

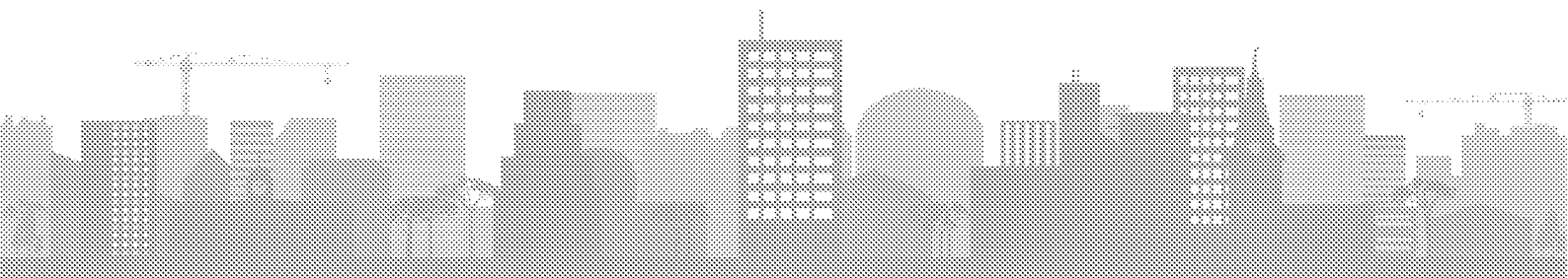
Air Quality Assessment

Yapton Road, Bilsham

Client: Conrad Energy (Developments) Limited

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Executive Summary

Redmore Environmental Ltd was commissioned by Conrad Energy (Developments) Limited to undertake an Air Quality Assessment in support of a planning application for the erection of a flexible generation facility with associated ancillary infrastructure on land off Yapton Road, Bilsham.

The installation will act as an electricity generating station that will supply power to the local distribution network in order to balance fluctuations in the National Grid network at a local level.

Combustion emissions from the facility have the potential to cause air quality impacts during normal operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and consider potential effects.

Dispersion modelling was undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the facility. The results indicated that impacts on pollutant concentrations were not predicted to be significant at any human receptor location in the vicinity of the site.

Impacts were also predicted at relevant ecological sites. The results indicated that emissions from the facility would not significantly affect existing conditions at any designation.

Based on the assessment results, air quality issues are not considered a constraint to planning consent for the proposals.

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1.0 INTRODUCTION

1.1 Background

- 1.1.1 Redmore Environmental Ltd was commissioned by Conrad Energy (Developments) Limited to undertake an Air Quality Assessment in support of a planning application for the erection of a flexible generation facility and associated infrastructure on land off Yapton Road, Bilsham.
- 1.1.2 Combustion emissions from the facility have the potential to cause air quality impacts during normal operation. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider potential effects.

1.2 Site Location and Context

- 1.2.1 The site is located on land off Yapton Road, Bilsham, at National Grid Reference (NGR): 498492, 102452. Reference should be made to Figure 1 for a map of the site and surrounding area.
- 1.2.2 It is proposed to construct and operate a gas fuelled generator set consisting of four engines. These will act as a backup electricity generation plant and operate during peak periods to supply power to the National Grid. It is anticipated that the plant will operate for a maximum of 3,000-hours per annum.
- 1.2.3 The operation of the plant will result in atmospheric emissions of combustion gases. These have the potential to cause air quality impacts at sensitive locations within the vicinity of the site. As such, potential effects have been assessed within the following report.

2.0 LEGISLATION AND POLICY

2.1 Legislation

2.1.1 The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO₂);
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm;
- Particulate matter with an aerodynamic diameter of less than 2.5µm;
- Benzene; and,
- Carbon monoxide.

2.1.2 Target Values were also provided for several other pollutants.

2.1.3 Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007¹. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 Table 1 presents the AQOs for pollutants considered within this assessment.

Table 1 Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration (µg/m ³)	Averaging Period
NO ₂	40	Annual mean

¹ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

Pollutant	Air Quality Objective	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum

2.1.5 Table 2 summarises the advice provided in DEFRA guidance² on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.2 Local Air Quality Management

2.2.1 Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the

² Local Air Quality Management Technical Guidance (TG16), DEFRA, 2021.

AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 Critical Loads and Levels

2.3.1 A critical load is defined by the UK Air Pollution Information System (APIS)³ as:

"A quantitative estimate of exposure to deposition of one or more pollutants, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge."

2.3.2 A critical level is defined as:

"Threshold for direct effects of pollutant concentrations according to current knowledge. Exceedance of a critical level is defined as the atmospheric concentration of the pollutant above the critical level."

2.3.3 A critical load refers to deposition of a pollutant, while a critical level refers to pollutant concentrations in the atmosphere (which usually have direct effects on vegetation or human health).

2.3.4 When pollutant loads (or concentrations) exceed the critical load or level it is considered that there is a risk of harmful effects. The excess over the critical load or level is termed the exceedance. A larger exceedance is often considered to represent a greater risk of damage.

2.3.5 Maps of critical loads and levels and their exceedances have been used to show the potential extent of pollution damage and aid in developing strategies for reducing pollution. Decreasing deposition below the critical load is seen as means for preventing the risk of damage. However, even a decrease in the exceedance may infer that less damage will occur.

³ UK Air Pollution Information System, www.apis.ac.uk.

2.3.6 Table 3 presents the critical levels for the protection of vegetation for pollutants considered within this assessment.

Table 3 Critical Levels for the Protection of Vegetation

Pollutant	Critical Level	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
Oxides of Nitrogen (NO_x)	30	Annual mean
	75	24-hour mean

2.3.7 Critical loads have been designated within the UK based on the sensitivity of the receiving habitat and have been identified for the relevant designations considered within the assessment in Section 3.5.

2.4 National Planning Policy

2.4.1 The revised National Planning Policy Framework⁴ (NPPF) was published in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

2.4.2 The purpose of the planning system is to contribute to the achievements of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives including the following of relevance to air quality:

"c) An environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

2.4.3 Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

⁴ NPPF, Ministry of Housing, Communities and Local Government, 2021.

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

[...]

preventing new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality [...]"

- 2.4.4 The NPPF specifically recognises air quality as part of delivering sustainable development and states that:

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

- 2.4.5 The implications of the NPPF have been considered throughout this assessment.

2.5 National Planning Practice Guidance

- 2.5.1 The National Planning Practice Guidance⁵ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 and updated on 1st November 2019 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

⁵ <https://www.gov.uk/guidance/air-quality-3>.

1. What air quality considerations does planning need to address?
2. What is the role of plan-making with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality considerations be relevant to the development management process?
6. What specific issues may need to be considered when assessing air quality impacts?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

2.5.2 These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

2.6 Local Planning Policy

2.6.1 Arun District Council (ADC) adopted the Arun Local Plan 2011 - 2031⁶ in July 2018. A review of the document identified the following policies of relevance to this report:

"Policy EMP SP3

Sustainable Development Principles

Strategic Employment Land Allocations

Employment is important for people's health and well-being. It is also place shaping in that it is an essential element of sustainable development. The creation of jobs is central to this Plan and the Council with its partners will support employment land brought forward on a scale and in locations consistent with this policy and these will be protected for the plan period. The strategic allocations will:

e) Need to be developed with consideration and enhancement of landscape character, designated and other protected habitats and species, air and water quality "

⁶ ADC, Arun Local Plan 2011 - 2031, 2018.

"Policy QE SP1

Quality of the Environment

The Council requires that all development contributes positively to the quality of the environment and will ensure that development does not have a significantly negative impact upon residential amenity, the natural environment or upon leisure and recreational activities enjoyed by residents and visitors to the District.

The location of existing industrial and commercial uses, including waste management uses, must be taken into consideration when assessing proposals for development sensitive to noise, light, odour and outputs to air. This is to ensure that land allocated for these uses are protected and to ensure that the amenity of new developments and facilities is safeguarded from the impacts of incompatible land uses."

"Policy QE DM3

Air Pollution

All major development proposals will be required to assess the likely impacts of the development on air quality and mitigate any negative impacts by:

- a. Ensuring the development is located within easy reach of established public transport services;
- b. Maximising provision for cycling and pedestrian facilities;
- c. Encouraging the use of cleaner transport fuels on site, through the inclusion of electric car charging points; and
- d. Contributing towards the improvement of the highway network where the development is predicted to result in increased congestion on the highway network.

Development proposed nearby any Air Quality Management Area (AQMA) declared within the District within the Plan period, will require an air quality assessment to identify likely impacts of development upon the designated area.

Developers will be required to ensure delivery of the actions set out within any Air Quality Action Plan.

Industrial development which is regulated by environmental permits (that creates or results in dust, smell, fumes, smoke, heat, radiation, gases, steam or other forms of pollution) must be located in such a position which ensures that the health, safety and amenity of users of the site or surrounding land is not put at risk and the quality of the environment would not be damaged or put at risk.

Developments shall also be consistent with all other Local Plan policies."

- 2.6.2 The implications of the above policies have been taken into consideration throughout the assessment.

3.0 BASELINE

3.1 Introduction

- 3.1.1 Existing air quality conditions in the vicinity of the site were identified in order to provide a baseline for assessment. These are detailed in the following Sections.

3.2 Local Air Quality Management

- 3.2.1 As required by the Environment Act (1995), ADC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that concentrations of all pollutants considered within the AQS are currently below the relevant AQOs within the district. As such, no AQMAs have been designated within the council's administrative extents.

3.3 Air Quality Monitoring

- 3.3.1 Monitoring of pollutant concentrations is undertaken by ADC throughout their area of jurisdiction. Recent NO₂ results recorded in the vicinity of the site are shown in Table 4.

Table 4 Monitoring Results

Monitoring Site		Monitored 2019 NO ₂ Concentration (µg/m ³)
19	Yapton 19	15

- 3.3.2 As shown in Table 4, annual mean NO₂ concentrations were below the AQO at the 19 - Yapton 19 monitoring site in 2019. Reference should be made to Figure 2 for a map of the survey location.

3.4 Background Pollutant Concentrations

- 3.4.1 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist Local Authorities in their Review and Assessment of air quality. The site is located in grid square NGR: 498500, 102500. Data

for this location was downloaded from the DEFRA website⁷ for the purpose of the assessment and is summarised in Table 5.

Table 5 Background Pollutant Concentration Predictions

Pollutant	Predicted 2021 Background Pollutant Concentration (µg/m ³)
NO ₂	7.71

3.4.2 As shown in Table 5, the predicted annual mean background NO₂ concentration is below the relevant AQO in the vicinity of the site.

3.5 Sensitive Receptors

3.5.1 A sensitive receptor is defined as any location which may be affected by changes in air quality. These have been defined for human and ecological receptors in the following Sections.

Human Receptors

3.5.2 A desk-top study was undertaken in order to identify any sensitive human receptor locations in the vicinity of the site that required specific consideration during the assessment. These are summarised in Table 6.

Table 6 Sensitive Human Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Northwood House	498582.4	102720.6
R2	Residential - Johnson Way	498801.4	102738.5
R3	Residential - Yapton Road	499366.3	102162.3
R4	Residential - Northwood Farm	499134.3	102025.8
R5	Residential - Ryebank Caravan Park	497601.2	101379.5
R6	Residential - Bilsham Road	497616.8	101579.6

⁷ <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>.

Receptor		NGR (m)	
		X	Y
R7	Residential - Hobbs Farm House	497688.8	101945.2
R8	Residential - Bilsham Road	497571.8	102055.0
R9	Residential - Taylors Close	497838.3	102323.5
R10	Residential - West View Drive	497996.9	102498.5
R11	Residential - Cinders Lane	498157.2	102567.0
R12	Residential - Fairholme Drive	498183.9	102752.4
R13	Residential - Abbots Field	498422.9	102746.1
R14	Retail - Cease Fire Café	498862.5	102529.2

3.5.3 Land allocated for housing in ADC's local plan is located approximately 550m east of the development. R14 is located 340m east of the site and is therefore considered to be a more conservative representation of human receptors in this direction. As such, the allocated land has not been considered further in this Assessment.

3.5.4 Reference should be made to Figure 2 for a map of the sensitive human receptor locations.

Ecological Receptors

3.5.5 Atmospheric emissions from the facility have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation of Habitats and Species Regulations (2010) and subsequent amendments require competent authorities to review applications and consents that have the potential to impact on ecological sites. A pre-application screening report from the Environment Agency (EA) indicated the following designation should be considered within the assessment:

- Solent and Dorset Coast Special Protection Area (SPA)

3.5.6 For the purpose of the modelling assessment discrete receptors were placed at the closest points of the designation to the facility to ensure the maximum potential impact was predicted. These are summarised in Table 7.

Table 7 Ecological Receptor Locations

Receptor		NGt (m)	
		X	Y
E1	Solent and Dorset Coast SPA	498484.6	99979.9
E2	Solent and Dorset Coast SPA	498121.1	99946.8
E3	Solent and Dorset Coast SPA	497756.3	99943.7
E4	Solent and Dorset Coast SPA	497205.7	99789.4

3.5.7 Reference should be made to Figure 3 for a map of the ecological receptors.

3.5.8 Critical loads have been designated within the UK based on the sensitivity and relevant features of the receiving habitat. A review of the APIS⁸ and MAGIC⁹ websites, as well as the relevant site designations and publicly available information, was undertaken in order to identify the most suitable habitat description and associated critical load for the area of the designation considered within the assessment.

3.5.9 The relevant nitrogen deposition critical loads are presented in Table 8.

Table 8 Critical Loads for Nitrogen Deposition

Receptor	APIS Habitat	Relevant Nitrogen Critical Load Class	Nitrogen Critical Load (kgN/ha/yr)	
			Low	High
E1	Dunes, Shingle and Machair	Coastal Stable Dune Grasslands - Acid Type	8	10
E2	Dunes, Shingle and Machair	Coastal Stable Dune Grasslands - Acid Type	8	10
E3	Dunes, Shingle and Machair	Coastal Stable Dune Grasslands - Acid Type	8	10
E4	Dunes, Shingle and Machair	Coastal Stable Dune Grasslands - Acid Type	8	10

3.5.10 The critical loads for acid deposition are presented in Table 9.

⁸ <http://www.apis.ac.uk/>.

⁹ Multi-Agency Geographic Information for the Countryside, www.magic.gov.uk.

Table 9 Critical Loads for Acid Deposition

Receptor	APIS Habitat	Relevant Acid Critical Load Class	Acid Critical Load (keq/ha/yr)		
			CI _{Min} N	CI _{Max} S	CI _{Max} N
E1	Dunes, Shingle and Machair	Dwarf Shrub Heath	-(a)	-(a)	-(a)
E2	Dunes, Shingle and Machair	Dwarf Shrub Heath	-(a)	-(a)	-(a)
E3	Dunes, Shingle and Machair	Dwarf Shrub Heath	-(a)	-(a)	-(a)
E4	Dunes, Shingle and Machair	Dwarf Shrub Heath	-(a)	-(a)	-(a)

NOTE: (a) No applicable acid critical load estimate available¹⁰.

3.5.11 Baseline pollutant concentrations and deposition rates at each ecological receptor were obtained from the APIS¹¹ website and are summarised in Table 10.

Table 10 Baseline Pollution Levels at Ecological Receptors

Receptor		Annual Mean NO _x Conc. (µg/m ³)	Baseline Deposition Rate		
			Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)	
				Nitrogen	Sulphur
E1	Solent and Dorset Coast SPA	10.29	9.38	0.7	0.12
E2	Solent and Dorset Coast SPA	9.84	9.38	0.7	0.12
E3	Solent and Dorset Coast SPA	9.84	9.38	0.7	0.12
E4	Solent and Dorset Coast SPA	10.29	9.38	0.7	0.12

¹⁰ <http://www.apis.ac.uk/acid-deposition-dunes-shingle-machair>

¹¹ <http://www.apis.ac.uk/>.

4.0 **METHODOLOGY**

4.1 **Introduction**

- 4.1.1 Combustion emissions from the plant have the potential to cause air quality impacts in the vicinity of the site. These have been quantified through dispersion modelling in accordance with the methodology outlined in the following Sections.

4.2 **Dispersion Model**

- 4.2.1 Dispersion modelling was undertaken using ADMS-5.2 (v5.2.4.0), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd. ADMS-5 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model utilising boundary layer height and Monin-Obukhov length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.
- 4.2.2 The model utilises hourly meteorological data to define conditions for plume rise, transport and diffusion. It estimates the concentration for each source and receptor combination for each hour of input meteorology and calculates user-selected long-term and short-term averages.

4.3 **Modelling Scenarios**

- 4.3.1 The scenarios considered in the modelling assessment for human receptors are summarised in Table 11.

Table 11 Human Receptor Assessment Scenarios

Parameter	Modelled As	
	Short Term	Long Term
NO ₂	99.63 rd percentile (%ile) 1-hour mean	Annual mean

- 4.3.2 The EA have issued guidance¹² on dispersion modelling of emissions from back-up generating plant. This includes a method for statistical analysis using the hypergeometric probability distribution in order to identify the potential for an exceedance of the 1-hour AQO for NO₂ for facilities that operate periodically on an undefined schedule.
- 4.3.3 The facility will operate for a maximum of 3,000-hours per annum. Using the hypergeometric probability distribution method, it was determined that should the results indicate 32 or more instances of NO₂ concentrations over 200µg/m³ within a year, then the probability of producing 19 instances of NO₂ concentrations over 200µg/m³, and therefore an exceedance of the AQO, within 3,000 operational hours would be 0.3%. As the plant can operate for periods in excess of 1-hour, this value was multiplied by 2.5 in accordance with the guidance¹³. This provided a probability of 0.8%. The EA indicate that:
- "Probabilities of 1% or less indicate exceedances are highly unlikely."
- 4.3.4 This level of probability is considered to be acceptable by the EA and therefore an appropriate criterion for use in the assessment.
- 4.3.5 Based on the number of instances determined previously, the 99.63rd %ile was calculated for use in the modelling assessment. As such, should predicted 99.63rd %ile 1-hour mean NO₂ concentrations be under 200µg/m³ then there is less than 1% probability of an AQO exceedance and the plant is considered acceptable in accordance with the utilised guidance¹⁴.
- 4.3.6 The EA guidance¹⁵ indicates that annual mean PCs can be calculated by scaling down long term predictions by the total number of operational hours over the total number of hours in the operating envelope. This approach was therefore adopted throughout the assessment.

¹² Guidance on dispersion modelling for oxides of nitrogen assessment from specified generators, EA, 2018.

¹³ Guidance on dispersion modelling for oxides of nitrogen assessment from specified generators, EA, 2018.

¹⁴ Guidance on dispersion modelling for oxides of nitrogen assessment from specified generators, EA, 2018.

¹⁵ Guidance on dispersion modelling for oxides of nitrogen assessment from specified generators, EA, 2018.

4.3.7 The scenarios considered for ecological receptors in the modelling assessment are summarised in Table 12.

Table 12 Ecological Receptor Assessment Scenarios

Parameter	Modelled As	
	Short Term	Long Term
NO _x	24-hour mean	Annual mean
Nitrogen deposition	-	Annual deposition
Acid deposition	-	Annual deposition

4.3.8 Predicted pollutant concentrations were summarised in the following formats:

- Process Contribution (PC) - Predicted pollutant concentration as a result of emissions from the facility only; and
- Predicted Environmental Concentration (PEC) - Total predicted pollutant concentration as a result of emissions from the facility and existing baseline levels.

4.3.9 Predicted ground level pollutant concentrations and deposition rates were compared with the relevant AQOs, critical levels and critical loads. These criteria are collectively referred to as Environmental Quality Standards (EQSs).

4.4 Assessment Area

4.4.1 The assessment area was defined based on the facility location, anticipated pollutant dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 497395, 101334 to 499595, 103534. One Cartesian grid with a resolution of 10m was used within the model to produce data suitable for contour plotting using the Surfer software package.

4.4.2 Reference should be made to Figure 4 for a graphical representation of the assessment grid extents.

4.5 Process Conditions

- 4.5.1 A summary of the inputs used in the assessment is provided in Table 13. These were obtained from the technical data sheet for the proposed generator sets, as provided by Conrad Energy (Developments) Limited. The same data was used to represent each generator.

Table 13 Process Conditions

Parameter	Unit	Value
Stack position	NGR	As shown on Figure 4
Stack height	m	7.0
Stack diameter	m	0.5
Exhaust gas temperature	°C	419
Exhaust gas moisture content	%	7.74
Exhaust gas flow rate	m ³ /hr	26,075
Exhaust gas flow rate (dry)	Nm ³ /hr	9,491
Exhaust gas efflux velocity	m/s	36.89

- 4.5.2 Reference should be made to Figure 4 for a map of the emission point locations.

4.6 Emissions

- 4.6.1 Anticipated pollutant concentrations in the exhaust gas stream from the generator sets were obtained from the technical data sheet provided by Conrad Energy (Developments) Limited. These are shown in Table 14.

Table 14 Pollutant Emission Concentration

Pollutant	Pollutant Emission Concentration (mg/Nm ³) (Dry, 5% Oxygen)
NO _x	250

- 4.6.2 The pollutant mass emission rates for use in the assessment were derived from the concentration shown in Table 14 and the flow rate shown in Table 13. The result is

summarised in Table 15. It should be noted that identical emission rates were utilised for all generator sets.

Table 15 Pollutant Mass Emission Rate - Per Engine

Pollutant	Pollutant Mass Emission Rate (g/s)
NO _x	0.6591

4.7 NO_x to NO₂ Conversion

4.7.1 Emissions of total NO_x from combustion processes are predominantly in the form of nitric oxide (NO). Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to NO₂. Comparisons of ambient NO and NO₂ concentrations in the vicinity of point sources in recent years has indicated that it is unlikely that more than 30% of the NO_x is present at ground level as NO₂.

4.7.2 Ambient NO_x concentrations were predicted through dispersion modelling. Concentrations of NO₂ shown in the results section assume 70% conversion from NO_x to NO₂ for annual means and 35% conversion for 1-hour concentrations, based upon EA guidance¹⁶.

4.8 Building Effects

4.8.1 The dispersion of substances released from elevated sources can be influenced by the presence of buildings close to the emission point. Structures can interrupt the wind flows and cause significantly higher ground-level concentrations close to the source than would arise in the absence of the buildings.

4.8.2 Analysis of the site layout indicated that a number of structures should be included within the model in order to take account of effects on pollutant dispersion. Input geometries are shown in Table 16.

¹⁶ Environmental permitting: air dispersion modelling reports, EA, 2018.

Table 16 Building Geometries

Building	NGR (m)		Height (m)	Length (m)	Width (m)	Angle (°)
	X	Y				
Generator 1	498500.6	102440.6	3.8	18.2	3.9	144.4
Generator 2	498495.0	102448.7	3.8	18.2	3.9	144.4
Generator 3	498489.2	102456.9	3.8	18.2	3.9	144.4
Generator 4	498483.4	102465.1	3.8	18.2	3.9	144.4

4.9 **Meteorological Data**

4.9.1 Meteorological data used in the assessment was taken from Thorney Island meteorological station over the period 1st January 2014 to 31st December 2018 (inclusive). This observation station is located at NGR: 476521, 102593, which is approximately 24.8km west of the facility. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

4.9.2 All meteorological files used in the assessment were provided by Atmospheric Dispersion Modelling Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 5 for wind roses of utilised meteorological records.

4.10 **Roughness Length**

4.10.1 Roughness length (z_0) is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 0.3m was used to describe both the modelling extents and meteorological site. This is considered appropriate for the morphology of the area and is suggested within ADMS-5 as being suitable for 'agricultural areas (min)'.

4.11 **Monin-Obukhov Length**

4.11.1 The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 10m was used to describe the modelling extents. This is considered appropriate for the nature of the area and is suggested within ADMS-5 as being suitable for 'small towns < 50,000'.

- 4.11.2 A minimum Monin-Obukhov length of 1m was used to describe the meteorological site. This is considered appropriate for the nature of the area and is suggested within ADMS-5 as being suitable for a 'rural location'.

4.12 Terrain Data

- 4.12.1 Inclusion of terrain data is recommended within the ADMS-5 user guide if the gradient within a modelling area varies by more than 10% (1 in 10). Assessment of changes in elevation throughout the modelling extents using Google Earth indicated the maximum gradient was 5.0%. As such, terrain data was not included within the model.

4.13 Nitrogen Deposition

- 4.13.1 Nitrogen deposition rates were calculated using the conversion factors provided within EA document 'Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06'¹⁷. Predicted pollutant concentrations were multiplied by the relevant deposition velocity and conversion factor to calculate the speciated dry deposition flux. The conversion factors used for the determination of nitrogen deposition are presented within Table 17.

Table 17 Conversion Factors to Determine Dry Deposition Flux for Nitrogen Deposition

Pollutant	Deposition Velocity (m/s)		Conversion factor ($\mu\text{g}/\text{m}^2/\text{s}$ to $\text{kg}/\text{ha}/\text{yr}$ of pollutant species)
	Grassland	Forest	
NO ₂	0.0015	0.003	95.9

- 4.13.2 The relevant deposition velocity for each ecological receptor was selected from Table 17 based on the vegetation type present within the designation.

¹⁷ Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06, EA, 2014.

4.14 **Acid Deposition**

- 4.14.1 Predicted ground level NO₂ concentrations were converted to kilo-equivalent ion depositions (keq/ha/yr) for comparison with the critical load for acid deposition at each of the identified ecological receptors. The conversion to units of equivalents, a measure of the potential acidifying effect of a species, was undertaken using the standard conversion factors shown in Table 18.

Table 18 Conversion Factors to Determine Dry Deposition Flux for Acid Deposition

Pollutant	Deposition Velocity (m/s)		Conversion Factor (µg/m ² /s to keq/ha/yr of pollutant species)
	Grassland	Forest	
NO ₂	0.0015	0.003	6.84

- 4.14.2 As shown in Table 9, critical loads were not available for APIS habitat 'Dunes, Shingle and Machair'¹⁸. The APIS website¹⁹ provides the following information in relation to acid sensitivity of this habitat type:

"Soil acidification as a result of acid deposition has relatively little impact in UK dunes because sand dune soils are generally well-buffered, with the exception of the few acidic dune systems"

- 4.14.3 As such, nitrogen deposition from the facility is not predicted to contribute to acidity at these locations.

4.15 **Background Concentrations**

- 4.15.1 Review of existing data in the vicinity of the site was undertaken Section 3.3 in order to identify suitable background values for use in the assessment. This indicated that monitoring location 19 is positioned adjacent to the B2233 Burndell Road and a significant distance from the proposals. As such, results are considered unlikely to be representative of the facility location or conditions at relevant sensitive human receptors in the vicinity of the site. In lieu of local monitoring data, the background NO₂ concentration predicted by

¹⁸ <http://www.apis.ac.uk/acid-deposition-dunes-shingle-machair>.

¹⁹ <http://www.apis.ac.uk/acid-deposition-dunes-shingle-machair>.

DEFRA, as shown in Table 4Table 5, was therefore utilised to represent baseline levels in the vicinity of the site.

4.15.2 Baseline pollutant levels at the ecological receptors were obtained from the APIS website, as summarised in Table 10.

4.15.3 It is not possible to add short-term peak baseline and process concentrations. This is because the conditions which give rise to peak ground-level concentrations of substances emitted from an elevated source at a particular location and time are likely to be different to the conditions which give rise to peak concentrations due to emissions from other sources. This point is addressed in in EA guidance 'Air emissions risk assessment for your environmental permit'²⁰, which advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum predicted short-term concentration due to emissions from the source to twice the annual mean baseline concentration. This approach was adopted throughout the assessment.

4.16 **Assessment Criteria**

Human Receptors

4.16.1 The significance of predicted air quality impacts at sensitive human receptors was determined in accordance with the guidance provided within the Institute of Air Quality Management (IAQM) document 'Land-Use Planning & Development Control: Planning for Air Quality'²¹. Using this methodology impacts are defined based on the interaction between the predicted pollutant concentration with the development in place (PEC) and the magnitude of change (PC), as outlined in Table 19.

Table 19 Significance of Impact

Concentration at Receptor in Assessment Year (PEC)	Predicted Concentration Change as Proportion of EQS (PC) (%)			
	1	2 - 5	6 - 10	> 10
75% or less of EQS	Negligible	Negligible	Slight	Moderate
76 - 94% of EQS	Negligible	Slight	Moderate	Moderate

²⁰ <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>.

²¹ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

Concentration at Receptor in Assessment Year (PEC)	Predicted Concentration Change as Proportion of EQS (PC) (%)			
	1	2 - 5	6 - 10	> 10
95 - 102% of EQS	Slight	Moderate	Moderate	Substantial
103 - 109% of EQS	Moderate	Moderate	Substantial	Substantial
110% or more of EQS	Moderate	Substantial	Substantial	Substantial

4.16.2 The matrix shown in Table 19 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as **negligible**.

4.16.3 Following the prediction of impacts at discrete receptor locations, the IAQM document²² provides guidance on determining the overall air quality impact significance of the operation of a development and states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the impact is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

4.16.4 The determination of significance relies on professional judgement and reasoning has been provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts.

4.16.5 It should be noted the above methodology is only suitable for predicting impacts at locations sensitive to changes in long term pollution levels. As such, significance has not been assigned to changes in short-term concentrations.

Ecological Receptors

4.16.6 EA guidance 'Air emissions risk assessment for your environmental permit'²³ states that PCs can be screened as insignificant if they meet the following criteria:

²² Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

²³ <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>.

- The short-term PC is less than 10% of the long-term environmental standard; and,
- The long-term PC is less than 1% of the long-term environmental standard.

4.16.7 Predicted PCs have been compared to the relevant EQSs and the criteria stated above. Where the impact is within these parameters, the EA concludes that impacts associated with an installation are acceptable.

4.17 Modelling Uncertainty

4.17.1 Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Model uncertainty - due to model limitations;
- Data uncertainty - due to errors in input data, including emission estimates, operational procedures, land use characteristics and meteorology; and,
- Variability - randomness of measurements used.

4.17.2 Potential uncertainties in the model results were minimised as far as practicable and worst-case inputs used in order to provide a robust assessment. This included the following:

- Choice of model - ADMS-5 is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible;
- Meteorological data - Modelling was undertaken using five annual meteorological data sets from the closest observation station to the site. The analysis was based on the worst-case year for each averaging period to ensure maximum concentrations were considered;
- Surface characteristics - The z_0 and Monin-Obukhov length were determined for both the dispersion and meteorological sites based on the surrounding land uses and guidance provided by CERC;
- Plant operating conditions - Operational parameters were obtained from the technical data sheet for the generators. As such, these are considered to be representative of normal operating conditions;
- Emission rates - The emission rates were derived from the relevant generator specification. As such, these are considered to be representative of maximum releases;

- Background concentrations - Background pollutant levels were obtained from the DEFRA background maps and the APIS website. These are considered representative of baseline air quality conditions at sensitive locations within the vicinity of the site;
- Receptor locations - A Cartesian Grid was included in the model in order to provide suitable data for contour plotting. Receptor points were also included at sensitive locations to provide additional consideration of these areas; and,
- Variability - All model inputs were as accurate as possible and worst-case conditions were considered as necessary in order to ensure a robust assessment of potential pollutant concentrations.

4.17.3 Results were considered in the context of the relevant EQSs and IAQM or EA significance criteria. It is considered that the use of the stated measures to reduce uncertainty and the use of worst-case assumptions when necessary has resulted in model accuracy of an acceptable level.

5.0 **RESULTS**

5.1 **Introduction**

- 5.1.1 Dispersion modelling was undertaken with the inputs described in Section 4.0. The results are outlined in the following Sections.
- 5.1.2 Reference should be made to Figure 6 and Figure 7 for graphical representations of predicted PECs, inclusive of background, throughout the assessment extents. It should be noted that the values shown in the Figures are predictions from the meteorological data set which resulted in the maximum pollutant concentration for that averaging period. For example, the maximum annual mean NO₂ concentration was predicted using the 2017 meteorological data set. As such, the contours shown in Figure 6 were produced from the 2017 model outputs.

5.2 **Maximum Pollutant Concentrations**

- 5.2.1 The maximum predicted pollutant concentrations at any point within the modelling extents for any meteorological data set are summarised in Table 20.

Table 20 Maximum Predicted Pollutant Concentrations

Pollutant	Averaging Period	EQS (µg/m ³)	PC (µg/m ³)	PC Proportion of EQS (%)	PEC (µg/m ³)	PEC Proportion of EQS (%)
NO ₂	Annual	40	10.73	26.83	18.44	46.10
	99.63 rd %ile 1-hour	200	117.16	58.58	132.58	66.29

- 5.2.2 As shown in Table 20, there were no predicted exceedences of any EQS at any location for any pollutant or averaging period of interest.

5.3 **Human Receptors**

- 5.3.1 Predicted annual mean NO₂ PECs at the sensitive human receptors, inclusive of background levels, are summarised in Table 21.

Table 21 Predicted Annual Mean NO₂ Concentrations

Receptor		Predicted Annual Mean NO ₂ PEC (µg/m ³)				
		2014	2015	2016	2017	2018
R1	Residential - Northwood House	1.25	1.25	1.10	1.14	1.15
R2	Residential - Johnson Way	0.78	1.04	0.88	0.91	0.72
R3	Residential - Yapton Road	0.18	0.19	0.20	0.28	0.18
R4	Residential - Northwood Farm	0.19	0.19	0.21	0.24	0.20
R5	Residential - Ryebank Caravan Park	0.10	0.08	0.10	0.07	0.10
R6	Residential - Bilsham Road	0.12	0.11	0.13	0.08	0.12
R7	Residential - Hobbs Farm House	0.18	0.15	0.19	0.10	0.18
R8	Residential - Bilsham Road	0.14	0.11	0.16	0.09	0.17
R9	Residential - Taylors Close	0.17	0.14	0.20	0.14	0.25
R10	Residential - West View Drive	0.21	0.21	0.18	0.20	0.23
R11	Residential - Cinders Lane	0.36	0.32	0.25	0.30	0.30
R12	Residential - Fairholme Drive	0.22	0.14	0.14	0.18	0.24
R13	Residential - Abbots Field	0.58	0.47	0.51	0.52	0.47
R14	Retail - Cease Fire Café	1.02	1.21	1.07	1.13	1.09

- 5.3.2 As indicated in Table 21, NO₂ PECs were below the annual mean EQS of 40µg/m³ at all sensitive receptor locations for all meteorological data sets.
- 5.3.3 Reference should be made to Figure 6 for a graphical representation of predicted concentrations throughout the assessment extents.
- 5.3.4 The significance of predicted impacts on annual mean NO₂ concentrations at the sensitive receptors are summarised in Table 22. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 22 Predicted Impacts on Annual Mean NO₂ Concentrations

Receptor		Predicted Concentration (PEC)	Predicted Concentration Change as Proportion of EQS (PC) (%)	Impact Significance
R1	Residential - Northwood House	Below 75% of EQS	2 - 5	Negligible
R2	Residential - Johnson Way	Below 75% of EQS	2 - 5	Negligible
R3	Residential - Yapton Road	Below 75% of EQS	1	Negligible
R4	Residential - Northwood Farm	Below 75% of EQS	1	Negligible
R5	Residential - Ryebank Caravan Park	Below 75% of EQS	0	Negligible
R6	Residential - Bilsham Road	Below 75% of EQS	0	Negligible
R7	Residential - Hobbs Farm House	Below 75% of EQS	0	Negligible
R8	Residential - Bilsham Road	Below 75% of EQS	0	Negligible
R9	Residential - Taylors Close	Below 75% of EQS	1	Negligible
R10	Residential - West View Drive	Below 75% of EQS	1	Negligible
R11	Residential - Cinders Lane	Below 75% of EQS	1	Negligible
R12	Residential - Fairholme Drive	Below 75% of EQS	1	Negligible
R13	Residential - Abbots Field	Below 75% of EQS	1	Negligible
R14	Retail - Cease Fire Café	Below 75% of EQS	2 - 5	Negligible

5.3.5 As indicated in Table 22, impacts on annual mean NO₂ concentrations as a result of the proposed development were predicted to be **negligible** at all locations.

5.3.6 Predicted 99.63rd %ile 1-hour mean NO₂ PECs, inclusive of background levels, are summarised in Table 23.

Table 23 Predicted 99.63rd %ile 1-hour Mean NO₂ Concentrations

Receptor		Predicted 99.63 rd %ile 1-hour Mean NO ₂ PEC (µg/m ³)				
		2014	2015	2016	2017	2018
R1	Residential - Northwood House	20.42	20.23	20.20	20.01	19.74
R2	Residential - Johnson Way	12.46	12.63	12.25	12.39	12.33

Receptor		Predicted 99.63 rd %ile 1-hour Mean NO ₂ PEC (µg/m ³)				
		2014	2015	2016	2017	2018
R3	Residential - Yapton Road	6.20	6.25	6.28	7.39	5.92
R4	Residential - Northwood Farm	7.13	7.34	7.15	7.32	7.16
R5	Residential - Ryebank Caravan Park	3.84	3.34	3.58	4.01	3.68
R6	Residential - Bilsham Road	4.38	3.99	4.52	4.50	4.42
R7	Residential - Hobbs Farm House	5.85	5.15	5.98	5.21	4.75
R8	Residential - Bilsham Road	5.80	4.68	6.32	4.93	4.75
R9	Residential - Taylors Close	6.92	6.59	7.39	7.08	7.19
R10	Residential - West View Drive	9.34	9.65	8.86	9.67	9.82
R11	Residential - Cinders Lane	14.46	14.06	13.86	14.19	14.20
R12	Residential - Fairholme Drive	10.57	10.03	9.55	10.64	11.05
R13	Residential - Abbots Field	17.67	17.83	17.96	18.13	18.18
R14	Retail - Cease Fire Café	14.25	14.46	14.45	14.52	14.48

5.3.7 As indicated in Table 23, 1-hour mean NO₂ PECs were below the EQS of 200µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.3.8 Reference should be made to Figure 7 for a graphical representation of predicted concentrations throughout the assessment extents. This indicates that the development is not predicted to cause EQS exceedences at any location.

5.3.9 As stated previously, the IAQM methodology provided in Section 4.16 is for the determination of the significance of annual mean impacts only. However, as there are no predicted 1-hour mean EQS exceedences at any receptor location for any meteorological data set, impacts are considered to be **not significant**.

5.4 Ecological Receptors

Nitrogen Oxides

Annual Mean

- 5.4.1 Predicted annual mean NO_x PECs at the ecological receptor locations, inclusive of background levels, are summarised in Table 24.

Table 24 Predicted Annual Mean NO_x Concentrations

Receptor	Predicted Annual Mean NO _x PEC (µg/m ³)				
	2014	2015	2016	2017	2018
E1	10.33	10.33	10.34	10.33	10.32
E2	9.89	9.89	9.89	9.87	9.87
E3	9.89	9.88	9.89	9.87	9.88
E4	10.33	10.32	10.33	10.32	10.34

- 5.4.2 As indicated in Table 24, annual mean NO_x PECs were below the EQS of 30µg/m³ at all ecological receptor locations for all meteorological data sets.

- 5.4.3 Maximum predicted annual mean NO_x concentrations at the ecological receptor locations are summarised in Table 25.

Table 25 Maximum Predicted Annual Mean NO_x Concentrations

Receptor		Maximum Predicted Annual Mean NO _x Concentration (µg/m ³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	Solent and Dorset Coast 01 SPA	0.05	10.34	0.16	34.46
E2	Solent and Dorset Coast 02 SPA	0.05	9.89	0.18	32.98
E3	Solent and Dorset Coast 03 SPA	0.05	9.89	0.17	32.97
E4	Solent and Dorset Coast 04 SPA	0.05	10.34	0.15	34.45

- 5.4.4 As shown in Table 25, PCs were below 1% of the EQS at all ecological receptors. As such, predicted effects on annual mean NO_x concentrations are considered to be **not significant**, in accordance with the stated criteria.

24-hour Mean

- 5.4.5 Predicted 24-hour mean NO_x PECs at the receptor locations, inclusive of background levels, are summarised in Table 26.

Table 26 Predicted 24-hour Mean NO_x Concentrations

Receptor	Predicted 24-hour Mean NO _x PEC (µg/m ³)				
	2014	2015	2016	2017	2018
E1	22.88	22.52	22.43	22.38	23.53
E2	21.05	21.32	21.91	21.92	21.78
E3	21.15	21.47	22.14	21.96	21.80
E4	21.90	22.02	22.10	21.84	22.22

- 5.4.6 As indicated in Table 26, predicted 24-hour mean NO_x PECs were below the EQS of 75µg/m³ at all ecological receptors.
- 5.4.7 Maximum predicted 24-hour mean NO_x concentrations at the receptor locations are summarised in Table 27.

Table 27 Maximum Predicted 24-hour Mean NO_x Concentrations

Receptor		Maximum Predicted 24-hour Mean NO _x Concentration (µg/m ³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	Solent and Dorset Coast 01 SPA	2.95	23.53	3.93	31.37
E2	Solent and Dorset Coast 02 SPA	2.24	21.92	2.98	29.22
E3	Solent and Dorset Coast 03 SPA	2.46	22.14	3.29	29.53
E4	Solent and Dorset Coast 04 SPA	1.64	22.22	2.18	29.62

5.4.8 As shown in Table 27, PCs were below 10% of the EQS at all ecological receptors. As such, predicted effects on 24-hour mean NO_x concentrations are considered to be **not significant**, in accordance with the stated criteria.

Nitrogen Deposition

5.4.9 Predicted annual nitrogen PC deposition rates at the ecological receptor locations are summarised in Table 28.

Table 28 Predicted Annual Nitrogen Deposition Rates

Receptor	Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)				
	2014	2015	2016	2017	2018
E1	0.004	0.004	0.005	0.004	0.003
E2	0.005	0.005	0.005	0.003	0.003
E3	0.005	0.004	0.005	0.003	0.004
E4	0.004	0.004	0.004	0.003	0.005

5.4.10 Maximum predicted annual nitrogen deposition rates at the receptor locations are summarised in Table 29.

Table 29 Maximum Predicted Annual Nitrogen Deposition Rates

Receptor		Maximum Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)	Proportion of EQS (%)	
			Low EQS	High EQS
E1	Solent and Dorset Coast 01 SPA	0.00	0.06	0.05
E2	Solent and Dorset Coast 02 SPA	0.01	0.07	0.05
E3	Solent and Dorset Coast 03 SPA	0.01	0.06	0.05
E4	Solent and Dorset Coast 04 SPA	0.00	0.06	0.05

5.4.11 As shown in Table 29, PCs were below 1% of the EQS at all locations. As such, predicted impacts on annual nitrogen deposition at the ecological receptors are considered to be **not significant**.

Acid Deposition

5.4.12 Predicted annual acid PC deposition rates are summarised in Table 30.

Table 30 Predicted Annual PC Acid Deposition Rates

Receptor	Predicted Annual PC Acid Deposition Rate (keq/ha/yr)				
	2014	2015	2016	2017	2018
E1	0.0003	0.0003	0.0003	0.0003	0.0002
E2	0.0003	0.0003	0.0004	0.0002	0.0002
E3	0.0004	0.0003	0.0004	0.0002	0.0003
E4	0.0003	0.0003	0.0003	0.0002	0.0003

5.4.13 Maximum predicted annual acid deposition rates at the receptor locations are summarised in Table 31.

Table 31 Predicted Annual Acid Deposition Rates

Receptor		Maximum Predicted Annual Acid PC Deposition Rate (keq/ha/yr)	Proportion of EQS (%)
E1	Solent and Dorset Coast 01 SPA	0.0003	-(a)
E2	Solent and Dorset Coast 02 SPA	0.0004	-(a)
E3	Solent and Dorset Coast 03 SPA	0.0004	-(a)
E4	Solent and Dorset Coast 04 SPA	0.0003	-(a)

NOTE: (a) No applicable acid critical load estimate available²⁴.

5.4.14 As shown in Table 31, critical loads have not been determined for APIS habitat type 'Dunes, Shingle and Machair'. As described in Section 4.14, predicted impacts on annual acid deposition at the ecological receptors are considered to be **not significant**.

²⁴ <http://www.apis.ac.uk/acid-deposition-dunes-shingle-machair>.

6.0 CONCLUSION

- 6.1.1 Redmore Environmental Ltd was commissioned by Conrad Energy (Developments) Limited to undertake an Air Quality Assessment in support of a planning application for the erection of a flexible generation facility with associated ancillary infrastructure on land off Yapton Road, Bilsham.
- 6.1.2 Combustion emissions from the facility have the potential to cause air quality impacts during normal operation. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider potential effects.
- 6.1.3 Dispersion modelling was undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the plant. Impacts at sensitive receptors were quantified and the results compared with the relevant EQSs and significance criteria.
- 6.1.4 Predicted concentrations of all pollutants were below the relevant EQSs at all locations of human exposure for all meteorological data sets modelled. Review of the dispersion modelling results also indicated that impacts on annual mean NO₂ concentrations were predicted to be **negligible** at all locations. There were no predicted 1-hour mean EQS exceedences at any location. As such, overall impacts are considered to be **not significant**.
- 6.1.5 Impacts at relevant ecological sites were also predicted to be **not significant** at the identified designations.
- 6.1.6 Based on the assessment results, air quality issues are not considered a constraint to planning consent for the proposal.

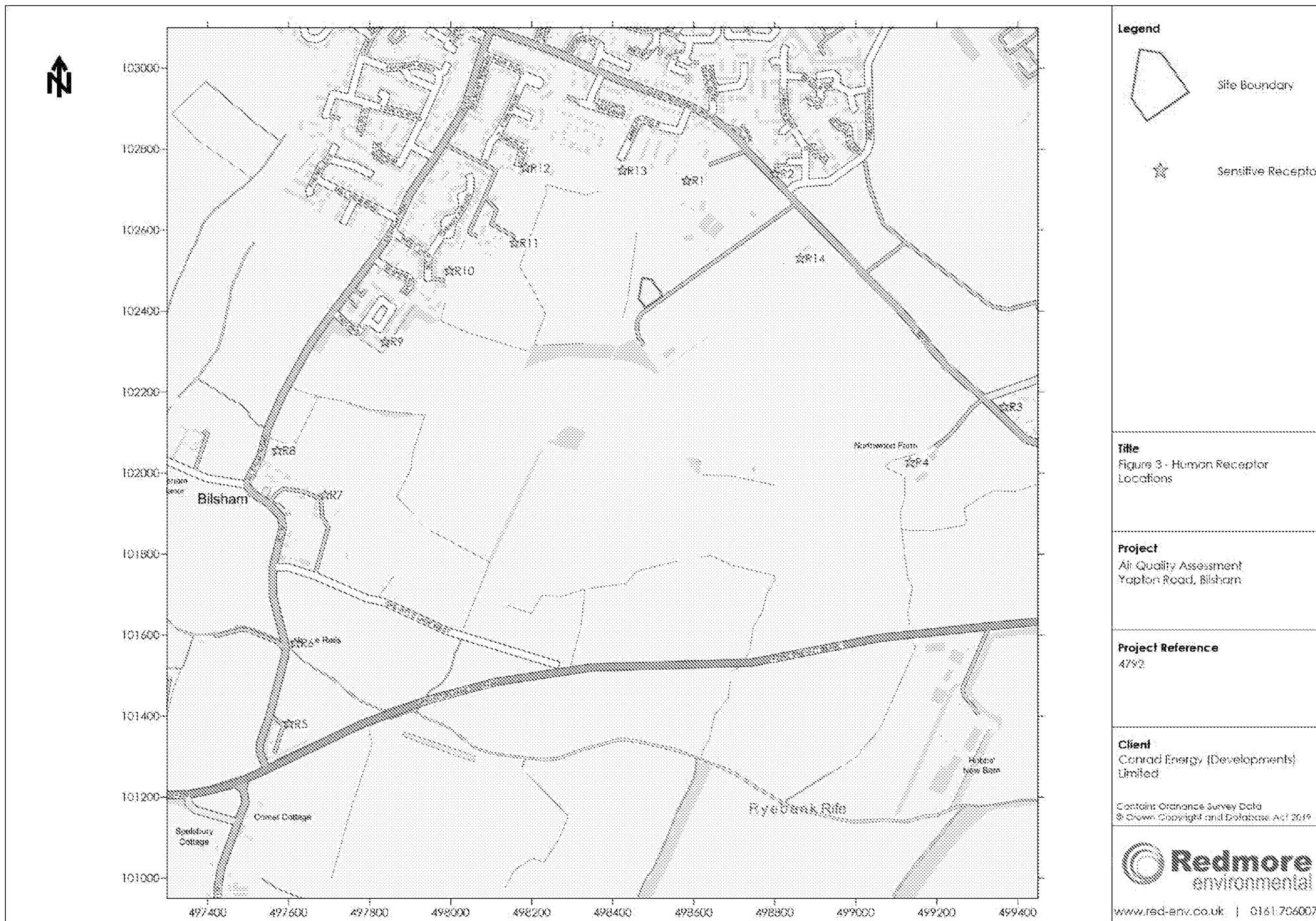
7.0 **ABBREVIATIONS**

ADC	Arun District Council
APIS	Air Pollution Information System
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EQS	Environmental Quality Standard
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
MAGIC	Multi-Agency Geographic Information for the Countryside
NGR	National Grid Reference
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
PH	Protected Habitat
PC	Process Contribution
PEC	Predicted Environmental Concentration
SPA	Special Protection Area
z ₀	Roughness length
%ile	Percentile

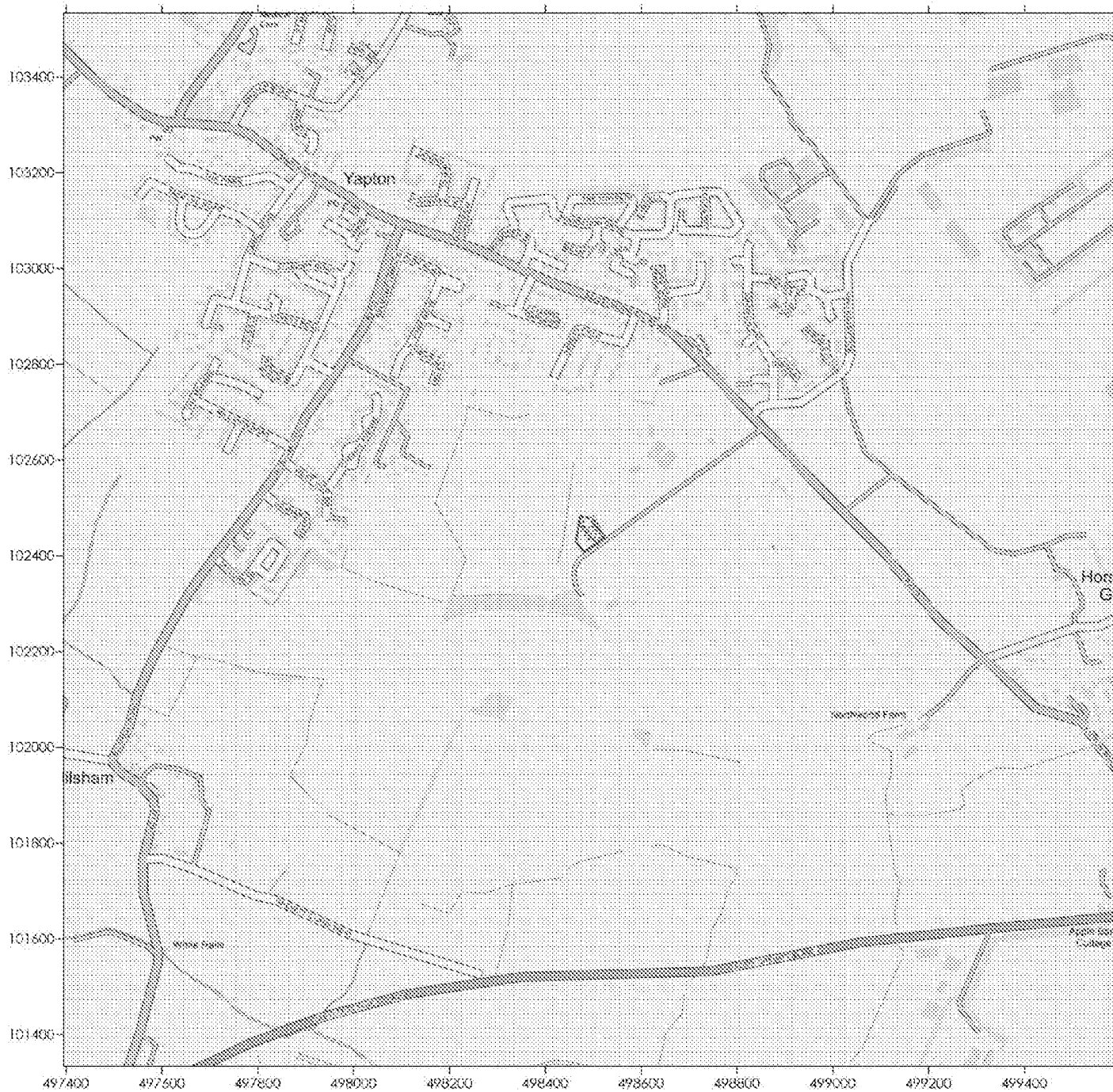
Figures











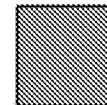
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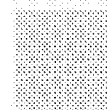
Site Boundary



Stock



Building



Output Grid

Title

Figure 5 - ADMS-5 Inputs

Project

Air Quality Assessment
Yapton Road, Bilsham

Project Reference

A792

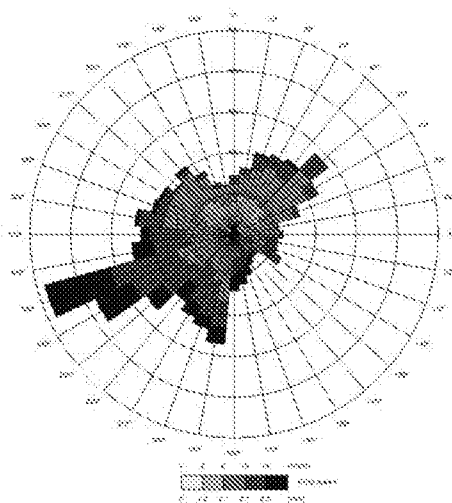
Client

Centrad Energy (Developments)
Limited

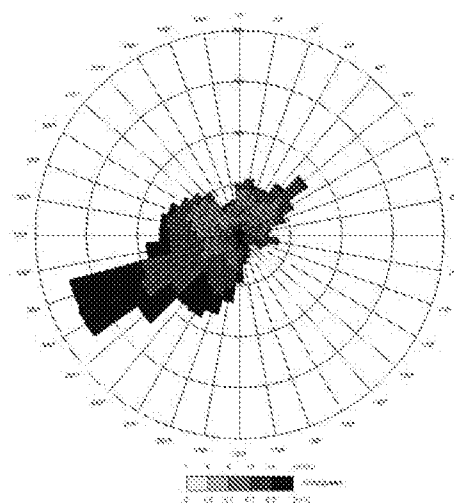
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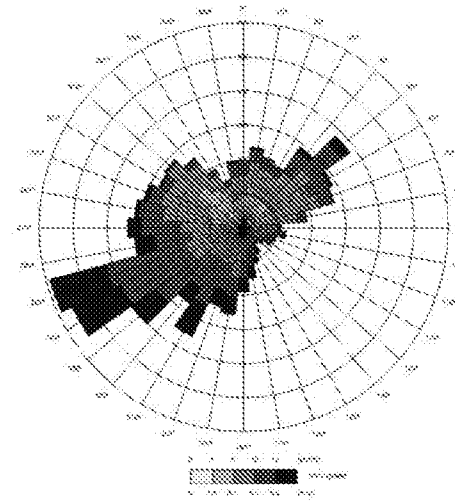
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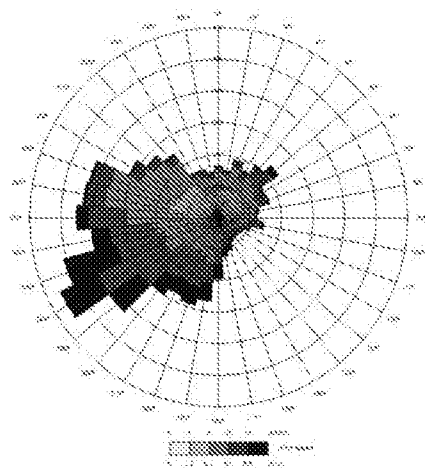
2014 Meteorological Data



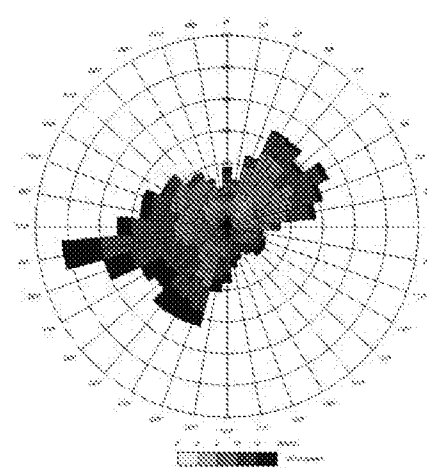
2015 Meteorological Data



2016 Meteorological Data



2017 Meteorological Data



2018 Meteorological Data

Legend

Title

Figure 6 - Wind Roses of 2014 to 2018 Thamey Island Meteorological Data

Project

Air Quality Assessment
Yapton Road, Bilsham

Project Reference

4792

Client

Centrad Energy (Developments)
Limited



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