Olleco

Uncooked Oil (UCO) Treatment Plant at Hindmans Way, Dagenham

Air Quality Assessment

Project No. 445417/AQ/01 (00)

OCTOBER 2023

RSK GENERAL NOTES

Report No: 445417/AQ/01 (00)

Title: Uncooked Oil (UCO) Treatment Plant at Hindmans Way, Dagenham – Air Quality Assessment

Client: Olleco

Date: 24th October 2023

Status: Draft for review

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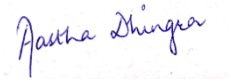
Signature		Signature	
Date:	24th October 2023	Date:	25th October 2023

Summary

RSK Environment Ltd (RSK) has been commissioned by Olleco (the client) to undertake an air quality impact assessment, in relation to the installation of natural gas boiler at Hindmans Way, Dagenham.

This air quality assessment has sought to characterise existing baseline ambient air quality and to assess the potential air quality impacts of the proposed natural gas boiler on human and ecological receptors.

The potential impact of the gas boiler on local air quality has been assessed using ADMS 6, an advanced dispersion model developed for regulatory purposes, and used meteorological data measured between 2020 and 2022 at the London City meteorological station. Buildings/structures to account for downwash effects have been included in the air dispersion model. Concentrations of the key air pollutants (nitrogen oxides, nitrogen dioxide, carbon monoxide) have been predicted at existing sensitive receptors.

The highest predicted impacts at the modelled discrete receptor locations representative of relevant exposure in any of the three modelled meteorological years have been reported and compared to the relevant Air Quality Standards (AQSs).

The client had informed that the boiler will be operational during weekdays from 6am-10pm. However, we have considered the boiler to be operational 24x7 throughout the year in the modelling for a conservative assessment.

There are no predicted exceedances of the annual and hourly mean nitrogen dioxide and 8 hour rolling mean CO AQS at any of the relevant discrete off-site human receptor locations. Therefore, the impact of the development on human health is considered to be 'not significant'.

The predicted maximum annual mean nitrogen oxides (NO_x) process contributions (PCs) are well below the EA screening criteria of 1% at the assessed ecologically sensitive locations. The predicted maximum daily mean NO_x PCs are well below the EA screening criteria of 10% at all ecologically sensitive locations. Therefore, the impact of the proposed development on annual and daily mean NO_x concentrations is considered to be 'not significant'. The predicted nitrogen deposition and acid deposition PCs for the proposed use, as a percentage of the critical load, are well below the 1% EA screening criteria at all receptor locations. Therefore, the overall impact of the development on ecological receptors is considered to be not significant.

In view of the assessment findings listed above, it is considered that the operation of the natural gas boiler is unlikely to result in any significant effect on local air quality.

Abbreviations

ADMS 6	Atmospheric Dispersion Modelling System 6 (a dispersion modelling software application)
APIS	Air Pollution Information System
AQAL	Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQS	Air Quality Standard
CO	Carbon Monoxide
Defra	Department for Environment, Food and Rural Affairs
EA	Environmental Agency
EC	European Commission
EPUK	Environmental Protection UK
EQS	Environmental Quality Standard
EU	European Union
IAQM	Institute of Air Quality Management
LBBD	London Borough of Barking and Dagenham
NAQS	National Air Quality Strategy
NPPF	National Planning Policy Framework
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
PC	Process Contribution
PEC	Predicted Environmental Concentration
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TVOC	Total Volatile Organic Compounds

Contents

1 INTRODUCTION

RSK Environment Limited (RSK) has been commissioned by Olleco (the client) to undertake an air quality impact assessment in relation to the operation of one natural gas boiler at new Uncooked Oil (UCO) Treatment Plant at Hindmans Way, Dagenham (also referred to as the development site). The approximate grid reference for the centre of the site is 548662, 1822767. Figure 1.1 shows the site location. The site falls within the London Borough of Barking and Dagenham (LBBD). The gas boiler is located next to the tank farm.

Figure 1.1: Site Location Plan

This air quality assessment has sought to characterise existing baseline ambient air quality and to assess the potential air quality impacts of the proposed development on human and ecological receptors.

2 LEGISLATION AND POLICY CONTEXT

2.1 Air Quality Legislation

2.1.1 Air Quality Strategy

UK air quality policy is published under the umbrella of the Environment Act 1995, Part IV and specifically Section 80, the National Air Quality Strategy. The latest *Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air*, published in July 2007 sets air quality standards and objectives for ten key air pollutants to be achieved between 2003 and 2020.

The Air Quality Framework Directive (1996) established a framework under which the European Commission (EC) could set limit or target values for specified pollutants. The directive identified several pollutants for which limit or target values have been or will be set in subsequent 'daughter directives'. The framework and daughter directives were consolidated by Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which retains the existing air quality standards and introduces new objectives for fine particulates ($PM_{2.5}$).

The Clean Air Strategy 2019 supersedes the policies outlined in the 2007 strategy. This latest strategy aims to have a more joined-up approach, outlining actions the Government plans to take to reduce emissions from transport, homes, agriculture and industry. However, the air quality objectives remain as previously detailed within the 2007 strategy.

2.1.2 Air Quality Standards

The air quality standards in the United Kingdom are derived from EC directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. The Air Quality Limit Values Regulations 2003 and subsequent amendments implement the Air Quality Framework Directive into English Law. Directive 2008/50/EC was translated into UK law in 2010 via the Air Quality Standards Regulations 2010.

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 was published on 31st January 2023, and came into force the following day. The 2023 Regulations introduce a reduced long-term annual average Air Quality Objective for $PM_{2.5}$ of 10 µg/m^3 by 2040, a reduction from the current Air Quality objective of 20 µg/m^3 set out within the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020. Additionally, the 2023 Regulations introduce an interim target of 12 µg/m^3 by January 2028 and 35% reduction in average population exposure by 2040, with an interim target of a 22% reduction by January 2028, both compared to a 2018 baseline.

The relevant[1] standards for England and Wales to protect human health and vegetation are summarised in Table 2.1.

[1] Relevance, in this case, is defined by the scope of the assessment.

Table 2.1: Air Quality Standards Relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit (µg/m^3)
Nitrogen dioxide (NO_2) *	1 calendar year	N/A	40
	1 hour	18	200
Nitrogen oxides (NO_x)**	1 calendar year	NA	30
Carbon Monoxide (CO)	8 hour rolling mean	N/A	10000
* For the protection of human health **For the protection of vegetation and ecosystems			

2.1.3 The Environment Act (1995) and Environmental Protection Act (1990)

The objectives are to be used in the review and assessment of air quality by local authorities under Section 82 of the Environment Act (1995), which inserts clauses into the Environmental Protection Act 1990. If exceedances of the objectives or AQSs are measured or predicted through the review and assessment process, the local authority must declare an air quality management area (AQMA) under Section 83 of the Act and produce an air quality action plan to outline how air quality is to be improved.

2.1.4 Environmental Permitting Regulations

Many industrial processes have the potential to release pollution to land, air and water, with the potential to pose a health risk to people as well as damaging the environment. To prevent this, many industrial processes are regulated under the EPR, which either set emissions limit values with which the installation must comply and/or requires best available techniques (BAT) to be used at the installation site.

The Environmental Permitting (England and Wales) Regulations 2018 is the latest update to the Regulations and brings the Medium Combustion Plant Directive (MCPD) (2015/2193/EC) into force in England and Wales. Guidance

2.1.5 Local Air Quality Management Review and Assessment Technical Guidance

Defra has published technical guidance for use by local authorities in their air quality review and assessment work. This guidance, referred to in this document as LAQM.TG (22), has been used to identify locations where exposure can be considered ‘relevant’. This is important as Directive 2008/50/EC indicates that the AQSs should not be applied at any locations situated within areas where members of the public do not have access and there is no fixed habitation. These definitions provide greater clarity than those specified in the EA 2018 guidance and broadly correlate such that these are considered more robust for use in an air quality assessment. The definitions identified in LAQM TG.22 are summarised in Table 2.2, below.

Table 2.2: Locations where AQSs should and should not be applied, replicated from LAQM TG.22

Averaging period	Locations where AQSs should be applied	Locations where AQSs should not be applied
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.
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply, together with hotels. 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 expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-minute mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes.	N/A

Notes: *Such locations should represent parts of the garden where relevant public exposure to pollutants is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied. In all cases, the AQSs should not be applied at locations where health and safety at work provisions exist and where members of the public do not have access.

2.1.6 Air emissions risk assessment for your environmental permit (Environment Agency, 2016) ('the Defra and EA guidance')

This guidance, which was adopted in 2016 by the Department for Environment, Food and Rural Affairs (Defra) and the EA, outlines a procedure which can be used to determine when detailed dispersion modelling is required and the elements which are required as part of detailed dispersion modelling assessment. A subsection of the guidance also outlines features of air quality assessment which should be submitted within the air quality assessment report. This report has been written with reference to this document and has been used in conjunction with the EA guidance (latest updated 2022 version).

This EA guidance includes a number of target Predicted Environmental Concentrations (PECs) for ecological receptors. The relevant target PECs for ecological receptors to this assessment are presented in Table 2.3.

Table 2.3: EA Guidance Targets for Protected Conservation Areas

Substance	Emission Period	Target (mean)
Nitrogen oxides (as NO_2)	Annual[1]	30 μg/m^3
	Daily	75 μg/m^3
[1]This is also a national air quality objective (part of the UK AQS) for the protection of vegetation and ecosystems		

2.1.7 AQTAG06: Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air (Environment Agency, 2014) ('AQTAG.06')

The AQTAG06 guidance, updated during 2014, provides technical guidance on how to approach detailed modelling of emissions to air when considering impacts on ecological receptors. It also includes a method which can be used to assess the potential impacts of nitrogen and acid deposition attributable to emissions of NO_x to air on local ecosystems.

2.1.8 Critical Levels and Loads

Excessive nitrogen deposition can lead to acidification and eutrophication of soils. In addition, species richness can be compromised, especially for slow growing species which may suffer from increased competition from invasive species (World Health Organisation, 2000).

The United Nations Economic Commission for Europe (UNECE) have set environmental criteria known as critical levels for the protection of vegetation from direct effects and critical loads to protect against the indirect effects of deposition of pollutants. Critical loads and levels are generally defined as: *"a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge"* (Nilsson and Grennfelt, 1988).

It is important to distinguish between a critical level and a critical load. The critical level refers to the gaseous concentration of a pollutant in the air, whereas the critical load relates to the quantity of pollutant deposited from air to the ground.

Critical levels and loads are defined by the UNECE as:

- Critical levels: *"concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge."*
- Critical loads: *"a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge."*

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

Critical levels and loads have been designated within the UK based on the sensitivity and qualifying features of the receiving habitat. Critical levels for relevant pollutant are set as detailed in Table 2.3. Critical loads for nutrient nitrogen are set under the Convention on Long-Range Transboundary Air Pollution and are based on empirical evidence, mainly observations from experiments and gradient studies (APIS, 2016). The critical loads used within this report are also presented in Section 5.

3 ASSESSMENT SCOPE

3.1 Overall Approach

The approach taken for assessing the potential air quality impacts of the proposed development may be summarised as follows:

- Baseline characterisation of local air quality;
- Desk study review to confirm the location of nearby existing receptors that may be sensitive to changes in airborne pollutant concentrations as a result of emissions arising from the proposed plant, including a review of local mapping data and statutory ecological sites; and
- Detailed dispersion modelling to predict the impact of emissions to air from the development on local air quality at nearby sensitive human and ecological receptors and across a modelled grid over the surrounding area.

3.2 Baseline Characterisation

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources.

A desk-based study has been undertaken including a review of monitoring data available from LBBDimated background data from Air Pollution Information System (APIS) and from the Local Air Quality Management (LAQM) Support website operated by Defra.

3.3 Air Pollutants of Concern

The proposed boiler will use natural gas. Therefore, the key air pollutants of concern for the operation of the proposed development are NO_2, NO_x and CO. The potential impacts on local air quality in terms of these pollutants only.

4 BASELINE AIR QUALITY CHARACTERISATION

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources. Baseline air quality data for the pollutants of concern have been reviewed in the following subsections.

4.1 Presence of Air Quality Management Area (AQMA)

The whole borough has been declared as an Air Quality Management Area (AQMAs) declared by LBBD. Therefore, the development site is located within an AQMA.

4.2 Baseline Monitoring Data

According to the 2022 Air Quality Annual Status Report for LBBD, the automatic air quality monitoring and non-automatic (passive) monitoring of NO_2 was undertaken at 2 & 28 sites respectively during 2021 within LBBD.

Annual average NO_2 concentrations measured in 2021 at the monitoring sites within 1 mile of the site are presented in Table 4.1. Measured NO_2 concentrations were below the annual mean NO_2 AQS at all monitoring locations during 2021.

Table 4.1: 2021 Annual Average NO_2 Concentrations Measured at TDC Diffusion Tube Sites

Site ID	Site Name	Approx. distance from site, km	Annual Average NO_2 (µg/m^3)
			2021
DT3	6/7 Scrattons Terrace	1.53	30.88
DT11	209 New Road (A1306)	1.50	31.34
DT22	1249 Chequers Lane	1.13	20.59
DT24	Cook Road	1.29	31.46

There is an automatic monitoring station BG2 located at Scrattons Farm (0.75 mile away from the proposed development). This station monitored the concentration of annual mean NO_2 and PM_{10} of 20 & 18 µg/m^3, which is well below the air quality standards (AQs).

4.3 LAQM Background Data

In addition to local monitoring data, Estimated background air quality data are available from the LAQM website operated by Defra (http://laqm.defra.gov.uk). The Defra LAQM website provides estimated annual average background concentrations of NO_2 and PM_{10} on a 1km^2 grid basis with the latest maps using 2018 base year data and with data projected up to the year 2030. **Table 4.2** presents estimated annual average background NO_2 and PM_{10} concentrations at the proposed development site for 2023-2025. The

estimated background concentrations at the study area are well below the relevant UK AQS objectives.

Table 4.2: Defra LAQM Estimated Annual Average NO_2 Concentrations at Study Site (2023-2025)

Year	Annual Average NO_2 ($\mu g/m^3$)	Annual Average PM_{10} ($\mu g/m^3$)	Annual Average $PM_{2.5}$ ($\mu g/m^3$)
2023	18.45	15.96	10.78
2024	17.82	15.77	10.63
2025	17.32	15.58	10.49
AQS	**40**	**40**	**20**
Note: Presented concentrations for 1 x 1 km grid squares centred on 548500, 182500; approximate centre of the study area is 548662,182277			

5 METHODOLOGY

5.1.1 Stack Height Assessment

Modelling results from the stack height assessment are reproduced in **Table** and Figure 4-1, below. Error! Reference source not found..

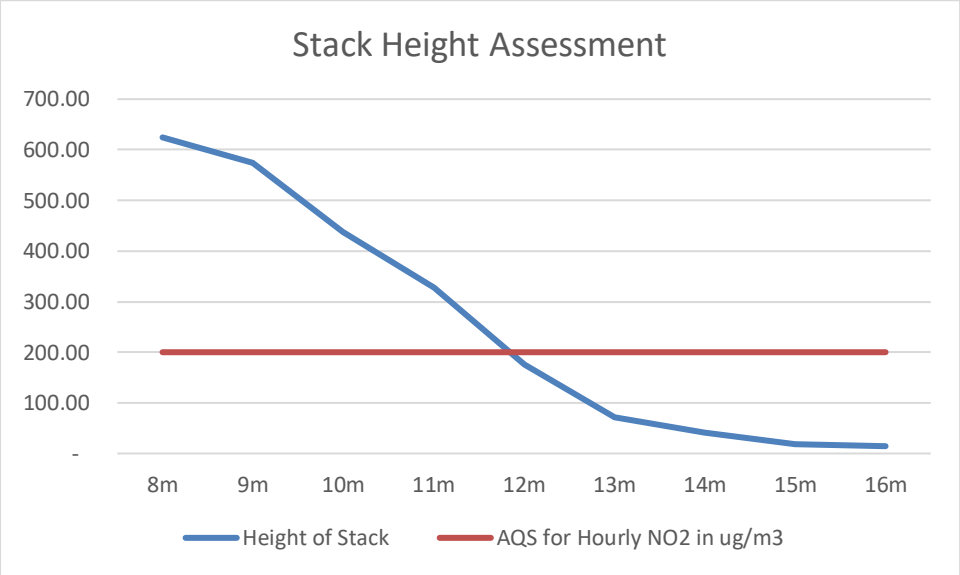
There are no predicted exceedances of the hourly NO_2 standard at any modelled discrete receptor for stacks greater than 12m.

Although no exceedances are predicted with an 12m stack, it is apparent from **Figure 4-1** that a 13m stack height is the most appropriate stack height for the proposed development, as any further increase in stack height from this point, will result in a lesser effect in hourly NO_2 emission reductions.

Table 5.1: Predicted hourly NO_2 concentrations at worst case receptor from stack height assessment

Stack Height above roof (m)	Maximum off-site gridded hourly NO_2 concentration (ug/m^3)	Maximum receptor hourly NO_2 concentration (ug/m^3)
8	1164.61	624.44
9	886.11	575.03
10	566.03	437.79
11	327.85	327.85
12	161.61	175.78
13	74.29	72.80
14	52.30	40.16
15	34.90	17.49
16	23.73	14.39

Figure 5-1: Predicted Hourly NO_2 Concentrations At Worst Case Receptor Vs. Stack Height



5.2 Operational Impact Assessment

5.2.1 Modelling Software

The impact assessment of the site was undertaken using ADMS 6 (Version 6.0.0.1). This model uses detailed information regarding the pollutant releases, local building effects and local meteorological conditions, to predict pollutant concentrations at specific locations selected by the user and is approved by the EA for regulatory applications.

5.2.2 Emission Sources and Operating profile

It is proposed that one natural gas boiler will be operating on site. The location of the boiler is shown in Figure B1 in Appendix B. Table 5.1 presents the physical and emission characteristics of the boilers, estimated as per the United States Environmental Protection Agency (US EPA)'s AP-42 database for natural gas boilers. In reality, the NOx and CO concentrations will be at or below the emission concentrations for new gas boilers as per the Medium Combustion Plant Directive. The client had informed that the boiler will be operational during weekdays from 6am-10pm. However, we have considered the boiler to be operational 24x7 throughout the year in the modelling for a conservative assessment.

Table 5.1: Physical and Emission Characteristics of Sources Included in the Assessment

Description	Stacks
Plant	**Natural Gas Boiler**
Operation Hours per annum	500
Make and Model	Yorkshireman Model
Fuel	Natural gas
Max Thermal Rating (In) mw	3.18
Stack height above ground level (m)	3
Stack diameter (m)	0.4
Stack exhaust temperature (^oC)	231
Actual Oxygen Content (vol %)	3.41
Actual Moisture Content (vol %)	16.7
Actual stack exit velocity (m/s)	14.72
NO_x exhaust emissions concentration (mg/Nm^3)	170 (Calculated from the NOx emission rate as mentioned below)
PM_{10} exhaust emissions concentration (mg/Nm^3)	-
CO exhaust emissions concentration (mg/Nm^3)	143 (Calculated from the NOx emission rate as mentioned below)
TVOCs exhaust emissions concentration (mg/Nm^3)	-
Volumetric Flow Rate (m^3/s) – Actual discharge conditions	1.83
Volumetric Flow Rate (m^3/s) – Reference conditions*	0.82
NO_x exhaust emissions rate (g/s)	0.14 (Estimated based on the US EPA's AP42 emission factor for gas boilers)
PM_{10} exhaust emissions rate (g/s)	-
CO exhaust emissions rate (g/s)	0.12 (Estimated based on the US EPA's AP42 emission factor for gas boilers)
TVOCs exhaust emissions rate (g/s)	-
Stack Location	X: 548662.02 Y: 182276.97
*Emission Concentration Release Conditions (REF): 273K, 101.3kPa, dry gas, 6% (Biomass Boiler) oxygen and 3% (Gas oil Boiler) oxygen	

5.2.3 Buildings

In order to capture the potential influence of buildings/structures on the dispersion profile of combustion emissions (e.g. building 'wake' and downwash effects), buildings

surrounding the development and those proposed as part of the development were included in the dispersion model. Heights for on-site buildings were provided by the client. Heights for off-site buildings were estimated on google earth. The locations and heights of these buildings/structures are listed in Table 5.2. Appendix B includes further details on the structures included in the assessment.

Table 5.2: Building Details included in the Air Quality Assessment

ID	Shape	Grid Ref (X)	Grid Ref (Y)	Height (m)	Angle (Degrees)
Building 1	Circular	548669.67	182276.99	9.6	0
Building 2	Circular	548669.06	182271.68	9.6	0
Building 4	Circular	548668.14	182266.93	9.6	0
Building 6	Circular	548674.80	182265.77	16.4	0
Building 7	Circular	548667.66	182261.83	9.6	0
Building 9	Circular	548674.22	182260.90	9.6	0
Building 10	Circular	548666.99	182256.78	9.6	0
Building 11	Rectangular	548680.68	182310.93	9.5	183.91
Building 12	Circular	548673.71	182256.20	9.0	0
Building 13	Rectangular	548678.80	182291.67	9.0	187.01
Building 14	Rectangular	548697.09	182284.19	9.0	183.23
Building 15	Circular	548676.10	182276.47	9.6	0
Building 16	Circular	548675.32	182270.82	16.4	0

5.2.4 Meteorological Data

Hourly sequential meteorological data measured between 2020 and 2022 at the London City meteorological station has been employed in the assessment. This meteorological station is located approximately 6 km west of the development site and is considered to be the representative of site conditions.

The maximum predicted pollutant concentrations for each of the three years have been reported. The windrose diagrams for the station are presented in Appendix A.

5.2.5 Surface Roughness Length and Terrain

A surface roughness length of 1.5m was used in the dispersion modelling study for the dispersion site. This value is considered appropriate for the morphology of the assessment area and is suggested within ADMS 6 as being suitable for 'large urban areas'. A roughness length of 1.5m was considered appropriate for the morphology of the meteorological station and is suggested within ADMS 6 as being suitable for 'large urban areas'. The terrain surrounding the site is relatively flat.

5.2.6 Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 100m was used in the dispersion modelling for the study area and the meteorological station.

5.2.7 Discrete Receptors and Modelled Domain

5.2.7.1 Human Receptors

Following a review of the local area, representative worst case location sensitive human receptors have been selected and considered in the assessment. Furthermore, for the purpose of considering potential impacts at a greater number of locations by producing isopleths (pollution concentration contours), for the predicted annual concentrations, hypothetical grid receptors spaced at 20m covering approximately a domain of 5 x 5km have also been included.

Details of all discrete human receptors included in the modelling study are summarised in Table 5.3. Each discrete human receptor was assumed to be 1.5m above ground level (i.e. close to 'breathing height').

Table 5.3: Human Receptors Included in the Dispersion Modelling Assessment

Receptor ID	Receptor Location	Grid reference	
		X	Y
Long-term (LR) receptors: residential units (1-hour & annual mean NO_2 , 8-hour CO AQS apply)			
R1	Residential Receptor Lytham Close	548100	181317
R2	Residential Receptor Redbourne Dr	547681	181447
R3	Residential Receptor Greenhaven Drive	547160	181239
R4	Residential Receptor Shaw Garden	548146	183321
R5	Residential Receptor at Julia Gardens	548007	183400
R6	Residential Receptor at Oval Roads	549894	183189
R7	Residential Receptor Mardyke Close	550306	183065
R8	Residential Receptor South Close	549303	183526
R9	Residential Receptor New Road	549665	183288
R10	Residential Receptor Butteridges Close	548732	183583
R11	Residential Receptor at Wanderer Dr	547150	182919
R12	Residential Receptor at Fielders Crescent	547465	182760
Short-term (SR) receptors: warehouse units, industrial and education centre (1-hour mean NO_2 , 8-hour CO AQS apply)			
R13	Industrial receptor at Hindsman Way	548823	182184
R14	Industrial receptor at Hindsman Way	548555	182263

Receptor ID	Receptor Location	Grid reference	
		X	Y
R15	Warehouse at Hindsman Way (Industrial)	548664	182286
R16	Education Centre	547532	182856
R17	Industrial receptor at Hindsman Way	548545	182074

5.2.7.2 *Ecologically Sensitive Receptors*

As per the Defra and EA (2016) guidance, total annual mean NO_x concentrations should be calculated at discrete receptor locations within any special areas of conservation (SACs), special protection areas (SPAs) and Ramsar sites within 10km of the proposed development site, and at any sites of special scientific interest (SSSIs) and local nature sites (ancient woods, local wildlife sites and national and local nature reserves) within 2km of the proposed development site.

RSK referred to the Multi-Agency Geographic Information for the Countryside (MAGIC) Maps website and Essex Recorders partnership to determine the presence of these sites within the identified distances from the site. These receptors included the closest locations within a range of wind directions and therefore considered to include the worst-case locations within the designated ecological sites. Details of all discrete receptors included in the modelling study are summarised in Table 5.4 and shown in Figure B2 in Appendix B. All ecological receptors were modelled at ground level (i.e. 0m) to allow for a conservative assessment.

Furthermore, for the purpose of considering potential impacts at a greater number of locations by producing isopleths (pollution concentration contours), for the predicted annual concentrations, hypothetical grid receptors spaced at 50m covering approximately a domain of 10 x 10km have also been included, to cover areas where designated sites are present. All receptors were modelled at ground level (i.e. 0m) to allow for a conservative assessment.

Table 5.4: Discrete Receptors (as worst-case locations) Included in the Dispersion Modelling Assessment

Receptor ID	Receptor	Grid reference	
		X	Y
E1	Epping Forest SAC	539889	188216
E2	Ripple LNR	546916	182585
E3	Scrattons Ecopark and Extension LNR	548079	183262
E4	Crossness LNR	549292	180728
E5	Beam valley	550260	183324

5.2.8 Background Air Quality Data Used in the Modelling

For human receptors, due to lack of representative monitoring data in the study area, Defra background concentrations of NO_2 and PM_{10} has been applied for all receptor locations, as a conservative approach. Human receptor background concentrations used within the assessment are presented in **Table 5.5.**

For ecological receptors, background NO_x, acid deposition and nitrogen deposition values were taken from the APIS website. The grid reference and a habitat type for each ecological receptor were entered into the search tool in order to obtain background concentrations for the relevant grid squares for each receptor. Ecological receptor background concentrations used within the assessment are presented in **Table 5.6- 5.8**.

5.2.8.1 Human Receptors

As discussed in Section 4, the nearest background monitoring location to the development site is BG2, which is a suburban background monitoring location. However, NO_2 concentration at this location is less than Defra background concentrations at some of the receptor locations, so the Defra background data is used. Table 5.5 details background concentrations used for discrete human receptors within the assessment.

Table 5.5: Background NO_2 used in the Dispersion Modelling Assessment

Receptor ID	Annual Average NO_2 ($\mu g/m^3$)	8 Hourly Average CO ($\mu g/m^3$)
R1	19.55	0.00
R2	17.06	0.00
R3	17.06	0.00
R4	21.27	0.41
R5	21.27	0.41
R6	22.91	0.40
R7	17.68	0.40
R8	22.91	0.40
R9	22.91	0.40
R10	21.27	0.41
R11	16.74	0.42
R12	16.74	0.42
R13	18.45	0.41
R14	18.45	0.41
R15	18.45	0.41
R16	16.74	0.42
R17	18.45	0.41

5.2.8.2 Ecologically Sensitive Receptors

Background NO_x concentrations and background nitrogen deposition rates for the area around the conservation sites were obtained from the UK Air Pollution Information System (APIS) website using the 'search by location' function. This data is based on resolutions of 1 to 5 km grid squares.

Table 5.6 presents the estimated annual average background NO_x concentrations at the discrete ecological receptors. It is noted that the background NO_x concentrations are well below the objective of 30µg/m^3 at all receptor locations.

Table 5.6: APIS Estimated Annual Average NO_x at Ecological Sites

Discrete Ecological Receptors	Ecological Site	Annual Average NO_x Concentration (µg/m^3)
E1	Epping Forest SAC	33.32
E2	Ripple LNR	30.81
E3	Scrattons Ecopark and Extension LNR	34.74
E4	Crossness LNR	27.16
E5	Beam valley LNR	29.24
Air Quality Objective*		**30**
*Air quality objective designated for the protection of vegetation and ecosystems.		

The nitrogen deposition and acid deposition values were taken from the Air Pollution Information System (APIS) search by location tool whereas broad habitat type was determined using the MAGIC Maps website. The background nitrogen and acid deposition rates obtained from APIS, used in this assessment, are presented in Table 5.7.

Table 5.7: Background Nitrogen Deposition Rates and Acid Deposition Rates used in the Assessment

Receptor ID	Ecological Site	Main Habitat	Habitat Applied in the Assessment	Existing Background Nitrogen Deposition Rate (kgN/ha/yr)	Existing Background N Acid Deposition Rate (keq/ha/yr)	Existing Background S Acid Deposition Rate (keq/ha/yr)
E1	Epping Forest SAC	European dry heaths	"Dry heaths Dwarf shrub heath"	11.23	1.26	0.21
E2	Dwarf shrub heath"	Broadleaved, Mixed and Yew Woodland	Broadleaved, Mixed and Yew Woodland	28.17	2.01	0.23
E3	Ripple LNR	Broadleaved, Mixed and Yew Woodland	Broadleaved, Mixed and Yew Woodland	27.53	1.97	0.24
E4	Scrattons Ecopark and Extension LNR	Arctic-alpine calcareous grassland	Arctic-alpine calcareous grassland	14.67	1.05	0.19
E5	Crossness LNR	Arctic-alpine calcareous grassland	Arctic-alpine calcareous grassland	14.70	1.05	0.19

5.2.9 Processing of Results

NO_x emitted to the atmosphere as a result of combustion will consist largely of nitric oxide (NO). Once released into the atmosphere, NO is oxidised to NO_2, which is of concern with respect to health and other impacts. The proportion of NO converted to NO_2 depends on a number of factors including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone (O_3). The dispersion modelling exercise predicts concentrations of NO_x which subsequently require conversion to NO_2 for comparison with objectives for human health. The long and short-term predicted NO_x Process Contributions (PCs) have been converted to the respective NO_2 concentrations using 70% for long-term emissions and 35% for short term emissions based on 'worst case' conversion criteria referenced by the Environment Agency[2]. For comparison with the NO_x objectives for ecological receptors, the results do not need to be converted as above.

The total pollutant concentrations (Predicted Environmental Concentrations (PECs)) are calculated from the Process Contribution (PC) as follows:

- Annual mean pollutant standards: PEC = PC + Background Concentration
- Other (short term) standards: $PEC_{short\ term} = PC_{short\ term} + (2 \times Background_{long\ term})$.

[2] Environment Agency, (n.d.). CONVERSION RATIOS FOR NO_X AND NO_2.

5.2.10 Nitrogen and Acid Deposition Calculations

Total annual mean NO_x concentrations, and acid and nitrogen deposition rates, were calculated at the identified discrete ecological receptor locations. The contribution of NO_2 emitted by the plant to nitrogen and acid deposition on sensitive ecological receptors has been determined by following the methodology set out in AQTAG06 (EA, 2014).

The broad habitat types identifiable at each identified ecological site were determined using information available on the APIS for the purpose of the nitrogen and acid deposition calculations. Where more than one habitat type was identified within each ecological site, it has been assumed that the habitat most sensitive to the development is represented at the modelled discrete receptor location, for a conservative assessment.

Background NO_x concentrations, the critical nitrogen deposition loading capacities, the nitrogen acid deposition loading capacities, and background nitrogen and acid deposition rates, were obtained from the APIS website.

The nitrogen deposition process contributions (PCs) were compared to the applicable nitrogen deposition lower critical loads. The acid deposition process contributions (PCs) were compared to the critical load. The relevant critical loads for nitrogen deposition and acidification critical loads, taken from APIS, at the identified ecological receptors are presented in Table 5.8. The results of the dispersion modelling assessment are discussed in Section 6.

Table 5.8: Critical Loads for Nitrogen Deposition and acidification critical loas

Receptor ID	Habitat	Nutrient Nitrogen Critical Load* (kgN/ha/yr)	CLMaxS (keqN/ha/yr)	CLMinN (keqN/ha/yr)	CLMaxN (keqS/ha/yr)
E1	European dry heaths	5	0.88	0.71	1.59
E2	Broadleaved, Mixed and Yew Woodland	10	8.27	0.36	8.62
E3	Broadleaved, Mixed and Yew Woodland	10	1.68	0.36	2.04
E4	Arctic-alpine calcareous grassland	5	4.00	1.07	5.07
E5	Arctic-alpine calcareous grassland	5	4.00	1.07	5.07
*Lower critical load used in assessment for conservative assessment					

5.3 Significance Criteria

The significance of the PC arising from the plant has been determined using the criteria outlined in the Defra & EA (2016) guidance. These are intended for use in interpreting the results of an air quality screening assessment to determine whether further detailed modelling is required, but they provide a useful guide to the significance of an impact in the absence of any agreed criteria relating to the assessment of impacts from dispersion modelling.

However, the PCs have also been viewed in context of the 'headspace' between predicted pollutant concentrations and the applicable AQS, whether they represent 'relevant exposure' and of the number of exceedances of any screening criteria which are exceeded.

Based on the Defra and EA 2016 screening criteria, the PC from the plant can be considered to be insignificant if the following primary criteria are met:

- The short-term PC is less than 10% of the short-term AQS / environmental assessment level (EAL); and
- The long-term PC is less than 1% of the long-term AQS / EAL.

If these criteria are met then the impact can be considered to be insignificant, if the criteria aren't met, then the secondary stage criteria can be used, which are:

- The short-term PC is less than 20% of the short-term AQS / EAL minus twice the long-term background concentration; and

- The long-term PEC is less than 70% of the long-term AQS / EAL.

If the second stage criteria are met, then the impact can be considered to be insignificant. However, if the criteria are not met, this does not necessarily mean an impact is significant and consideration has been given as to whether the PEC exceeds the relevant standards and consideration of the conservative nature of this assessment.

5.4 Uncertainties and Assumptions

The following uncertainties and assumptions have been made in the air quality assessment:

- Estimated background data from the APIS website were used in the assessment. It is assumed that these background concentrations are likely to be applicable for the lifetime of the development, which is considered to be a conservative assumption;
- There will be uncertainties introduced because the modelling has simplified real-world processes into a series of algorithms. For example, it has been assumed that wind conditions measured at the London City Meteorological station for 2020 to 2022 were representative of wind conditions at and around the site. Furthermore, it has been assumed that the subsequent dispersion of emitted pollutants will conform to a Gaussian distribution in order to simplify the real-world dilution and dispersion conditions;
- There is an element of uncertainty in all measured and modelled data. All values presented in this report are considered reasonable estimates. Where estimations in emissions are made, these are overestimated and hence the impacts on local air quality reported are considered to be conservative in nature.

6 OPERATIONAL PHASE RESULTS

The main impact of the development is considered to be exhaust emissions from the boiler when operational on sensitive receptors in the area surrounding the site. The modelling results of highest concentration predicted across all three years are presented in the following subsections for discrete human and ecological receptors.

The client had informed that the boiler will be operational during weekdays from 6am-10pm. However, we have considered the boiler to be operational 24x7 throughout the year in the modelling for conservative assessment.

The operating hours will be applied to the calculation of long-term concentration of NO_x, NO_2.

In addition, contour plots for predicted concentrations are presented in Appendix C. The contours detail the maximum predicted concentration at each gridded receptor location across 2022 as highest concentration was observed during this year.

6.1 Impacts on Human Receptors

6.1.1 Annual Mean NO_2 Impacts

The AQS for annual mean NO_2 concentrations is 40µg/m^3. The maximum magnitude of change in annual mean NO_2 concentrations at the assessed discrete receptors representative of relevant human exposure, assessed across any of the meteorological years modelled, is described in Table 6.1 below.

The results of the assessment indicate that with the natural gas boiler, predicted annual mean NO_2 concentrations for all receptor locations will be below the AQS. The highest annual mean NO_2 concentration was predicted to be 22.95 µg/m^3 at both R6 and R9 (see **Table 6.1**).

As shown on Table 6.1, predicted annual mean NO_2 PCs resulting from the operation of the site are below 1% screening criteria at all the modelled receptors, and annual mean NO_2 PECs are below 70% of the AQS at all relevant discrete receptor locations. The operation of the proposed development does not cause any exceedance of the annual mean NO_2 AQS when the PECs are considered. Therefore, impact of the development on annual mean NO_2 concentrations, at sensitive human receptors, is considered to be ‘not significant’.

Table 6.1: Predicted Annual NO_2 Concentrations at Discrete Receptors - Highest Results for Each Receptor

Receptor ID	Annual Mean NO_2 Background ($\mu g/m^3$)	Annual Mean NO_2 Concentration ($\mu g/m^3$)			
		PC ($\mu g/m^3$)	PC as % of Objective	PEC ($\mu g/m^3$)	PEC as % of Objective
R1	19.55	0.01	0.0%	19.57	48.9%
R2	17.06	0.02	0.0%	17.08	42.7%
R3	17.06	0.01	0.0%	17.07	42.7%
R4	21.27	0.01	0.0%	21.28	53.2%
R5	21.27	0.01	0.0%	21.28	53.2%
R6	22.91	0.04	0.1%	22.95	57.4%
R7	17.68	0.02	0.1%	17.71	44.3%
R8	22.91	0.02	0.1%	22.93	57.3%
R9	22.91	0.04	0.1%	22.95	57.4%
R10	21.27	0.01	0.0%	21.28	53.2%
R11	16.74	0.01	0.0%	16.75	41.9%
R12	16.74	0.01	0.0%	16.76	41.9%
R13	Short-term AQS are applicable these receptors				
R14					
R15					
R16					
R17					
AQS / EAL Objective	40 $\mu g/m^3$				

6.1.2 99.8th Hourly Mean NO_2 Concentrations

The maximum 99.8th hourly mean NO_2 concentrations at the assessed discrete human receptors representative of relevant exposure, assessed across any of the meteorological years modelled, is described in Table 6.2 below.

The results of the assessment indicate that with the natural gas boiler, predicted hourly mean NO_2 concentrations for all receptor locations will be below the AQS objective. Predicted PCs of 1-hour mean NO_2 concentration are below 10% of the AQS at all receptors except at nearest worst case receptor R15 (36.4%) exceeding the second stage screening criteria of 20%, however, predicted 1-hour mean NO_2 PECs at all discrete receptors including R15 are well below the AQS. The highest hourly mean NO_2 concentration was predicted to be 109.69 $\mu g/m^3$ at R15 (industrial receptor) which is well below the hourly AQ standard. Therefore, impact of the development on hourly mean NO_2 concentrations, at sensitive human receptors, is considered to be 'not significant'.

Table 6.2 Predicted Hourly Mean NO_2 Concentrations at Discrete Receptors - Highest Results for Each Receptor

Receptor ID	Annual Mean NO_2 Background ($\mu g/m^3$)	99.8th Hourly Mean NO_2 Concentration ($\mu g/m^3$)			
		PC ($\mu g/m^3$)	PC as % of Objective	PEC ($\mu g/m^3$)	PEC as % of Objective
R1	39.11	0.33	0.2%	39.44	19.7%
R2	34.11	0.27	0.1%	34.39	17.2%
R3	34.11	0.17	0.1%	34.28	17.1%
R4	42.54	0.32	0.2%	42.86	21.4%
R5	42.54	0.27	0.1%	42.81	21.4%
R6	45.82	0.24	0.1%	46.06	23.0%
R7	35.37	0.18	0.1%	35.55	17.8%
R8	45.82	0.25	0.1%	46.07	23.0%
R9	45.82	0.28	0.1%	46.10	23.0%
R10	42.54	0.22	0.1%	42.76	21.4%
R11	33.48	0.19	0.1%	33.67	16.8%
R12	33.48	0.27	0.10%	33.76	16.90%
R13	36.89	4.96	2.5%	41.86	20.9%
R14	36.89	10.08	5.0%	46.97	23.5%
R15	36.89	72.80	36.4%	109.69	54.8%
R16	33.48	0.29	0.1%	33.77	16.9%
R17	36.89	3.21	1.6%	40.10	20.1%
AQS / EAL Objective	200 $\mu g/m^3$				

6.1.3 Maximum 8-hour Mean CO Concentrations

The maximum 8-hour mean CO concentrations at the assessed discrete human receptors representative of relevant exposure, assessed across any of the meteorological years modelled, is described in Table 6.5 below.

The results of the assessment indicate that with the natural gas boiler, predicted 8-hour mean CO concentrations for all receptor locations are below the AQS objective. Predicted PCs of 8-hour mean CO concentration are below 1.5% of the AQS at all receptors, furthermore, all predicted 8-hour mean CO PECs at discrete receptors are well below the AQS. The highest 8-hour mean CO concentration was predicted to be 134 $\mu g/m^3$ at R15 (see Table 6.5). Therefore, impact of the development on 8-hour mean CO concentrations, at sensitive human receptors, is considered to be 'not significant'.

Table 6.5 Predicted 8-hour Mean CO Concentrations at Discrete Receptors - Highest Results for Each Receptor

Receptor ID	Annual Mean CO Background (µg/m^3)	Maximum 8-hour Mean CO Concentration (µg/m^3)			
		PC (µg/m^3)	PC as % of Objective	PEC (µg/m^3)	PEC as % of Objective
R1	0.00	0.41	0.0%	0.41	0.0%
R2	0.00	0.57	0.0%	0.57	0.0%
R3	0.00	0.33	0.0%	0.33	0.0%
R4	0.41	0.51	0.0%	1.32	0.0%
R5	0.41	0.42	0.0%	1.24	0.0%
R6	0.40	0.59	0.0%	1.40	0.0%
R7	0.40	0.26	0.0%	1.05	0.0%
R8	0.40	0.47	0.0%	1.28	0.0%
R9	0.40	0.58	0.0%	1.39	0.0%
R10	0.41	0.41	0.0%	1.23	0.0%
R11	0.42	0.36	0.0%	1.19	0.0%
R12	0.83	10.60	0.1%	11.41	0.1%
R13	0.81	23.70	0.2%	24.51	0.2%
R14	0.81	0.52	0.0%	1.35	0.0%
R15	0.81	134.69	1.3%	135.50	1.4%
R16	0.83	0.54	0.0%	1.37	0.0%
R17	0.81	4.43	0.0%	5.24	0.1%
AQS / EAL Objective	10,000 µg/m3				

6.2 Impacts on Ecological Receptors

6.2.1 Annual Mean NO_x Concentrations

Table 6.8 presents the maximum annual mean NO_x PCs and PECs at each of the assessed ecological receptor locations out of those obtained from the three meteorological years modelled has been compared to the annual mean NO_x EAL.

Table 6.8: Annual Average NO_x Concentrations at Ecologically Sensitive Sites

Receptor ID	NO_x baseline (µg/m^3)	AQS/EAL (µg/m^3)	NO_x PC (µg/m^3)	PC as a % of AQS/EAL	NO_x PEC (µg/m^3)	PEC as a % of AQS/EAL
E01	33.32	30	0.0004	0.001%	33.3184	111%
E02	30.81	30	0.0164	0.055%	30.8264	103%
E03	34.74	30	0.0182	0.061%	34.7582	116%
E04	27.16	30	0.0140	0.047%	27.1740	91%

Receptor ID	NO_X baseline ($\mu g/m^3$)	AQS/EAL ($\mu g/m^3$)	NO_X PC ($\mu g/m^3$)	PC as a % of AQS/EAL	NO_X PEC ($\mu g/m^3$)	PEC as a % of AQS/EAL
E05	29.24	30	0.0372	0.124%	29.2772	98%

The predicted maximum annual mean NO_x PCs are well below the EA screening criteria of 1% at all SPA/SAC/Ramsar receptor locations. Therefore, the impact of the development on annual mean NO_x concentrations, on ecological receptors, is considered to be 'not significant'.

6.2.2 Daily Mean NO_x concentrations

Table 6.9 presents the maximum daily mean NO_x PCs and PECs at each of the assessed ecological receptor locations out of those obtained from the three meteorological years modelled has been compared to the daily NO_x EAL.

The predicted maximum daily mean NO_x PCs are well below the EA screening criteria of 10% at all discrete receptor locations. Therefore, the impact of the development on daily mean NO_x concentrations, on ecological receptors is considered to be 'not significant'.

Table 6.9: Daily Average NOx Concentrations at Ecologically Sensitive Sites

Receptor ID	NO_X baseline ($\mu g/m^3$)	AQS/EAL ($\mu g/m^3$)	NO_X PC ($\mu g/m^3$)	PC as a % of AQS/EAL	NO_X PEC ($\mu g/m^3$)	PEC as a % of AQS/EAL
E01	33.32	75	0.009	0.0%	66.64	88.86
E02	30.81	75	0.183	0.2%	61.80	82.40
E03	34.74	75	0.281	0.4%	69.76	93.01
E04	27.16	75	0.245	0.3%	54.57	72.75
E05	29.24	75	0.229	0.3%	58.71	78.28

6.2.3 Nitrogen Deposition

The highest process contribution at the assessed ecological receptor location out of those obtained from the three meteorological years modelled has been presented as a percentage of the lower critical load. The lowest critical load available on the APIS website, is used to provide for a conservative assessment. Results are summarised in Table 6.10.

It is noted that the total nitrogen deposition exceeded the lower critical loads at all receptor locations, due to the high background nitrogen deposition already exceeding the lower critical loads. However, it should be noted that the predicted nitrogen deposition PC, as a percentage of the lower critical load are all well below the 1% EA screening criteria, indicating that the PC would have minimal impact on nitrogen deposition at any of the ecosystems assessed. The overall impact of the development on nitrogen deposition is considered to be not significant.

6.2.4 Acid Deposition

The highest process contribution at the assessed ecological receptor location out of those obtained from the three meteorological years modelled has been presented as a percentage of the critical load. The critical load available on the APIS website is used to provide for a conservative assessment. Results are summarised in Table 6.11.

The predicted acid deposition PC as a percentage of the critical load, were predicted to be below 1% at all discrete receptors considered. The highest PC as a percentage of the minimum critical load function was 0.013% at the Scrattons Ecopark and Extension LNR, therefore indicating that the process contribution would have minimal impact on acidification at any of the ecosystems identified.

Table 6.10: Nitrogen Deposition Contribution at Ecological Sensitive Sites

Receptor ID	Receptor	Broad Habitat Type	PC (kg N/ha/yr)	Background N Deposition (kg N/ha/yr)	Total N Deposition (kg N/ha/yr)	Lower Critical Load	Process Contribution as a % of Lower Critical Load
E1	Epping Forest SAC	Dry heaths Dwarf shrub heath	0.000	11.227	11.227	5	0.001%
E2	Ripple LNR	Broadleaved, Mixed and Yew Woodland	0.003	28.170	28.173	10	0.033%
E3	Scrattons Ecopark and Extension LNR	Broadleaved, Mixed and Yew Woodland	0.004	27.530	27.534	10	0.037%
E4	Crossness LNR	Arctic-alpine calcareous grassland	0.001	14.670	14.671	5	0.028%
E5	Beam valley LNR	Arctic-alpine calcareous grassland	0.004	14.700	14.704	5	0.075%

Table 6.11: Acid Deposition at Ecological Sensitive Sites

Receptor ID	Receptor	Broad Habitat Type	Process Nitrogen Acid Deposition (keq/ha/yr)	Process Sulphur Acid Deposition (keq/ha/yr)	Background Acid Deposition (keq/ha/yr)		Maximum Critical Load (Sulphur) (keq/ha/yr)	Minimum Critical Load (Nitrogen) (keq/ha/yr)	Maximum Critical Load (Nitrogen) (keq/ha/yr)	Process Contribution as a % of lower critical load	
					Nitrogen	Sulphur				PC	PEC
E1	Epping Forest SAC	Dry heaths Dwarf shrub heath	0.0000	NA	1.260	0.210	0.88	0.71	1.59	0.000%	92.22%
E2	Ripple LNR	Broadleaved, Mixed and Yew Woodland	0.0002	NA	2.010	0.230	8.27	0.36	8.62	0.003%	25.98%
E3	Scrattons Ecopark and Extension LNR	Broadleaved, Mixed and Yew Woodland	0.0003	NA	1.970	0.240	1.68	0.36	2.04	0.013%	108.29%
E4	Crossness LNR	Arctic-alpine calcareous grassland	0.0001	NA	1.050	0.190	4.00	1.07	5.07	0.002%	24.46%
E5	Beam valley LNR	Arctic-alpine calcareous grassland	0.0003	NA	1.050	0.190	4.00	1.07	5.07	0.005%	24.46%

6.3 Overall Effects

As identified above:

- There are no predicted exceedances representative of relevant exposure of the annual mean NO_2 and hourly NO_2 AQSs at any of the relevant discrete off-site sensitive human receptor locations.
- There are no predicted exceedances representative of relevant exposure of the 8-hour CO AQSs at any of the relevant discrete off-site sensitive human receptor locations.
- For ecological receptors, the predicted maximum annual mean NO_x PCs are well below the EA screening criteria of 1% at all modelled receptor locations and, and the predicted maximum daily mean NO_x PCs are well below the EA screening criteria of 10% at all discrete receptor locations.
- The predicted nitrogen deposition and acid deposition PCs for the proposed use, as a percentage of the critical load are all well below the 1% EA screening criteria.

Taking the conservative nature of the assessment and the above results into consideration, the impact on local air quality from the operation of the plant is considered to be ‘not significant’.

7 SUMMARY AND CONCLUSIONS

An assessment of air quality impacts in relation to the proposed installation and operation of a natural gas boiler at new uncooked oil treatment plant at Hindsman Way, Dagenham has been undertaken, with reference to existing air quality in the area and relevant air quality legislation, policy and guidance.

The potential impact of the natural gas boiler on local air quality has been assessed using ADMS-6, an advanced dispersion model developed for regulatory purposes, and used meteorological data measured between 2020 and 2022 at the London City meteorological station. Buildings/structures to account for downwash effects have been included in the air dispersion model. Concentrations of the key air pollutants (NO_x, NO_2, and CO) have been predicted at discrete receptors including existing sensitive receptors.

Hypothetical gridded receptors at a regular spacing 20m covering approximately a domain of 5x 5km centred over the development site and nearby sensitive human receptors, and spacing 50m covering approximately a domain of 10 x 10km covering sensitive ecological receptors. Background concentrations were used in combination with the predicted PC from the operation of the natural gas boiler, in order to determine the total PEC for each pollutant and relevant averaging period.

The highest predicted impacts at any of the modelled discrete receptor locations representative of relevant exposure in any of the three modelled meteorological years have been reported and compared to the relevant AQSs. For human receptors, there are no predicted exceedances representative of relevant exposure of the annual mean NO_2 and hourly NO_2 AQSs at any of the relevant discrete off-site sensitive human receptor locations. There are no predicted exceedances representative of relevant exposure of the 8-hour CO AQSs. Therefore, the impact of the development on human health is considered to be not significant.

For ecologically sensitive receptors, the predicted maximum annual mean NO_x PCs are well below the EA screening criteria of 1% at all modelled receptor locations. The predicted maximum daily mean NOx PCs are well below the EA screening criteria of 10% at all discrete receptor locations. Therefore, the impact of the proposed development on annual and daily mean NO_x concentrations is considered to be ‘not significant’. The predicted nitrogen deposition and acid deposition PCs for the proposed use, as a percentage of the critical load are well below the 1% EA screening criteria at all receptor locations. Therefore, the overall impact of the development on ecological receptors is considered to be not significant.

Taking the conservative nature of the assessment and the above results into consideration, the impact on local air quality from the operation of the development is considered to be ‘not significant’.

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APPENDIX A - WINDROSES

This appendix contains the 2020 – 2022 windroses for the London City Meteorological Station

Figure B1: Windrose for the London City Meteorological Station – 2020

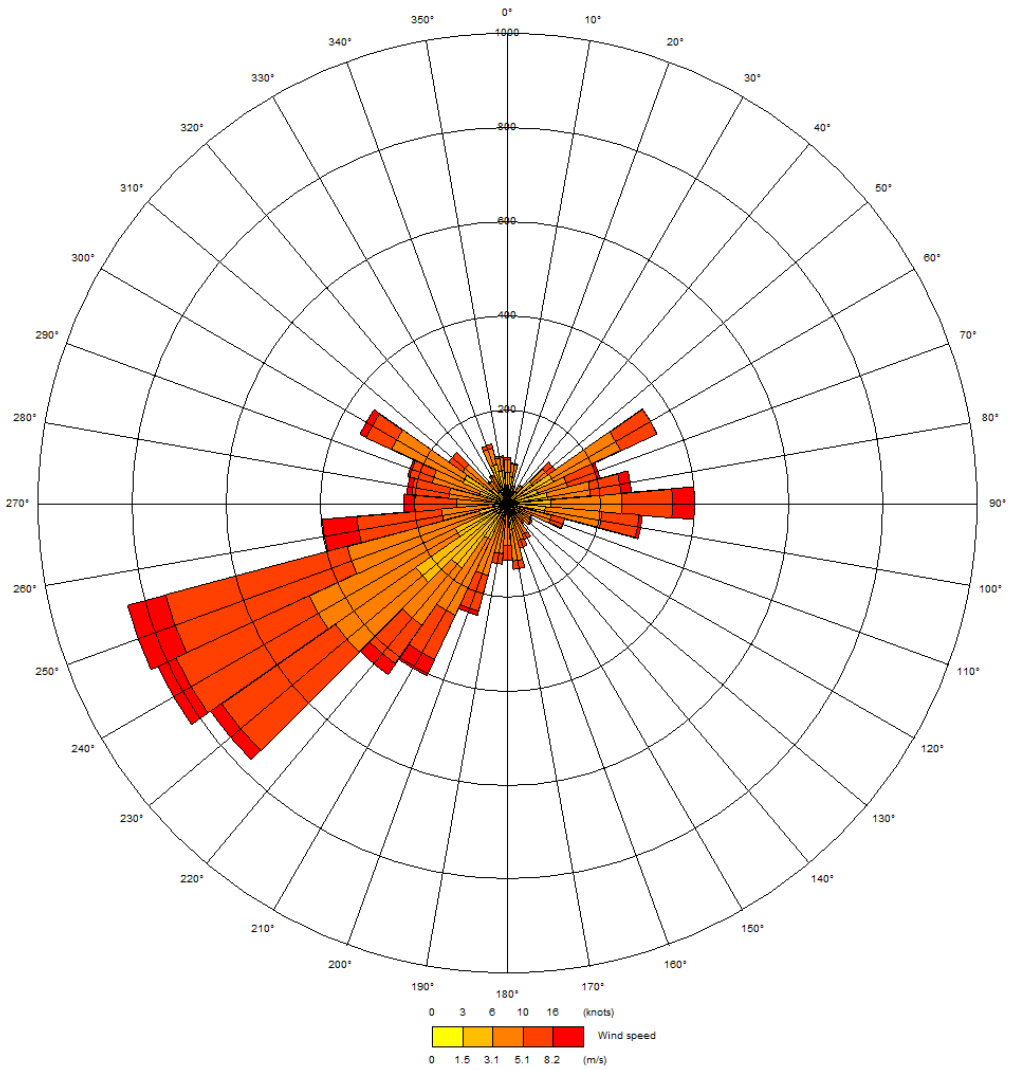


Figure B2: Windrose for the London City Meteorological Station – 2021

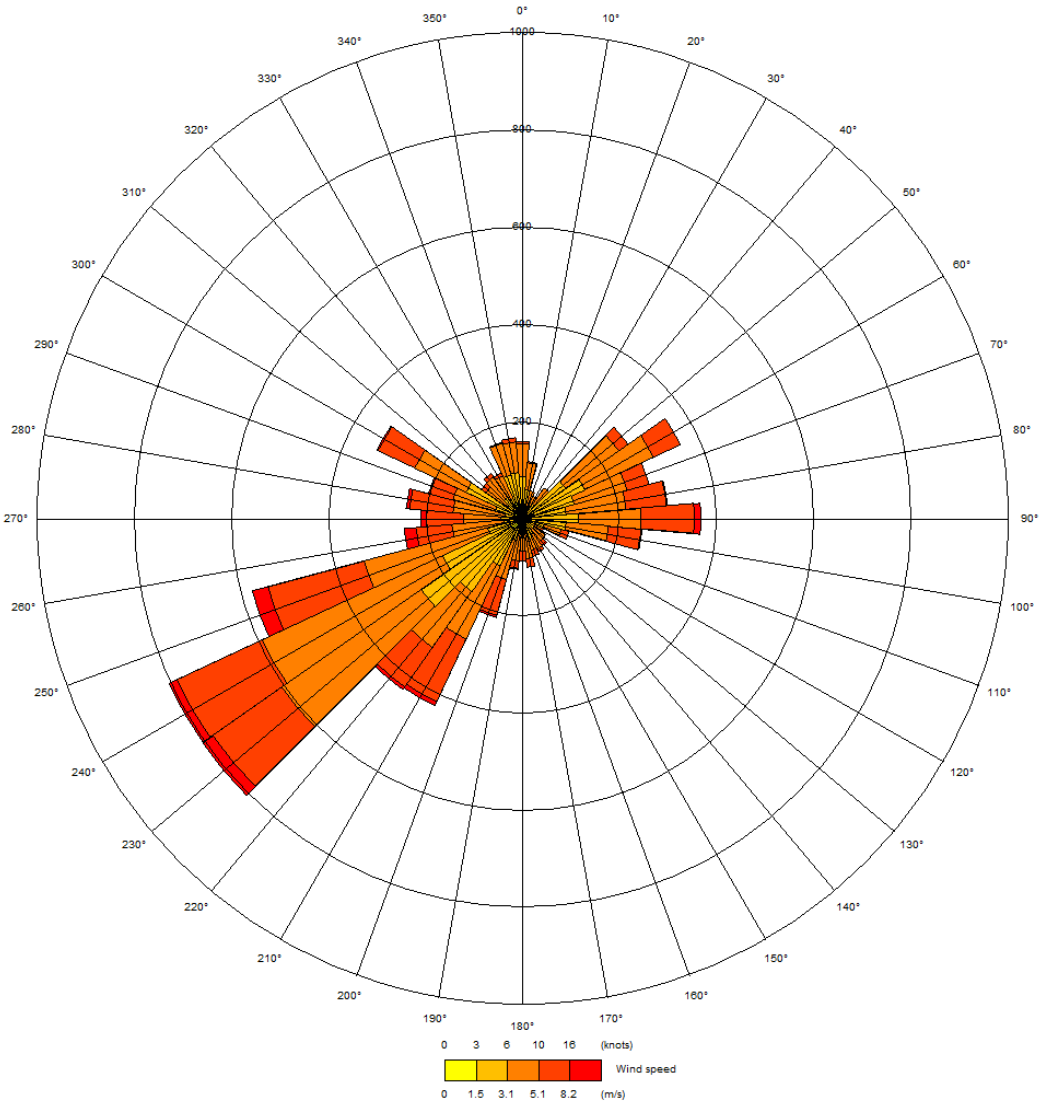
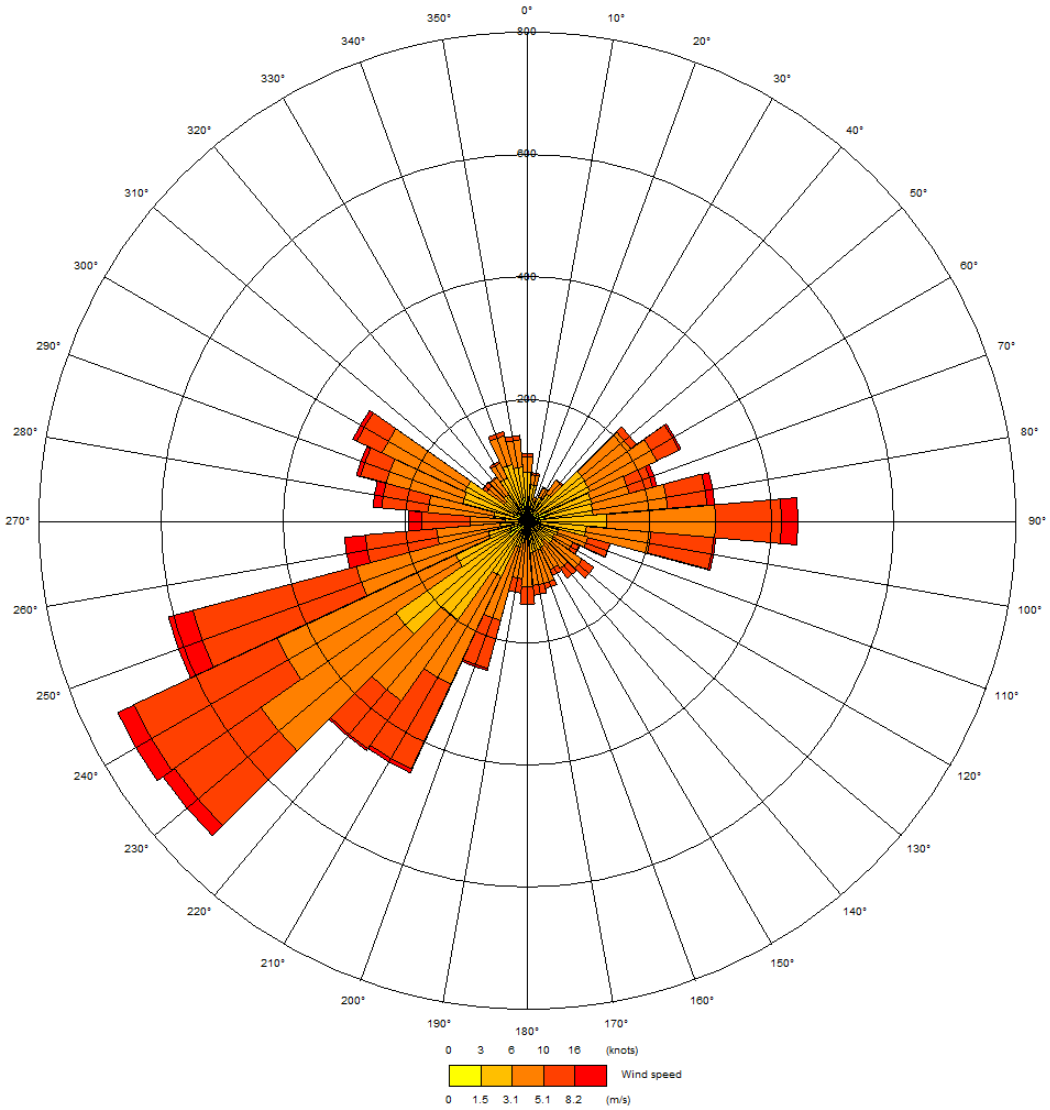


Figure B3: Windrose for the London City Meteorological Station – 2022



APPENDIX B - FIGURES

This appendix contains the following figures referenced within this report:

Figure B1: Human Receptors included in the Dispersion Modelling Assessment

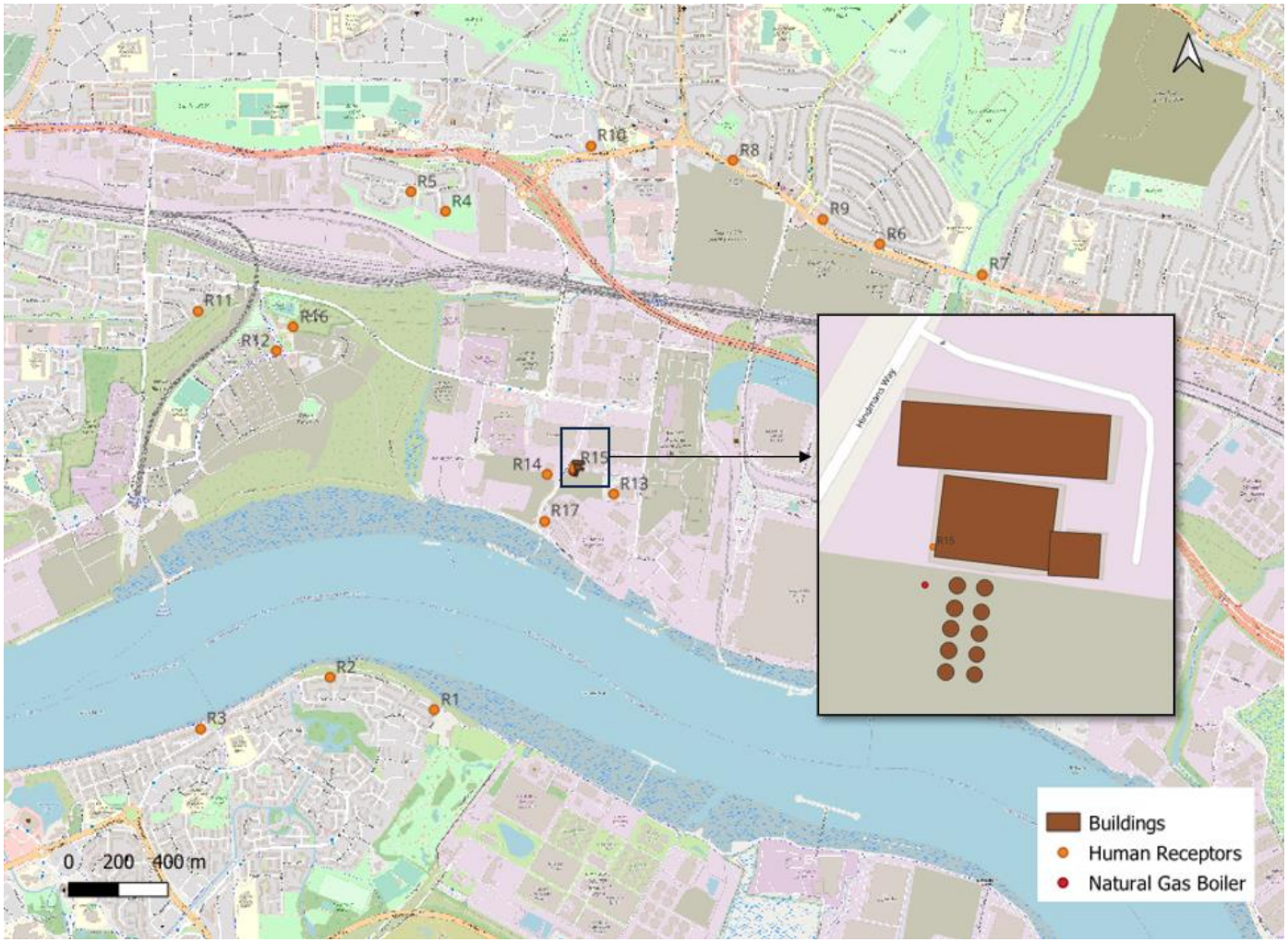
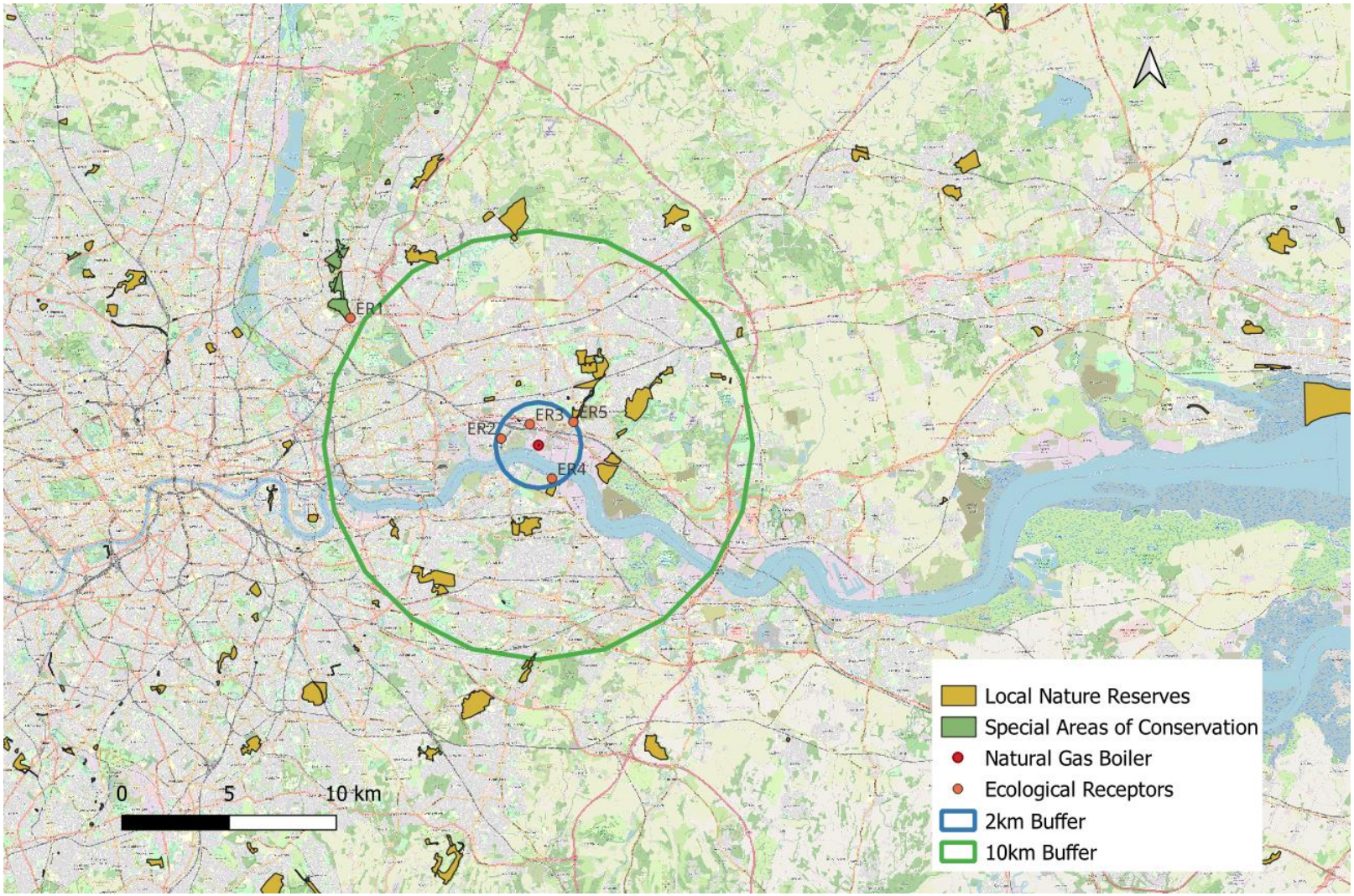


Figure B2: Ecological Receptors included in the Dispersion Modelling Assessment



APPENDIX C - CONTOUR PLOTS SHOWING PREDICTED POLLUTANT CONCENTRATIONS

This appendix contains contour plot (isopleths) illustrating the dispersion profiles of emission components released from the plant. The data is based on the meteorological data year which experienced the highest pollutant concentrations. Average background pollutant concentrations across the study area have been applied.

Figure C1 Predicted Annual Average NO_2 Concentrations (µg/m^3) PEC – relevant for human receptor locations – 2022 met data

Figure C2: Predicted 99.8th Percentile of Hourly NO_2 Concentrations (µg/m^3) PEC – relevant for human receptor locations – 2022 met data

Figure C3: Predicted Annual Average NO_x Concentrations (µg/m^3) PEC – relevant for ecological receptor locations – 2022 met data

Figure C4: Predicted Daily Average NO_x Concentrations (µg/m^3) PEC – relevant for ecological receptor locations – 2022 met data

Figure C5: Predicted 8 Hourly Rolling Average CO Concentrations (µg/m^3) PEC – relevant for ecological receptor locations – 2022 met data