PC (as the 99.73th percentile of hourly averages) during routine operational testing occurs at R9 Keepers Cottage. The highest PC was 3.6$\mu g/m^3$, which represents 1% of the relevant AQS and can therefore be considered **insignificant** according to the Environment Agency's risk assessment guidance.

Loss of Off-site Power Event Impacts

The maximum short-term PCs of SO_2 (as the 99.73th percentile of hourly averages) are predicted to occur during the loss of off-site power scenario at R9 Keepers Cottage. The highest PC was 22.6$\mu g/m^3$, which represents 6% of the relevant AQS and is below the threshold for insignificance.

All other receptors receive lower impacts, and therefore it is considered highly unlikely that an exceedance of the AQS would occur at any identified receptor.

Given the worst case assumptions used in the assessment, it is considered very unlikely that operation of the installation would lead to a breach of the hourly average AQS for SO_2 for any of the operational scenarios assessed.

Table 5-4: Predicted hourly averages (short-term) (as the 99.73th percentile) process contributions for SO_2 at all identified receptors and operating scenarios (highest result shown in bold)

RECEPTOR	AQS (µg/m³)	COMMISSIONING PC (µg/m³)	COMMISSIONING PC / AQS	COMMISSIONING BC (µg/m³)	COMMISSIONING PC / AQS - BC	OPERATION – ROUTINE TESTING PC (µg/m³)	OPERATION – ROUTINE TESTING PC / AQS	OPERATION – ROUTINE TESTING BC (µg/m³)	OPERATION – ROUTINE TESTING PC / AQS - BC	LOSS OF OFF-SITE POWER EVENT PC (µg/m³)	LOSS OF OFF-SITE POWER EVENT PC / AQS	LOSS OF OFF-SITE POWER EVENT BC (µg/m³)	LOSS OF OFF-SITE POWER EVENT PC / AQS - BC
R1 Sizewell Village	**350**	11.1	3%	7.9	3%	2.7	<1%	7.9	<1%	18.7	5%	7.9	5%
R2 Holme Farm Sizewell	350	8.2	2%	7.9	2%	1.9	<1%	7.9	<1%	13.8	4%	7.9	4%
R5 The Round House	350	9.0	3%	7.9	3%	2.0	<1%	7.9	<1%	14.4	4%	7.9	4%
R6 Old Abbey Farm	350	7.3	2%	7.9	2%	1.6	<1%	7.9	<1%	10.5	3%	7.9	3%
R7 Old Abbey Farm Care Home	350	7.3	2%	7.9	2%	1.6	<1%	7.9	<1%	10.4	3%	7.9	3%
R9 Keepers Cottage	**350**	**15.9**	**5%**	**7.9**	**5%**	**3.6**	**1%**	**7.9**	**1%**	**22.6**	**6%**	**7.9**	**7%**
R10 Abbey Cottage	350	6.6	2%	7.9	2%	1.4	<1%	7.9	<1%	9.9	3%	7.9	3%
R11 Crown Farm	350	8.5	2%	7.9	2%	2.0	<1%	7.9	<1%	14.1	4%	7.9	4%
R12 Crown Lodge	350	8.3	2%	7.9	2%	2.0	<1%	7.9	<1%	14.3	4%	7.9	4%
R13 Halfway Cottages	350	9.3	3%	7.9	3%	2.2	<1%	7.9	<1%	15.8	5%	7.9	4%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

BCs for short-term impacts are based on twice the annual average BC

Sulphur Dioxide – 24-Hour Average (Short-Term) Impacts

The 24-hour average (as the 99.18th percentile) SO_2 PCs at each receptor, and for each operational scenario assessed, are shown in **Table 5-5**.

Commissioning Impacts

The maximum short-term PCs of SO_2 (as the 99.18th percentile of 24-hour averages) occurs at R9 Keepers Cottage. The highest PC 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. As this is the worst case receptor, and all other receptors receive lower impacts, no exceedances are anticipated at any receptor.

Operation – Routine Testing Impacts

The maximum short-term SO_2 PC (as the 99.18th percentile of 24-hour averages) during routine operational testing occurs at R9 Keepers Cottage. The highest PC was 1.3μg/m^3, which represents 1% of the relevant AQS and can therefore be considered **insignificant** according to the Environment Agency's Risk Assessment guidance.

Loss of Off-site Power Event Impacts

The maximum short-term PCs of SO_2 (as the 99.18th percentile of 24-hour averages) are predicted to occur during the loss of off-site power event at R9 Keepers Cottage. The highest PC was 9.3μg/m^3, which represents 7% of the relevant AQS and therefore is not considered to represent a risk of exceedance of the AQS.

All other receptors receive lower impacts, and therefore it is considered highly unlikely that an exceedance of the AQS would occur at any identified receptor.

Given the worst case assumptions used in the assessment, it is considered unlikely that operation of the installation would lead to a breach of the 24-hour average AQS for SO_2 for any of the operational scenarios assessed.

Table 5-5: Predicted 24-hour averages (short-term) (as the 99.18th percentile) PCs for SO_2 at all identified receptors and operating scenarios (highest result shown in bold)

RECEPTOR	AQS (µg/m³)	COMMISSIONING PC (µg/m³)	COMMISSIONING PC / AQS	COMMISSIONING BC (µg/m³)	COMMISSIONING PC / AQS - BC	OPERATION – ROUTINE TESTING PC (µg/m³)	OPERATION – ROUTINE TESTING PC / AQS	OPERATION – ROUTINE TESTING BC (µg/m³)	OPERATION – ROUTINE TESTING PC / AQS - BC	LOSS OF OFF-SITE POWER EVENT PC (µg/m³)	LOSS OF OFF-SITE POWER EVENT PC / AQS	LOSS OF OFF-SITE POWER EVENT BC (µg/m³)	LOSS OF OFF-SITE POWER EVENT PC / AQS - BC
R1 Sizewell Village	**125**	5.2	4%	7.9	4%	1.2	1%	7.9	1%	8.3	7%	7.9	7%
R2 Holme Farm Sizewell	125	2.8	2%	7.9	2%	0.6	<1%	7.9	<1%	4.9	4%	7.9	4%
R5 The Round House	125	2.3	2%	7.9	2%	0.5	<1%	7.9	<1%	3.7	3%	7.9	3%
R6 Old Abbey Farm	125	2.6	2%	7.9	2%	0.5	<1%	7.9	<1%	3.9	3%	7.9	3%
R7 Old Abbey Farm Care Home	125	2.6	2%	7.9	2%	0.5	<1%	7.9	<1%	4.0	3%	7.9	3%
R9 Keepers Cottage	125	**6.0**	**5%**	**7.9**	**5%**	**1.3**	**1%**	**7.9**	**1%**	**9.3**	**7%**	**7.9**	**8%**
R10 Abbey Cottage	125	2.4	2%	7.9	2%	0.5	<1%	7.9	<1%	3.3	3%	7.9	3%
R11 Crown Farm	125	3.2	3%	7.9	3%	0.7	1%	7.9	<1%	5.4	4%	7.9	5%
R12 Crown Lodge	125	3.0	2%	7.9	3%	0.6	<1%	7.9	<1%	4.5	4%	7.9	4%
R13 Halfway Cottages	**125**	2.7	2%	7.9	2%	0.6	<1%	7.9	<1%	4.7	4%	7.9	4%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration.

BCs for short-term impacts are based on twice the annual average BC

Particulate Matter – Annual Average (Long-Term) Impacts:

Total particulate matter emissions have been conservatively assessed as PM_{10} and $PM_{2.5}$, in line with the AQS objectives, when some of the particulate emission may consist of particle sizes greater than 10μm (or 2.5μm), which are not entrained within the lung, and therefore are not covered by the AQS objectives. Assuming all particulates fall within these fractions is therefore considered likely to overestimate the particulate impacts.

The annual average PM_{10} PCs at each receptor, and for each operational scenario assessed, are shown in **Table 5-6** and $PM_{2.5}$ PCs are shown in **Table 5-7**.

Commissioning Impacts

The maximum annual average PM_{10} PC at any receptor is 0.02μg/m^3, which occurs R1 and R9 Sizewell Village and Keepers Cottage. This PC represents less than 0.1% of the relevant AQS objective and therefore can be considered **insignificant** in accordance with the Environment Agency's risk assessment guidance. Impacts at all receptor locations are therefore considered to be **insignificant**.

The same predicted concentrations have also been used to conservatively assess impacts of $PM_{2.5}$, and therefore the maximum annual average PC 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 impacts can also be considered to be **insignificant** at all receptors.

Operation – Routine Testing Impacts

The impacts predicted during routine operation are lower than those predicted for the commissioning period, due to the reduction in operation hours from 2,446 during commissioning to 720 during routine testing operation.

It is therefore considered that routine operations are unlikely to result in or contribute to an exceedance of the annual average PM_{10} AQS objective and $PM_{2.5}$ target at any identified receptor, due to the insignificance of the predicted impacts.

Table 5-6: Predicted annual average (long-term) PCs for PM_{10} at all identified receptors and operating scenarios (highest result shown in bold)

RECEPTOR	AQS (µg/m³)	COMMISSIONING PC (µg/m³)	COMMISSIONING PC / AQS	COMMISSIONING BC (µg/m³)	COMMISSIONING PEC / AQS	ROUTINE TESTING PC (µg/m³)	ROUTINE TESTING PC / AQS	ROUTINE TESTING BC (µg/m³)	ROUTINE TESTING PEC / AQS
R1 Sizewell Village	**40**	**0.02**	**<0.1%**	**12.3**	**31%**	0.005	<0.1%	12.3	31%
R2 Holme Farm Sizewell	40	0.01	<0.1%	12.3	31%	0.004	<0.1%	12.3	31%
R5 The Round House	40	0.01	<0.1%	12.3	31%	0.002	<0.1%	12.3	31%
R6 Old Abbey Farm	40	0.01	<0.1%	12.3	31%	0.002	<0.1%	12.3	31%
R7 Old Abbey Farm Care Home	40	0.01	<0.1%	12.3	31%	0.002	<0.1%	12.3	31%
R9 Keepers Cottage	**40**	**0.02**	**<0.1%**	**12.3**	**31%**	**0.006**	**<0.1%**	**12.3**	**31%**
R10 Abbey Cottage	40	0.01	<0.1%	12.3	31%	0.002	<0.1%	12.3	31%
R11 Crown Farm	40	0.01	<0.1%	12.3	31%	0.003	<0.1%	12.3	31%
R12 Crown Lodge	40	0.01	<0.1%	12.3	31%	0.003	<0.1%	12.3	31%
R13 Halfway Cottages	40	0.01	<0.1%	12.3	31%	0.003	<0.1%	12.3	31%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

Table 5-7: Predicted annual average (long-term) process contributions for $PM_{2.5}$ at all identified receptors and operating scenarios (highest result shown in bold)

		COMMISSIONING				ROUTINE TESTING			
RECEPTOR	AQS (µg/m³)	PC (µg/m³)	PC / AQS	BC (µg/m³)	PEC / AQS	PC (µg/m³)	PC / AQS	BC (µg/m³)	PEC / AQS
R1 Sizewell Village	**20**	**0.02**	**<0.1%**	**7.7**	**38%**	0.005	<0.1%	**7.5**	**38**%
R2 Holme Farm Sizewell	20	0.01	<0.1%	7.7	38%	0.004	<0.1%	7.5	38%
R5 The Round House	20	0.01	<0.1%	7.7	38%	0.002	<0.1%	7.5	38%
R6 Old Abbey Farm	20	0.01	<0.1%	7.7	38%	0.002	<0.1%	7.5	38%
R7 Old Abbey Farm Care Home	20	0.01	<0.1%	7.7	38%	0.002	<0.1%	7.5	38%
R9 Keepers Cottage	**20**	**0.02**	**<0.1%**	**7.7**	**38%**	**0.006**	**<0.1%**	**7.5**	**38%**
R10 Abbey Cottage	20	0.01	<0.1%	7.7	38%	0.002	<0.1%	7.5	38%
R11 Crown Farm	20	0.01	<0.1%	7.7	38%	0.003	<0.1%	7.5	38%
R12 Crown Lodge	20	0.01	<0.1%	7.7	38%	0.003	<0.1%	7.5	38%
R13 Halfway Cottages	20	0.01	<0.1%	7.7	38%	0.003	<0.1%	7.5	38%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

Particulate Matter – 24-Hour Average (Short Term) Impacts

Total particulate matter emissions have been conservatively assessed as PM_{10} for comparison with the daily average AQS.

The 24-hour average (as the 90.41th percentile) PM_{10} PCs at each receptor, and for each operational scenario assessed, are shown in **Table 5-8**.

Commissioning Impacts

The maximum short-term PC of PM_{10} (as the 90.41th percentile of 24-hour averages) is predicted at R9 Keepers Cottage. The highest PC was 1.4μg/m^3, which represents 3% of the relevant AQS 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 **insignificant**.

Operation – Routine Testing Impacts

The maximum short-term PC of PM_{10} (as the 90.41th percentile of 24-hour averages) during routine testing operations is predicted to occur at R9 Keepers Cottage. The highest PC was 0.3μg/m^3, which represents less than 1% of the relevant AQS 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 **insignificant**.

Loss of Off-site Power Event Impacts

The maximum short-term PC of PM_{10} (as the 90.41th percentile of 24-hour averages) is predicted to occur during the loss of off-site power event at R9 Keepers Cottage. The highest PC was 2.4μg/m^3, which represents 5% of the relevant AQS 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 **insignificant**.

Table 5-8: Predicted 24-Hour averages (short-term) (as the 90.41th percentile) PCs for PM_{10} at all identified receptors and operating scenarios (highest result shown in bold)

RECEPTOR	AQS (µg/m³)	COMMISSIONING PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC	OPERATION – ROUTINE TESTING PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC	LOSS OF OFF-SITE POWER EVENT PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC
R1 Sizewell Village	50	0.9	2%	24.5	4%	0.2	<1%	24.6	<1%	1.6	3%	24.6	6%
R2 Holme Farm Sizewell	50	0.8	2%	24.5	3%	0.2	<1%	24.6	<1%	1.4	3%	24.6	5%
R5 The Round House	50	0.6	1%	24.5	3%	0.1	<1%	24.6	<1%	1.0	2%	24.6	4%
R6 Old Abbey Farm	50	0.4	1%	24.5	2%	0.1	<1%	24.6	<1%	0.6	1%	24.6	2%
R7 Old Abbey Farm Care Home	50	0.4	1%	24.5	2%	0.1	<1%	24.6	<1%	0.7	1%	24.6	3%
R9 Keepers Cottage	**50**	**1.4**	**3%**	24.5	**6%**	**0.3**	<1%	24.6	**1%**	**2.4**	**5%**	24.6	**9%**
R10 Abbey Cottage	50	0.3	1%	24.5	1%	0.1	<1%	24.6	<1%	0.6	1%	24.6	2%
R11 Crown Farm	50	0.7	1%	24.5	3%	0.2	<1%	24.6	<1%	1.2	2%	24.6	5%
R12 Crown Lodge	50	0.7	1%	24.5	3%	0.1	<1%	24.6	<1%	1.3	3%	24.6	5%
R13 Halfway Cottages	50	0.9	2%	24.5	4%	0.2	<1%	24.6	<1%	1.5	3%	24.6	6%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

BCs for short-term impacts are based on twice the annual average BC

Carbon Monoxide – Hourly Average (Short-Term) Impacts:

The hourly average (as the 100th percentile) CO PCs at each receptor, and for each operational scenario assessed, are shown in **Table 5-9**.

Commissioning Impacts

The maximum short-term CO PC is predicted to occur during commissioning at R9 Keepers Cottage. The highest PC was 65.6µg/m^3, which represents 0.2% of the relevant EAL 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 **insignificant**.

Operation– Routine Testing Impacts

The maximum short-term CO PC during routine operations is predicted to occur at R9 Keepers Cottage. The highest PC was 15.5µg/m^3, which represents less than 0.1% of the relevant EAL 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 **insignificant**.

Loss of Off-site Power Event Impacts

The maximum short-term CO PC is predicted to occur during the loss of off-site power event at R11 Crown Farm. The highest PC was 77.1µg/m^3, which represents 0.3% of the relevant EAL 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 **insignificant**.

Table 5-9: Predicted hourly averages (short-term) (as the 100th percentile) PCs for CO at all identified receptors and operating scenarios (highest result shown in bold)

RECEPTOR	AQS (µg/m³)	COMMISSIONING PC (µg/m³)	COMMISSIONING PC / AQS	COMMISSIONING BC (µg/m³)	COMMISSIONING PC / AQS - BC	OPERATION – ROUTINE TESTING PC (µg/m³)	OPERATION – ROUTINE TESTING PC / AQS	OPERATION – ROUTINE TESTING BC (µg/m³)	OPERATION – ROUTINE TESTING PC / AQS - BC	LOSS OF OFF-SITE POWER EVENT PC (µg/m³)	LOSS OF OFF-SITE POWER EVENT PC / AQS	LOSS OF OFF-SITE POWER EVENT BC (µg/m³)	LOSS OF OFF-SITE POWER EVENT PC / AQS - BC
R1 Sizewell Village	30,000	37.6	0.1%	184	<1%	11.4	<0.1%	184	<1%	57.2	0.2%	184	<1%
R2 Holme Farm Sizewell	30,000	28.6	0.1%	184	<1%	8.5	<0.1%	184	<1%	45.0	0.1%	184	<1%
R5 The Round House	30,000	41.5	0.1%	184	<1%	10.5	<0.1%	184	<1%	54.4	0.2%	184	<1%
R6 Old Abbey Farm	30,000	21.6	0.1%	184	<1%	5.1	<0.1%	184	<1%	31.9	0.1%	184	<1%
R7 Old Abbey Farm Care Home	30,000	21.5	0.1%	184	<1%	5.5	<0.1%	184	<1%	31.2	0.1%	184	<1%
R9 Keepers Cottage	**30,000**	**65.6**	**0.2%**	**184**	**<1%**	**15.5**	**<0.1%**	**184**	**<1%**	75.0	0.3%	184	<1%
R10 Abbey Cottage	30,000	23.2	0.1%	184	<1%	5.7	<0.1%	184	<1%	30.9	0.1%	184	<1%
R11 Crown Farm	30,000	47.8	0.1%	184	<1%	11.6	<0.1%	184	<1%	**77.1**	**0.3%**	**184**	**<1%**
R12 Crown Lodge	30,000	46.3	0.1%	184	<1%	11.6	<0.1%	184	<1%	76.5	0.3%	184	<1%
R13 Halfway Cottages	30,000	47.3	0.1%	184	<1%	13.0	<0.1%	184	<1%	68.3	0.2%	184	<1%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

BCs for short-term impacts are based on twice the annual average BC

Carbon Monoxide – 8-Hour Rolling Average (Short-Term) Impacts:

The 8-hour rolling average CO PCs at each receptor, and for each operational scenario assessed, are shown in **Table 5-10**.

Commissioning Impacts

The maximum short-term CO PC during commissioning activities occurs at R9 Keepers Cottage. The highest PC was 28.6μg/m^3, which represents 0.3% of the relevant AQS and is therefore below the 10% threshold for insignificance of short term impacts, as defined in the Environment Agency's Risk Assessment guidance.

Impacts at all receptors are therefore considered **insignificant.**

Operation – Routine Testing Impacts

The maximum short-term CO PC during routine operational testing activities occurs at R9 Keepers Cottage. The highest PC was 6.9μg/m^3, which represents 0.1% of the relevant AQS and is therefore below the 10% threshold for insignificance of short-term impacts, as defined in the Environment Agency's Risk Assessment guidance.

Impacts at all receptors are therefore considered **insignificant**.

Loss of Off-site Power Event Impacts

The maximum short-term CO PC is predicted to occur during the loss of off-site power event at R9 Keepers Cottage. The highest PC was 43.3μg/m^3, which represents 0.4% of the relevant AQS and is therefore below the 10% threshold for insignificance of short-term impacts, as defined in the Environment Agency's Risk Assessment guidance.

Impacts at all receptors are therefore considered **insignificant.**

Table 5-10: Predicted 8 hour rolling averages PCs for CO at all identified receptors and operating scenarios (short-term) (highest result shown in bold)

		COMMISSIONING				OPERATION – ROUTINE TESTING				LOSS OF OFF-SITE POWER EVENT			
RECEPTOR	AQS (µg/m³)	PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC	PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC	PC (µg/m³)	PC / AQS	BC (µg/m³)	PC / AQS - BC
R1 Sizewell Village	10,000	24.4	0.2%	184	<1%	6.0	0.1%	184	<1%	39.6	0.4%	184	<1%
R2 Holme Farm Sizewell	10,000	19.4	0.2%	184	<1%	4.1	0.0%	184	<1%	32.1	0.3%	184	<1%
R5 The Round House	10,000	18.9	0.2%	184	<1%	4.1	0.0%	184	<1%	28.0	0.3%	184	<1%
R6 Old Abbey Farm	10,000	12.5	0.1%	184	<1%	2.6	0.0%	184	<1%	19.2	0.2%	184	<1%
R7 Old Abbey Farm Care Home	10,000	12.0	0.1%	184	<1%	2.5	0.0%	184	<1%	18.9	0.2%	184	<1%
R9 Keepers Cottage	**10,000**	**28.6**	**0.3%**	**184**	**<1%**	**6.9**	**0.1%**	**184**	**<1%**	**43.3**	**0.4%**	**184**	**<1%**
R10 Abbey Cottage	10,000	11.5	0.1%	184	<1%	2.7	0.0%	184	<1%	19.4	0.2%	184	<1%
R11 Crown Farm	10,000	17.2	0.2%	184	<1%	4.0	0.0%	184	<1%	26.0	0.3%	184	<1%
R12 Crown Lodge	10,000	20.2	0.2%	184	<1%	4.6	0.0%	184	<1%	33.3	0.3%	184	<1%
R13 Halfway Cottages	10,000	18.0	0.2%	184	<1%	4.3	0.0%	184	<1%	31.1	0.3%	184	<1%

AQS = Air Quality Standard or EAL, PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

BCs for short-term impacts are based on twice the annual average BC

Predicted Results – Habitat Receptors

The maximum predicted ground level PCs of pollutants at receptor locations have been compared against the appropriate Critical Level or Load to assess whether the potential impacts are predicted to be insignificant, or whether the potential for any significant impact exists.

The results tables presented use a Red, Amber Green colour coding system, as follows:

- Green = PC/ PEC can be screened as insignificant (for SACs, SPAs and SSSIs this is where the PC / Critical Level/ Load = less than 1% of long term impacts and less than 10% for short term impacts or PEC / Critical Level = less than 70% of long term impacts. For CWSs, where long and short term PCs are less than 100% of the Critical Level, they are considered to be insignificant);
- Amber = Not screened as insignificant, but no exceedance of the Critical Level or Load is predicted, or where an exceedance is already occurring due to high background concentrations, i.e. the exceedance is not considered to be due to the impacts of the installation;
- Red = PCs / PECs indicate an exceedance of the Critical Level or Load, where background concentrations are not already causing the exceedance, i.e. the exceedance is considered to result from the impacts of the installation.

Critical Levels

The impact of emissions of nitrogen oxides and sulphur dioxide has been assessed based on the scenarios detailed in **Tables 3-2** and **3-3** through comparison of the maximum predicted PCs with the Critical Levels at the closest point to the installation of each of the identified sensitive Habitat receptors.

Critical Levels for air pollutants are not habitat specific, unlike Critical Loads as seen in **Section 4.3.2** of this chapter, and have been defined to cover broad vegetation types (e.g. forest, arable, semi-natural), sometimes with more stringent values set for sensitive lichens and bryophytes (as is the case for SO_2). Critical Levels for the different pollutants have been derived nationally from experiments that show varied effects on vegetation, including such effects as visible injury symptoms of exposure (e.g. leaf discolouration and leaf loss), reduced growth, and species composition changes in semi-natural vegetation.

Annual Average NO_x Impacts

Exceedance of NO_x Critical Levels can result in damage to lichens and bryophytes, changes in plant composition and leaf discoloration.

The maximum predicted annual average PCs for NO_x for all the Habitat receptors, for both commissioning and routine operating scenarios, along with a comparison against the relevant Critical Levels, are provided in **Table 5-11**.

Table 5-11: Predicted annual average (long-term) PCs for NO_x at all identified receptors and operating scenarios (highest result shown in bold)

RECEPTOR	CL (µg/m³)	COMMISSIONING PC (µg/m³)	COMMISSIONING PC / CL	COMMISSIONING BC (µg/m³)	COMMISSIONING PEC / CL	ROUTINE TESTING PC (µg/m³)	ROUTINE TESTING PC / CL	ROUTINE TESTING BC (µg/m³)	ROUTINE TESTING PEC / CL
E1 Alde Ore	30	0.07	0.2%	7.6	26%	0.02	<0.1%	7.4	25%
E2 Minsmere	**30**	**13.5**	**45.0%**	**7.7**	**71%**	**3.9**	**12.9%**	**7.5**	**38%**
E3 Orfordness	30	0.05	0.2%	7.2	24%	0.01	<0.1%	7.0	24%
E4 Sandlings	30	0.5	1.8%	7.7	27%	0.2	0.5%	7.5	26%
E5 Sizewell Marshes	30	3.9	12.9%	7.5	38%	1.1	3.7%	7.4	28%
E6 Leiston and Aldeburgh, E8 and E9 Dower House	30	0.3	1.1%	7.5	26%	0.09	0.3%	7.4	25%
E7 Leiston Common	30	0.6	1.9%	7.8	28%	0.2	0.6%	7.6	26%
E10 Suffolk shingle beaches	30	4.1	13.8%	9.5	45%	1.2	3.9%	9.3	35%
E11 Peckham Pits Wood	30	1.2	4.0%	7.7	30%	0.4	1.2%	7.5	26%
E12 Sizewell levels	30	13.3	44.3%	7.7	70%	3.8	12.7%	7.5	38%
E13 Minsmere South Levels	30	3.2	10.6%	7.7	36%	0.9	3.1%	7.5	28%

CL = Critical Level (for the Protection of Vegetation and Ecosystems), PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

It can be seen from **Table 5-11** that the PCs at all the CWSs (Receptors E7 – E13) are less than 100% of the Critical Level for both the operating scenarios assessed, and therefore can be considered **not significant**.

Of the remaining ecological receptor sites, the PCs at two of the Habitat sites (E1 and E3) are predicted to be less than 1% of the Critical Level during the commissioning phase. E6 (Leiston and Aldeburgh, E8 and E9 Dower House) is only slightly over the 1% insignificant threshold (at 1.1%) and therefore it is also considered it can be screened as insignificant, particularly as the PEC is well below 70%.

The worst case impacts are predicted to occur at E2 (Minsmere – Walberswick Heaths and Marshes) which is predicted to experience NO_x concentrations representing 45% of the Critical Level during the commissioning period. When combined with the background concentrations it represents 71% of the Critical Level. Given that Critical Levels are defined as *"concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as plants, ecosystems or materials, may occur according to present knowledge"*, it is not considered that the PEC will have an adverse effect as no exceedance is predicted. Additionally, when taking into consideration the background NO_x concentration at this site, the PEC shows that exceedance of the Critical Level is unlikely.

During routine operation, impacts are reduced, with two additional sites (E4 and E7) predicted to experience PC impacts less than 1% of the Critical Level. All the PECs are well below 70% at all sites and therefore impacts can be considered to be **insignificant**.

For all results, it is important to note that the assessment has been based on the worst case emissions from the EDGs, when emissions from the UDGs would lead to a lower level of impact. Also the commissioning times for the UDGs (738 hours x 2 UDGs equates to a total of 1,476 hours) are greater than commissioning times for the EDGs (242.5 hours x 4 equates to a total of 970 hours per EPR Unit).

Commissioning operations will only occur for two years and the PCs for the routine operating scenario are much lower, with the majority of the Habitat sites experiencing impacts from PCs that can be considered to be **insignificant**, with all PECs below 70% of the annual average Critical Levels predicted during commissioning and routine operations.

An isopleth **Figure 12C.9** showing the dispersion of NO_x during routine operation is provided in **Appendix B** of this document.

Daily NO_x Impacts

There are no commissioning operating scenarios which could lead to emissions from the DGs occurring over a 24-hour period, and therefore impacts against the daily NO_x Critical Level have only been assessed for routine testing operations. In line with the operating scenarios described for the installation (**Table 3-3**), it has been assumed that one DG is operational throughout the year, although the routine testing operations of each DG will only occur for 60 hours over the year, and therefore for all DGs this will result in only 720 hours of operation on an annual basis.

The maximum results of the daily NO_x modelling for all the Habitat receptors are provided in **Table 5-12**.

Table 5-12: Predicted daily average PCs for NO_x at all identified receptors (highest result shown in bold)

RECEPTOR	CL (µg/m³)	ROUTINE TESTING PC (µg/m³)	PC / CL	BC (µg/m³)[1]	PEC / CL
E1 Alde Ore	75	4.8	6%	11.1	21%
E2 Minsmere	**75**	**303.6**	**405%**	11.3	420%
E3 Orfordness	75	3.3	4%	10.6	18%
E4 Sandlings	75	25.4	34%	11.3	49%
E5 Sizewell Marshes	75	307.4	410%	11.0	425%
E6 Leiston and Aldeburgh, E8 and E9 Dower House	75	20.7	28%	11.0	42%
E7 Leiston Common	**75**	41.4	55%	11.4	70%
E10 Suffolk Beaches	**75**	149.5	199%	14.0	218%
E11 Reckham Pits Wood	75	70.5	94%	11.3	109%
E12 Sizewell Levels	**75**	**320.7**	**428%**	**11.3**	**443%**
E13 Minsmere South Levels	75	111.6	149%	11.3	164%

CL = Critical Level (for the Protection of Vegetation and Ecosystems), PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

Notes: [1] Background concentrations have been multiplied by 1.5 for daily impacts.

It can be seen from **Table 5-12** that six of the identified receptors could experience PCs that would result in an exceedance of the daily Critical Level (E2 and E13 both at Minsmere, E5 and E12 at Sizewell, E10 Suffolk Shingle Beaches CWS and E11 Reckham Pits Wood).

However, 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, 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'*[13].

The isopleth plot shown in **Figure 12C.10** of **Appendix B** of this document shows that an area of approximately 2km² centered on the installation could be subject to exceedances of the daily Critical Level, potentially affecting the following Habitat features:

- coastal flood plain;
- reedbed;
- vegetated shingle;
- sand dunes;

[13] Sutton MA, Howard CM, Erisman JW, Billen G, Bleeker A, Grennfelt P, van Grinsven H, Grizzetti B. 2013. The European Nitrogen Assessment: Sources, Effects and Policy Perspectives. Page 414. Cambridge University Press. 664pp. ISBN-10: 1107006120

- lowland heath;
- wet woodland; and,
- coniferous trees.

The Habitat receptors experiencing the worst case impacts are E2 (Minsmere – Walberswick Marshes), E5 (Sizewell Marshes) and E12 (Sizewell levels), which all show an area of exceedance of the daily Critical Level. These sites comprise areas of coniferous trees, wet woodland and reedbed. Reedbeds are considered to be relatively insensitive to atmospheric NO_x concentrations, particularly over a short duration of time, and therefore it is not considered that adverse impacts would occur on this feature.

Similarly, it is considered that woodland (receptor E11) would also be relatively insensitive, although any associated epiphytic lichen communities would be more susceptible. Although predicted concentrations for the vegetated shingle, sand dunes and lowland heath are lower, these habitats are likely to be more sensitive to elevated nitrogen, and the predicted NO_x levels would exceed the daily Critical Level for these features.

However, although the predicted atmospheric NO_x levels may be increased while the installation is in operation, the DGs will only operate for a maximum of 720 hours (based on 60 hours per DG) in the year in total. Any exposure to nitrogen oxides would therefore be comparatively short-term and it is therefore considered that these habitats will have time to recover from short term exposure. This conclusion applies to the various habitat features in general (e.g. lowland heath) as well as to any component species that may be of particular sensitivity (e.g. lichens and bryophytes).

Statistical analysis of the daily NO_x impacts (assuming 100% operation of an EDG) indicates that the daily NO_x Critical Level is exceeded up until the 80th percentile for the worst case year of met data, and therefore an exceedance could occur for just 20% of the time. Taking into account that the DGs only operate for 8% of hours (720 ÷ 8760) for annual routine operation, this results in a probability of the two events occurring at the same time of 1.6% chance of an exceedance occurring (0.2 x 0.08 = 0.016).

Given the position stated above regarding the lower importance of the daily mean Critical Level than the annual mean, coupled with the conservative assumptions used in the assessment, it is considered that the actual level of impact will be lower than predicted in **Table 5-12**.

Annual Sulphur Dioxide Impacts

As with NO_x, exceedance of SO_2 Critical Levels can result in damage to lichens and bryophytes, changes in plant composition and result in leaf discoloration.

The maximum predicted annual average PCs for SO_2 for all the Habitat receptors for both commissioning and routine operating scenarios, compared to the Critical Level for higher plants (i.e. 20µg/m^3), are provided in **Table 5-13**.

Table 5-13: Predicted annual averages PCs for SO_2 at all identified receptors and operating scenarios (relative to the Critical Level for higher plants) (highest result shown in bold)

		COMMISSIONING				ROUTINE TESTING			
RECEPTOR	CL (µg/m^3)	PC (µg/m^3)	PC / CL	BC (µg/m^3)	PEC / CL	PC (µg/m^3)	PC / CL	BC (µg/m^3)	PEC / CL
E1 Alde Ore	20	0.003	0.0%	2.2	11%	0.001	0.0%	2.2	11%
E2 Minsmere	**20**	**0.5**	**2.3%**	**4.0**	**22%**	**0.1**	**0.7%**	**4.0**	**21%**
E3 Orfordness	20	0.002	0.0%	2.5	13%	0.000	0.0%	2.5	13%

RECEPTOR	CL (µg/m³)	COMMISSIONING PC (µg/m³)	PC / CL	BC (µg/m³)	PEC / CL	ROUTINE TESTING PC (µg/m³)	PC / CL	BC (µg/m³)	PEC / CL
E4 Sandlings	20	0.02	0.1%	2.7	1%	0.005	0.0%	2.7	14%
E5 Sizewell Marshes	20	0.1	0.7%	2.7	14%	0.04	0.2%	2.7	14%
E6 Leiston and Aldeburgh, E8 and E9 Dower House	20	0.01	0.1%	3.1	16%	0.003	0.0%	3.1	16%
E7 Leiston Common	20	0.02	0.1%	2.5	13%	0.006	0.0%	2.5	13%
E10 Suffolk Beaches	20	0.1	0.7%	2.4	13%	0.04	0.2%	2.4	12%
E11 Reckham Pits Wood	20	0.04	0.2%	3.0	15%	0.01	0.1%	3.0	15%
E12 Sizewell Levels	**20**	**0.5**	**2.3%**	**4.0**	**22%**	**0.1**	**0.7%**	**4.0**	**21%**
E13 Minsmere South Levels	20	0.11	0.5%	4.0	20%	0.03	0.1%	4.0	20%

CL = Critical Level (for the Protection of Vegetation and Ecosystems), PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

A similar comparison has been made for the lower end of the relevant Critical Level range (i.e. 10µg/m³), and this is provided in **Table 5-14**.

Table 5-14: Predicted annual averages PCs for SO_2 at all identified receptors and operating scenarios (relative to the Critical Level for bryophytes and lichens) (highest result shown in bold)

RECEPTOR	CL (µg/m³)	COMMISSIONING PC (µg/m³)	PC / CL	BC (µg/m³)	PEC / CL	ROUTINE TESTING PC (µg/m³)	PC / CL	BC (µg/m³)	PEC / CL
E1 Alde Ore	10	0.003	0.0%	2.2	22%	0.001	0.0%	2.2	22%
E2 Minsmere	**10**	**0.5**	**4.7%**	**4.0**	**45%**	**0.1**	**1.3%**	**4.0**	**41%**
E3 Orfordness	10	0.002	0.0%	2.5	25%	0.000	0.0%	2.5	25%
E4 Sandlings	10	0.02	0.2%	2.7	27%	0.005	0.1%	2.7	27%
E5 Sizewell Marshes	**10**	0.1	1.3%	2.7	28%	0.04	0.4%	2.7	27%
E6 Leiston and Aldeburgh, E8 and E9 Dower House	10	0.01	0.1%	3.1	31%	0.003	0.0%	3.1	31%
E7 Leiston Common	10	0.02	0.2%	2.5	25%	0.006	0.1%	2.5	25%
E10 Suffolk Beaches	10	0.1	1.4%	2.4	25%	0.04	0.4%	2.4	24%
E11 Peckham Pits Wood	10	0.04	0.4%	3.0	30%	0.01	0.1%	3.0	30%
E12 Sizewell levels	**10**	**0.5**	**4.6%**	**4.0**	**45%**	**0.1**	**1.3%**	**4.0**	**41%**

RECEPTOR	CL ($\mu g/m^3$)	COMMISSIONING PC ($\mu g/m^3$)	COMMISSIONING PC / CL	COMMISSIONING BC ($\mu g/m^3$)	COMMISSIONING PEC / CL	ROUTINE TESTING PC ($\mu g/m^3$)	ROUTINE TESTING PC / CL	ROUTINE TESTING BC ($\mu g/m^3$)	ROUTINE TESTING PEC / CL
E13 Minsmere South Levels	10	0.1	1.1%	4.0	41%	0.03	0.3%	4.0	40%

CL = Critical Level (for the Protection of Vegetation and Ecosystems), PC = Process Contribution, BC = Background Concentration, PEC = Predicted Environmental Concentration

It can be seen from **Table 5-13** and **5-14** that for the majority of sites, the PCs from both commissioning and routine operations are less than 1% of the Critical Levels, and therefore can be considered **insignificant**.

However, E2 (Minsmere to Walberswick Heaths and Marshes SAC, SPA) and E12 (Sizewell Levels and Associated Areas CWS) are predicted to experience SO_2 PCs greater than 1%, although only during commissioning operations.

The Habitat receptor experiencing the worst case impacts are E2 and E12. The impacts during the commissioning phase are highest; however it is unlikely that an exceedance of the Critical Level will occur given that the PECs are less than 45% of the Critical Level for more sensitive species, and therefore below the screening criteria of 70% for annual average impacts. Commissioning operations will only occur for two years and the PCs during the routine operating scenario are much lower, with the majority of the Habitat sites experiencing impacts that can be considered to be **insignificant**.

It is considered that the impacts from the operation of the installation will not result in any exceedances of the SO_2 Critical Levels for either higher plants or bryophytes and lichens, during commissioning or routine operations.

Critical Loads

Depositional Impacts

The assessment of depositional impacts takes into account the relevant interest features within each habitat receptor and compares predicted impacts against Critical Loads for the individual features therein, and therefore is a more robust and site specific assessment than that carried out for Critical Levels, which is a generic standard.

An assessment against the appropriate habitat feature-relevant deposition Critical Loads has been carried out for all relevant statutory and non-statutory Habitat sites and the interest features present, as detailed in **Appendix A** of this document. This includes both nutrient nitrogen deposition due to emissions of nitrogen dioxide, and acid deposition due to nitrogen dioxide and sulphur dioxide emissions.

The interest features applicable to the assessment (i.e. those habitat types for which Critical Loads are available) have been identified through the www.apis.ac.uk website. These are detailed for each habitat in **Appendix A** of this document, with the relevant Critical Loads defined in **Table A4**.

AQTAG06 states that wet deposition within the locality of an emission source (typically within 10km) is generally considered to be insignificant for NO_2 and SO_2 and therefore these have been screened out of this impact assessment.

It has been agreed between the Environmental Agency and Natural England, that PCs of less than 1% of the Critical Load for pollutant deposition (nitrogen and acid) can be considered to be insignificant, and that PCs greater than 1% have the potential to be significant, depending upon the context.

Nutrient Nitrogen

An assessment of nutrient enrichment has been undertaken by calculating nitrogen deposition from the dispersion modelling data. This has been done by applying deposition velocities to the predicted annual average NO_2 concentrations determined through the modelling at the individual interest features. The deposition velocities have been taken from Environmental Agency guidance AQTAG06 and have been selected for the appropriate interest features at the habitat receptor (0.0015m/s for grassland for NO_2 and 0.003m/s for woodland).

The predicted deposition flux rates (during both commissioning and routine operation) have then been converted to units of kg N/ha/year (kilograms of nitrogen per hectare per year) using the conversion factor of 95.9 provided in the AQTAG06 guidance. The resulting value has then been compared to the lower value in the range of relevant Critical Loads available for the interest features present within each habitat site, and are presented in **Table 5-15**.

Table 5-15: Nitrogen deposition at identified habitat receptors (highest result shown in bold)

Receptor	Critical Load Class	CLd RANGE	BG N-DEP (kg N/ha/yr)	COMMISSIONING				ROUTINE OPERATION			
				NO_2 PC µg/m³	PC N-DEP (kg N/ha/yr)	PC / CLd[1]	PEC / CLd[1]	NO_2 PC µg/m³	PC N-DEP (kg N/ha/yr)	PC / CLd[1]	PEC / CLd[1]
E1a	Pioneer, low-mid, mid upper saltmarshes	20 – 30	12.9	0.043	0.006	0.03%	65%	0.012	0.002	0.01%	65%
E1c	Pioneer, low-mid, mid upper saltmarshes	20 – 30	12.9	0.049	0.007	0.04%	65%	0.014	0.002	0.01%	65%
E1d	Rich fens	15 - 30	11.2	0.032	0.005	0.04%	75%	0.009	0.001	0.01%	75%
E2b	Coastal stable dunes	8 – 15	13.1	3.1	0.44	5.5%	169%	0.88	0.13	1.6%	165%
E2c	**Dry heath**	**10 – 20**	**13.8**	**7.9**	**1.14**	11.4%	142%	2.3	0.33	3.3%	141%
E2d	Fen, marsh and swamp (rush pasture etc…)	15 – 25	13.1	7.6	1.09	7.3%	95%	2.2	0.31	2.1%	89%
E2e	Fen, marsh and swamp (swamp and reedbeds)	15 – 30	13.1	0.49	0.071	0.5%	88%	0.14	0.02	0.1%	88%
E3a	Coastal stable dunes	8 – 15	8.3	0.034	0.005	0.06%	104%	0.009	0.001	0.02%	104%
E4a	Dry heath	10 – 20	15.0	0.33	0.047	0.5%	150%	0.095	0.01	0.1%	150%
E5a	Fen, marsh and swamp (fen meadow)	15 – 30	12.0	2.0	0.284	1.9%	82%	0.60	0.09	0.6%	81%
E5b	Fen, marsh and swamp (rush pasture etc…)	15 – 25	12.0	3.4	0.484	3.2%	83%	0.97	0.14	0.9%	81%
E6a	Dry heath	10 – 20	11.5	0.33	0.047	0.5%	115%	0.09	0.01	0.1%	115%
E7a	Dwarf shrub heath	10 – 20	12.0	0.43	0.062	0.6%	121%	0.13	0.02	0.2%	121%
E8a	Dwarf shrub heath	10 – 20	12.0	0.23	0.033	0.3%	121%	0.066	0.01	0.1%	121%
E10a	Coastal stable dunes – acid type	8 – 10	12.0	2.9	0.416	5.2%	156%	0.83	0.1	1.5%	152%

Receptor	Critical Load Class	CLd RANGE	BG N-DEP (kg N/ha/yr)	COMMISSIONING				ROUTINE OPERATION			
				NO_2 PC µg/m³	PC N-DEP (kg N/ha/yr)	PC / CLd[1]	PEC / CLd[1]	NO_2 PC µg/m³	PC N-DEP (kg N/ha/yr)	PC / CLd[1]	PEC / CLd[1]
E11a	Broadleaved, mixed and yew woodland	10 – 20	21.4	0.53	0.154	1.5%	216%	0.16	0.04	0.4%	215%
E12a	**Coniferous woodland**	**5 – 15**	**21.4**	8.0	2.29	**46%**	**474%**	**2.3**	**0.6**	**13%**	**441%**
E12b	Broadleaved, mixed and yew woodland	10 – 20	21.4	0.59	0.170	1.7%	216%	0.18	0.05	0.5%	215%
E13a	Dwarf shrub heath	10 – 20	12.0	**2.2**	0.321	3.2%	124%	0.64	0.09	0.9%	121%

Notes: [1]The most stringent Critical Load from the range provided has been used in the assessment

CLd = Critical Load, PC = Process Contribution, BG = Background Nitrogen Deposition rate

The Air Pollution Information Website (APIS) provides the background nitrogen deposition rates for each location. As can be seen in **Table 5-15**, the majority of the locations and habitat features included in the table are already subject to average background nitrogen deposition that is over the lower Critical Load value. Any additional impact from the installation therefore needs to be considered in this context.

During commissioning, nine of the habitat features assessed are predicted to experience increases in nitrogen deposition of less than 1% of the lower value of the Critical Load range for that habitat. This increases to fourteen habitat features during routine operation. It is therefore considered that nitrogen deposition will have an **insignificant** effect on these receptors.

For those Habitat features where impacts cannot be considered insignificant (E2b–d, E5a and b, E10a, E11a, E12a and b and E13a), further consideration of the results is required.

The average background deposition rates at all these features are in excess of the lower end of the Critical Load range, and in some cases exceed the higher end of the Critical Load range.

The maximum PC for nitrogen deposition, as a result of the installation, represents an increase of 46% of the lower value in the Critical Load range during the commissioning phase and 13% during routine operation at receptor E12a - Sizewell levels. When considered against the higher value of the Critical Load range these numbers reduce to 19% and 4% respectively. This occurs within an area of coniferous woodland in the Sizewell levels and associated areas (i.e. Goose Hill, the majority of which will be cleared for the development). However, given that the background nitrogen deposition for this location and habitat feature is already more than four times the lower end of the Critical Load range (and nearly 1.5 times the upper end figure) then the overall change resulting from the installation's emissions is considered to be modest. Furthermore, any retained habitat is not considered to be of particular nature conservation value.

In contrast, the two habitat areas within Sizewell Marshes SSSI (E5a – the fen meadow, and E5b – the swamp/reedbed), which are predicted to see nutrient increases of 1.9% and 3.2% respectively of the lower Critical Load value during the two year commissioning period, are of high nature conservation importance. For both of these areas, the background deposition levels are under the lower value of the relevant Critical Load range, and therefore with the PC, no exceedance of the Critical Load is predicted. In addition, these are mesotrophic habitats that are relatively tolerant of nutrient input. These habitats also receive treated sewage effluent discharged into Leiston beck from Leiston sewage treatment works, which will be more significant in terms of nutrient loading. In addition, the reedbed habitat that would be most affected would largely be lost to the development. The proposed compensation habitat for the reedbed, at the Aldhurst Farm habitat creation scheme, is located further from the installation and therefore would experience lower rates of predicted N-Deposition.

Three of the four habitats assessed within the Minsmere to Walberswick Heaths and Marshes SAC, SPA, Ramsar and SSSI (the coastal dune habitat at E2b, the dry heath at E2c, and the fen/swamp at E2d) would also experience increases in nitrogen deposition of more than 1%, though much less than for Sizewell levels (at 5.5%, 11.4% and 7.3% of the lower value of the Critical Load range for the three sub-locations, respectively (or 3.0%, 5.7% and 4.4% of the higher value in the Critical Load range)). However, two of these habitat features are already receiving nitrogen inputs above the lower value of the relevant Critical Load range. Therefore, whilst the PC represent greater than 1% of the Critical Load for these features, it is very unlikely that this would lead to significant changes in species composition or to noticeable damage to the constituent plants, including any lichens and bryophytes.

The other locations where nitrogen deposition is predicted to be greater than 1% are the coastal dune habitat within the Suffolk shingle beaches CWS (E10a), the dry heath habitat within the Minsmere South Levels CWS (E13a), two areas of broadleaved woodland at Reckham Pits Wood (E11a) and within the Sizewell Levels and Associated Areas CWS (E12b). Both dune and heathland habitats are relatively sensitive to nitrogen deposition, owing to their low nutrient status. However, in both cases the background nitrogen deposition is already significantly above the lower Critical Load for these habitats, such that these relatively small percentage increases (1.1% and 1.7%, respectively) are considered unlikely to cause adverse effects.

Similarly, the small increases anticipated for the two areas of broadleaved woodland (E11a and E12b) are considered likely to be **insignificant**, given that both are already significantly over the lower Critical Load for this habitat.

Whilst an increase in the levels of nitrogen deposition is clearly predicted for a number of the habitats within the vicinity of the installation, it is important to note that the PCs discussed will be short-term and temporary (especially during commissioning operations), and are also set against a background of high chronic nitrogen deposition in the wider area. Therefore, even given the worst-case assumptions used in this assessment (such as the assessment of annual impacts against emissions at the emission limit values when they will be below this value) and the use of worst case model assumptions, the PCs are considered unlikely to result in significant changes in species composition or habitat condition at any receptor.

Acid Deposition

Increases in acidity from deposition of SO_2 and NO_2 from the modelled PCs have also been considered. This has been done by applying deposition velocities to the predicted annual average NO_2 and SO_2 concentrations determined through the modelling at the individual interest features. The deposition velocities have been taken from the Environmental Agency's guidance AQTAG06 and have been selected for the appropriate interest features at the habitat receptor (for NO_2: 0.0015m/s for grassland and 0.003m/s for woodland, for SO_2: 0.012m/s for grassland and 0.024m/s for woodland).

The resulting dry deposition flux (µg/m^2/s) has then been converted to keq /ha/year (keq refers to molar equivalent of potential acidity resulting from e.g. sulphur, oxidised and reduced nitrogen, per hectare per year) using the conversion factor of 6.84 for NO_2 and 9.84 for SO_2, as provided in the AQTAG06 guidance.

The predicted acidity deposition rates and background deposition rates have been used within the APIS Critical Load function tool to determine whether the contribution will result in exceedance of the defined Critical Loads for the features present. The data required for completion of the APIS tool is summarised in **Appendix A** of this document (**Table A5**).

The results from the APIS tool are presented in **Table 5-16**.

Table 5-16: Acid deposition at identified habitat receptors

	COMMISSIONING							ROUTINE OPERATION					
	PROCESS CONTRIBUTION						CRITICAL LOAD FUNCTION	PROCESS CONTRIBUTION					CRITICAL LOAD FUNCTION
	NO_x PC µg/m³	SO_2 PC µg/m³	N keq ha/yr	S keq ha/yr	PC/CLd %	Back'gd/ CLd %	PEC/CLd %	NO_x PC µg/m³	SO_2 PC µg/m³	N keq ha/yr	S keq ha/yr	PC/CLd %	PEC/CLd %
E2b	3.1	0.15	0.03	0.02	5.3%	193.7%	198.9%	0.9	0.043	0.009	0.005	1.8%	195.4%
E2c	7.9	0.39	0.08	0.05	10.5%	88.9%	99.4%	2.3	0.11	0.02	0.01	3.2%	92.2%
E2d	7.6	0.37	0.08	0.04	21.1%	193.7%	214.8%	2.2	0.11	0.02	0.01	7.0%	200.70%
E2e	0.49	0.024	0.005	0.003	1.8%	193.7%	195.4%	0.14	0.0070	0.001	0.0008	0.0%	193.7%
E3a	0.034	0.0017	0.0004	0.0002	0.0%	18.4%	18.4%	0.0098	0.00048	0.0001	0.00006	0.0%	18.4%
E4a	0.33	0.12	0.003	0.01	1.5%	94.8%	96.2%	0.095	0.0047	0.001	0.0006	0.0%	94.8%
E5a	2.0	0.097	0.02	0.01	4.2%	154.3%	158.5%	0.60	0.030	0.006	0.004	1.4%	155.7%
E5b	3.4	0.17	0.04	0.02	8.4%	154.3%	162.7%	0.97	0.048	0.01	0.006	2.8%	157.1%
E6a	0.33	0.013	0.003	0.001	0.0%	72.9%	72.9%	0.095	0.0032	0.001	0.0004	0.0%	72.9%
E7a	0.43	0.021	0.004	0.003	0.1%	4.3%	4.3%	0.13	0.0063	0.001	0.0007	0.0%	4.3%
E8a	0.23	0.011	0.002	0.001	0.3%	36.7%	36.7%	0.066	0.0033	0.0007	0.0004	0.1%	36.7%
E10a	2.9	0.14	0.03	0.02	1.0%	10.5%	11.7%	0.83	0.041	0.008	0.005	0.5%	10.5%
E11a	0.53	0.026	0.01	0.006	0.4%	39.1%	39.6%	0.16	0.0077	0.003	0.002	0.2%	39.3%
E12a	**8.0**	**0.39**	**0.2**	**0.09**	**7.6%**	**51.5%**	**59.1%**	**2.3**	**0.11**	**0.05**	**0.03**	**2.0%**	**53.5%**

	COMMISSIONING							ROUTINE OPERATION					
	PROCESS CONTRIBUTION						CRITICAL LOAD FUNCTION	PROCESS CONTRIBUTION					CRITICAL LOAD FUNCTION
	NO_x PC µg/m³	SO_2 PC µg/m³	N keq ha/yr	S keq ha/yr	PC/CLd %	Back'gd/ CLd %	PEC/CLd %	NO_x PC µg/m³	SO_2 PC µg/m³	N keq ha/yr	S keq ha/yr	PC/CLd %	PEC/CLd %
E12b	0.59	0.029	0.01	0.007	1.6%	139.7%	141.3%	0.18	0.0090	0.004	0.002	0.8%	140.5%
E13a	2.2	0.11	0.02	0.01	0.6%	7.70%	8.3%	0.64	0.032	0.007	0.004	0.2%	7.7%

Eight out of the sixteen habitat features listed in **Table 5-16** experience acid deposition PCs that are less than 1% of the lower Critical Load for that habitat during the commissioning phase, and can therefore be considered **insignificant**. This increases to eleven sites during the operational phase.

For all the remaining Habitat features, the majority of the data presented in **Table 5-16** indicates that where the lower Critical Loads are already being exceeded due to high background levels of acid deposition.

Table 5-16 shows that the maximum PC at the worst affected part of any Habitat receptor is 21.1% of lower Critical Load function, and this occurs during the commissioning phase. This occurs within the grazing marsh of the Minsmere to Walberswick Heaths and Marshes (receptor E2d). However, as background acid deposition significantly exceeds the Critical Load, this increase would be expected to have only a minimal impact. When compared to the upper Critical Load values, the PC represents 2.6% of the Critical Load function. Furthermore, grazing marsh would not be considered to be a particularly sensitive habitat to acid deposition, as the soils are likely to be well buffered. Also, given that this change has been calculated for the closest part of the site to the installation (and therefore worst case), the PCs over the rest of the site will be below this value. During routine operation of the installation, the contribution to overall acid deposition levels is reduced to 7.0% of the lower Critical Load (or 0.7% for the higher Critical Load values) at this point.

Since all of the sites identified in the assessment above are subject to background acid deposition that is generally above the lower Critical Load value (and often also the upper figure), any additional impact from the installation is likely to be relatively minor. Furthermore, given the high buffer capacity of the grazing marsh, the worst-case assumptions made in this assessment, the predicted PCs to acid deposition are very conservative, and are likely to be lower than presented. Since even these worst-case PCs represent only a small proportion of the Critical Loads, compared to the current background deposition, any acid deposition resulting from the commissioning and/or routine operation phases is very unlikely to result in significant impacts at these receptors.

6. CONCLUSIONS

Dispersion modelling of emissions of identified pollutants from the DGs comprising the Part A permitted installation demonstrates that the impacts of all main pollutants are unlikely to result in significant environmental impacts when emitted at the proposed emission concentrations.

A number of worst case assumptions have been used in the assessment, including:

- emissions at the proposed emission limit values or benchmark emission levels, when average emissions are likely to be below these values;
- emissions from EDG sources only, where emissions from UDGs lead to significantly lower impacts.
- assumption that 70% of NO_x emissions are converted to NO_2 in the stack vicinity in the long-term and 35% conversion in the short-term;
- assumption that 100% of particulate emissions are PM_{10}/ $PM_{2.5}$ or smaller;
- worst case results for all years of meteorological data assessed, for each species and averaging period; and,
- inclusion of buildings within the model.

The only predicted exceedance of air quality standards at human health receptors is for short term NO_2 PCs, during the loss of off-site power event. It is predicted that, in combination with the background concentrations, the hourly NO_2 AQS objective could be exceeded at R1 (Sizewell Village), which has a PEC of 105% and 136% of the AQS at R9 – Keepers Cottage.

Short-term impacts of the loss of off-site power event have been assessed assuming continuous operation over 8,760 hours, 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 99.8th percentile specified in the short term air quality objective allows for the exceedance of the AQS for 18 hours per year. As this scenario represents emergency shutdown of the EPR's, it is not possible to state how long an actual loss of off-site power event would last. However, the scenario would therefore need to last longer than 18 hours to cause an exceedance of the objective.

The actual duration of loss of off-site power events cannot be easily determined, however, the frequencies of loss of off-site power events can be predicted and allocated to a significant range of durations. Frequency predictions are given on an 'per reactor year' basis, as they are based on the frequency over one year for a single reactor, no matter what the operational regime is. A review of the frequency of loss of off-site power scenarios for the Hinkley Point C site and the Sizewell C site has been carried out[14] and concluded that the frequency of the main conceived loss of off-site power events for the Sizewell C site are as follows:-

- short loss of off-site power (less than 2 hours) – 3.72 x 10^{-2} per reactor year;
- long loss of off-site power (between 2 and 24 hours) – 4.99 x 10^{-3}per reactor year;

[14] EDF Energy, NNB Generation Company. 2016. Site Specific Short and Long Loop Frequency Updates for HPC and SZC EPRs. Document reference: HPC-UKX-NNBOSL-U0-GEV-RET-100000

To put these numbers into context for the Sizewell C CA installation, the above frequencies are considered to translate as:

- short loss of off-site power - expected to occur a limited number of times during the lifetime of the plant; and
- long loss of off-site power - expected to occur about once in the lifetime of a fleet of nuclear sites.

All other impacts at human health receptors are unlikely to result in any exceedance of AQS objectives.

For ecological receptors, the assessment has considered the impact relative to published Critical Levels and Critical Loads. Annual Critical Levels are not exceeded under permitted operating scenarios with the worst case impacts occurring during the commissioning phase at E2 (Minsmere – Walberswick Heaths), and E12 (Sizewell levels), with PECs up to 71% of the Critical Level. Due to the conservative assumptions made in the assessment for running hours and EDG only emissions, it is considered likely that actual impacts would be below those reported in the assessment above. Commissioning operations will only occur for two years and the PCs for the routine operating scenario are much lower, with the majority of the Habitat sites experiencing impacts from PCs that can be considered to be **insignificant**, with all PECs below 71% of the annual average Critical Levels predicted during routine operations.

Although it is considered that the daily mean Critical Level is of lower importance than the annual mean Critical Level for the protection of the Habitat as a whole, there are predicted exceedances of the daily mean NO_x Critical Level over a number of designated ecological sites within close proximity to the installation. It is considered that the assessment carried out to determine the daily mean NO_x impacts was very conservative, given that it was assumed that one DG was operational throughout the year, when routine testing operations of each DG is estimated to occur for 60 hours per year. Operation of all DGs will result in an estimated 720 hours of operation on an annual basis. Given that any exposure to nitrogen oxides would therefore be comparatively short-term, it is considered that the exposed habitats will have time to recover. This, and the conservative modelling assumptions used in the assessment, indicates that the predicted level of impact would be lower than predicted in the assessment.

In addition, statistical analysis has been carried out on the daily NO_x impacts, which found that (assuming 100% operation of an EDG) the daily NO_x Critical Level is exceeded up until the 80^{th} percentile for the worst case year of met data, and therefore an exceedance could occur for 20% of the time. Taking into account the 8% of hours (720 ÷ 8760) of planned annual routine operation, this results in a probability of the two events occurring at the same time of 1.6% chance (0.2 x 0.08 = 0.016).

Nutrient nitrogen and acid deposition rates from the installation emissions on identified features within the designated habitat sites are also considered unlikely to result in significant impacts during the ongoing operation of the installation. This is largely due to very high background deposition rates, which in most cases are above the lower Critical Load value (and often also the upper figure). The predicted impacts are all lower than the most stringent value in the Critical Load ranges for all receptor species within the designated habitat sites, and therefore compared to the background deposition rates are considered unlikely to represent significant impacts at these receptors. All depositional impacts were reported as the worst case deposition rate for each identified habitat feature, and therefore impacts over the rest of the feature would be lower than those reported in the assessment.

Whilst an increase in the levels of nitrogen and acid deposition is clearly predicted for a number of the habitats within the vicinity of the installation, it is important to note that the PCs discussed will be short-term and temporary (especially during commissioning operations), and are also set against a background of high chronic nitrogen and acid deposition in the wider area. Therefore, even given the worst-case assumptions used in this assessment (such as the assessment of annual impacts against emissions at the emission limit values when they will be below this value) and the use of worst case model assumptions, the PCs are considered unlikely to result in significant changes in species composition or habitat condition at any receptor.

The purpose of the EDGs is to provide a power supply to safety systems in the event of a loss of off-site power event. The UDGs provide a power supply to a smaller number of safety systems in the event of a loss of both off-site power and the EDGs. In doing this, the EDGs and UDGs provide a critical nuclear safety function as their sole function. As such, the EDGs and UDGs are never used for commercial generation.

In order to fulfil their design safety function, the EDGs and UDGs must be tested in accordance with the specified testing requirements which will primarily be based on the safety case requirements. In addition to the minimum test durations that will be detailed in the technical specifications for the EDGs and UDGs, extra test runs may be required following:

- failed technical specification test runs; or
- failed return to service test runs (following planned or unplanned maintenance work);
- major overhaul of an EDG or UDG (these may be extended duration test runs).

In essence, it is essential that the EDGs and UDGs are permitted to be tested for as long a duration (and as often) as necessary in order to guarantee their availability to perform their designated nuclear safety function.

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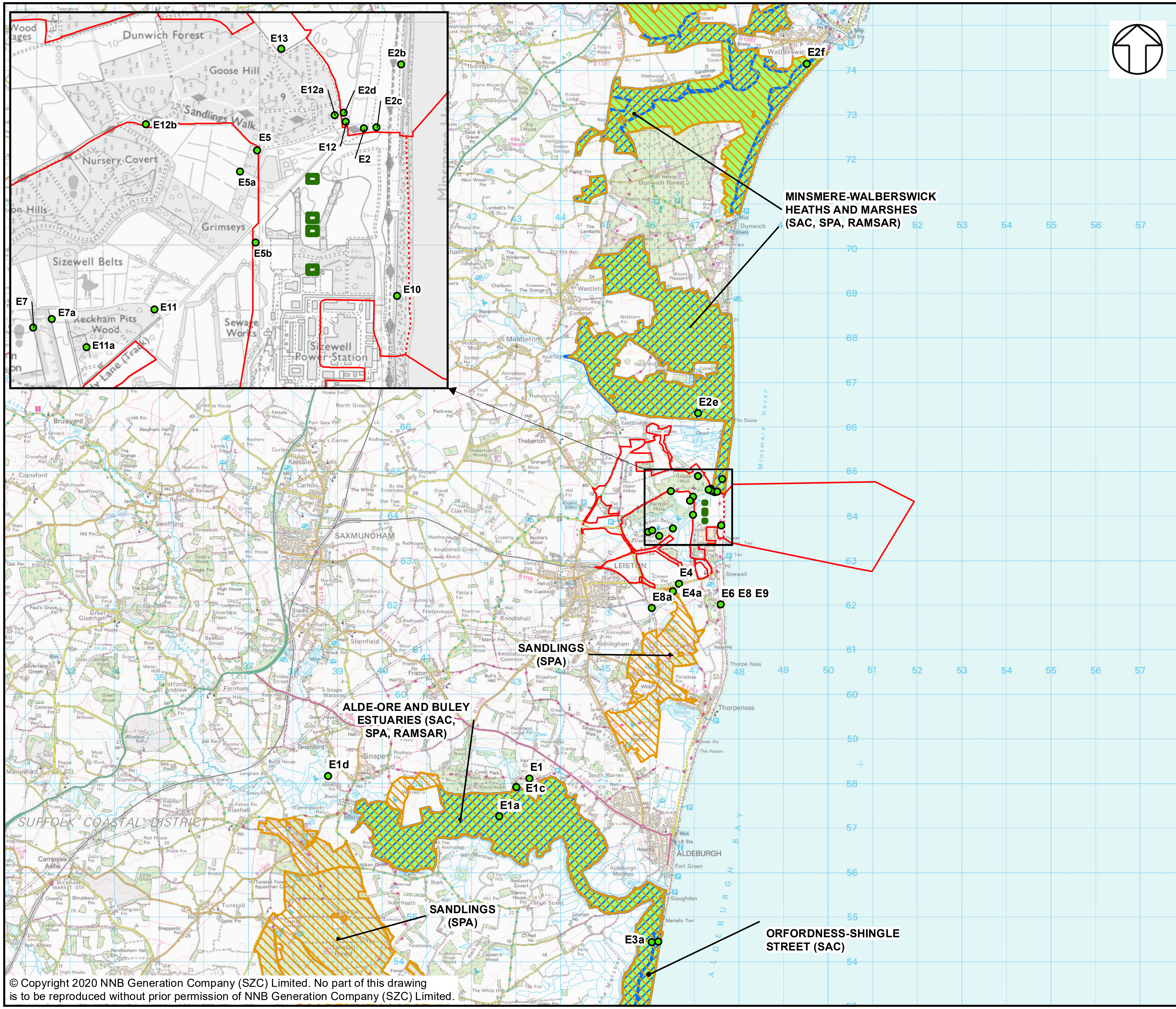
FIGURES



NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE
- DEMARCATION LINE
- INSTALLATION BOUNDARY
- HABITAT RECEPTOR
- SPECIAL PROTECTION AREA
- SPECIAL AREA OF CONSERVATION
- RAMSAR

NOT PROTECTIVELY MARKED

DOCUMENT:
SIZEWELL C
ENVIRONMENTAL STATEMENT
VOLUME 2
APPENDIX 12C
COMBUSTION ACTIVITIES

DRAWING TITLE:
INTERNATIONALLY DESIGNATED ECOLOGICAL RECEPTORS

DRAWING NO:
FIGURE 12C.3

DATE:	DRAWN:	SCALE :
JAN 2020	I.W.	1:80,000 @A3

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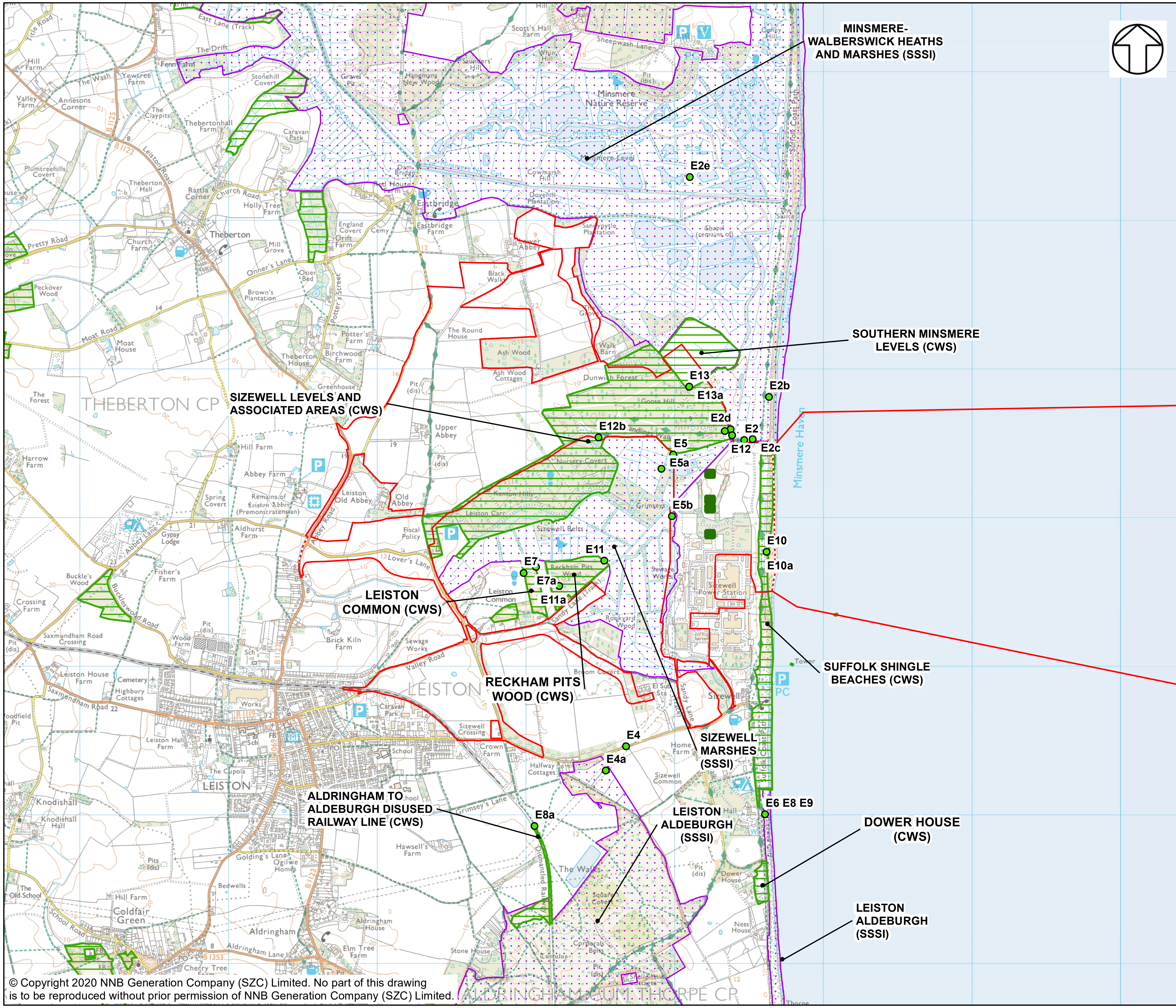

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- INSTALLATION BOUNDARY
- HABITAT RECEPTOR
- SITE OF SPECIAL SCIENTIFIC INTEREST
- COUNTY WILDLIFE SITES

NOT PROTECTIVELY MARKED

DOCUMENT:
SIZEWELL C
ENVIRONMENTAL STATEMENT
VOLUME 2
APPENDIX 12C
COMBUSTION ACTIVITIES

DRAWING TITLE:
LOCALLY AND NATIONALLY DESIGNATED ECOLOGICAL RECEPTORS

DRAWING NO:
FIGURE 12C.4

DATE:	DRAWN:	SCALE :
JAN 2020	I.W.	1:24,000 @A3

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APPENDIX A – HABITAT SITES

Table A1: International statutory designated sites within 10km and cited interest features

<table>
<tr><th>Designated Site</th><th colspan="4">Cited Interest Features</th></tr>
<tr><td>E1

Alde – Ore Estuary SAC</td><td colspan="4">Supports the following Annex 1 habitats as primary reason for selection:
<u>Estuaries</u>
The only bar-built estuary in the UK with a shingle bar. Contains diverse and species-rich intertidal sand and mudflat biotopes. Large areas of shallow water occur over sub-tidal sediments and extensive mudflats and saltmarshes are exposed at low water.

Habitat present as qualifying features, but not primary reason for selection:
<u>Mudflats and sand flats not covered by sea at low tide</u>
There is no Critical Load for nutrient nitrogen defined within APIS for this habitat feature.
<u>Atlantic salt meadows</u>
Comprises saltmarsh that develops when halophytic vegetation colonises soft intertidal sediments of mud and sand in areas protected from strong wave action.</td></tr>
<tr><td rowspan="9">E1

Alde – Ore Estuary SPA</td><td colspan="4">The Alde-Ore comprises the estuarine complex of the rivers Alde, Butley and Ore, including Havergate Island and Orfordness. There is a variety of habitats including intertidal mud-flats, saltmarsh, vegetated shingle (including the second-largest and best-preserved area in Britain at Orfordness), saline lagoons and semi-intensified grazing marsh. At different times of the year, the site supports notable assemblages of wetland birds including seabirds, wildfowl and waders. As well as being an important wintering area for waterbirds, the Alde-Ore Estuary provides important breeding habitat for several species of seabird, wader and raptor. During the breeding season, gulls and terns feed substantially outside the SPA.</td></tr>
<tr><td>Bird Species</td><td>Broad Habitat</td><td>Species sensitive due to nutrient nitrogen impacts on broad habitat?</td><td>Species sensitive due to acidity impacts on broad habitat?</td></tr>
<tr><td>Sandwich tern</td><td rowspan="2">Supralittoral sediment - dunes</td><td rowspan="2">Yes – no evidence of this habitat type cited for this receptor, nor on the www.magic.gov.uk website.</td><td rowspan="2">No</td></tr>
<tr><td>Little tern</td></tr>
<tr><td>Eurasian marsh harrier</td><td>Fen, marsh and swamp</td><td>Yes – assessed as rich fens</td><td>No</td></tr>
<tr><td>Pied avocet</td><td>Littoral sediment</td><td>Yes – assessed as Pioneer, low-mid, mid-upper saltmarshes</td><td>No</td></tr>
<tr><td>Ruff</td><td>Neutral grassland
littoral sediment</td><td>No
No</td><td>No</td></tr>
<tr><td>Common redshank</td><td>Littoral sediment</td><td>No</td><td>No</td></tr>
<tr><td>Lesser black-backed gull</td><td>Supralittoral rock</td><td>No</td><td>No</td></tr>
</table>

<table>
<tr><th>Designated Site</th><th colspan="4">Cited Interest Features</th></tr>
<tr><td>E1

Alde – Ore Estuary Ramsar</td><td colspan="4"><u>Ramsar Criteria 1</u>
The site comprises the estuary complex of the rivers Alde, Butley and Ore, including Havergate Island and Orfordness. There are a variety of habitats including, intertidal mudflats, saltmarsh, vegetated shingle (including the second-largest and best-preserved area in Britain at Orfordness), saline lagoons and grazing marsh.

<u>Ramsar Criteria 2</u>
The site supports a number of nationally-scarce plant species.</td></tr>
<tr><td>E2

Minsmere to Walberswick Heaths and Marshes SAC</td><td colspan="4">Supports the following Annex 1 habitats as a primary reason for selection:
<u>Annual vegetation of drift lines</u>
It occurs on a well-developed beach strandline of mixed sand and shingle and is the best and most extensive example of this restricted geographical type. Species include those typical of sandy shores, such as sea sandwort (Honckenya peploides) and shingle plants such as sea beet (Beta vulgaris ssp. Maritima).
APIS states that this habitat feature is not sensitive to nitrogen deposition.

<u>European dry heaths</u>
This type of vegetation is dominated by heather (Calluna vulgaris), western gorse (Ulex gallii) and bell heather (Erica cinerea).

Habitat present as qualifying features, but not primary reason for selection:
<u>Perennial vegetation of stony banks</u>
Comprises vegetated coastal shingle with plant species yellow horned-poppy, (Glaucium flavum) rare sea-kale (Crambe maritima) and sea pea (Lathyrus japonicus). Where sea spray is blown over the shingle, plant communities with a high frequency of salt-tolerant species such as thrift (Armeria maritima) and sea campion (Silene uniflora) occur. These may exist in a matrix with abundant lichens.</td></tr>
<tr><td rowspan="7">FE2

Minsmere to Walberswick SPA[1]</td><td colspan="4">Minsmere – Walberswick comprises two large marshes, the tidal Blyth Estuary and associated habitats. This composite coastal site contains a complex mosaic of habitats, notably areas of marsh with dykes, extensive reedbeds, mud-flats, lagoons, shingle, woodland and areas of lowland heath. It supports the largest continuous stand of common reed Phragmites australis in England and Wales. There are nationally important numbers of breeding and wintering birds. In particular, the reedbeds are of major importance for breeding bittern (Botaurus stellaris) and marsh harrier (Circus aeruginosus). A range of breeding waders (e.g. Avocets Recurvirostra avosetta) and heathland birds occur in other areas of the SPA. The shingle beaches support important numbers of breeding little tern (Sterna albifrons), which feed substantially outside the SPA in adjacent marine waters. The site is also important for wintering bitterns and raptors.</td></tr>
<tr><td>Bird Species</td><td>Broad Habitat</td><td>Species sensitive due to nutrient nitrogen impacts on broad habitat?</td><td>Species sensitive due to acidity impacts on broad habitat?</td></tr>
<tr><td rowspan="2">European nightjar</td><td>Coniferous woodland</td><td>No</td><td>No</td></tr>
<tr><td>Dwarf shrub heath</td><td>Yes</td><td>No</td></tr>
<tr><td>Little tern</td><td>Supralittoral sediment - dunes</td><td>Yes</td><td>No</td></tr>
<tr><td>Hen harrier</td><td>Dwarf shrub heath
fen marsh and swamp
littoral sediment</td><td>No</td><td>No</td></tr>
<tr><td>Great bittern</td><td></td><td>Yes</td><td>No</td></tr>
</table>

Designated Site	Cited Interest Features			
	Eurasian marsh harrier	Fen marsh and swamp	Yes	No
	Eurasian teal	Neutral grassland	No	No
	Northern shoveler		No	No
	Pied avocet	Littoral sediment	Yes	No
	Greater white-fronted goose	Littoral sediment improved grassland	No No	No
	Gadwall	Standing open water and canals	No	No
E2 Minsmere to Walberswick Ramsar	<u>Ramsar Criteria 1</u> The site contains a mosaic of marine, freshwater, marshland and associated habitats, complete with transition areas in between. Contains the largest continuous stand of reedbeds in England and Wales and rare transition in grazing marsh ditch plants from brackish to fresh water. <u>Ramsar Criteria 2</u> This site supports nine nationally scarce plants.			
E3 Orfordness to Shingle Street SAC	Supports the following **Annex 1** habitats as a primary reason for selection: <u>Coastal lagoons</u> The lagoons at this site have developed in the shingle bank adjacent to the shore at the mouth of the Ore Estuary. The salinity of the lagoons is maintained by percolation through the shingle, although at high tides sea water can overtop the shingle bank. The fauna of these lagoons includes typical lagoon species, such as the cockle (*Cerastoderma glaucum*), the ostracod (*Cyprideis torosa*) and the gastropods (*Littorina saxatilis tenebrosa*) and (*Hydrobia ventrosa*). The nationally rare starlet sea anemone (*Nematostella vectensis*) is also found at the site. This habitat feature does not occur within an area of the SAC that is within 10km of the installation boundary and therefore has been screened from requiring assessment. <u>Annual vegetation of drift lines</u> Orfordness is an extensive shingle spit some 15km in length. Drift line vegetation occurs on the sheltered, western side of the spit, at the transition from shingle to saltmarsh, as well as on the exposed eastern coast. The drift line community is widespread on the site and comprises sea beet and orache (*Atriplex* spp) in a strip 2-5m wide. APIS states that this habitat feature is not sensitive to nitrogen deposition. <u>Perennial vegetation of stony banks</u> This spit supports some of the largest and most natural sequences in the UK of shingle vegetation affected by salt spray. The southern end of the spit has a particularly fine series of undisturbed ridges, with zonation of communities determined by the ridge pattern. Pioneer communities with sea pea and false oat-grass (*Arrhenatherum elatius*) grassland occur. Locally these are nutrient-enriched by the presence of a gull colony; elsewhere they support rich lichen communities.			
E4 Sandlings SPA[1]	The Sandlings SPA lies near the Suffolk coast between the Deben Estuary and Leiston. The heaths support both acid grassland and heather-dominated plant communities with dependent invertebrate and bird communities of conservation value. Woodlark (*Lullula arborea*) and nightjar (*Caprimulgus europaeus)* have also adapted to breeding in the large blocks of conifer forest, using areas that have recently been felled and recent plantation, as well as areas managed as open ground			

Designated Site	Cited Interest Features			
	Bird Species	**Broad Habitat**	**Species sensitive due to nutrient nitrogen impacts on broad habitat?**	**Species sensitive due to acidity impacts on broad habitat?**
	European nightjar	Coniferous Woodland	No	No
	Wood lark	Dry heath	Yes	No

Table A2: National statutory designated sites within 2km and cited interest features

Designated Site	Cited Interest Features
E1 Alde – Ore Estuary SSSI	This site stretches along the coast from Bawdsey to Aldeburgh and inland to Snape. It includes Orfordness, Shingle Street, Havergate Island, and the Butley, Ore and Alde Rivers. The scientific interests of the site are outstanding and diverse. The shingle structures of Orfordness and Shingle Street are of great physiographic importance whilst the cliff at Gedgrave is of geological interest. The site also contains a number of coastal formations and estuarine features including mud-flats, saltmarsh, vegetated shingle and coastal lagoons which are of special botanical and ornithological value.
E2 Minsmere to Walberswick Heaths and Marshes SSSI	This composite site is situated on the coast of Suffolk between Southwold in the north and Sizewell in the south. It contains a complex series of habitats, notably mudflats, shingle beach, reedbeds, heathland and grazing marsh, which combine to create an area of exceptional scientific interest. Minsmere to Walberswick SSSI includes the habitat features supporting the avian interest features of the Minsmere to Walberswick SPA.
E5 Sizewell Marshes SSSI	Sizewell Marshes are important for their large area of lowland, unimproved wet meadows which support outstanding assemblages of invertebrates and breeding birds. Several nationally scarce plants are also present.
E6 Leiston to Aldeborough SSSI	Leiston-Aldeburgh contains a rich mosaic of habitats including acid grassland, heath, scrub, woodland, fen, open water and vegetated shingle. This mix of habitats in close juxtaposition and the associated transition communities between habitats are unusual in the Suffolk Coast and Heaths. The variety of habitats support a diverse and abundant community of breeding and overwintering birds, a high number of dragonfly species and many scarce plants. Critical Loads are defined for all the interest features present, except for the vegetated shingle, for which no Critical Load is defined. The areas of the habitat site consisting of reedbeds and coastal flood plain occur greater than 2km from the installation boundary and therefore have been screened from assessment. Leiston to Aldeborough SSSI includes the heath habitat supporting the avian interest features of the Sandlings SPA (E4a).

Table A3: Non-statutory designated sites (County Wildlife Sites) within 2km and cited interest features

CWS	Cited Interest Features
E7 Leiston Common (Number Suffolk Coastal 105)	Leiston Common supports lowland heath vegetation. Bell heather, a rare plant in Suffolk, grows on Leiston Common together with more widespread plants for example harebell, heath bedstraw and tormentil. Another notable and uncommon feature of the site is the presence of an extensive and diverse lichen flora.
E8 Aldringham to Aldeburgh Disused Railway Line (Number Suffolk Coastal 3)	This section of disused railway line supports a species-diverse flora both on the line of the old track and on the gently sloping embankments. These include the nationally rare species mossy stonecrop and an unusual species of clover; suffocated clover. The majority of this site was designated as part of the Leiston - Aldeburgh SSSI in 1999.
E9 Dower House (Number Suffolk Coastal 216)	Grassland on the cliff top of the Dower House is a valuable example of unimproved dry acid/dry maritime grassland. The sward composition includes species typically associated with acid grasslands and heaths such as heath violet (*Viola canina*) and heath speedwell (*Veronica officinalis*), but also species tolerant of calcareous conditions. Areas of bare ground and rabbit scrapings are important for drought tolerant annuals such as corn salad (*Valerianella locusta*) and early forget-me not (*Myosotis ramosissima*) as well as the nationally scarce mossy stonecrop (*Crassula tillea*). Small areas of ling (Calluna vulgaris) and bell heather are established on parts of the site gradually grading into blackthorn scrub.
E10 Suffolk shingle beaches (Number Suffolk Coastal 4)	The stretches of shingle beach along the Suffolk coast are of conservation importance for the range of shingle plants that grow there. Species include sea pea, sea kale, sea spurge, sea sandwort and sea bindweed.
E11 Reckham Pitts Wood	Included within CWS Sizewell levels and associated areas.
E12 Sizewell levels and associated areas (Number Suffolk Coastal 106)	A large area of land, consisting of woodland, plantation, wet meadow, osier beds and scrub. In 1994 the area designated as an SSSI was extended to include a large proportion of this CWS.
E13 Southern Minsmere Levels (Number Suffolk Coastal 107)	This site contains all the marshes east of Eastbridge to the sea, south of Minsmere New Cut. It abuts the Minsmere-Walberswick SSSI. The entire valley is of great importance for wildlife forming perhaps the last unspoilt and least improved of Suffolk's larger marshland river valleys. Many of them are improved, although some of the dykes retain a reasonable flora with plants such as broad-leaved pondweed, frogbit and water violet. Additional interest is given by a few small areas of scrub and woodland on the site. In 1994 a large proportion of this CWS was confirmed as part of the extended Minsmere-Walberswick SSSI.

Table A4: Criteria for N-Deposition assessment

Designated Site	Cited Interest Features	Nitrogen Class	Critical Load Range N/ha/yr	NGR
E1 - Alde-Ore Estuary SAC, SPA, Ramsar and SSSI				
E1a	Estuaries	Pioneer, low-mid, mid-upper saltmarshes	20 - 30	642637, 257245
E1b	Mudflats/sand flats not covered by sea at low tide	No Critical Load for nutrient nitrogen		
E1c	Atlantic salt meadow	Pioneer, low-mid, mid-upper saltmarshes	20 - 30	643031, 257904
E1d	Fen, marsh and swamp	Rich fens	15 - 30	638800, 258155
E2 - Minsmere to Walberswick Heaths and Marshes and SSSI and Minsmere to Walberswick SPA				
E2a	Annual vegetation of drift lines	Not sensitive to Nitrogen		
E2b	Perennial vegetation of stony banks	Coastal stable dune grasslands	8 - 15	647639, 264809
E2c	European dry heaths	Dry heath	10 - 20	647530, 264525
E2d	Coastal floodplain grazing marsh	Fen, marsh and swamp (rush pasture - moist and wet oligotrophic grassland)	15 - 25	647382, 264592
E2e	Reedbed	Rich fens - fen, marsh and swamp (swamp, fen meadow and reedbeds)	15 - 30	647106, 266290
E2f	Littoral sediment	Pioneer, low-mid, mid-upper saltmarshes	20 – 30	649540, 274132
E3 – Orfordness to Shingle Street SAC				
E3a	Perennial vegetation of stony banks	Coastal stable dune grasslands	8 - 15	646064, 254424
E3b	Annual vegetation of drift lines	Not sensitive to Nitrogen		
E3c	Coastal lagoons	Pioneer, low-mid, mid-upper saltmarshes	20 - 30	Occurs more than 10km from the installation
E4 – Sandlings SPA				
E4a	Lowland heath	Dry heath	10 - 20	646542, 262295
E4b	Coniferous Woodland	Listed species not sensitive due to nutrient nitrogen impacts on broad habitat, and in any case it is understood that this woodland has been felled.		

Designated Site	Cited Interest Features	Nitrogen Class	Critical Load Range N/ha/yr	NGR
E5 – Sizewell Marshes SSSI				
E5a	Fen meadow	Rich fens - fen, marsh and swamp (fen meadow)	15 - 30	646916, 264326
E5b	Rush pasture	Fen, marsh and swamp (rush pasture - moist and wet oligotrophic grassland)	15 - 25	646986, 264008
E6 – Leiston and Aldeburgh SSSI				
E6a	Lowland heath	Dry heath	10 - 20	646542, 262295 (same as E4a)
E6b	Reedbeds	Rich fens - fen, marsh and swamp (swamp and reedbeds)	15 - 30	Occurs more than 2km from the installation
E6c	Acid grassland	Inland dune and siliceous grassland	8 - 15	Occurs more than 2km from the installation
E6d	Broadleaved deciduous woodland	Broadleaved, mixed and yew woodland	10 - 20	Occurs more than 2km from the installation
E7 - Leiston Common CWS				
E7a	Lowland health	Dwarf shrub heath	10 - 20	646072, 263665
E8 - Aldringham to Aldeburgh Disused Railway Line CWS				
E8a	Lowland heath	Dwarf shrub heath	10 - 20	646061, 261921
E9 – Dower House				
E9a	Vegetated shingle	Supralittoral sediment	No Critical Load defined for this feature	
E10 – Suffolk Shingle Beaches				
E10a	Vegetated shingle and Sand Dune	Coastal stable dune grasslands – acid type	8 - 10	647622, 263768
E11 – Reckham Pits Wood				
E11a	Mixed trees	Broadleaved, mixed and yew woodland	10 - 20	646228, 263538
E12 – Sizewell Levels and Associated Areas				
E12a	Coniferous woodland	Coniferous woodland	5 - 15	647342, 264580
E12b	Broadleaved deciduous woodland	Broadleaved, mixed and yew woodland	10 - 20	646493, 264538
E13 – Southern Minsmere Levels				

Designated Site	Cited Interest Features	Nitrogen Class	Critical Load Range N/ha/yr	NGR
E13a	Lowland heath	Dwarf shrub heath	10 - 20	647103, 264879

Table A5: Criteria for acid deposition assessment and input into APIS tool

	ACIDITY CLASS	BACKGROUND DEPOSITION (keq/ha/yr) N	S	ACIDITY CRITICAL LOADS MinCLMinN	MinCLMaxN	MinCLMaxS
E1 - Alde-Ore Estuary SAC, SPA, Ramsar and SSSI						
None of habitats listed are sensitive to acidification. None of the bird species listed for the SPA are deemed to be sensitive to acidity impacts on their broad habitat.						
E2 - Minsmere to Walbserwick Heaths and Marshes SAC and SSSI and Minsmere to Walbserwick SPA and Ramsar site						
E2a	Not sensitive to acidification					
E2b	Acid grassland	0.9	0.2	0.223	0.568	0.202
E2c	Dwarf shrub heath	0.9	0.2	0.714	1.237	0.202
E2d	Acid grassland	0.9	0.2	0.223	0.568	0.202
E2e	Swamp, fen, reedbed	0.9	0.2	0.223	0.568	0.202
None of the bird species listed for the SPA are deemed to be sensitive to acidity impacts on their broad habitat.						
E3 - Orfordness to Shingle Street SAC						
E3a	Acid grassland	0.6	0.2	0.223	4.353	4.120
E3b	Not sensitive to acidification.					
E3c	Occurs more than 10km from the installation.					
E4 – Sandlings SPA						
E4a	Dwarf shrub heath	1.1	0.2	0.714	1.372	0.480
E4b	Coniferous Woodland	Neither bird species listed for the SPA are deemed to be sensitive to acidity impacts on this broad habitat, in any case, it is understood that this woodland has been felled.				
E5 – Sizewell Marshes SSSI						
E5a	Acid grassland	0.9	0.2	0.223	0.713	0.490
E5b	Acid grassland	0.9	0.2	0.223	0.713	0.490
E6 – Leiston and Aldeburgh SSSI						
E6a	Dwarf shrub heath	0.8	0.2	0.714	1.372	0.480
E6b	Occurs more than 2km from the installation.					
E6c	Occurs more than 2km from the installation.					
E6d	Occurs more than 2km from the installation.					
E7 - Leiston Common CWS						

	ACIDITY CLASS	BACKGROUND DEPOSITION (keq/ha/yr) N	S	ACIDITY CRITICAL LOADS MinCLMinN	MinCLMaxN	MinCLMaxS
E7a	Dwarf shrub heath	0.86	0.18	1.035	5.175	4.14
E8 - Aldringham to Aldeburgh Disused Railway Line CWS						
E8a	Dwarf shrub heath	0.86	0.18	0.89	1.38	0.49
E10 – Suffolk Shingle Beaches						
E10a	Dwarf shrub heath	0.86	0.18	1.29	3.01	1.71
E11 – Reckham Pits Wood						
E11a	Broadleaved/ coniferous unmanaged woodland	1.53	0.23	0.29	4.50	4.21
E12 – Sizewell Levels and Associated Areas						
E12a	Broadleaved/ coniferous unmanaged woodland	1.53	0.23	0.21	3.42	3.20
E12b	Broadleaved, mixed and yew woodland	1.53	0.23	0.14	1.26	1.12
E13 – Southern Minsmere Levels						
E13a	Dwarf shrub heath	0.86	0.18	1.15	3.48	2.33

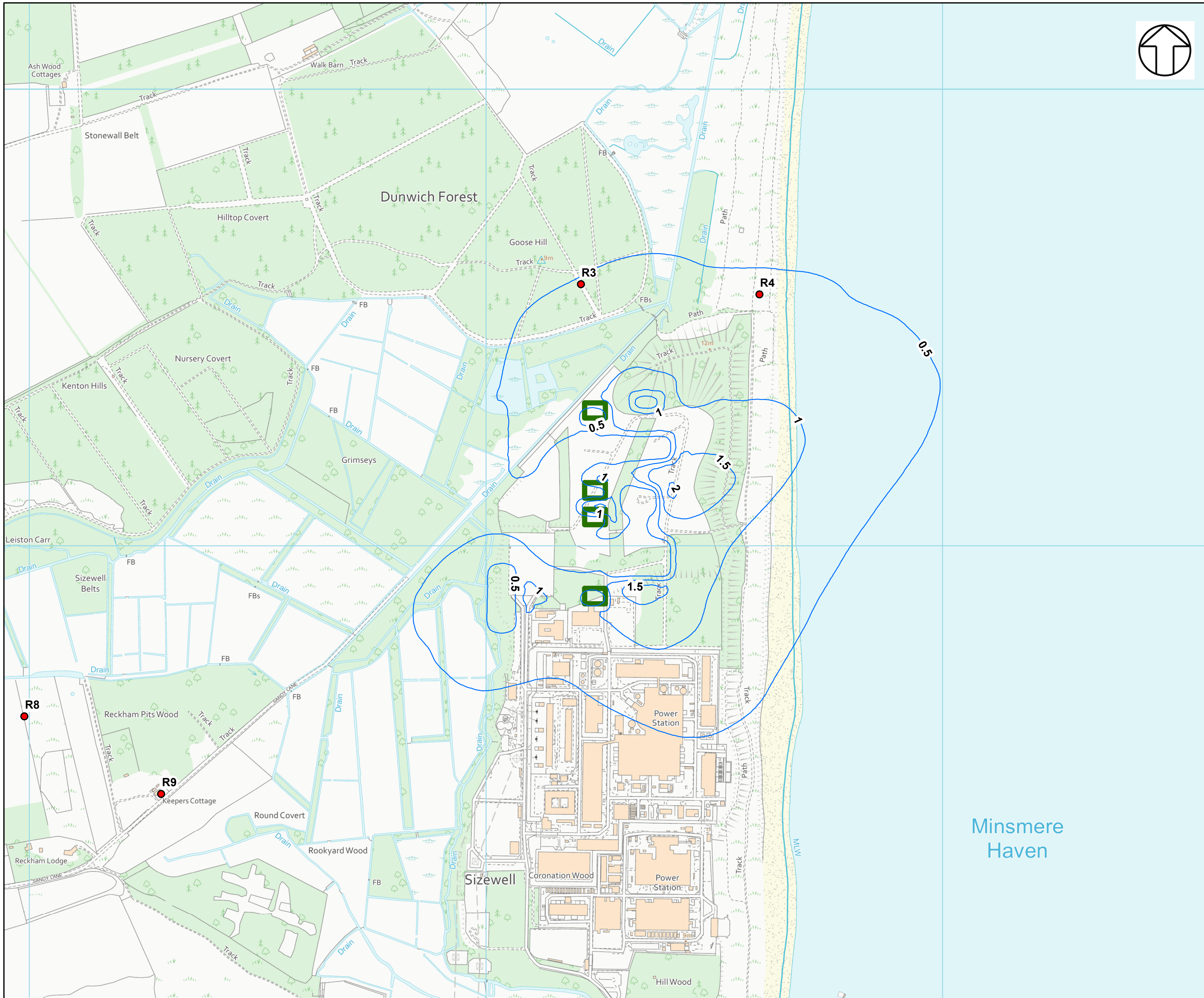
Spatial Distribution of Habitat Features

There is no central source for habitat mapping data and not all interest features are recorded; for example, not all SACs have recent plans showing the location and distribution of all the cited interest features. For this reason, a number of separate data sources have been used to determine the location and extent of habitat features. **Table A5** summarises the data sources that have been used.

Table A6: Data sources used for habitat mapping – Figures 12C.3 and 12C.4

Site Designation	Interest Features	Mapping Data Used
E1 Alde – Ore Estuary SAC	• Estuaries. • Mudflats and sand flats not covered by sea at low tide. • Atlantic salt meadows (saltmarsh).	Plan from Natural England showing where saltmarsh and mudflats occur.
E2 Minsmere to Walberswick SAC	• Annual vegetation of drift lines. • European dry heaths. • Perennial vegetation of stony banks.	Plan from Natural England showing the location of annual vegetation of drift lines (as a yellow line). Habitat mapping data supplied by Suffolk Biological Records Centre showing show where lowland heath (European dry heaths) is distributed. Habitat mapping data supplied by Suffolk Biological Records Centre showing where vegetated shingle is located - used as a proxy for perennial vegetation of stony banks.
E3 Orfordness to Shingle Street SAC (note that this SAC is located on one side of the Alde – Ore Estuary)	• Coastal lagoons. • Annual vegetation of drift lines. • Perennial vegetation of stony banks.	Plan from Natural England showing where shingle and annual vegetation of drift lines occurs.
E4 Sandlings SPA	• Lowland heath. • Conifer plantation (clearfell).	Habitat mapping data supplied by Suffolk Biological Records Centre showing show where lowland heath (European dry heaths) and conifer plantation are distributed.
All SSSI	• Habitat features.	Habitat mapping data supplied by Suffolk Biological Records Centre showing the distribution of habitat types within the various SSSI boundaries.
All CWS	• Habitat features.	Habitat mapping data supplied by Suffolk Biological Records Centre showing the distribution of habitat types within the various CWS boundaries.

APPENDIX B - ISOPLETH FIGURES



NOTES

KEY

INSTALLATION BOUNDARY

ANNUAL MEAN NO_2 ($\mu g/m^3$)

HUMAN HEALTH RECEPTOR

NOT PROTECTIVELY MARKED

DOCUMENT:

SIZEWELL C
ENVIRONMENTAL STATEMENT
VOLUME 2
APPENDIX 12C
COMBUSTION ACTIVITIES

DRAWING TITLE:

SIZEWELL C COMBUSTION ACTIVITIES
ISOPLETHS OF THE ANNUAL MEAN NO_2

DRAWING NO:

FIGURE 12C.7

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JAN 2020	I.W.	1:8,000 @A3

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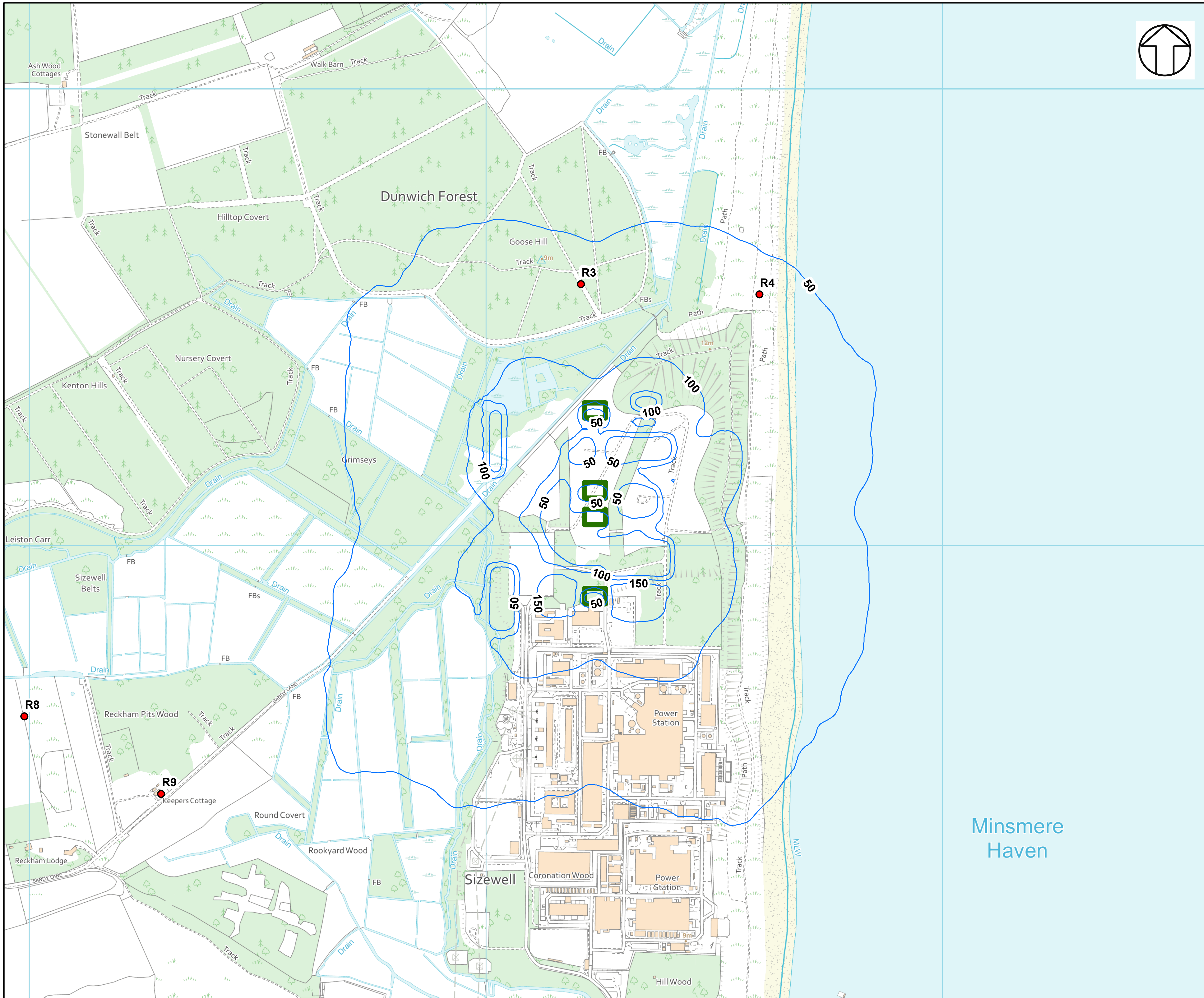

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- HOURLY MEAN NO_2 ($\mu g/m^3$)
- HUMAN HEALTH RECEPTOR

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DOCUMENT:
SIZEWELL C
ENVIRONMENTAL STATEMENT
VOLUME 2
APPENDIX 12C
COMBUSTION ACTIVITIES

DRAWING TITLE:
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ISOPLETHS OF THE HOURLY MEAN NO_2

DRAWING NO:
FIGURE 12C.8

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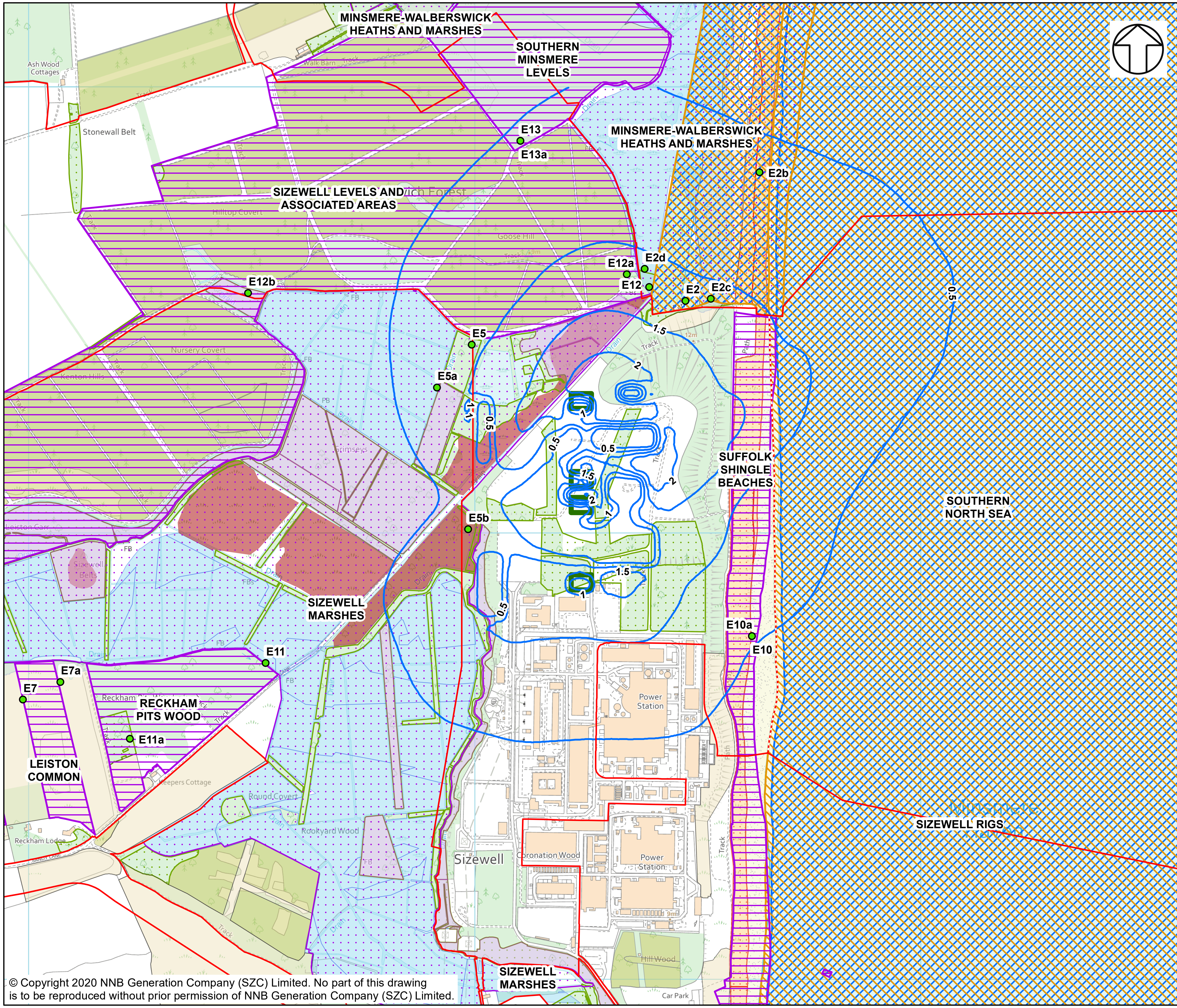

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- INSTALLATION BOUNDARY
- ANNUAL MEAN NOx (µg/m^3)
- HABITAT RECEPTOR
- SITE OF SPECIAL SCIENTIFIC INTEREST
- SPECIAL PROTECTION AREAS
- SPECIAL AREA OF CONSERVATION
- COUNTY WILDLIFE SITES
- LOWLAND HEATH
- WET WOODLAND
- NON CONIFEROUS TREES
- CONIFEROUS TREES
- VEG SHINGLES
- SAND DUNES
- REEDBED
- COASTAL FLOOD PLAIN GRAZING MARSH

NOT PROTECTIVELY MARKED

DOCUMENT:
SIZEWELL C
ENVIRONMENTAL STATEMENT
VOLUME 2
APPENDIX 12C
COMBUSTION ACTIVITIES

DRAWING TITLE:
SIZEWELL C COMBUSTION ACTIVITIES
ISOPLETHS OF THE ANNUAL MEAN NO_X

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FIGURE 12C.9

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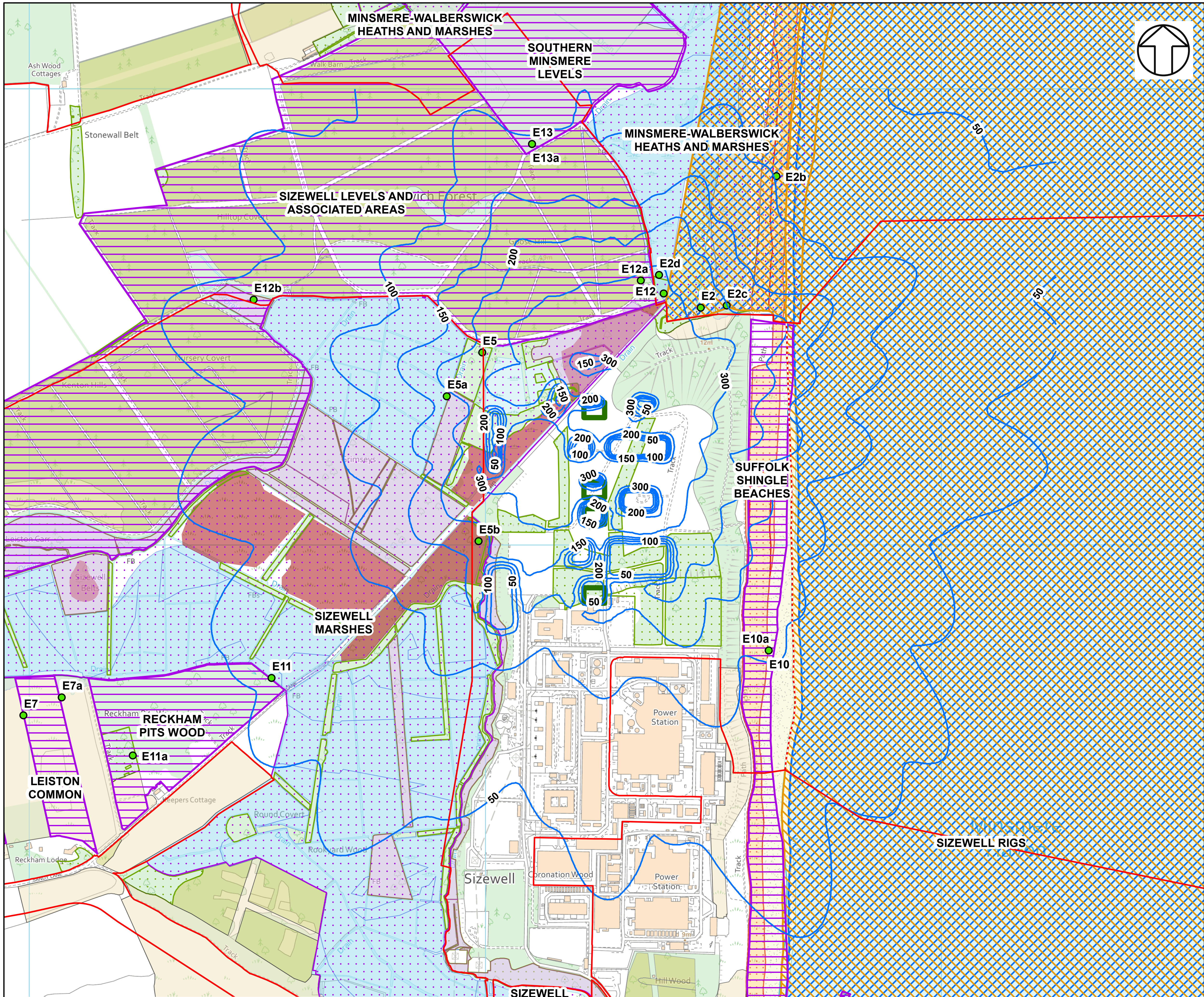

NOTES

KEY

- SIZEWELL C MAIN DEVELOPMENT SITE BOUNDARY
- DEMARCATION LINE
- INSTALLATION BOUNDARY
- DAILY MEAN NO_x ($\mu g/m^3$)
- HABITAT RECEPTOR
- SITE OF SPECIAL SCIENTIFIC INTEREST
- SPECIAL PROTECTION AREAS
- SPECIAL AREA OF CONSERVATION
- COUNTY WILDLIFE SITES
- LOWLAND HEATH
- WET WOODLAND
- NON CONIFEROUS TREES
- CONIFEROUS TREES
- VEG SHINGLES
- SAND DUNES
- REEDBED
- COASTAL FLOOD PLAIN GRAZING MARSH

NOT PROTECTIVELY MARKED

DOCUMENT:
SIZEWELL C
ENVIRONMENTAL STATEMENT
VOLUME 2
APPENDIX 12C
COMBUSTION ACTIVITIES

DRAWING TITLE:
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ISOPLETHS OF THE DAILY MEAN NO_X

DRAWING NO:
FIGURE 12C.10

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APPENDIX C - MODEL SENSITIVITY

The dispersion modelling assessment has been based on a number of conservative assumptions, such as:

- emissions at the proposed emission limit values or benchmark emission levels, when average emissions are likely to be below these values;
- emissions from EDG sources only, where emissions from UDGs lead to significantly lower impacts;
- worst case meteorological data for each species and averaging period; and,
- inclusion of buildings within the model.

The inputs that gave the worst case modelling results have been considered as the constant in this sensitivity analysis. Other model inputs have then been varied against this to understand the impacts.

Sensitivity of the predicted results to the modelling inputs has been considered for the routine operating scenario for EPR Unit 1 DGs at the worst-affected receptors, as Unit 1 generally led to the highest predicted results since they are located closer to the identified receptors than the other DGs. That said, the results of the sensitivity analysis are not in every case directly comparable to the data reported in the main assessment, as only the maximum value of Unit 1 and 2 was presented in the main report whereas the results from only Unit 1 are presented below.

Receptor R9 Keepers Cottage has been selected to represent the worst-affected human heath receptor, with R2 Minsmere and 5 Sizewell Marshes SSSI representing the worst-affected ecological receptors for annual mean and daily mean respectively, as these were generally found to experience the highest PCs in the main assessment.

Sensitivity results have been compared with results obtained for Wattisham 2016 meteorological data set, as generally this meteorological year lead to the highest impacts at the receptors concerned.

The sensitivity of the predicted results to model input variables are summarised in **Tables C-1** (Human Health) and **C-2** (Ecological). A range of input parameters have been assessed to understand the effect that such changes have on the impact assessment results. These include using different years of meteorological data, running the model without the use of the buildings effects module, amending the surface roughness, and considering the effects of modelling the UDGs instead of the EDGs. Time varying emission profiles and different emission concentrations have also been considered.

The maximum predicted concentrations at the associated receptor for the Wattisham 2016 Unit 1 model scenario are shown in the table, and the percentage of the PC that results from the variable input is also shown. Results in **Tables C-1** and **C-2** that are less than 100% means that using that set of input parameters results in predicted impacts lower than those presented in the main assessment. Conversely, results in the tables that exceed 100% are higher than those reported in the main assessment.

Table C-1 Point source dispersion model sensitivity analysis – human health receptor R9

Model input variable	% of PC at worst-affected receptor					
	Hourly NO_2	15 Min SO_2	Hourly CO	Daily PM_{10}	Annual NO_2	Annual PM_{10}
Wattisham 2016 Unit 1 **PC (µg/m[3])**	**33.9**	**4.9**	**10.3**	**0.3**	**0.15**	**0.006**
Meteorological data (Wattisham 2014-2018)	77%	83%	93%	25%	53%	53%
Buildings representation	53%	43%	44%	41%	54%	54%
Surface roughness representation (0.1m – 0.5m)	–94 - 102%	97 - 106%	100 – 103%	100 - 101%	93 - 98%	93 - 98%
Site specific roughness file	53%	43%	44%	41%	87%	87%
UDG emission source	34%	40%	44%	31%	29%	31%
Time variable emission profile	N/A	N/A	N/A	N/A	120%	120%

The main uncertainties associated with the model are considered to be associated with the selection of meteorological data and surface roughness.

The range of other years of Wattisham meteorological data result in PCs that were between 25 – 93% of the PC used for the sensitivity assessment, with PCs for annual PM_{10} and NO_2 being half of the reported value for the year leading to the lowest PCs. PCs for daily PM_{10} were only a quarter of the of the reported value.

The surface roughness used in the main assessment was 0.3m, the maximum surface roughness associated with agricultural land. The model run with a lower surface roughness of 0.1m led to higher predicted impacts, with results up to 106% of those used for the sensitivity assessment. The higher surface roughness of 0.5m (parkland and open suburbia) lead to lower predicted PCs, with results up to 94% of those used for the sensitivity assessment.

In addition, a site specific surface roughness file has also been developed to take account of the varying surface roughness in the vicinity of the installation, namely:

- Sea = 0.0001m
- Woodland = 0.5m
- Foreshore = 0.1m
- Other land = 0.3m

This led to results up to lower than the reported values used in the sensitivity analysis, with short-term impacts being generally less than half the reported values in the assessment. The reduction was less marked for annual average impacts which were 87% of the reported values.

Sensitivity of the type of DG operating has also been carried out, as the UDG have a lower thermal capacity and consequently lower emission concentrations and rates. It can be seen that PCs reduce to approximately a third of the value used in the sensitivity analysis, when only UDG operation is considered. While this is an unrealistic scenario, it does indicate that the combination of EDGs and UDGs will reduce the level of predicted impact over the results presented in the main assessment.

The main assessment has used the time varying source function to pro-rata long-term emissions, in order to determine the impacts for the proposed running hours during commissioning (factored by 28%) and routine operation (factored by 8%). In comparison, the tool has also been used to determine the model sensitivity to particular run times, assuming that the DGs are operational for only 3 hours per morning during weekdays throughout the year. Compared to the pro-rata approach, the predicted results are 120% of those used in the sensitivity analysis. However, as it is not known when the testing of the units will be carried out at this stage, and therefore it is considered that the approach used in the main assessment is appropriate.

Table C-2 Point source dispersion model sensitivity analysis – ecological receptor E2 (Annual) E5 (daily)

Model input variable	% of reported Process Contribution at worst-affected receptor		
	Daily NO_x	Annual NO_x	Annual SO_2
Wattisham 2016 Unit 1 PC (µg/m^3)	171.6	1.2	0.05
Meteorological data (Wattisham 2014-2018)	66%	77%	77%
Buildings representation	26%	40%	40%
Surface roughness representation (0.1m – 0.5m)	91 – 111.6%	93 - 102%	93 - 102%
Site specific roughness file	91%	103%	103%
UDG Emission source	28%	30%	32%
Time variable emission profile	N/A	132%	132%

The main uncertainties associated with the model are again considered to be associated with the choice of meteorological data and surface roughness (inclusion of buildings within the model has not been considered further as it is appropriate that buildings are included in the final model).

The range of years of Wattisham meteorological data result in values that were up to 66% of the PC used for the sensitivity assessment.

The model run with a lower surface roughness of 0.1m led to higher short-term predicted impacts, with results up to 112% of those used for the sensitivity assessment. The higher surface roughness of 0.5m (parkland and open suburbia) leads to higher predicted annual PCs, with results up to 102% of those used for the sensitivity assessment.

In addition, the site specific surface roughness file led to annual results up to 102% of the reported values used in the sensitivity analysis, and a slight reduction annual average impacts.

The operation of UDG reduces PCs to less than a third of the value used in the sensitivity analysis.

The assumption that the DGs are operational for 3 hours in the morning during weekdays led to results that are 130% of those used in the sensitivity analysis for NO_x and SO_2.

APPENDIX D – STACK HEIGHT DISCUSSION

INTRODUCTION

The stack height for the DGs has been selected due to the presence of overhead power lines, which will potentially limit the stack height, to ensure that there is sufficient clearance under the power lines.

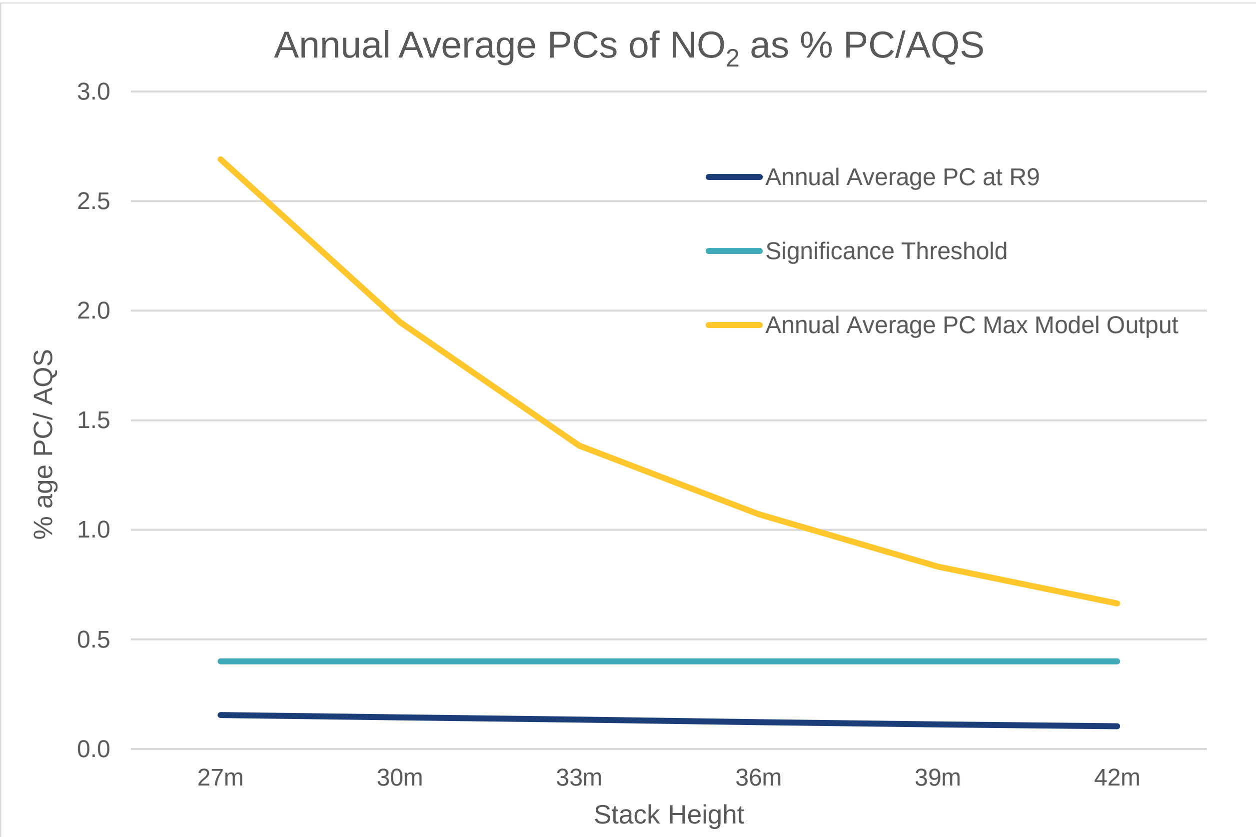
That said, an assessment of stack height with regards to Best Available Techniques (BAT) has been carried out to determine what the optimised height would be if this were not constrained, giving due consideration to the minimisation of ground-level air quality impacts balanced against the visual impacts of a taller stack.

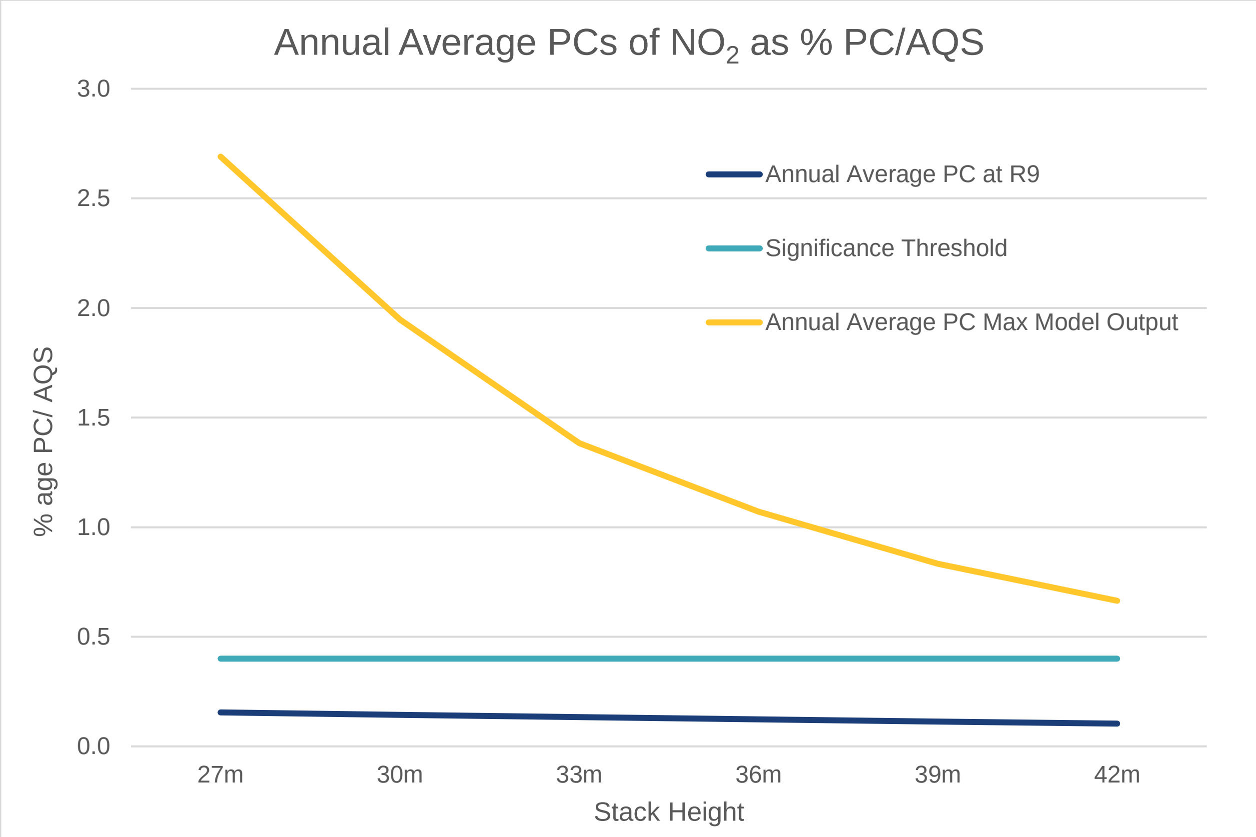
Dispersion modelling has been undertaken to determine the optimum stack height range, through comparison of the maximum impacts at human health receptors, and the proposed stack height identified through determination of a BAT curve. A BAT curve shows the reduction in ground level pollutant concentrations with increasing stack height, and the 'elbow' of the curve typically represents the most appropriate stack height that balances impacts with the height of the stack (i.e. it represents BAT for that emission point). A screening stack height range for the DGs was selected based on typical plant stack heights of 27 – 42 above finished ground level.

The stack height assessment has been based on one year of meteorological data (2016), EDG operation and on the routine operational scenario (that being the main operating scenario for the DGs long-term).

The stack heights plots are presented in **Figure 12C.11**, and show the PC/AQS at the indicative stack heights.

Figure 12C.11: Stack Height Determination





The ‘elbow’ of the curve can be clearly seen at 33m for the maximum concentrations for the model output for the annual average PCs, however for the hourly average there is no clear ‘elbow’. At receptor locations, the PC concentrations show a very steady decrease with increased stack height, however no definitive ‘elbow’ can be seen.

It is therefore considered that the selected height of 27.3m, which is considered to be the highest stack height that can be achieved enabling the clearance required for the overhead lines, represents BAT for the DGs.

VOLUME 2, CHAPTER 12, APPENDIX 12D : OFF-SITE DEVELOPMENTS ASSESSMENT

Contents

Tables

Plates

None provided.

Figures

None provided.

1. Off-site Developments Assessment

1.1 Introduction

1.1.1 This appendix of **Volume 2** of the **Environmental Statement (ES)** presents an assessment of the 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 sites south of Benhall and east of Halesworth and, if required, the marsh harrier habitat improvement area (Westleton). They are referred to throughout this appendix as the 'off-site developments' or 'the proposed development'.

1.1.2 Detailed descriptions of the proposed development sites (referred to throughout this volume as the 'site' as relevant to the location of the works), the proposed off-site development works and different construction and operational phases are provided in **Chapters 1** to **4** of this volume of the **ES**. A glossary of terms and list of abbreviations used in this chapter is provided in **Volume 1, Appendix 1A** of the **ES**.

1.2 Legislation, policy and guidance

1.2.1 **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. Furthermore, **Volume 2, Chapter 12** provides a description of legislation, policy and guidance relevant to the assessment of effects for the main development site of the Sizewell C Project. There is no further legislation, policy and guidance over and above that described in **Volume 1**, **Appendix 6H** and **Volume 2, Chapter 12** that is deemed relevant to the assessment of effects associated with the off-site development works.

1.3 Methodology

a) Scope of the assessment

1.3.1 The generic Environmental Impact Assessment (EIA) methodology is detailed in **Volume 1**, **Chapter 6**. The full method of assessment for air quality that has been applied for the Sizewell C Project is included as an appendix to **Volume 1**, **Appendix 6H**.

1.3.2 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. 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** of the **ES**.

1.3.3 This section provides specific details of the air quality screening exercise, as detailed below.

1.3.4 Where the proposed off-site development works are considered to have the potential for likely significant effects, these have been screened in for further assessment. Where no likely significant effects have been identified, the proposed off-site development works have been screened out. The scope of assessment considers the impacts of the construction and operational use of the proposed off-site developments.

b) Environmental screening

1.3.5 An environmental screening exercise was undertaken to identify which of the off-site development works may give rise to environmental effects that could potentially be significant.

1.3.6 All off-site development works have been screened out of the air quality assessment as they are considered not likely to give rise to significant effects on air quality at nearby sensitive receptors during their construction and operation, therefore they are not considered further in this **ES**.

1.3.7 **Table 1.1** provides a summary of the environmental screening exercise.

Table 1.1: Summary of environmental screening exercise.

Proposed Off-site Developments	Summary of Potential Effects	Screened In or Out of the Assessment
Sports facilities at Leiston	Construction of the sports facilities is not expected to result in significant effects on air quality at sensitive receptors. Earthworks and materials used for construction are expected to give a negligible level of risk of dust impacts. Traffic related to construction and operation of the sports facilities is not expected to meet criteria that determine that an assessment of traffic emissions is needed. There would be no operational emissions associated with the site.	Screened out
Fen meadow compensation site south of Benhall	Construction of the fen meadow compensation site is not expected to result in significant effects on air quality at sensitive receptors. Earthworks and materials used for construction are	Screened out

Proposed Off-site Developments	Summary of Potential Effects	Screened In or Out of the Assessment
	expected to give a negligible level of risk of dust impacts. Traffic related to construction of the fen meadow compensation site is not expected to meet criteria that determine that an assessment of traffic emissions is needed. There would be no operational emissions associated with the site.	
Fen meadow compensation site east of Halesworth	Construction of the fen meadow compensation site is not expected to result in significant effects on air quality at sensitive receptors. Earthworks and materials used for construction are expected to give a negligible level of risk of dust impacts. Traffic related to construction of the fen meadow compensation site is not expected to meet criteria that determine that an assessment of traffic emissions is needed. There would be no operational emissions associated with the site.	Screened out
Marsh harrier habitat improvement area - west of Westleton	Works required to establish the marsh harrier habitat improvement area are not expected to result in significant effects on air quality at sensitive receptors, as these would be equivalent to farming operations. Therefore, a negligible level of risk of dust impacts is expected. Traffic related to works required to establish the marsh harrier habitat improvement area is not expected to meet criteria that determine that an assessment of traffic emissions is needed. There would be no operational emissions associated with the site.	Screened out

VOLUME 2, CHAPTER 12, APPENDIX 12E : BASELINE MONITORING REPORT

Contents

Tables

Plates

Figures

None provided.

Annexes

1. Baseline Monitoring Report

1.1 Introduction

1.1.1 This document reports the method and results of the baseline dust and nitrogen dioxide surveys for the Sizewell C Project. The requirements for determining baseline dust deposition rates were set out in the scoping opinion published by the Planning Inspectorate (Ref. 1.1) (Ref. 1.2).

1.1.2 The focus of the baseline dust survey is an area of land to the north of the current Sizewell B power station, an area proposed for the permanent Sizewell C nuclear power station, and a temporary construction area including borrow pits and spoil storage areas. The area of land of concern is shown in **Plate 1.2**: Schematic showing dust survey sampling locations and **Figure 12.1**, the study area for the baseline dust survey is referred to in this document as the 'measurement site'.

1.1.3 The focus area of the baseline nitrogen dioxide survey extends from Bucklesham to Wrentham and Brampton along the A12 and includes sites near Needham Market, Saxmundham and Leiston. The nitrogen dioxide monitoring locations are shown in **Annex 12E.1**.

1.2 Baseline Dust Survey

a) Dust Survey Methodology

1.2.1 There are no statutory air quality standards in England that define an acceptable deposition rate for particulate matter from air. The deposition of particulate matter results in the accumulation of material on surfaces, such as the leaves of plants or on property. There is some evidence within the scientific literature that dust deposition rates of between 100 – 200 mg/m^2/day could represent the threshold at which complaints might be generated, depending upon baseline deposition rates (Ref. 1.3). There is also some guidance for major infrastructure works that significant impacts on vegetation are unlikely to occur at deposition rates of less than 1000 mg/m^2/day (Ref. 1.4). In the UK it is unusual for material not to be washed from vegetation by rainfall on a regular basis and therefore the deposition of particulate matter to vegetation is rarely a significant issue.

1.2.2 Receptors in the vicinity of the measurement site are exposed to a current rate of dust deposition. This rate is affected by meteorological conditions, industrial and agricultural activities and road traffic. As the measurement site is coastal, the sea also contributes to current dust deposition rates in form of salt spray and sand.

1.2.3 The predominant land use at the measurement site is open 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 generate large amounts of fugitive dust due to disturbance of the soil or organic matter. Track out of mud and soil onto the road network leads to vehicles spreading fugitive dust beyond the field boundaries.

i. Sampling Equipment

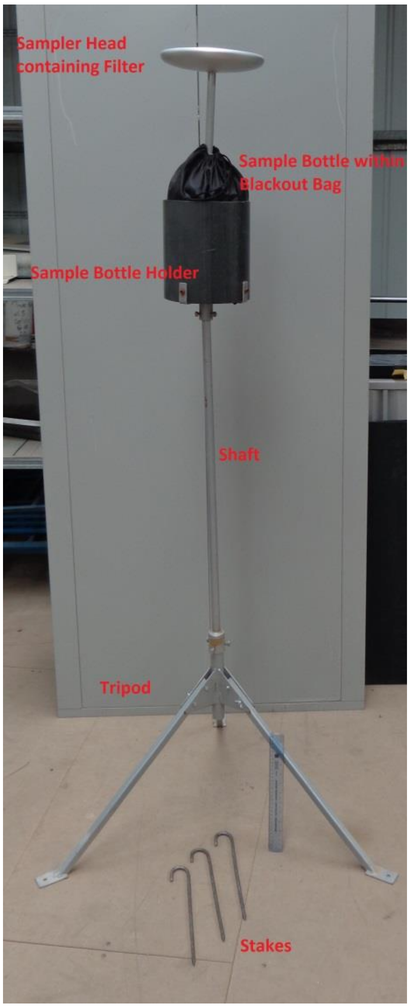
1.2.4 Passive samplers have been used in order to determine the baseline dust deposition rate and an indication of the predominant direction of the dust source. These deposition gauges, commonly called ‘Frisbee’ type gauges, are suitable for remote monitoring where there is no power supply, and require very little maintenance. The gauge consists of a metal sampling head, which includes a coarse foam insert to reduce interference from larger particles such as leaves and seed pods. This sample head is attached to a sample bottle in a blackout bag in order to reduce the growing of algae within the bottle. This is all supported in a holder mounted on a tripod, putting the sample head at approximately 2 metres from the ground. An example is shown in **Plate 1.1**

1.2.5 An adhesive strip was mounted around the circumference of the monitor to each of the Frisbee type deposition gauges. Each strip is pre-prepared with a mark at the centre of the strip that is mounted in alignment with grid north (based on national grid referencing from Ordnance Survey mapping). The adhesive becomes soiled as particulates adhere to it, with the greatest degree of soiling occurring on the side of the monitor facing towards the source of the particulate matter. The method is best suited to long term monitoring of fugitive sources of particulate matter and is capable of providing useful information that supports the use of deposition rate data. The adhesive strips were replaced every two weeks for analysis by reflectometry to determine the proportional directional coverage of deposited material on the adhesive media. The analysis was undertaken at the same laboratory as undertook the gravimetric analysis of the samples collected using Frisbee type deposition gauges.

1.2.6 A two week sampling period was used to avoid deterioration of the adhesive (the recommended exposure time ranges from 1 to 3 weeks). The Frisbee gauges were cleaned and the sample bottles were replaced every 4 weeks. The sample head is cleaned with demineralised water so as not to introduce a source of contamination to the sample. The sample head is cleaned into the sample bottle, so as to catch all the dust deposited during the previous 4 weeks.

1.2.7 The total mass of dust within each sample bottle is determined, and converted to a rate of dust deposition expressed as milligram of material per square metre per day (mg/m^2/day). The adhesive strip is scanned, and the reflectance measured. The decrease in reflectance is proportional to the amount of dust deposited onto the strip. The results from the adhesive strip are reported as the Effective Area Coverage per day (EAC/day), which is the percentage of the strip that is covered due to dust.

Plate 1.1: Annotated Example of a Frisbee-Type Deposition Gauge



ii. Sampling Locations

1.2.8 Sampling locations have been selected in order to represent the areas in the vicinity of the proposed development. Sampling locations have been selected at the measurement site boundary near to farmland in order to determine baseline dust deposition rates at locations near to farmland. During the construction works of the proposed development, this baseline could be a significant contribution towards the background dust deposition experienced at sensitive receptors. There are also two ecological sites adjacent to the proposed development boundary – Minsmere-Walberswick Heaths and Marshes (a Site of Special Scientific Interest (SSSI), with areas also designated as a Special Area of Conservation (SAC) and a Special Protection Area (SPA)) and Sizewell Marshes SSSI. Ecological sites can be sensitive to dust and particulate matter and sampling locations have been selected in order to determine the baseline dust deposition at these sites.

1.2.9 A simple schematic showing monitoring locations is available in **Plate 12E2.1**, and a summary of the sites is provided in **Annex 12E.1** of this **Volume.** Additional details describing each location are provided in **Annex 12E.2** of this **Volume.**

Table 1.1: Sampling Locations

Site ID	Site and Surrounding Area Description	Coordinates (x,y)
Measurement site 1	Field boundary, adjacent to the B1122 on the western boundary of the proposed development. Measurement site represents the B1122 corridor and land to the west of the site, between Leiston and Theberton.	644814, 264518
Measurement site 2	Field boundary, adjacent to Potter's Farm. Measurement site represents the area of land to the west and north-west of the proposed development.	645031, 265098
Measurement site 3	Field boundary, on the northern boundary of the proposed development. The measurement site represents the open, agricultural land to the north of the proposed development.	645447, 265550
Measurement site 4	The measurement site is located near to Upper Abbey Farm, and represents the open agricultural land within the proposed development land take area.	645211, 264533
Measurement site 5	The measurement site is located to the north of the proposed development at the Grove, near to the boundary of the Minsmere-Walberswick Heaths and Marshes SSSI. This measurement site represents the areas of land to the north-east of the site.	646418, 265444
Measurement site 6	The measurement site is located towards the south-west of the site, to the south of Upper Abbey Farm and to the east of Leiston Old Abbey. This measurement site represents the areas to the south and south-west of the proposed development.	645340, 264065
Measurement site 7	The measurement site is located on the edge of Dunwich Forest, on the southern boundary of the	646576, 264561

Site ID	Site and Surrounding Area Description	Coordinates (x,y)
	proposed development and adjacent to the Sizewell Marshes SSSI. This measurement site represents the areas to the east and south-east of the proposed development, mainly the forest and SSSI.	
Measurement site 8	The measurement site is located to the south of the proposed development, to the west of Lover's Lane and the western boundary of the Sizewell Marshes SSSI. The measurement site represents the areas to the south and south-west of the proposed development.	645394, 263566

Plate 1.2: Schematic showing dust survey sampling locations

b) Dust Survey Results

i. Dust Deposition

1.2.10 A summary of the deposition results is shown in **Table 1.2**, which show seasonal and monthly dust deposition rates, respectively. The baseline dust deposition rates show great variation across the course of the year, with a general decrease in deposition rates during the winter months (see **Table 1.3** for specific dates), and a general increase during the summer months. Average dust deposition rates across all measurement sites are 36 mg/m^2/day for spring, 58 mg/m^2/day for summer, 28 mg/m^2/day for autumn and 19 mg/m^2/day for winter. During the winter, wetter weather leads to a decrease in fugitive dust from fields and a reduction in suspended particulate matter in the air as it is washed out. As spring and summer progress, the soil and air becomes drier, leading to an increase in fugitive dust emissions and suspended particulate matter. These lead naturally to changes in dust deposition rates. There are also changes in farming activities, with ploughing in the spring and late autumn, and harvest in the summer and early autumn. Crop fields are also left bare after harvesting, with the soil exposed until crops start to grow (early winter for winter crops, and early spring for summer crops). It is noted that during the summer period, specifically 09 May 2017 to 06 June 2017, a deposition rate of 327 mg/m^2/day was observed at measurement site 4. This presents itself as significantly higher than any other deposition rate recorded in the study, however, values of this range are not unexpected in summer and although it may feasible to consider this value as the result of a temporary source, temporary sources can be considered numerous in summer and likely occur year on year. Even when this value is omitted from calculations, summer remains the season with highest deposition rate.

1.2.11 On a number of instances, the foam particle trap on the top of the monitor was found on the floor or missing, and the contribution of material held in the foam have therefore not been included within the reported result. Despite this, the results do not differ greatly from the expected pattern, and the absence of the foam trap is not considered to have had a significant influence on the results. The majority of results are well below the 100mg/m^2/day criteria, with all results well below the 1000mg/m^2/day criteria given by the Highways Agency. There are two results where the 100mg/m^2/day is exceeded – measurement site 1 in February to March, and measurement site 4 in May. The source of the increase in dust is likely to be local to the sample location in each case, such as vehicle movements. During May, the deposition rates increased slightly across all sample locations, possibly due to an increase in farming related activities in the wider area. As measurement site 4 is significantly higher than any other measurement site, it is likely that the activity was close to this measurement site.

Table 1.2: Monthly Averaged Seasonal Dust Deposition Rates (mg/m^2/day)

Measurement Site ID	Spring (14/02/17 to 08/05/17)	Summer (09/05/17 to 04/09/17)	Autumn (05/09/17 to 26/09/17 and 28/09/16 to 21/11/16)	Winter (22/11/16 to 13/02/17)
Measurement site 1	137	-a	40	33
Measurement site 2	17	-a	26	27
Measurement site 3	18b	-a	27	30b
Measurement site 4	39	112b	28	14b
Measurement site 5	8b	29	23b	13
Measurement site 6	29b	67b	37b	12b
Measurement site 7	16	40	19	11
Measurement site 8	21b	42	25b	11b

a Sample discontinued

b Foam Particle Trap missing or found on floor for one or more sampling period– result not included in total deposition rate

c Discontinued site data excluded

Table 1.3: Dust Deposition Rates (mg/m^2/day)

Measurement Site ID	28/09/16 to 25/10/16	25/10/16 to 22/11/16	22/11/16 to 20/12/16	20/12/16 to 17/01/17	17/01/17 to 14/02/17	14/02/17 to 14/03/17	14/03/17 to 10/04/17	10/04/17 to 09/05/17	09/05/17 to 06/06/17	06/06/17 to 04/07/17	04/07/17 to 01/08/17	01/08/17 to 05/09/17	05/09/17 to 26/09/17
Measurement site 1	31	49	38	49	13	137	-b	-b	-b	-b	-b	-b	-b
Measurement site 2	28	23	6	66	9	17	-b	-b	-b	-b	-b	-b	-b
Measurement site 3	27	a	46a, c	34	10	18c	-b	-b	-b	-b	-b	-b	-b
Measurement site 4	29	27	11c	19	12	39	47	32	327	22c	68	32	29
Measurement site 5	34	23	18	9	13	3c	9	13	42	20	36	18	12c
Measurement site 6	19	69	16	16	5c	22	30	35	93	30c	57	87	24c
Measurement site 7	22	10	5	11	17	14	19	16	55	30	44	32	25
Measurement site 8	34	17	9	12	13c	10	31	21	49	30	57	32	24c

[a] *Sample exposed for two months due to no access on 22/11/16*

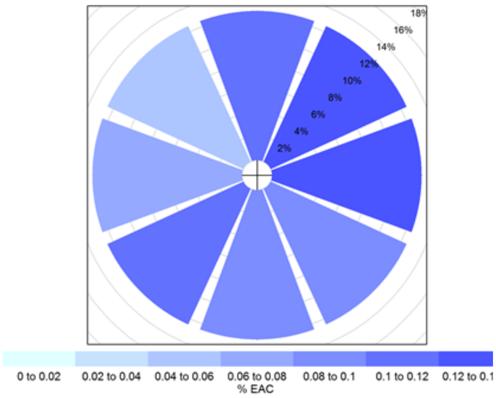
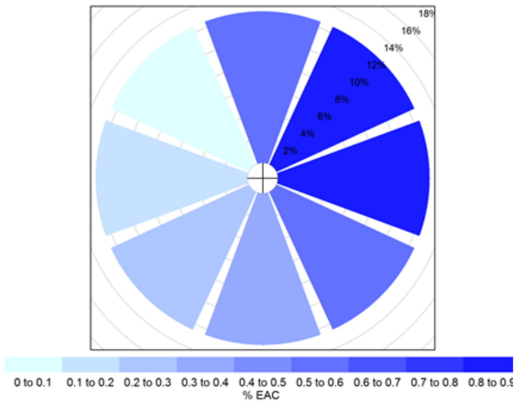
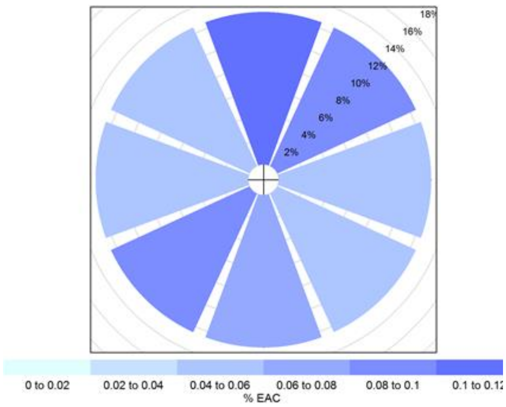
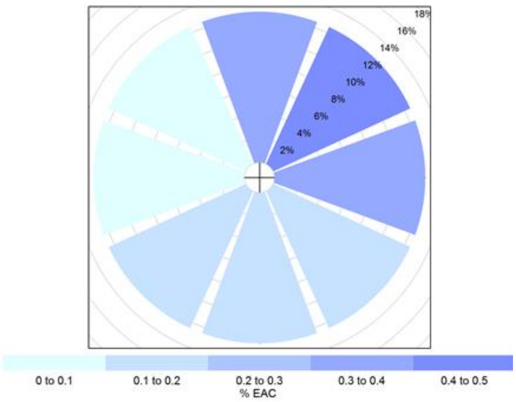
[b] *Sample Discontinued*

[c] *Foam Particle Trap missing or found on floor – result not included in total deposition rate*

ii. Directional Dust

1.2.12 **Plate 1.3** shows the mean percentage area coverage (%EAC) and maximum %EAC for each 45° segment of the compass, corresponding to sampling media facing north, north-east, east, south-east, south, south-west, west and north-west. The colour scale indicates the magnitude of soiling experienced for each segment of the sampling surface. These diagrams therefore illustrate the relative magnitude of the contributions made by material from each direction, to the total deposition rates observed at each measurement site under baseline conditions. The %EAC plots do not provide any information as to whether the sampled material was deposited at an even rate during the whole sampling period or if most of the material was deposited during a short duration event, such as ploughing or tilling arable land near to a gauge.

Plate 1.3: Mean and Maximum %EAC by Directional Sectors

Measurement Site	Mean %EAC	Maximum %EAC
1		
2		

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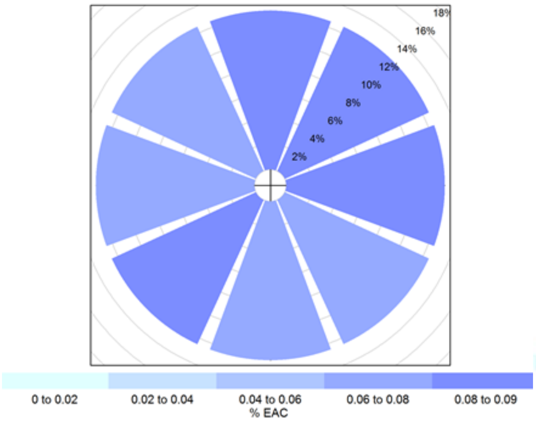
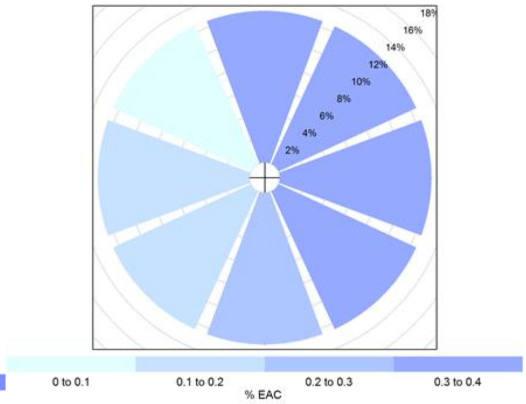
<tr><td>3</td><td>
</td><td>
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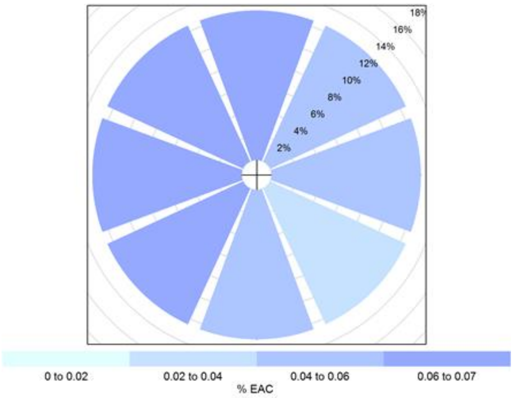
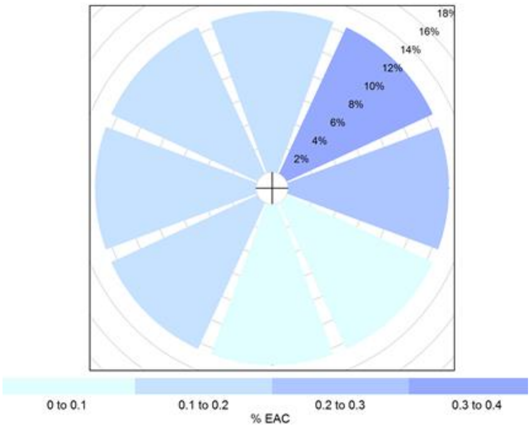
<tr><td>4</td><td>
</td><td>
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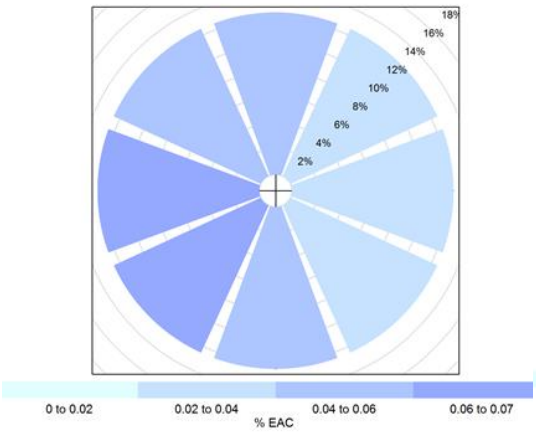
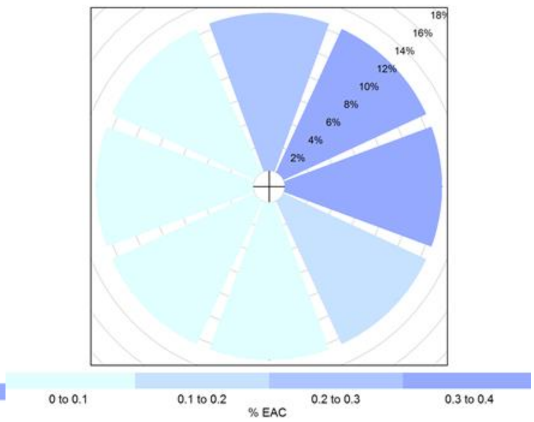
<tr><td>5</td><td>
</td><td>
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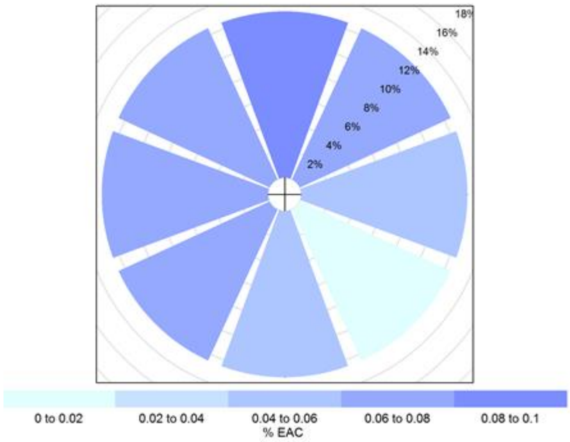
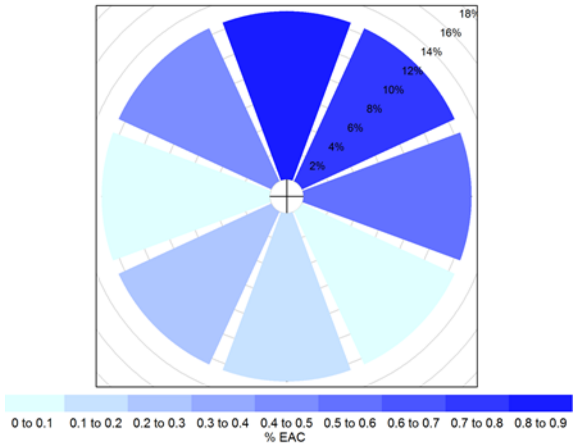
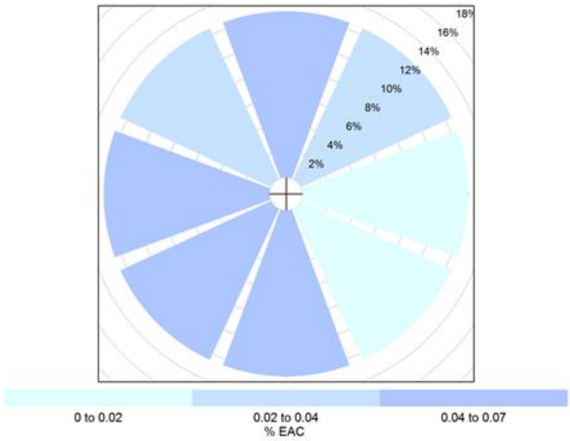
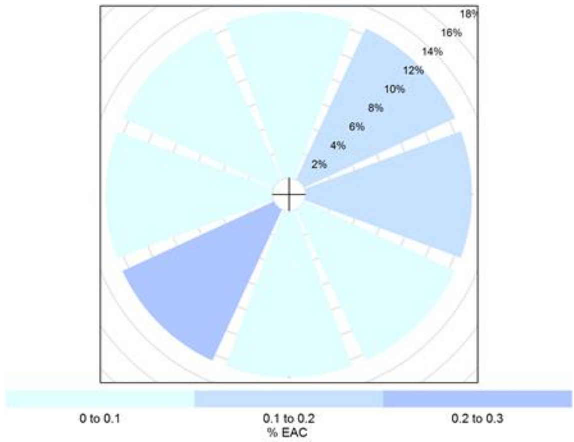
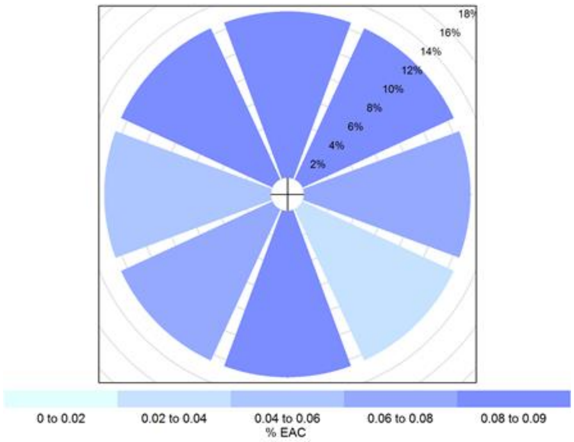
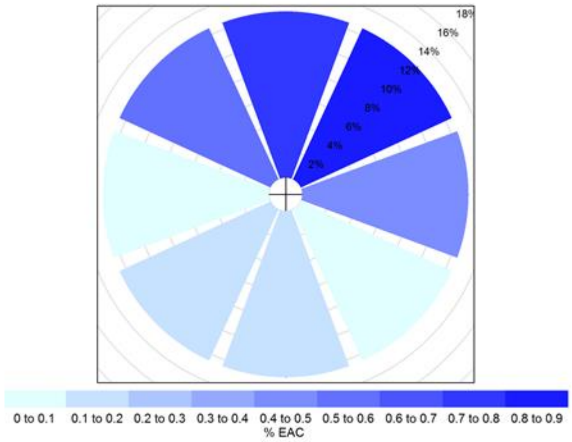
<table>
<tr><th>Measurement Site</th><th>Mean %EAC</th><th>Maximum %EAC</th></tr>
<tr><td>6</td><td></td><td></td></tr>
<tr><td>7</td><td></td><td></td></tr>
<tr><td>8</td><td></td><td></td></tr>
</table>

1.3 Baseline Nitrogen Dioxide Survey

a) Nitrogen Dioxide Survey Methodology

1.3.1 As part of the transport emissions impact assessments for proposed Sizewell C nuclear development there was a need for measurement data to represent the long-term concentrations of nitrogen dioxide in areas with limited coverage from the local authority monitoring. This survey gathers data from the locations required by the wider assessment.

b) Sampling Equipment

1.3.2 Each diffusion tube comprises an acrylic tube approximately 10 cm long and 1 cm diameter. Contained within the tube and end cap are two fine wire meshes that are the collection media. The tube includes a rubber collar enabling the tube to be sat into a tube holder. The holder is temporarily fitted to the support street furniture and is removed without damage to the street furniture at the end of the survey. Analysis of nitrogen dioxide concentrations is performed in accordance of UKAS accreditation schedule for quantification of nitrogen dioxide by Staffordshire Highways Laboratory.

c) Sampling Locations

1.3.3 The locations of the diffusion tubes are shown in **Table 1.4** and **Plate 12E2.1** in **Annex 12E.2**. The first month was exposed from 25th October 2019 – 22nd November 2019 (672 hours), the second from 22nd November 2019 – 20st December 2019 (670 hours) and the third month from 20st December 2019 – 16 January 2020 (647) hours. The laboratory results sheets are displayed in **Annex 12E.3.**

Table 1.4: Diffusion tube locations

Tube ID	X,Y location (m)	Height (m)
DT1	649314, 282201	2.5
DT2	641655, 277376	2
DT3	643505, 283239	1.7
DT4	643669, 273884	2
DT5	644707, 269685	1.2
DT6	640405, 269604	2.5
DT7	641462, 267821	1.5
DT8	638602, 267046	1.7

Tube ID	X,Y location (m)	Height (m)
DT9	640875, 270145	1.6
DT10	640636, 269880	1.5
DT11	638319, 266015	1.5
DT12	643222, 266548	1.6
DT13	644351, 265089	1.7
DT14	644498, 263759	3
DT15	640592, 264076	1.2
DT16	631300, 256943	1.1
DT17	631168, 256771	1.4
DT18	623208, 240954	1.2
DT19	623520, 242349	1.4
DT20	622164, 241502	1.5
DT21	613212, 253933	1.2
DT22	612066, 259428	1.4
DT23	626060, 249198	2.4

d) Baseline Nitrogen Dioxide Results

1.3.4 Concentrations of nitrogen dioxide (µg/m^3) as reported by the laboratory at each tube location for each of the three exposure periods are displayed in **Table 1.5**. Certificates as provided by Staffordshire Highways Laboratory are available in **Annex 12E.3.**

Table 1.5: Monthly concentrations of nitrogen dioxide (µg/m^3) as reported by Staffordshire Highways Laboratory

Tube ID	Month 1 NO_2 Concentration (µg/m^3)	Month 2 NO_2 Concentration (µg/m^3)	Month 3 NO_2 Concentration (µg/m^3)	Period Mean NO_2 Concentration (µg/m^3)
DT1	17.3	21.4	17.5	18.7
DT2	15.5	17.6	14.5	15.9
DT3	15.0	19.2	14.0	16.1
DT4	15.8	20.2	14.4	16.8
DT5	13.8	13.6	13.0	13.5
DT6	20.7	20.1	19.0	19.9
DT7	14.7	18.6	13.4	15.6

Tube ID	Month 1 NO_2 Concentration (µg/m^3)	Month 2 NO_2 Concentration (µg/m^3)	Month 3 NO_2 Concentration (µg/m^3)	Period Mean NO_2 Concentration (µg/m^3)
DT8	35.5	35.2	25.1	31.9
DT9	24.4	24.4	19.9	22.9
DT10	23.2	25.6	22.5	23.8
DT11	25.3	23.9	22.7	24.0
DT12	13.4	14.2	11.1	12.9
DT13	15.3	17.7	*	16.5
DT14	16.3	19.9	15.1	17.1
DT15	11.2	14.4	10.7	12.1
DT16	21.7	23.9	19.5	21.7
DT17	23.2	24.2	18.7	22.0
DT18	24.7	24.3	15.7	21.6
DT19	22.5	26.4	19.6	22.8
DT20	29.5	35.0	26.5	30.3
DT21	4.0	24.8	23.3	17.4
DT22	31.4	29.7	22.9	28.0
DT23	*	*	24.2	24.2
DT24	19.9	29.1	23.5	24.2

** Tube discovered missing*

1.3.5 Nitrogen dioxide concentrations obtained from this survey were used to verify modelled annual mean nitrogen dioxide concentrations. In order to perform this verification procedure, the data was annualised and bias adjusted using results of multiple co-location studies performed by the lab in which the analysis was performed these procedures were carried out in accordance of Defra's technical guidance document (Ref. 1.5).

1.3.6 Continuous monitoring data for 2018 from nearby monitoring sites at Norwich Lakenfields, Wicken Fen and St Osyth were selected to annualise the diffusion tube data. The annual mean nitrogen dioxide concentrations at each of these continuous monitoring sites was divided by the period mean at each of these monitoring sites, where the period was selected to match the same dates in which the diffusion tube survey was performed. The average value obtained was then used to factor nitrogen dioxide concentrations obtained in the diffusion tube survey to obtain an annualised mean. **Table 1.6** shows the Annual Mean/Period Mean ratio used where 3 months of diffusion tube data were obtained.

Table 1.6: Annualisation ratios for each reference location

Reference Location	Annual Mean NO_2 Concentrations (µg/m³)	Period Mean NO_2 Concentrations (µg/m³)	Ratio (Annual Mean/ Period Mean)
Norwich Lakenfields	11.7	15.1	0.77
Wicken Fen	8.0	11.0	0.72
St Osyth	12.7	14.6	0.87
Average	10.8	13.6	0.79

1.3.7 The government operates an inter-laboratory comparison scheme for the analysis of nitrogen dioxide tubes, a laboratory bias-adjustment factor is reported on an annual basis. The appropriate value for calendar year 2018 and the combination of tube type and laboratory used is 0.88, as displayed in **Plate 1.4**. The annualised value has been multiplied by this laboratory bias adjustment factor to give the right-hand column of values in **Table 1.7**, which are the values to be used in subsequent assessment.

Plate 1.4: Screenshot of Defra bias adjustment factor spreadsheet

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 09/19

Follow the steps below in the correct order to show the results of relevant co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet

This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of March 2020

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[5] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Staffordshire Scientific Services	20% TEA in water	2018	UC	Manchester City Council	12	37	35	5.0%	G	**0.95**
Staffordshire Scientific Services	20% TEA in water	2018	KS	Manchester City Council	12	61	62	-2.3%	G	**1.02**
Staffordshire Scientific Services	20% TEA in water	2018	SI	Manchester City Council	12	23	24	-4.7%	G	**1.05**
Staffordshire Scientific Services	20% TEA in water	2018	R	Bury Council	12	30	25	19.0%	G	**0.84**
Staffordshire Scientific Services	20% TEA in water	2018	KS	Marylebone Road Intercomparison	12	84	85	-0.7%	G	**1.01**
Staffordshire Scientific Services	20% TEA in water	2018	R	Salford City Council	11	44	40	10.5%	G	**0.91**
Staffordshire Scientific Services	20% TEA in water	2018	B	Salford City Council	9	18	14	24.6%	G	**0.80**
Staffordshire Scientific Services	20% TEA in water	2018	UB	Salford City Council	12	30	25	18.0%	G	**0.85**
Staffordshire Scientific Services	20% TEA in water	2018	R	stockport	12	43	37	15.6%	G	**0.87**
Staffordshire Scientific Services	20% TEA in water	2018	KS	Oldham Council	12	36	29	23.9%	G	**0.81**
Staffordshire Scientific Services	20% TEA in water	2018	R	Stoke-on-Trent City Council	10	57	56	2.7%	G	**0.97**
Staffordshire Scientific Services	20% TEA in water	2018	UB	Stoke-on-Trent City Council	11	28	23	19.1%	G	**0.84**
Staffordshire Scientific Services	20% TEA in water	2018	UB	Wigan Council	10	26	16	61.3%	G	**0.62**
Staffordshire Scientific Services	20% TEA in water	2018	R	East Staffordshire Borough Council	12	44	40	10.8%	G	**0.90**
Staffordshire Scientific Services	20% TEA in water	2018	O	South Staffordshire Council	12	32	35	-7.1%	G	**1.08**
Staffordshire Scientific Services	20% TEA in water	2018	R	Tameside MBC	10	64	43	48.6%	G	**0.67**
Staffordshire Scientific Services	20% TEA in water	2018		**Overall Factor[3] (16 studies)**				Use		**0.88**

Table 1.7: Annualised and bias adjusted concentrations of nitrogen dioxide (µg/m^3)

Reference Location	Period Mean NO_2 Concentrations (µg/m^3)	Annualised NO_2 Concentrations (µg/m^3)	Annualised and Bias Adjusted NO_2 Concentrations (µg/m^3)
DT1	18.7	14.7	13.0
DT2	15.9	12.5	11.0
DT3	16.1	12.6	11.1
DT4	16.8	13.2	11.6
DT5	13.5	10.6	9.3
DT6	19.9	15.7	13.8
DT7	15.6	12.2	10.8
DT8	31.9	25.1	22.1
DT9	22.9	18.0	15.9
DT10	23.8	18.7	16.5
DT11	24.0	18.9	16.6
DT12	12.9	10.2	8.9
DT13	16.5	12.5	11.0
DT14	17.1	13.5	11.8
DT15	12.1	9.5	8.4
DT16	21.7	17.1	15.0
DT17	22.0	17.3	15.3
DT18	21.6	17.0	14.9
DT19	22.8	18.0	15.8
DT20	30.3	23.9	21.0
DT21	17.4	18.3	16.1
DT22	28.0	22.0	19.4
DT23	24.2	18.3	16.1
DT24	24.2	19.0	16.7

1.4 Summary

1.4.1 Baseline dust deposition rates, expressed in mg dust per square metre of surface area per day, were sampled at eight measurement sites and directional soiling rate information was also gathered at each measurement site based on the effective area coverage (%EAC) of the sample media. The survey operated for 6 months at measurement site 1, measurement site 2 and measurement site 3, from the 28th September 2016 to the 14th March 2017. The survey operated 12 months at measurement sites 4, measurement site 5, measurement site 6, measurement site 7 and measurement site 8, from the 28th September 2016 to the 26th September 2017.

1.4.2 The results of the dust deposition monitoring show that there is a seasonal change in baseline dust deposition rates throughout the year, with lower deposition rates observed during the winter months (December to February/March), compared to the warmer months of June to September. Dust deposition rates range from 3 mg/m^2/day to 327mg/m^2/day, with the lowest results reported in February to March, and the highest reported in May.

1.4.3 The mean %EAC results show that there is no clear indication of predominant direction for soiling across the measurement site, while the maximum EAC results show that there are local sources to each measurement site that have a significant effect for short time periods. The area around the proposed development site is rural, and is mostly comprised of farmland, with some woodland and small urban areas. The scale and pattern of observed dust deposition rates is considered to be consistent with deposited material being contributed by farming related activities and natural sources.

1.4.4 Baseline nitrogen dioxide concentrations were also quantified at 24 locations within the transport dispersion modelling domain. Concentrations at all locations are well below the annual mean air quality object value of 40µg/m^3.

Annex 12E.1: Measurement site descriptions

Sampling Site Description

1.1.1 The sampling locations are described in turn below and images are included illustrate the surrounding land uses. Some images show gauges during set up and prior to Frisbee heads being set level ready for the next sampling period.

Measurement Site 1

1.1.2 Measurement site 1 is located at the southern end of the same field as Measurement site 2, an arable field that was in use during the survey. The measurement site is located at the field edge, with a hedgerow immediately adjacent to the sample equipment, and open field on the other three sides. The land surrounding the sampling locations can be seen in **Plate 12E.1.**

1.1.3 Measurement site 1 is located near to the B1122 at the western boundary of the proposed development. The land to the west of the measurement site is similar in nature to the sampling location, open farmland. The measurement site represents those areas of land adjacent to the B1122 road corridor between Leiston and Theberton, and rural areas to the west.

1.1.4 The measurement site was operated for six months from the 28th September 2016 to the 14th March 2017, during which the field is in use. During the survey it is expected that the field will be accessed by tractor for crop management such as spraying, but not for activities which would be expected to generate a large amount of fugitive dust, such as ploughing or harvesting.

Plate 12E.1: Measurement Site 1 Sampling Location

Facing North-West

Facing North-East

Facing South-East

Facing West

Measurement Site 2

1.1.5 Measurement site 2 is located at the northern end of the same field as Measurement site 1, an arable field that was in use during the survey. The measurement site is located at the field edge, with a hedgerow immediately adjacent to the sampling equipment, and open field on the other three sides. The land surrounding measurement site 2 can be seen in **Plate 12E.2.**

1.1.6 The measurement site is located near the western boundary of the proposed development, near to Potter's Farm, an active farm that includes residential receptors. The land surrounding the measurement site is mixed, with residential receptors, woodland and open farmland, and the measurement site represents areas to the west of the proposed development away from road corridors.

1.1.7 The measurement site was operated for six months from the 28th September 2016 to the 14th March 2017, during which the field is in use. During the survey it is expected that the field will be accessed by tractor for crop management such as spraying, but not for activities which would be expected to generate a large amount of fugitive dust, such as ploughing or harvesting.

Plate 12E.2: Measurement Site 2 Sampling Location

Facing North

Facing East

Facing South

Facing West

Measurement Site 3

1.1.8 Measurement site 3 is located within an arable field that was in use during the survey. The measurement site is located at the field edge, with small trees and shrubs immediately adjacent to the sampling equipment, and open field on the other three sides. The land surrounding measurement site 3 can be seen in **Plate 12E.3.**

1.1.9 The measurement site is located near the northern boundary of the proposed development, near to Plantation Cottages and Lower Abbey Farm, an active farm that includes residential receptors. The land surrounding the measurement site is mixed, with residential receptors, woodland and open farmland, and the measurement site represents areas to the north of the proposed development away from road corridors.

1.1.10 The measurement site was operated for six months from the 28th September 2016 to the 14th March 2017, during which the field is in use. During the survey it is expected that the field will be accessed by tractor for crop management such as spraying, and for activities which would be expected to generate a large amount of fugitive dust, such as ploughing or harvesting.

Plate 12E.3: Measurement Site 3 Sampling Location

Facing North

Facing East

Facing West

Facing South

Measurement Site 4

1.1.11 Measurement site 4 is located at the south eastern corner of a field to the west of Upper Abbey, an arable field that was in use during the survey. The measurement site is located at the field edge, with a hedgerow near to the sampling equipment, and open field on the other three sides. The land surrounding measurement site 4 can be seen in **Plate 12E.4.**

1.1.12 The measurement site is located within the boundary of the proposed development, near to Upper Abbey, a residential receptor and near to an active farm yard. The land surrounding the measurement site is predominantly open farmland, and the measurement site represents open farmland, both within the proposed development boundary and in the wider area surrounding the proposed development.

1.1.13 The measurement site was operated for twelve months from the 28th September 2016 to the 26th September 2017, during which the field is in use. During the survey the area adjacent to the sampling location was used as a site compound for works vehicles undertaking drilling works across the measurement site, although there was no drilling activity near to measurement site 4. The compound comprised a hard-core base layer, which remained in situ, and a number of small measurement site offices/cabins and a generator.

Plate 12E.4: Measurement Site 4 Sampling Location

Facing South

Facing East

Facing North

Facing West

Measurement Site 5

1.1.14 Measurement site 5 is located at the eastern edge of a field to the north of the proposed development boundary. The field was not in used during the survey, and had been left to fallow as grassland. The measurement site is located at the field edge, with trees and a hedgerow near to the sampling equipment, and open field on the other three sides. The land surrounding measurement site 5 can be seen in**, Plate 12E.5.**

1.1.15 The measurement site is located outside of the boundary of the proposed development, near to the boundary of the Minsmere-Walberswick Heaths and Marshes SSSI at a location called The Grove. The SSSI extends to the north and north-east of the proposed development, with areas on the coast also designated as a Special Areas of Conservation (SAC) and a Special Protection Area (SPA). The land surrounding the measurement site is predominantly open farmland, and the measurement site represents the SSSI and open farmland to the north of the proposed development.

1.1.16 The measurement site was operated for twelve months from the 28th September 2016 to the 26th September 2017, during which the field is not in use.

Plate 12E.5: Measurement Site 5 Sampling Location

Facing South

Facing South-West

Facing North

Facing East

Measurement Site 6

1.1.17 Measurement site 6 is located in the south western corner of a field near the South-West corner of the proposed development boundary. The field was in use during the survey, and at the start of the survey there were a number of ground excavations being undertaken nearby. The measurement site is located at the field edge, with trees and a hedgerow near to the sampling equipment, and open field on the side. The land surrounding measurement site 6 can be seen in **Plate 12E.6.**

1.1.18 The measurement site is located within of the boundary of the proposed development, to the east of Leiston Old Abbey. The land surrounding the measurement site is predominantly open farmland, with woodland to the south and east. The measurement site represents areas to the south and west of the proposed development, comprised of arable fields and hedgerows.

1.1.19 The measurement site was operated for twelve months from the 28th September 2016 to the 26th September 2017, during which the field is in use.

Plate 12E.6: Measurement Site 6 Sampling Location

Facing North

Facing West

Facing South

Facing East

Measurement Site

1.1.20 Measurement site 7 is located on the southern boundary proposed development, within Dunwick Forest. The sampling equipment is located in an open area with low level vegetation, with woodland to the north. The measurement site is located on the northern boundary of the Sizewell Marshes SSSI. The land surrounding measurement site 7 can be seen in **Plate 12E.7.**

1.1.21 The measurement site is located within of the boundary of the proposed development, to the north of the Sizewell B power station. The land surrounding the measurement site is marsh land to the south and woodland to the north. The measurement site represents the land to the south of the proposed development boundary, comprising both woodland and the marshland of the SSSI.

1.1.22 The measurement site was operated for twelve months from the 28th September 2016 to the 26th September 2017. The forest is open to the public for walking, with no access to public vehicles. During the survey, some logging work was undertaken within the forest, however this was not located near to the monitor.

Plate 12E.7: Measurement Site 7 Sampling Location


Facing South


Facing West


Facing North


Facing East

Measurement Site 8

1.1.23 Measurement site 8 is located outside of the proposed development boundary to the south, adjacent to Lover's Lane and on the opposite side of the road to the Sizewell Marshes SSSI. The sampling equipment is located in an open area with low level vegetation. The measurement site is located west of the Sizewell Marshes SSSI. The land surrounding measurement site 8 can be seen in **Plate 12E.8.**

1.1.24 The measurement site is located in an open field left to fallow as grassland, with no high vegetation nearby. The measurement site is representative of the open land to the south of the proposed development and to the east of Leiston, as well as Leiston itself.

The measurement site was operated for twelve months from the 28th September 2016 to the 26th September 2017, during which the field is not in use.

Plate 12E.8: Measurement Site 8 Sampling Location

Facing South

Facing East

Facing North

Facing South-West

Annex 12E.2. Nitrogen Dioxide Sampling Locations

Plate 12E2.1: Schematic showing diffusion tube locations

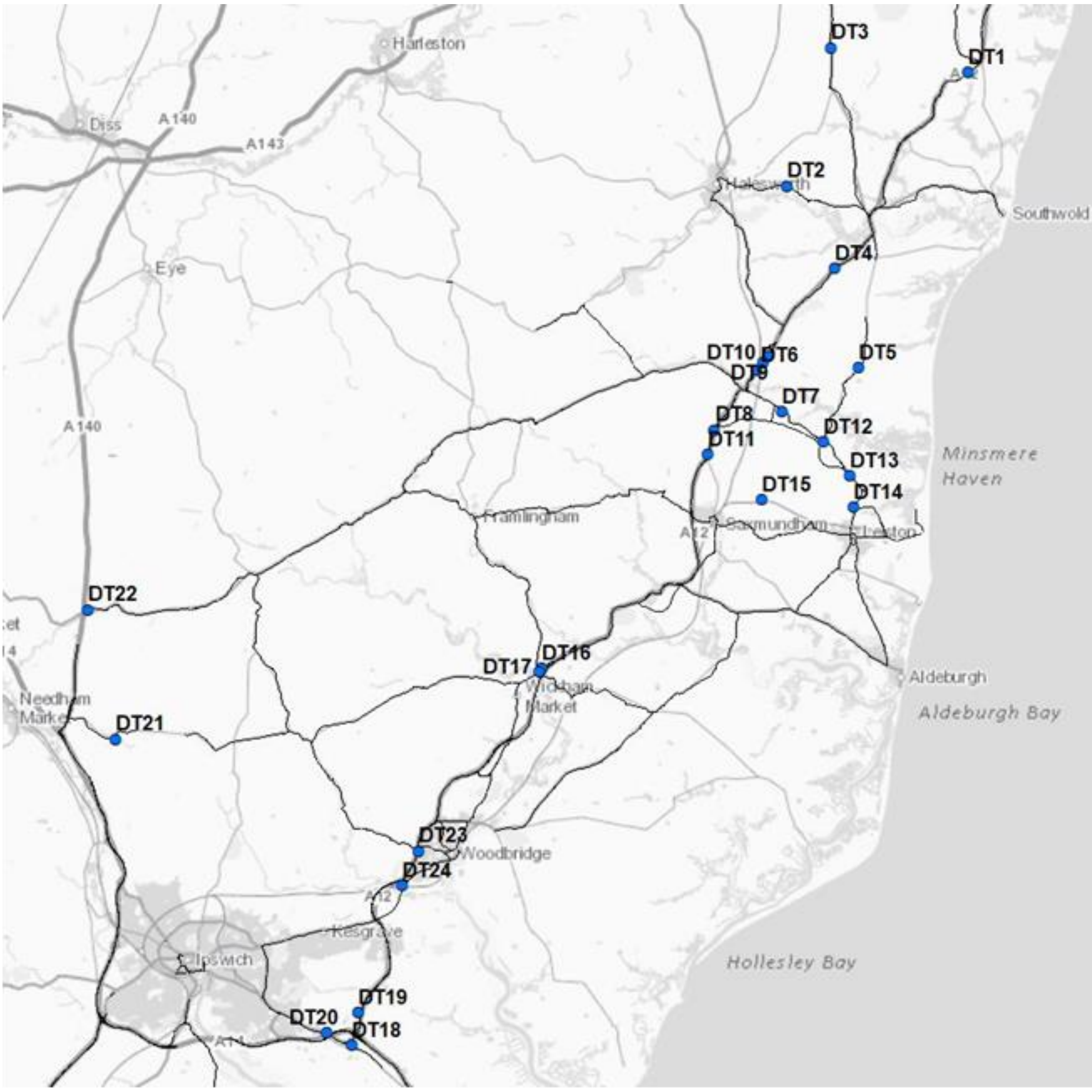


Table 1.1: Diffusion tube locations

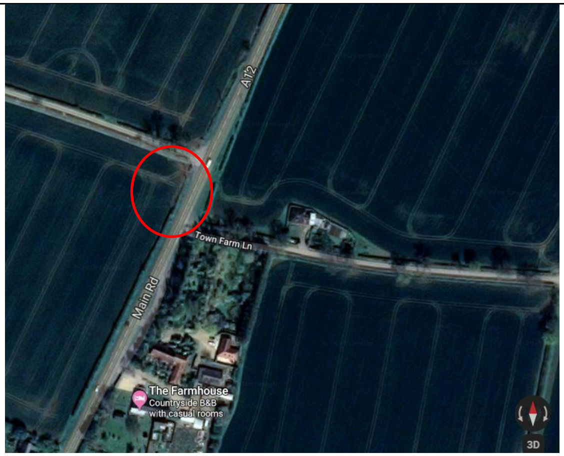
DT1			NR34 7HE, 649314,282201 Speed limit sign on A12 NB approaching Wrentham

DT2			IP19 9JX, 641655,277376 Post by Blyford Lane eastbound side of B1123 approaching Blyford
DT3			NR34 8DF, 643505,283239 Road sign by field, northbound side of London Rd approaching Shadingfield

DT4			IP17 3RE, 643669,273884 Speed limit sign by Hazel lane junction, southbound side of A12 leaving Blythburgh

DT5			IP17 3AT, 644707,269685 Speed limit sign by Heath View junction, northbound side of B1125 leaving Westleton
DT6			IP17 3PL 640405,269604 Lamppost 2, northbound side of A12 approaching Darsham railway station. **Do Tube 10 whilst parked here too**

DT7			IP17 3LN 641462,267821 Road sign by Moor Rd junction, eastbound side of B1122 approaching Middleton Moor

DT8			IP17 3PL 638602,267046 DT8: road sign by Town Farm Lane junction, Northbound side of A12 towards Yoxford

DT9			IP17 3PP 640875,270145 road sign before Sai Grace Ashram, southbound side of A12 toward from Darsham train station
DT10			IP17 3PW 640636,269880 road sign next to layby northbound A12 away from Darsham station

DT11			IP17 2RG 638319,266015 Road sign before B1121 junction on A12 SB, park in layby bit accessible on B1121

DT12			IP17 3NB 643222,266548 road sign by Leiston Rd junction, westbound side of B1122 away from Theberton
DT13			IP16 4RL 644351,265089 Way sign opposite Potter St, southbound on B1122 away from Theberton

DT14			IP16 4TA 644498,263759 Road sign on B1122 SB towards Leiston. Park in Marsh Harrier conservation car park

DT15			IP17 2PW 640592,264076 Road sign at junction of Hawthorne Road and Clayhills Road
DT16			IP13 0AB 631300,256943 Road sign by field entrance A12 NB on slip at B1116

DT17			IP13 0AB 631168,256771 Speed limit sign B1078 SB carriageway toward Wickham Market

DT18			IP10 0DH 623208,240954 Caution right hand bend sign just after small layby Felixtowe RD WB carriageway approaching A2256

DT19			IP10 0AT 623520, 242349 Road sign after flyover, WB Bucklesham RD

DT20			IP10 0BF 622164,241502 Give way sign, WB on A1156 Felixtowe Rd at Straight RD junction

DT21			IP6 9QA 613212,253933 Post on B1078 WB just before Sandy lane junction
DT22			IP14 6AA 612066,259428 Road sign by sign EB on A1120, opposite layby, not far from A140

DT23			IP12 4HF 626060,249198 Road sign A12 lampost on Bilney Road access from south if road closed

DT24			IP12 4TF 625347,247744 Lamppost 121 on Top Street

Annex 12E.3. Laboratory Results for Nitrogen Dioxide Survey

Staffordshire County Council

the knot unites

UKAS TESTING 0719

To:
AECOM Infrastructure & Environment UK Ltd
Scott House
Alencon Link
BASINGSTOKE
Hampshire
RG21 7PP

REPORT

For the attention of: Andy Brown

Date : 12 December 2019
Site : SZC
NO2 - Batch 1
Method : E/5049
Issue No. : 1

Lab Ref	Sample Details	Exposure Time Hours	*Nitrogen Dioxide (20°C) µg/m^3	Comments
10481785	SZC 1	672	17.3	-
10481786	SZC 2	672	15.5	-
10481787	SZC 3	672	15.0	-
10481788	SZC 4	672	15.8	-
10481789	SZC 5	672	13.8	-
10481790	SZC 6	671	20.7	-
10481791	SZC 7	672	14.7	-
10481792	SZC 8	669	35.5	-
10481793	SZC 9	671	24.4	-
10481794	SZC 10	671	23.2	-
10481795	SZC 11	669	25.3	-
10481796	SZC 12	672	13.4	-
10481797	SZC 13	672	15.3	-
10481798	SZC 14	672	16.3	-
10481799	SZC 15	669	11.2	-
10481800	SZC 16	670	21.7	-
10481801	SZC 17	670	23.2	-
10481802	SZC 18	670	24.7	-
10481803	SZC 19	670	22.5	-
10481804	SZC 20	670	29.5	Spider in tube
10481805	SZC 21	670	4.0	-
10481806	SZC 22	670	31.4	-
10481807	SZC 23	I/S	I/S	Tube missing
10481808	SZC 24	670	19.9	-
10481809	Travel Blank	671	< 1.0	-

Comments

The hours of exposure account for the change from BST to GMT.

The limit of detection for the laboratory method E/5049 is 0.055µg NO2. This equates to 1.0µg/m^3 based on an exposure of 744 hours.

Emma Loach
Lab Manager

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I/S - Insufficient sample - unable to complete analysis for the reason given in the sample comments. Tests marked * are included in the UKAS accreditation schedule for this laboratory. Further information on accredited tests can be obtained on request. Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation. The laboratory does not accept any liability for data supplied by the client in the form of air volumes and exposure dates.

Emma Loach
Laboratory Manager

Staffordshire Highways Laboratory
Sandyford Street
ST16 3NF

Tel: 01785 277360
E-mail: emma.loach@staffordshire.gov.uk
www.staffordshire.gov.uk

Staffordshire County Council

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UKAS TESTING 0719

To:

AECOM Infrastructure & Environment UK Ltd
Scott House
Alencon Link
BASINGSTOKE
Hampshire
RG21 7PP

REPORT

For the attention of: Andy Brown

Date : 14 January 2020
Site : SZC
NO2 - Batch 2
Method : E/5049
Issue No. : 1

Lab Ref	Sample Details	Exposure Time Hours	*Nitrogen Dioxide (20°C) µg/m^3	Comments
10483324	SZC 1	670	21.4	-
10483325	SZC 2	670	17.6	-
10483326	SZC 3	670	19.2	-
10483327	SZC 4	670	20.2	-
10483328	SZC 5	670	13.6	Spider in tube
10483329	SZC 6	670	20.1	-
10483330	SZC 7	670	18.6	-
10483331	SZC 8	670	35.2	-
10483332	SZC 9	670	24.4	-
10483333	SZC 10	670	25.6	-
10483334	SZC 11	670	23.9	-
10483335	SZC 12	670	14.2	-
10483336	SZC 13	670	17.7	-
10483337	SZC 14	670	19.9	-
10483338	SZC 15	670	14.4	-
10483339	SZC 16	670	23.9	-
10483340	SZC 17	670	24.2	-
10483341	SZC 18	670	24.3	-
10483342	SZC 19	670	26.4	-
10483343	SZC 20	670	35.0	-
10483344	SZC 21	670	24.8	-
10483345	SZC 22	670	29.7	-
10483346	SZC 23	I/S	I/S	Tube missing
10483347	SZC 24	670	29.1	-
10483348	Travel Blank	670	< 1.0	-

Comments

The limit of detection for the laboratory method E/5049 is 0.055µg NO2. This equates to 1.0µg/m^3 based on an exposure of 720 hours.

Emma Loach
Lab Manager

E Loach

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I/S - Insufficient sample - unable to complete analysis for the reason given in the sample comments. Tests marked * are included in the UKAS accreditation schedule for this laboratory. Further information on accredited tests can be obtained on request. Opinions and Interpretations expressed herein are outside the scope of UKAS accreditation. The laboratory does not accept any liability for data supplied by the client in the form of air volumes and exposure dates.

Emma Loach
Laboratory Manager

Staffordshire Highways Laboratory
Sandyford Street
ST16 3NF

Tel: 01785 277360
E-mail: emma.loach@staffordshire.gov.uk
www.staffordshire.gov.uk

References

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1.2 The Planning Inspectorate, 2019. Scoping Opinion Proposed Sizewell C Nuclear Development, July 2019

1.3 Vallack H.W. and Shillito D.E., (1998), Suggested Guidelines for Deposited Ambient Dustfall. Atmospheric Environment, Vol. 32, pp 2737-2744

1.4 Highways Agency (2007), Design Manual for Roads and Bridges (DMRB) – Part 1, HA 207/07, Volume 11, Section 3

1.5 Defra (2018). Local Air Quality Management Technical Guidance (TG16)

VOLUME 2, CHAPTER 12, APPENDIX 12F : CAMPUS COMBINED HEAT AND POWER EMISSIONS ASSESSMENT

Contents

Tables

Plates

None provided.

Figures

None provided.

1. Campus Combined Heat and Power Emissions Report

1.1 Introduction

1.1.1 This appendix to **Volume 2, Chapter 12,** of the ES presents data for predicted pollutant concentrations associated with use of the Combined Heat and Power (CHP) plant located at the proposed campus.

1.2 Predicted pollutant concentrations for NO_2 and CO

Table 12F.1: 2028 peak construction annual mean NO_2 concentrations and magnitude of change descriptors at human receptors.

Receptor	Background NO_2 concentration ($\mu g/m^3$)	Maximum CHP NO_2 concentrationat receptor ($\mu g/m^3$)	Total concentration ($\mu g/m^3$)	Magnitude of change descriptor
LE3	5.9	0.1	6.0	Imperceptible
LE9	6.7	<0.1	6.7	Imperceptible
LE10	6.7	<0.1	6.7	Imperceptible
LE11	6.0	<0.1	6.0	Imperceptible
LE14	6.1	<0.1	6.1	Imperceptible
LE13	5.8	<0.1	5.8	Imperceptible
LE12	6.3	<0.1	6.3	Imperceptible
LE7	6.0	<0.1	6.0	Imperceptible
LE1	6.7	<0.1	6.7	Imperceptible
LE8	6.7	<0.1	6.7	Imperceptible
LE6	5.9	<0.1	5.9	Imperceptible
LE5	5.9	<0.1	5.9	Imperceptible
LE4	5.9	<0.1	5.9	Imperceptible
LE2	6.0	<0.1	6.1	Imperceptible
LE15	5.9	0.1	5.9	Imperceptible
LE16	5.9	0.1	5.9	Imperceptible
LE19	6.0	<0.1	6.1	Imperceptible
LE17	5.8	0.1	6.0	Imperceptible
LE18	6.0	<0.1	6.0	Imperceptible
LE20	6.0	<0.1	6.0	Imperceptible
LE21	6.0	<0.1	6.0	Imperceptible
LE22	6.0	<0.1	6.0	Imperceptible

Receptor	Background NO_2 concentration (µg/m^3)	Maximum CHP NO_2 concentrationat receptor (µg/m^3)	Total concentration (µg/m^3)	Magnitude of change descriptor
LE23	6.0	<0.1	6.0	Imperceptible
LE24	6.0	<0.1	6.0	Imperceptible
LE25	5.8	0.1	5.9	Imperceptible
LE26	5.8	0.2	6.0	Imperceptible
LE27	5.8	0.1	6.0	Imperceptible
LE28	5.9	0.2	6.1	Imperceptible
LE29	5.8	0.1	5.8	Imperceptible
LE30	5.8	<0.1	5.8	Imperceptible
LE31	5.8	<0.1	5.8	Imperceptible
LE32	6.0	<0.1	6.0	Imperceptible
LE33	6.0	<0.1	6.0	Imperceptible
LE34	6.3	<0.1	6.3	Imperceptible
LE35	6.7	<0.1	6.7	Imperceptible
LE36	6.3	<0.1	6.3	Imperceptible
LE37	6.3	<0.1	6.3	Imperceptible
LE38	6.3	<0.1	6.3	Imperceptible
LE39	5.9	<0.1	5.9	Imperceptible
LE40	6.3	<0.1	6.3	Imperceptible
LE52	6.0	0.1	6.1	Imperceptible
LE2c	6.0	<0.1	6.1	Imperceptible
LE3c	5.9	0.1	6.0	Imperceptible
LE53	6.0	<0.1	6.0	Imperceptible
LE54	6.0	<0.1	6.0	Imperceptible
LE7c	6.0	<0.1	6.0	Imperceptible
LE16c	5.9	0.1	5.9	Imperceptible
LE17c	6.0	0.1	6.1	Imperceptible
LE18c	6.0	<0.1	6.0	Imperceptible
LE20c	6.0	<0.1	6.0	Imperceptible
LE55	5.9	<0.1	5.9	Imperceptible
LE55c	6.0	<0.1	6.0	Imperceptible
LE56	6.0	<0.1	6.0	Imperceptible
LE56c	6.0	<0.1	6.0	Imperceptible

Receptor	Background NO_2 concentration (µg/m³)	Maximum CHP NO_2 concentrationat receptor (µg/m³)	Total concentration (µg/m³)	Magnitude of change descriptor
LEI 1	6.7	<0.1	6.7	Imperceptible
LEI 2	6.7	<0.1	6.7	Imperceptible
LEI 3	6.7	<0.1	6.7	Imperceptible
LE46	6.0	<0.1	6.0	Imperceptible
LE57	6.1	<0.1	6.1	Imperceptible
LE42	5.8	1.7	7.5	Low

Table 12F.2: 2028 peak construction hourly mean NO_2 concentrations and magnitude of change descriptors at human receptors.

Receptor	Background NO_2 concentration (µg/m³)	Maximum CHP NO_2 concentration at receptor (µg/m³)	Total concentration (µg/m³)	Magnitude of change descriptor
LE3	11.7	2.7	14.4	Very Low
LE9	13.4	0.5	13.9	Imperceptible
LE10	13.4	0.4	13.8	Imperceptible
LE11	12.0	0.3	12.4	Imperceptible
LE14	12.2	0.1	12.3	Imperceptible
LE13	11.6	0.4	12.0	Imperceptible
LE12	12.6	0.5	13.2	Imperceptible
LE7	12.0	0.6	12.6	Imperceptible
LE1	13.4	0.5	13.9	Imperceptible
LE8	13.4	0.5	13.9	Imperceptible
LE6	11.7	0.6	12.3	Imperceptible
LE5	11.7	0.6	12.3	Imperceptible
LE4	11.7	0.6	12.3	Imperceptible
LE2	12.0	0.9	13.0	Imperceptible
LE15	11.7	1.5	13.2	Imperceptible
LE16	11.7	1.5	13.2	Imperceptible
LE19	12.0	0.9	13.0	Imperceptible
LE17	11.6	2.3	13.9	Very Low
LE18	12.0	0.8	12.8	Imperceptible
LE20	12.0	0.5	12.5	Imperceptible

Receptor	Background NO_2 concentration (µg/m^3)	Maximum CHP NO_2 concentration at receptor (µg/m^3)	Total concentration (µg/m^3)	Magnitude of change descriptor
LE21	12.0	0.5	12.4	Imperceptible
LE22	12.1	0.5	12.5	Imperceptible
LE23	12.0	0.6	12.6	Imperceptible
LE24	12.0	0.5	12.4	Imperceptible
LE25	11.5	1.5	13.0	Imperceptible
LE26	11.6	2.9	14.5	Very Low
LE27	11.6	1.9	13.5	Imperceptible
LE28	11.7	3	14.7	Very Low
LE29	11.5	0.8	12.3	Imperceptible
LE30	11.6	0.4	12.0	Imperceptible
LE31	11.6	0.4	12.0	Imperceptible
LE32	12.0	0.7	12.7	Imperceptible
LE33	12.0	0.6	12.6	Imperceptible
LE34	12.6	0.6	13.2	Imperceptible
LE35	13.4	0.6	14.0	Imperceptible
LE36	12.6	0.4	13.1	Imperceptible
LE37	12.6	0.4	13.0	Imperceptible
LE38	12.6	0.4	13.0	Imperceptible
LE39	11.8	0.4	12.2	Imperceptible
LE40	12.6	0.6	13.2	Imperceptible
LE52	12.0	1.3	13.3	Imperceptible
LE2c	12.0	0.9	13.0	Imperceptible
LE3c	11.7	2.5	14.2	Very Low
LE53	12.0	0.4	12.4	Imperceptible
LE54	12.0	0.8	12.7	Imperceptible
LE7c	12.0	0.6	12.6	Imperceptible
LE16c	11.7	1.7	13.4	Imperceptible
LE17c	12.0	2.1	14.1	Very Low
LE18c	12.0	0.8	12.8	Imperceptible
LE20c	12.0	0.5	12.5	Imperceptible
LE55	11.8	0.3	12.1	Imperceptible
LE55c	12.0	0.4	12.4	Imperceptible

Receptor	Background NO_2 concentration (µg/m³)	Maximum CHP NO_2 concentration at receptor (µg/m³)	Total concentration (µg/m³)	Magnitude of change descriptor
LE56	12.1	0.4	12.4	Imperceptible
LE56c	12.1	0.4	12.4	Imperceptible
LEI 1	13.4	0.5	13.9	Imperceptible
LEI 2	13.4	0.5	13.9	Imperceptible
LEI 3	13.4	0.5	13.9	Imperceptible
LE46	12.0	0.7	12.7	Imperceptible
LE57	12.1	0.2	12.3	Imperceptible
LE42	11.6	7.5	19.1	High

Table 12F.3: 2028 peak construction 8-hourly rolling mean CO concentrations and magnitude of change descriptors at human receptors.

Receptor	Background CO concentration (µg/m³)	Maximum CHP CO concentration at receptor (µg/m³)	Total concentration (µg/m³)	Magnitude of change descriptor
LE3	210.0	1.7	211.7	Imperceptible
LE9	209.0	0.2	209.2	Imperceptible
LE10	209.0	0.2	209.2	Imperceptible
LE11	210.0	0.1	210.1	Imperceptible
LE14	206.0	<0.1	206.0	Imperceptible
LE13	203.0	0.2	203.2	Imperceptible
LE12	207.0	0.2	207.2	Imperceptible
LE7	208.0	0.3	208.3	Imperceptible
LE1	209.0	0.2	209.2	Imperceptible
LE8	209.0	0.2	209.2	Imperceptible
LE6	207.0	0.3	207.3	Imperceptible
LE5	207.0	0.3	207.3	Imperceptible
LE4	207.0	0.3	207.3	Imperceptible
LE2	210.0	0.5	210.5	Imperceptible
LE15	210.0	0.8	210.8	Imperceptible
LE16	210.0	0.7	210.7	Imperceptible
LE19	210.0	0.5	210.5	Imperceptible
LE17	208.0	1.7	209.7	Imperceptible

Receptor	Background CO concentration (µg/m³)	Maximum CHP CO concentration at receptor (µg/m³)	Total concentration (µg/m³)	Magnitude of change descriptor
LE18	210.0	0.4	210.4	Imperceptible
LE20	210.0	0.2	210.2	Imperceptible
LE21	210.0	0.2	210.2	Imperceptible
LE22	210.0	0.2	210.2	Imperceptible
LE23	210.0	0.2	210.2	Imperceptible
LE24	210.0	0.2	210.2	Imperceptible
LE25	204.0	1.7	205.7	Imperceptible
LE26	208.0	2.2	210.2	Imperceptible
LE27	206.0	1.5	207.5	Imperceptible
LE28	210.0	2.1	212.1	Imperceptible
LE29	204.0	0.6	204.6	Imperceptible
LE30	203.0	0.2	203.2	Imperceptible
LE31	203.0	0.2	203.2	Imperceptible
LE32	208.0	0.4	208.4	Imperceptible
LE33	208.0	0.3	208.3	Imperceptible
LE34	207.0	0.3	207.3	Imperceptible
LE35	209.0	0.3	209.3	Imperceptible
LE36	207.0	0.2	207.2	Imperceptible
LE37	207.0	0.2	207.2	Imperceptible
LE38	207.0	0.2	207.2	Imperceptible
LE39	203.0	0.2	203.2	Imperceptible
LE40	207.0	0.2	207.2	Imperceptible
LE52	208.0	0.8	208.8	Imperceptible
LE2c	210.0	0.5	210.5	Imperceptible
LE3c	210.0	1.6	211.6	Imperceptible
LE53	210.0	0.2	210.2	Imperceptible
LE54	210.0	0.3	210.3	Imperceptible
LE7c	208.0	0.3	208.3	Imperceptible
LE16c	210.0	0.7	210.7	Imperceptible
LE17c	210.0	1.2	211.2	Imperceptible
LE18c	210.0	0.4	210.4	Imperceptible
LE20c	210.0	0.2	210.2	Imperceptible

Receptor	Background CO concentration (µg/m³)	Maximum CHP CO concentration at receptor (µg/m³)	Total concentration (µg/m³)	Magnitude of change descriptor
LE55	210.0	0.1	210.1	Imperceptible
LE55c	210.0	0.1	210.1	Imperceptible
LE56	210.0	0.1	210.1	Imperceptible
LE56c	210.0	0.2	210.2	Imperceptible
LEI 1	209.0	0.2	209.2	Imperceptible
LEI 2	209.0	0.2	209.2	Imperceptible
LEI 3	209.0	0.2	209.2	Imperceptible
LE46	208.0	0.3	208.3	Imperceptible
LE57	206.0	<0.1	206.0	Imperceptible
LE42	208.0	18.8	226.8	Imperceptible

1.3 Predicted pollutant concentrations for NO_x at ecological receptors

Table 12F.4: Maximum impacts at sensitive ecological receptors.

Assessment Criterion	Background concentration	Critical Level or Critical Load	Maximum PC at Receptor	PC/ Critical Level or Critical Load	Magnitude of change
NO_x, Annual mean (µg/m³)	7.7	30	0.08	0.3%	Imperceptible
NO_x, Daily mean (µg/m³)	11.3	75	1.0	1.3%	Imperceptible
Nitrogen deposition kg N/Ha/yr	13.1	8-15	0.011	0.1%	Imperceptible
Acid deposition keq/Ha/yr	0.9	0.57	0.001	0.2%	Imperceptible

Table 12F.5: Maximum predicted concentrations of NO_x at sensitive ecological receptors.

Receptor	Description	Annual Mean NO_x (µg/m^3) at receptor	Daily mean NOx (µg/m^3) at receptor
E1	Alde-Ore and Butley Estuaries, Special Protection Area (SPA) & Ramsar.	<0.01	<0.1
E2	Minsmere – Walberswick Heaths and Marshes SAC, SPA, Ramsar, SSSI.	0.08	0.8
E3	Orfordness to Shingle Street SAC.	<0.01	0.1
E4	Sandlings SPA.	0.02	0.4
E5	Sizewell Marshes SSSI.	0.04	0.5
E6	Leiston Aldeburgh SSSI.	0.02	0.2
E7	Leiston Common County Wildlife Site (CWS).	0.08	1.0
E8	Aldringham to Aldeburgh Disused Railway CWS.	0.02	0.3
E9	Dower House CWS.	0.02	0.2
E10	Suffolk Shingle Beaches CWS.	0.03	0.3
E11	Reckham pits CWS.	0.06	0.6
E12	Sizewell Levels and areas CWS.	0.05	0.4
E13	Southern Minsmere Levels – Dunwich Forest & Kenton Hills CWS.	0.07	0.7