SUEZ Recycling and Recovery UK Ltd

SUEZ Holloway Lane AD Facility, West Drayton, UB7 0AE

Air Quality Impact Assessment

1st February 2024

PRESENTED TO

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EXECUTIVE SUMMARY

The report presents the findings of an air quality impact assessment undertaken to support an Environmental Permit Application to operate an installation activity which involves the anaerobic digestion (AD) of separately collected food waste as a new operation at Holloway Lane, West Drayton, UB7 0AE.

The proposed AD facility will comprise the operations of a Combined Heat and Power (CHP) engine which will have a capacity of 1.2-megawatt electrical output (MW el).

The long-term and short-term predicted environmental concentrations of NO_2 from the operations of the proposed CHP are all below the relevant air quality objectives for the protection of human health. The short-term predicted environmental concentrations of SO_2 from the operations of the proposed CHP are below the relevant air quality objectives for the protection of human health.

The effects of NO_2 and SO_2 emission impacts from the operations of the proposed CHP on the human receptors are considered to be 'not significant'.

The effects of NO_x and SO_2 emission impacts from the operations of the proposed CHP on the ecological receptors are 'not significant' for the protection of vegetation and ecosystems.

In summary, both NO_x and SO_2 emission impacts from the operations of the proposed CHP on the human receptors and ecological receptors are 'not significant'.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AD	Anaerobic Digestion
AQAL	the Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Standards
CHP	Combined Heat and Power
CL	Critical Level
DEFRA	Department for Environment Food & Rural Affairs
EAL	Environmental Assessment Limits
EC	European Commission
EPUK	Environmental Protection UK
EU	European Union
EPAQS	The Expert Panel on Air Quality Standards
GLA	Greater London Authority
IAQM	The Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NGR	The United Kingdom National Grid Reference
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_x	Total oxides of nitrogen
PC	Process Contribution
MHCLG	the Ministry for Housing, Communities and Local Government
OS	the UK Ordnance Survey
PEC	Predicted Environment Concentration
SAC	Special Areas of Conservation
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
STP	Standard temperature and pressure
TETRA TECH	Tetra Tech Limited
WHO	World Health Organization
UK	The United Kingdom
USEPA	United States Environmental Protection Agency
°C	Temperature (in Celsius)
g/s	Gram per second
m/s	Velocity (in metres per second)
$\mu g/m^3$	Concentration (in micrograms per cubic metre)
mg/Nm^3	Concentration (in milligrams per cubic metre at standard conditions
mg/s	Emission rate (in milligrams per second)
%ile	Percentile
%(v/v)	Percentage (volume per volume)

1.0 INTRODUCTION

Tetra Tech Limited has been commissioned by SUEZ Recycling and Recovery UK Ltd to prepare an air quality impact assessment undertaken to support an Environmental Permit Application to operate an installation activity which involves the anaerobic digestion (AD) of separately collected food waste as a new operation at Holloway Lane, West Drayton, UB7 0AE.

The process of the proposed AD facility will generate biogas which will be processed by a Combined Heat and Power (CHP) engine to generate heat and electricity that would be used by the AD plant. Once the parasitic load has been met, any excess biogas will be processed by a gas upgrading plant to National Gas Grid criteria and injected into the gas grid. Alternatively, excess biogas will be processed by the CHP engines to generate electricity that will be exported to the National Grid.

The CHP engine will have a capacity of 1.2MW and therefore it's considered that the CHP engine will be subject to the Medium Combustion Plant Directive (MCPD) and therefore will comprise a MCP with a specified generator (SG).

1.1 SITE LOCATION

The Holloway Lane AD Site is located approximately 445 m south from West Drayton at Holloway Lane, Sipson, Middlesex, UB7 0AE and is centred at approximate National Grid Reference (NGR) TQ 06719 78035.

The location of the site and site environmental permit boundary are shown in **Figure 1-1**, the Holloway Lane site layout is shown in **Figure 1-2**, and the AD facility site layout plan is shown in **Figure 1-3**.

1.2 OVERVIEW AND SCOPE OF ASSESSMENT

The potential impacts from the operations of the CHP at the proposed AD facility and operations of have been assessed.

There will be a flare at the proposed AD facility, however, the flare will only be used as a contingency when the CHP engine is not available. Therefore, this flare has not been included in the modelling.

The emission sources in the assessment include:

(1) 1 x CHP - a Jenbacher J416GS-B.L generator at the proposed AD facility.

The objective of this Air Quality Assessment is to determine whether off-site impacts from the considered emission sources meet the required air quality objectives (AQOs) or air quality Environmental Assessment Limits (EALs) for the protection of human health, vegetation and habitats.

Figure 1-1. Site Location

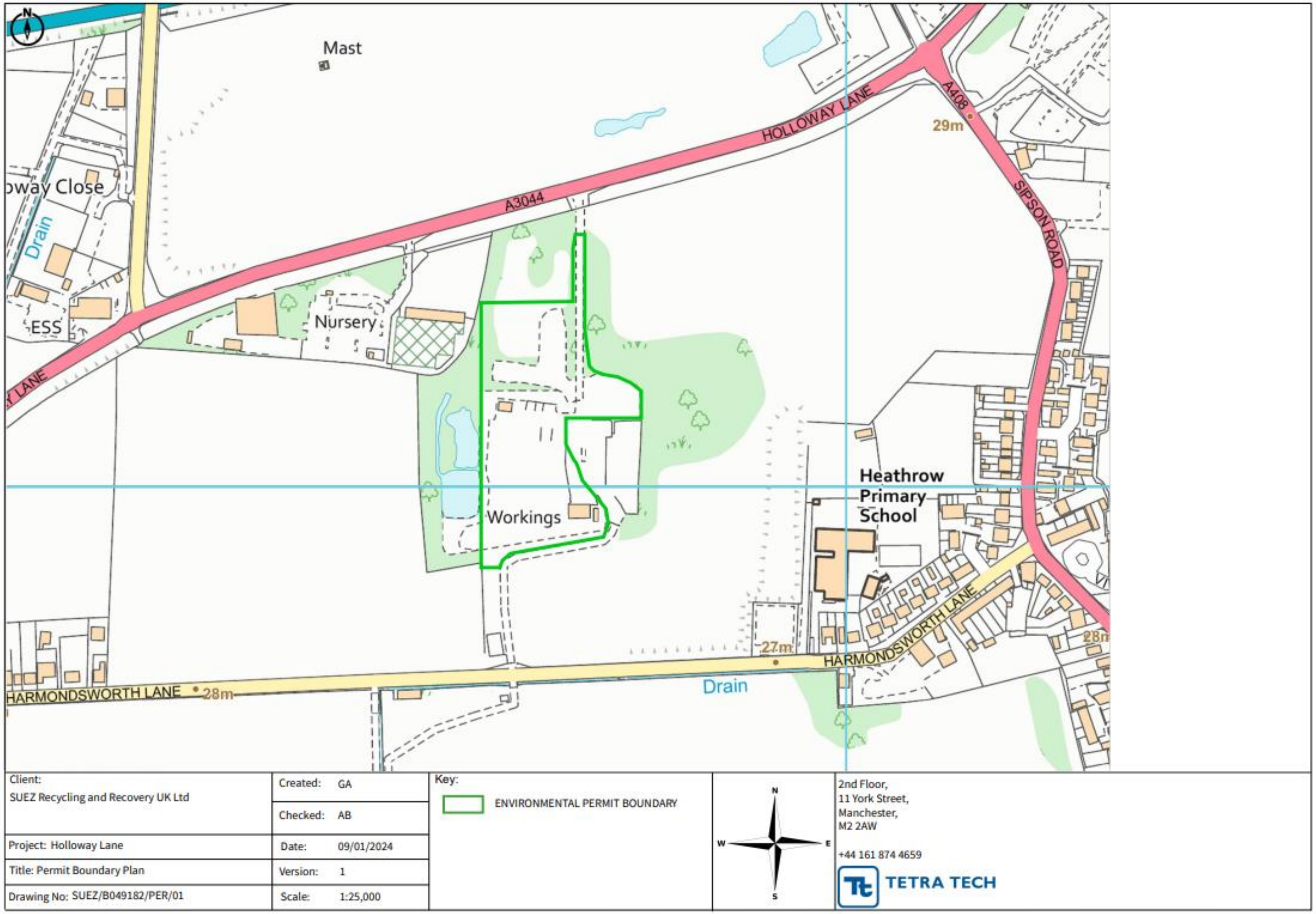
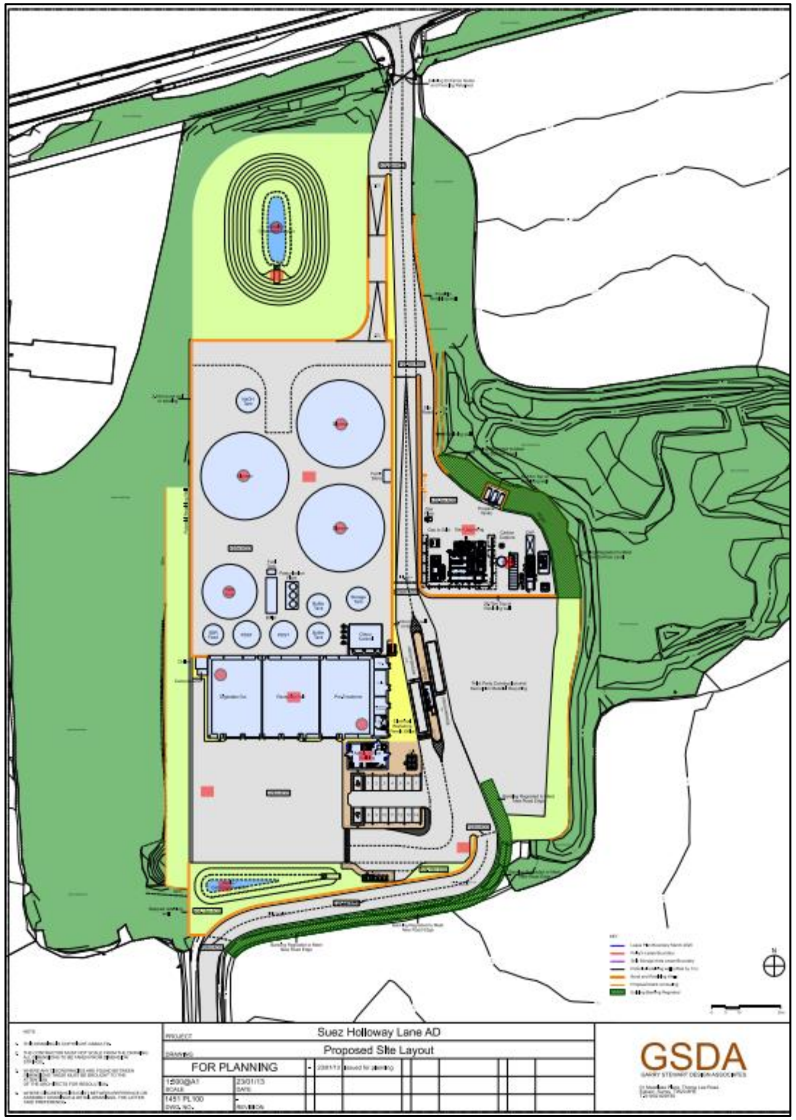


Figure 1-2. Holloway Lane Site Layout (after SUEZ)

Figure 1-3. Proposed AD Site Layout



2.0 EXTANT POLICY, LEGISLATION AND RELEVANT AGENCIES

2.1 DOCUMENTS CONSULTED

The following documents were consulted during the undertaking of this assessment:

Legislation and Best Practice Guidance

- Environmental Permitting: Core Guidance, for the Environmental Permitting (England and Wales) Regulations 2016 (Si 2016 No 1154), last revised: March 2020, Defra.
- The Air Quality Standards Regulations (Amendments), 2016;
- The Air Quality Strategy for England, Defra, April 2023;
- The Environment Act, 1995;
- The Environment Act, 2021;
- Local Air Quality Management Technical Guidance LAQM.TG(22), Defra, 2022;
- Guidance of air emissions risk assessment for your environmental permit, 21 December 2023;
- Guidance of Environmental permitting: air dispersion modelling reports; 19 January 2021;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1), IAQM, May 2020; and
- Ecological Assessment of Air Quality Impacts, CIEEM, January 2021.

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- Department for Transport: Road Traffic Statistics (https://roadtraffic.dft.gov.uk/);
- Multi-Agency Geographic Information for the Countryside (http://magic.defra.gov.uk/); and
- https://www.gov.uk/government/organisations/environment-agency;
- London Borough of Hillingdon website (https://www.hillingdon.gov.uk/).

Site Specific Reference Documents

- Air Quality Action Plan, 2019-2024, London Borough of Hillingdon, May 2019;
- 2021 Air Quality Annual Status Report (ASR) for London Borough of Hillingdon, May 2022.

2.2 AIR QUALITY LEGISLATIVE FRAMEWORK

European Legislation

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

- **Directive 1999/30/EC** – the First Air Quality 'Daughter' Directive – sets ambient air limit values for NO_2 and oxides of nitrogen, sulphur dioxide, lead and PM_{10};
- **Directive 2000/69/EC** – the Second Air Quality 'Daughter' Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality 'Daughter' Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- **Directive 2004/107/EC** – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

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

The European Union (Withdrawal) Act 2018 (EUWA) provides a new framework for the continuity of 'retained EU law' in the UK. EU Directives no longer have to be implemented by the UK except to any extent agreed or decided by the UK unilaterally.

EUWA retains the domestic effect of EU Directives to the extent already implemented in UK law, by preserving the relevant domestic implementing legislation enacted in UK law before 'Implementation Period' completion day. Though the EU Directives are not retained, following the UK's departure from the EU, the EUWA converts the current framework of Air Quality targets, however the role that the EU instructions were party to are lost.

The Air Quality Standards Regulations (Amendments 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

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

For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments. The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 amends the AQO for $PM_{2.5}$ outlined within the Air Quality Standards Regulations (2010 & 2016 Amendments).

Guidance of air emissions risk assessment for your environmental permit requests to compare the impact of the emissions to air to the following environment standards:

- Air Quality Standards Regulations 2010 Limit Values and Target Values;
- UK Air Quality Strategy Objectives; and
- Environmental Assessment Levels.

The Environmental Standards and Limits Values

The Air Quality Standards Regulations 2010 Limit Values and the Limit values are presented in **Table 2-1** and **Table 2-2**.

Table 2-1. Environmental Standards and Limits Values

Substance	Averaging time	Concentration	Environmental Standard	Exceedances (number of times a year that you can exceed the limit
NO_2	1-Hour Mean	200 µg/m^3	Limit Value	Up to 18 1-hour periods
	Annual Mean	40 µg/m^3	Limit Value	None
SO_2	1 Hour Mean	350 µg/m^3	Limit Value	Up to 24 1-hour periods
	24 Hour Mean	125 µg/m^3	Limit Value	Up to 3 24-hour periods

Table 2-2. Ecological Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter
NO_X	UK	30 µg/m^3	Annual Mean	31st December 2000	30 µg/m^3	19 July 2021
SO_2	UK	20 µg/m^3	Annual Mean	31st December 2000	20 µg/m^3	19 July 2021
	UK	20 µg/m^3	Winter average	31st December 2000	20 µg/m^3	19 July 2021

Within the context of this assessment, the annual mean objectives are those against which facades of residential receptors will be assessed and the short-term objectives apply to all other receptor locations, where people may be exposed over a short duration, both residential and non-residential such as using gardens, balconies, walking along streets, using playgrounds, footpaths or external areas of employment uses.

A guidance of institute of air quality management (IAQM) sets out the critical levels for the protection of vegetation and ecosystems. The NO_2 and SO_2 critical levels adopted in the IAQM guidance of "*A Guide to the*

Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1), IAQM, May 2020" are presented in **Table 2-3**.

Table 2-3. Critical Levels

Pollutant	Averaging Period	Critical Level
NO_X	24 hours	75 µg/m^3
	Annual	30 µg/m^3
SO_2	Annual	10 µg/m^3 (for lichens and bryophytes)
	Annual	20 µg/m^3

Local Air Quality Management

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 assessing present and likely future air quality against the AQOs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA).

2.3 ENVIRONMENTAL PERMITTING AND POLICY GUIDANCE

The DEFRA guidance within 'Environmental Permitting: Core Guidance - For the Environmental Permitting (England and Wales) Regulations 2016 (Si 2016 No 1154), last revised: March 2020', includes details on the 'national air quality strategy' as follows:

> *"A1.23 Part IV of the Environment Act 1995 concerns air quality. Section 80 requires the Secretary of State to prepare a national air quality strategy, and section 81 requires the Environment Agency and Natural Resources Wales to have regard to that strategy when discharging their pollution control functions."*

3.0 ASSESSMENT METHODOLOGY

Guidance within 'Air emissions risk assessment for your environmental permit' details methodologies for analysing and presenting the detailed modelling results.

3.1 COMPARE AND SUMMARISE MODELLING RESULTS

The guidance states that the following should all be included and considered in the results of the assessment:

- The PC.
- The PEC.
- The substances which are screened out.
- The substances that have been included for detailed assessment.
- The relevant environmental standards referred to when evaluating emissions.
- Any additional action required, for example a cost benefit analysis.

3.2 DETERMINING WHETHER FURTHER ACTION IS REQUIRED

Pre-application discussions with the Environment Agency may have already shown whether it is required to take further action, such as a cost benefit analysis of your proposals.

3.2.1 When Further Action is not Required

Further action is not required if the assessment has shown that both of the following apply:

- The proposed emissions comply with BAT associated emission levels (AELs) or the equivalent requirements where there is no BAT AEL; and
- The resulting PECs will not exceed environmental standards.

3.2.2 When Further Action is Required

A cost benefit analysis is required if any of the following apply:

- The PCs could cause a PEC to exceed an environmental standard (unless the PC is very small compared to other contributors – if this is the case contact the Environment Agency).
- The PEC is already exceeding an environmental standard.
- The activity or part of it is not covered by a 'BAT reference document' (BREF).
- The proposals do not comply with BAT AELs - in this case you'll need to make a request for an exception ('derogation') that includes a cost benefit analysis of your proposals.
- The EA has asked to do a BAT assessment.

3.2.3 Discussion on Detailed Modelling Results

Guidance within 'Environmental permitting: air dispersion modelling reports, 19 January 2021' states the following:

> *"The assessment should include a discussion of results (what they mean and their significance):*

For a detailed modelling assessment PCs are insignificant where they are less than:

- *10% of a short-term environmental standard; and*
- *1% of a long-term environmental standard.”*

4.0 BASELINE CONDITION

This section provides a review of the existing baseline air quality in the vicinity of the proposed facility in order to provide a benchmark against which to assess potential air quality impacts of the proposed operations. Baseline air quality in the vicinity of the site has been defined from a number of sources, as described in the following sections.

4.1 AIR QUALITY REVIEW AND ASSESSMENT

Air Quality Review

As required under section 82 of the Environment Act 1995, London Borough of Hillingdon Council has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction.

Air Quality Management Areas (AQMA)

An AQMA was declared in Hillingdon in 2003 due to exceedance of objectives for NO_2. Air quality problems in the Borough continue to be most severe around Heathrow Airport and the major road network that goes through the Borough, reflecting the largest sources of nitrogen oxide (NO_x) emissions within the AQMA which covers the southern half of the Borough, as shown in **Figure 4-1** (Reference: 2021 Air Quality Annual Status Report (ASR) for London Borough of Hillingdon, May 2022). The possible inclusion of areas in the north of the Borough has been kept under review.

Figure 4-1. Hillingdon's AQMA (after

Air Quality Action Plan

An Air Quality Action Plan (AQAP) has been produced as part of our duty to London Local Air Quality Management. It outlines the action we will take to improve air quality in the London Borough of Hillingdon between 2019 and 2024.

Actions to improve air quality are being taken by Hillingdon through its AQAP, through actions by the GLA such as the ULEZ, and via legislation at UK and European levels. Particular attention is being paid to a series of air quality Focus Areas in the Borough, where pollutant exposures are of highest concern.

Hillingdon continues to take action through its AQAP to address problems across the borough:

- Understand and tackle pollution hot-spots;
- Reduce emissions where Hillingdon has direct influence, for example on Council controlled roads and from the Council fleet;
- Work with other entities such as TfL, Highways England, HS2 and Heathrow to control emissions where Hillingdon does not have direct influence; and

Air Quality Monitoring

Monitoring of air quality within the county is undertaken through continuous and non-continuous monitoring methods. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the site.

<u>Continuous Monitoring</u>

There were 12 operational automatic continuous monitoring sites in the London Borough of Hillingdon in 2021. Hillingdon 1 in South Ruislip (HI1), Hillingdon 3 in Oxford Avenue (HI3), Hillingdon Sipson (SIPS), London Harmondsworth (HIL1), Hillingdon Hayes (HIL5), and London Harmondsworth Osiris (HIL4) are all part of the Borough monitoring network. London Hillingdon (HIL) is part of the Defra - owned Automatic Urban and Rural Network (AURN). London Heathrow (LHR2), Heathrow Oaks Road (T54), Heathrow Green Gates (T55), London Harlington (HRL) and London Heathrow Bath Road (LHRBR) are all part of the Heathrow Airport monitoring network.

Among the 12 monitoring sites, the following three automatic continuous monitoring stations are located in the area surrounding the development site:

- Site ID of HIL at London Hillingdon, which is located approximately 600 m north-northeast of the proposed reception Hall;
- Site ID of HIL1 at London Harmondsworth which is located approximately 1.2 km west-southwest of the proposed reception Hall;
- Site ID of SIPS at Hillingdon Sipson, which is located approximately 950 m southeast of the proposed reception Hall;

The monitoring results at the above 3 automatic continuous monitoring sites from 2018 to 2021 are presented in **Table 4-1**.

Table 4-1. Nitrogen Dioxide at Automatic Continuous Monitoring Locations

ID	Site name	Site Type	X OS Grid Ref	Y OS Grid Ref	Distance to kerb of nearest road (m)	NO_2 Annual Mean Concentration (μg/m^3)			
						2018	2019	2020	2021
HIL	London Hillingdon	Urban Background	506951	178605	2.5	46	45	28	25
HIL1	London Harmondsworth	Roadside	505561	177661	1.0	36	34	25	27
SIPS	Hillingdon Sipson	Urban Background	507325	177282	2.5	30	30	19	19

As shown in **Table 4-1**, the NO_2 monitoring results are above the AQO in 2018 and 2019 at London Hillingdon site.

<u>Non-Continuous Monitoring</u>

Passive diffusion tube monitoring of NO_2 was carried out at 44 sites in the Borough in 2021, covering both background and roadside locations, supplementing the information generated by the automatic network.

The NO_2 diffusion tube closest to the development is HILL01, located on Keats Way, West Drayton, approximately 410 m north east of the proposed development site. The monitoring results are presented in **Table 4-2**.

Table 4-2. Nitrogen Dioxide Monitoring Locations

ID	Site name	Site Type	X OS Grid Ref	Y OS Grid Ref	Distance to kerb of nearest road (m)	NO_2 Annual Mean Concentration (μg/m^3)			
						2018	2019	2020	2021
HILL01	AURN site, Keats way, West Drayton	Roadside	506926	178614	30m from M4	42	38.6	25.6	25.7
HILL40	On zone sign at corner of Sipson Close/Sipson Rd. UB7 0JX.	Roadside	507316	177576	1.8	-	35.5	23.6	23.4

As shown in **Table 4-2**, the NO_2 diffusion tube monitoring result is above the AQO in 2018 at HILL01 site.

4.2 BACKGROUND POLLUTANT MAPPING

Background pollutant concentration data on a 1 km x 1 km spatial resolution is provided by the UK National Air Quality Archive[1] and is routinely used to support LAQM and Air Quality Assessments where local pollutant monitoring has not been undertaken.

Background concentrations as used within the prediction calculations were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 km x 1 km grid squares nearest to the site. Defra issued revised 2018 based background maps for NO_X and NO_2 which incorporate updates to the input data used for modelling. The mapped background concentrations adjacent to the site are summarised in **Table 4-3** below.

1 www.airquality.co.uk.

Table 4-3. Predicted Background Concentrations

Year	UK NGR (m)		Background Mapping Data	
	X	Y	NO_2	NO_x
2023	506500	178500	24.77	37.49
2023	507500	178500	27.20	42.12
2023	506500	177500	25.16	39.35
2023	507500	177500	26.98	43.06

Table 4-3 shows that there were no NO_2 background exceedances of the relevant AQOs within the vicinity of the facility in 2023.

The NO_2 concentration of 38.6 µg/m^3, which was recorded at the NO_2 diffusion tube HILL01 of AURN site, Keats way, West Drayton in 2021, has been used for the identified receptors to the north of the M4 in the assessment. The NO_2 concentration of 35.5 µg/m^3, which was recorded at the NO_2 diffusion tube HILL40 at Sipson Close/Sipson Road, UB7 0JX in 2021, has been used for the remaining identified receptors which are not located close to a motorway. It should be noted that the selected NO_2 concentrations are higher than the Defra's mapped background concentration (in **Table 4-3**) to produce a worst-case assessment.

For SO_2 background, London Borough Hillingdon no longer routinely monitors sulphur dioxide anywhere within the borough. The concentration was extracted for the UK Air 'Modelled background pollution data' (https://uk-air.defra.gov.uk/data/pcm-data). The SO_2 concentrations of 1.73 µg/m^3 in 2022 has been used in the assessment.

4.3 SENSITIVE RECEPTORS

4.3.1 Discrete (Individual) Human Receptors

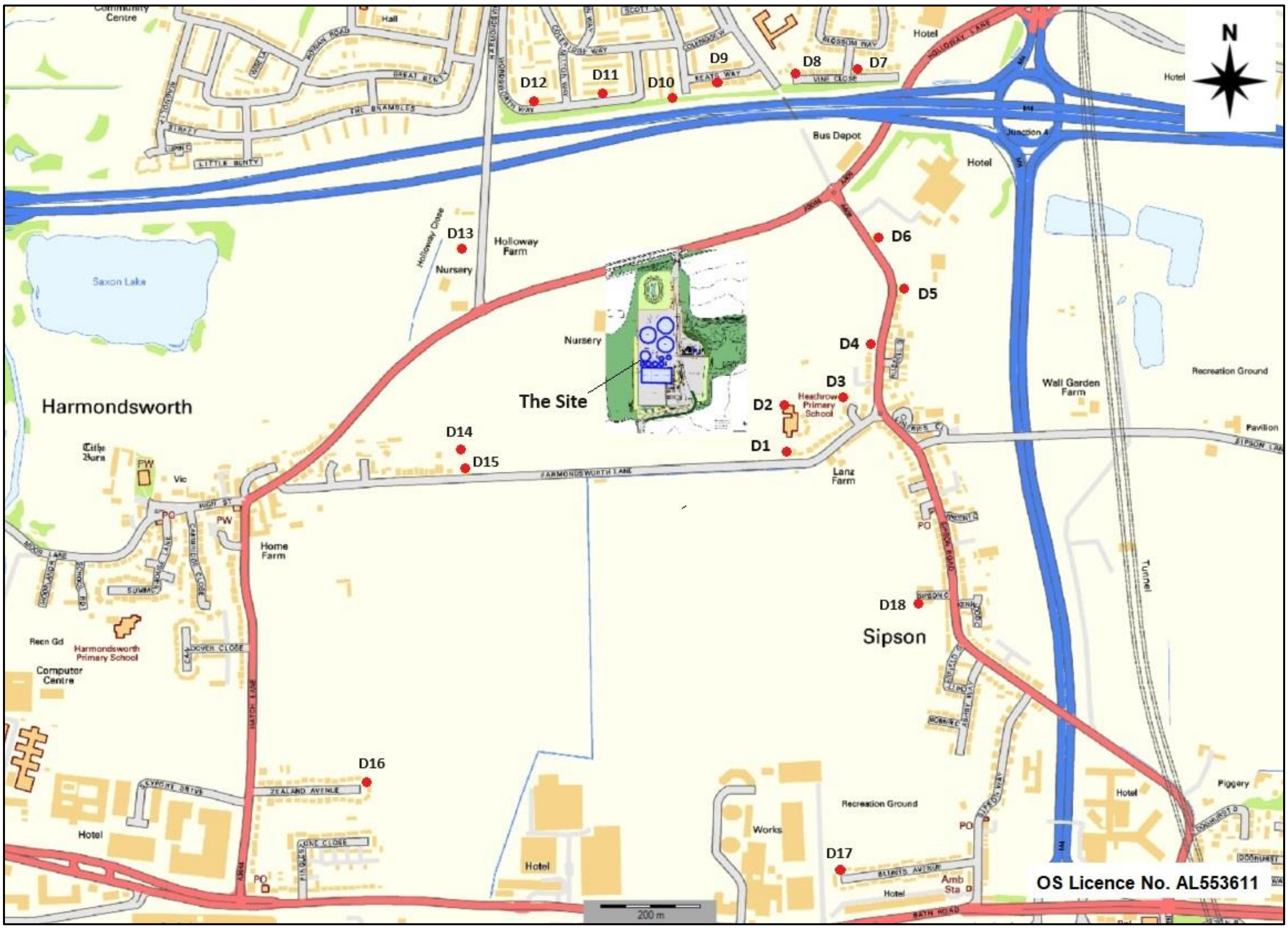
The discrete sensitive receptors identified for the purposes of this air quality assessment are contained in **Table 4-4** and shown in **Figure 4-2**. The assessment has also been undertaken to determine the potential impacts on those selected receptors.

It should be noted that these do not represent an exhaustive list of all receptors within the vicinity of the Site, rather worst-case representative locations within and adjacent to the site.

Table 4-4. Modelled Sensitive Human Receptors

Receptor ID	Receptor Name	UK NGR (m)	
		X	Y
D1	46 Harmondsworth Lane	506982	177865
D2	Heathrow Primary School	506976	177956
D3	18 Wykeham Close	507091	177977
D4	356 Sipson Road	507147	178084
D5	241 Sipson Road	507210	178191
D6	239 Sipson Road	507159	178294
D7	15 Vine Close	507119	178629
D8	2 Vine Close	506998	178625
D9	88 Keats Way	506842	178607
D10	74 Keats Way	506751	178581
D11	231 Wordsworth Way	506610	178585
D12	177 Wordsworth Way	506478	178570
D13	Holloway Farm	506327	178275
D14	62a Harmondsworth Lane	506327	177867
D15	62 Harmondsworth Lane	506337	177828
D16	21 Zealand Ave	506136	177203
D17	64 Blunts Ave	507090	177027
D18	30 Sipson Close	507251	177563

Figure 4-2. Location of Sensitive Human Receptors



4.3.2 Ecological Receptors

Guidance contained in 'air emissions risk assessment for your environmental permit' (Defra and Environment Agency, 2 August 2016) states that assessments should consider the impact on the conservation areas:

Examining if there are any of the following within 10 km of the site:

- special protection areas (SPAs);
- special areas of conservation (SACs); and,
- Ramsar sites (protected wetlands).

Examining if there are any of the following within 2 km of the site:

- sites of special scientific interest (SSSIs); and,
- local nature sites (ancient woods, local wildlife sites and national and local nature reserves)

A review has identified the ecological sites which are presented in **Table 4-5** and **Figure 4-3**. These have been included in the habitat assessment as ecological receptors.

Table 4-5. Modelled Ecological Receptors

Receptor ID	Receptor Name	UK NGR (m)	
		X	Y
E1	South West London Waterbodies Ramsar SSSI, SPA	503008	175480
E2	Carp Ponds and Broads Dock LWS	505786	178100
E3	Wordsworth Way Deciduous Woodland	507061	178600
E4	Holloway Lane Deciduous Woodland	507175	178603
E5	Holiday Inn Deciduous Woodland	507215	178502
E6	M4 Deciduous Woodland	506776	178498

Additionally, a screening distance of 10 km has been applied, where ecological sites have been identified within this distance from the proposed site. Windsor Forest and Great Park (SAC) is located within 10 km of the development. However, Windsor Forest and Great Park (SAC) is located approximately 980 m to the south-west, and is further from the development site than receptor location E1 (South West London Waterbodies Ramsar (SSSI, SPA)). It can therefore be determined that, due to the prevailing meteorological conditions, Windsor Forest and Great Park (SAC) will be subject to a lesser impact than receptor location E1, Therefore, E1 can be considered as a worst-case representation of conditions and effects at Windsor Forest And Great Park (SAC).

Figure 4-3. Location of Ecological Receptors

4.3.3 Cartesian Grid Receptor

A Cartesian receptor grid was used in the model in order to produce the concentration contour lines. The Cartesian receptor grid consists of receptors identified by their x (East-west) and y (north-south) coordinates. The grid was constructed with grid spacing (x, y) of 50 m x 50 m over an area covering 3000 m by 3000 m with south-west corner UK NGR (m) of 505300, 176600.

5.0 DETAILED MODELLING METHODOLOGY

In order to consider the air quality impacts of the facility on the local air quality a quantitative assessment using the third generation Breeze AERMOD dispersion model has been undertaken. AERMOD is a development from the ISC3 dispersion model and incorporates improved dispersion algorithms and pre-processors to integrate the impact of meteorology and topography within the modelling output.

The model utilises hourly meteorological data to define conditions for plume rise, transport, diffusion and deposition. It estimates the concentration for each source and receptor combination for each hour of input meteorology and calculates user-selected short-term averages.

5.1 MODELLING PARAMETERS AND AVERAGING PERIOD

The dispersion modelling has assessed the impact of emissions from the facility taking into consideration of the operation of the proposed installation.

The same averaging period should be used for comparison of emissions against environmental standards. For example, most long-term standards are expressed as an annual mean and many short-term standards as an hourly mean. Note that there are certain exceptions to this which are important when considering compliance with statutory AQS. The averaging period associated with the relevant modelled pollution are detailed in **Table 5-1.**

Table 5-1. Modelling Parameters and Averaging Period

Parameter	Modelled As	
	Short-Term	Long-Term
NO_2	99.79th percentile (%ile) 1-hour mean	Annual mean
SO_2	99.73rd %ile 1-hour 15min (99.90%ile 1-hour)	Annual mean for the protection of vegetation and ecosystems

For short term averaging periods the following UK DEFRA methodology has been used.

For 1-hour NO_2 concentrations:

- 99.79th percentile (%ile) 1-hour Process Contribution NO_2 + 2 x (annual mean background contribution NO_2).

5.2 EMISSION SOURCE

5.2.1 The Proposed AD Plant CHP Engine

The CHP engine at the proposed AD Plant is a Jenbacher J416GS-B.L gas engine, with an electrical output 1.2MW el.

The emissions from the CHP have been derived from the engine specifications and the emission monitoring data from two same JMC 416 GS-B.L CHP engines operating at the SUEZ's AD facility at Charlton Lane. The mass emissions used within AERMOD and stack gas parameters are presented in **Table 5-2.**

Table 5-2. CHP Stack Emissions for the Assessment and Stack Parameters

Parameter	Emission Rate (Each CHP)	Unit
NO_x Emissions, dry, 0 °C, 5% O_2	250	mg/Nm^3
SO_2 Emissions, dry, 0 °C, 5% O_2	52.55 [a]	mg/Nm^3
Exhaust Gas Volume, Wet	5,174	Nm^3/hr
Exhaust Gas Volume, dry	4616	Nm^3/hr
Stack Gas Temperature	422	°C
Stack Moisture content	11	%
Exhaust Gas Flow Rate at stack conditions: Wet and at 422 °C	13,172	Am^3/s
Mass NO_x Emissions	1,154	kg/hr
	0.321	g/s
Mass SO_2 Emissions	242.6	kg/hr
	0.067	g/s
Modelled stack diameter	0.346	m
Stack velocity	38.91	m/s
Stack Height (m)	20.37 m above Ground Level	m

Note:

a. *The concentrations were derived from 'Stack emissions testing reports' at SUEZ Recovery & Recycling UK, Charlton Lane EcoPark for CHP Gas Engine 1 & 2, in January 2022.*

5.3 CHP/FLARES OPERATION HOURS

The air quality assessment is based on the CHP at proposed AD plant to be operating continuously to produce a worst-case assessment.

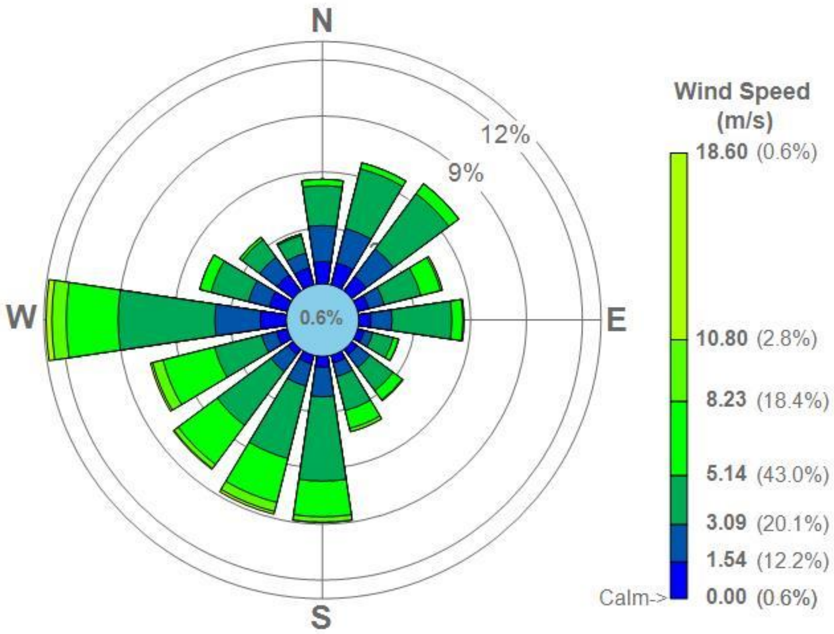
There will be a flare at the proposed AD facility, however, the flare will only be used as a contingency when the CHP engine is not available. Therefore, this flare has not been included in the modelling.

5.4 METEOROLOGICAL DATA

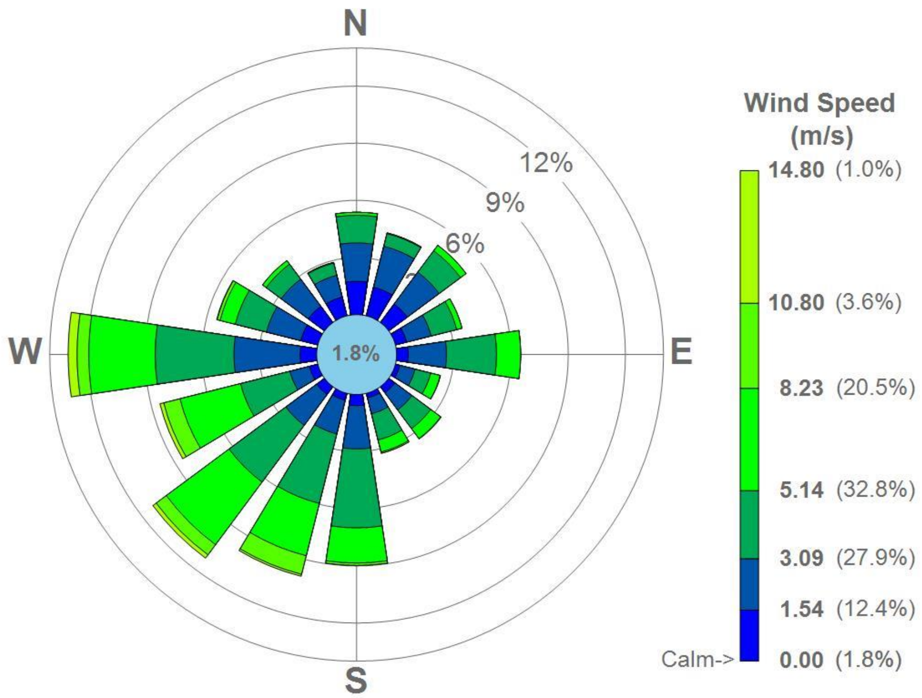
The 5-year meteorological data (2018 – 2022 inclusive) used in the assessment is derived from Heathrow Airport weather station, which is considered representative of conditions within the vicinity of the site, with all the complete parameters necessary for the AERMOD model. Reference should be made to **Figure 5-1** for an illustration of the prevalent wind conditions at the Heathrow Airport weather station.

Figure 5-1. Heathrow Airport Meteorological Station Windrose

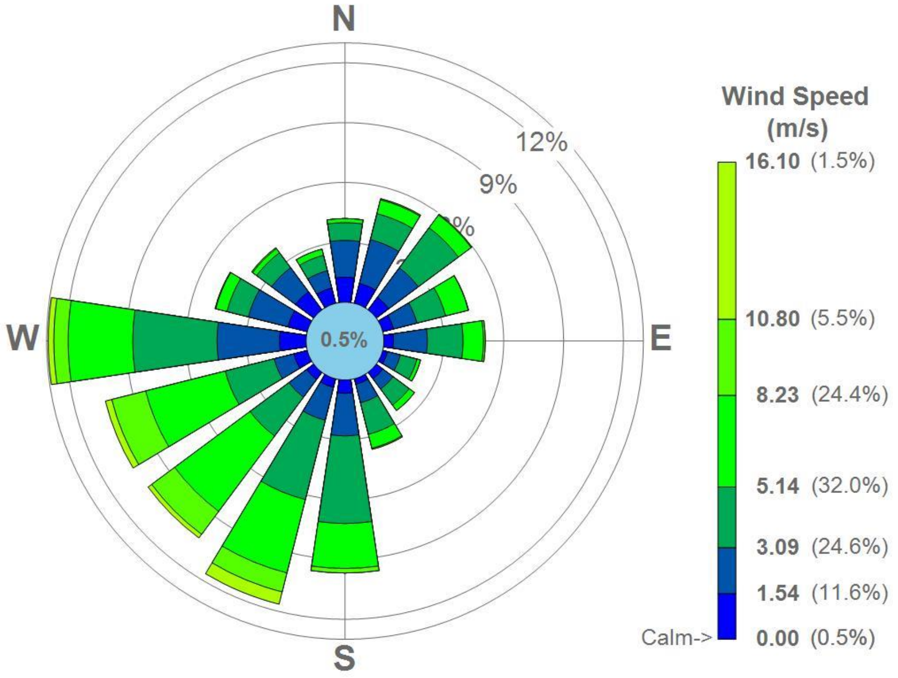
2018 Windrose



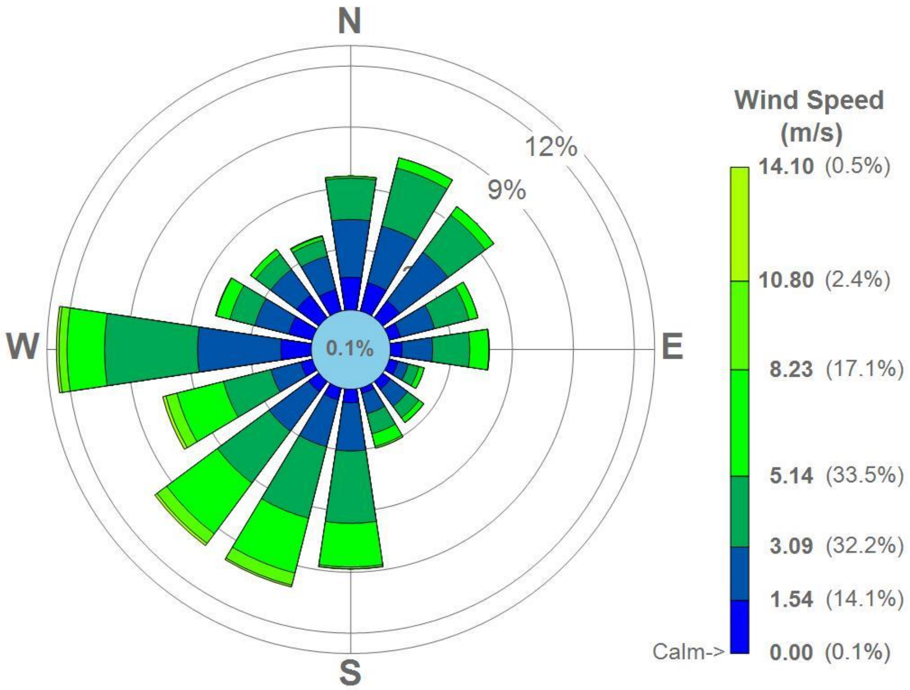
2019 Windrose



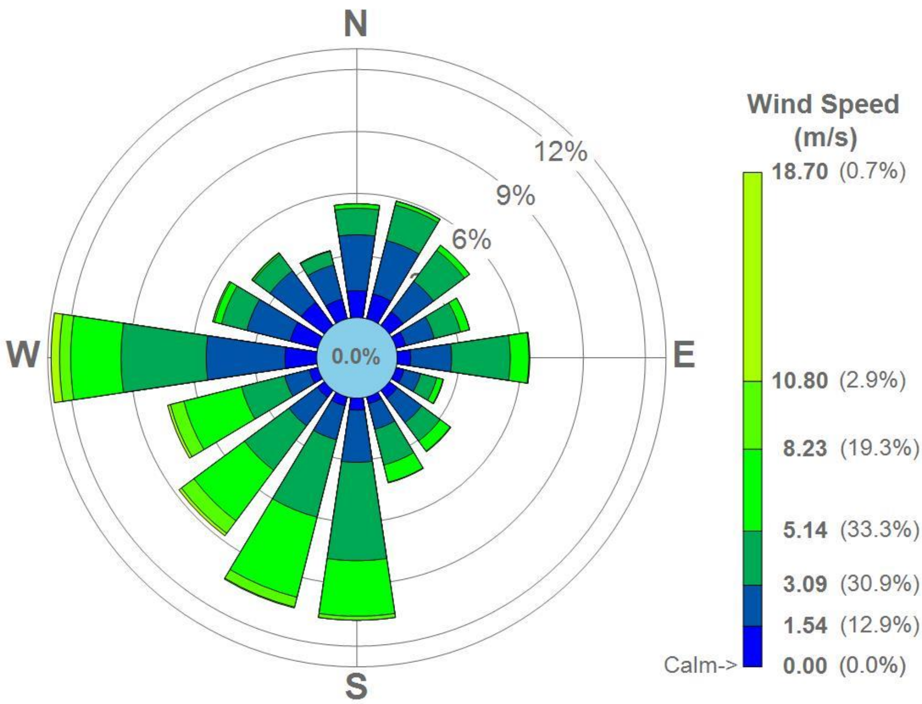
2020 Windrose



2021 Windrose



2022 Windrose



5.5 SURFACE CHARACTERISTICS

The land uses surrounding the Site are mostly described as farmlands, open fields and residential properties. A surface roughness value of 0.5 (the value for open suburbia areas) has been used in the modelling for a worst-case assessment.

5.6 BUILDINGS IN THE MODELLING ASSESSMENT

Buildings nearby or immediately adjacent to the CHP flues could potentially cause building downwash effects on emission sources and have therefore been modelled. The locations and dimensions of the buildings used in the model are given in **Table 5-3** and illustrated in **Figure 5-2**.

Table 5-3. Locations and Heights of Buildings Used in the Model

ID	Name	UK NGR (m)		Modelled Building Height (m)	Note
		506689	178036		
1	Main Process Building	506689	178036	16.0	-
2	Storage Tank	506743	178056	11	Radius = 4.3m
3	Buffer Tank1	506729	178054	16.64	Radius = 4.3m
4	Buffer Tank2	506729	178043	16.64	Radius = 4.3m
5	PDST Tank1	506716	178043	10.28	Radius = 5m
6	PDST Tank2	506703	178043	10.28	Radius = 5m
7	SBR Feed Tank	506690	178043	8.37	Radius = 3.8m
8	SBR Tank	506697	178059	10.77	Radius = 110m
9	Digester 1	506737	178082	15.3	Radius = 16m
10	Digester 2	506737	178120	15.3	Radius = 16m
11	Digester 3	506702	178101	15.3	Radius = 16m
12	Carbon Capture Unit	506796	178070	15.9	Radius = 1.74m

Figure 5-2. Locations of Modelled Buildings

5.7 TREATMENT OF TERRAIN

The presence of steep terrain can influence the dispersion of emissions and the resulting pollutant concentrations. USEPA guidance indicates that terrain effects should be considered if the gradient exceeds 1:10. A digital terrain file in the UK Ordnance Survey (OS) Landranger format (.NTF) has been used in the assessment.

5.8 NO_X TO NO_2 CONVERSION

Emissions of NO_x from combustion processes are predominantly in the form of NO. Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to NO_2. Given the short travel time to the areas of maximum concentration and the rate of reaction to convert NO to NO_2, it is unlikely that more than 30% of the NO_x is present at ground level as NO_2. This conversion factor is based on comparison of ambient NO and NO_2 continuous measurements evaluated over recent years.

Ground level NO_x concentrations have been predicted through dispersion modelling. NO_2 concentrations reported in the results section assume 70% conversion from NO_x to NO_2 for annual means and a 35% conversion for short term (hourly) concentrations, based upon EA methodology[2].

5.9 MODELLING UNCERTAINTY

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

- Model uncertainty - due to model limitations;
- Data uncertainty - including emissions estimates, background estimates and meteorology; and,
- Variability - randomness of measurements used.

However, potential uncertainties in model results have been minimised as far as practicable and worst-case inputs considered in order to provide a robust assessment. This included the following:

- Choice of model - AERMOD 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;
- Facility operating parameters - Operational parameters were provided for the facility;
- Emission rates - Emissions were based on 24-hour operation, this is likely to overestimate impacts as periods of shut down have not been considered;
- Background concentrations - Background pollutant concentrations were obtained from a number of recognised sources in order to consider baseline levels in the vicinity of the site, as detailed within the main report text; and,
- Variability - All model inputs are as accurate as possible and worst-case conditions have been considered where necessary in order to ensure a robust assessment of potential pollutant concentrations.

2 Conversion Ratios for NO_x and NO_2, Environment Agency, updated.

6.0 DETAILED MODELLING ASSESSMENT RESULTS

The detailed computational modelling assessment of process emissions was undertaken using the input parameters detailed in Section 5.

All predicted concentrations have been compared to the relevant environmental assessment criteria, as detailed in Sections 2 and 3.

6.1 NITROGEN DIOXIDE (NO_2)

Long-Term (annual Mean) NO_2

The long-term emissions of NO_2 from the sources considered were assessed for all 5 years of meteorological data. The maximum process contributions (PCs) within the modelled receptor locations and their associated predicted environmental concentrations (PECs) are compared against the relevant AQO, in **Table 6-1.**

From the meteorological dataset, the year resulting in maximum long-term NO_2 PC concentration was identified as 2020. The predicted maximum PC occurs at the receptor location of 239 Sipson Road (D6).

The maximum NO_2 PC in **Table 6-1** is 0.27 µg/m³ and the associated NO_2 PEC is 35.77 µg/m³, which is below the relevant long-term AQS of 40 µg/m³ for the protection of human health.

Table 6-1. The Maximum Long-Term (Annual Mean Concentration of NO_2

Pollutant	Year	Process Contrib'tn (PC)	PC as %age of AQO	Background	PEC[(a)] (PC +Background)	Easting (m)	Northing (m)	Receptor Name
NO_2	2018	0.26	0.65	35.50	35.76	507147	178084	356 Sipson Road
NO_2	2019	0.25	0.62	35.50	35.75	507147	178084	356 Sipson Road
NO_2	2020	0.27	0.68	35.50	35.77	507159	178294	239 Sipson Road
NO_2	2021	0.21	0.53	35.50	35.71	507147	178084	356 Sipson Road
NO_2	2022	0.23	0.58	35.50	35.73	507147	178084	356 Sipson Road
AQO	40 µg/m³							

Note:
a. *Inclusive of the associated diffusion tube concentration recorded in 2019.*

Table 6-2 presents a summary of the predicted nitrogen dioxide concentrations, both PCs and PECs, at the modelled receptors locations.

The impact description of changes associated with the modelled emissions with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-2.**

Table 6-2. The Long-Term (Annual Mean) Concentrations of NO_2 and Impact Description of Effects at Receptors

Receptor		Predicted Annual Mean Concentration (µg/m³) – 2020 Met Data, and NO_2 Impact Description at Receptors						
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background	PEC[(a)] (PC +Background)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D1	46 Harmondsworth Lane	0.07	0.18	35.50	35.57	88.9%	76-94% of AQO	Insignificant
D2	Heathrow Primary School	0.08	0.21	35.50	35.58	89.0%	76-94% of AQO	Insignificant
D3	18 Wykeham Close	0.12	0.29	35.50	35.62	89.0%	76-94% of AQO	Insignificant
D4	356 Sipson Road	0.24	0.60	35.50	35.74	89.3%	76-94% of AQO	Insignificant
D5	241 Sipson Road	0.22	0.56	35.50	35.72	89.3%	76-94% of AQO	Insignificant
D6	239 Sipson Road	0.27	0.68	35.50	35.77	89.4%	76-94% of AQO	Insignificant
D7	15 Vine Close	0.17	0.42	38.60	38.77	96.9%	95-102% of AQO	Insignificant
D8	2 Vine Close	0.14	0.36	38.60	38.74	96.9%	95-102% of AQO	Insignificant
D9	88 Keats Way	0.10	0.24	38.60	38.70	96.7%	95-102% of AQO	Insignificant
D10	74 Keats Way	0.08	0.20	38.60	38.68	96.7%	95-102% of AQO	Insignificant
D11	231 Wordsworth Way	0.06	0.14	38.60	38.66	96.6%	95-102% of AQO	Insignificant
D12	177 Wordsworth Way	0.04	0.10	38.60	38.64	96.6%	95-102% of AQO	Insignificant
D13	Holloway Farm	0.06	0.14	35.50	35.56	88.9%	76-94% of AQO	Insignificant
D14	62a Harmondsworth Lane	0.07	0.17	35.50	35.57	88.9%	76-94% of AQO	Insignificant
D15	62 Harmondsworth Lane	0.09	0.22	35.50	35.59	89.0%	76-94% of AQO	Insignificant
D16	21 Zealand Ave	0.06	0.15	35.50	35.56	88.9%	76-94% of AQO	Insignificant
D17	64 Blunts Ave	0.02	0.04	35.50	35.52	88.8%	76-94% of AQO	Insignificant
D18	30 Sipson Close	0.03	0.08	35.50	35.53	88.8%	76-94% of AQO	Insignificant
AQO	**40 µg/m³**							

Note:

a. *Inclusive of the urban background diffusion tube concentration recorded in 2019; and*
b. *Inclusive of the 2019 diffusion tube concentration and the tube is located adjacent to M4.*

The percentage changes in process contribution of NO_2 relative to the AQAL as a result of the engine operations at all receptor locations, with respect to NO_2 exposure, are determined to be 0.68% or less. The effect of the engine operations on the local area is considered to be insignificant.

The predicted long-term NO_2 concentrations from the modelled emission sources are considered acceptable for the protection of human health.

Short-Term (1-Hour Mean) NO_2

The short-term emissions of NO_2 from the sources considered were assessed for all 5 years of meteorological data. The maximum PCs within the modelled receptor locations and their associated PECs are compared against the relevant AQS, in **Table 6-3.**

From the meteorological dataset, the year resulting in maximum short-term NO_2 PC concentration was identified during 2022. The predicted maximum short-term PC occurs at the receptor location of Holloway Farm (D13).

The highest short-term NO_2 PC in **Table 6.3** is 3.23 µg/m^3 and the associated short-term NO_2 PEC is 74.23 µg/m^3, which is below the relevant short-term AQO of 200 µg/m^3 for the protection of human health.

Table 6-3. The Maximum Short-Term (1-Hour Mean, 99.79th Percentile) Concentrations of NO_2

Pollutant	Year	Process Contrib'tn (PC)	PC as %age of AQO	Background	PEC[(a)] (PC +Background)	Easting (m)	Northing (m)	Receptor Name
NO_2	2018	3.02	1.51	71.00	74.02	506327	178275	Holloway Farm
NO_2	2019	2.63	1.31	71.00	73.63	506327	178275	Holloway Farm
NO_2	2020	2.39	1.19	71.00	73.39	506327	178275	Holloway Farm
NO_2	2021	2.27	1.13	71.00	73.27	506327	178275	Holloway Farm
NO_2	2022	3.23	1.62	71.00	74.23	506327	178275	Holloway Farm
AQO	**200 µg/m^3**							

Note:
a. *Inclusive of the associated diffusion tube concentration recorded in 2019.*

The short-term NO_2 PEC concentrations have been calculated at each of the discrete receptors listed for the worst meteorological year of 2022 and these results are detailed in **Table 6-4** (overleaf).

Table 6-4. Summary of the Predicted Short-Term NO_2 Concentrations at Discrete Receptors

Receptor		Predicted 1-hour Mean (99.79th Percentile) Concentration (µg/m^3) – 2022 Met Data				
ID	**Name**	**Process Contribution (PC)**	**PC as %age of AQO**	**Background**	**PEC[(a)] (PC +Background)**	**PEC as percentage of AQO**
D1	46 Harmondsworth Lane	1.09	0.54	71.00	72.09	36.0%
D2	Heathrow Primary School	1.09	0.54	71.00	72.09	36.0%
D3	18 Wykeham Close	1.79	0.89	71.00	72.79	36.4%
D4	356 Sipson Road	2.29	1.15	71.00	73.29	36.6%
D5	241 Sipson Road	1.44	0.72	71.00	72.44	36.2%
D6	239 Sipson Road	1.84	0.92	71.00	72.84	36.4%
D7	15 Vine Close	1.17	0.59	77.20	78.37	39.2%
D8	2 Vine Close	1.22	0.61	77.20	78.42	39.2%
D9	88 Keats Way	1.18	0.59	77.20	78.38	39.2%
D10	74 Keats Way	1.24	0.62	77.20	78.44	39.2%
D11	231 Wordsworth Way	0.92	0.46	77.20	78.12	39.1%
D12	177 Wordsworth Way	1.02	0.51	77.20	78.22	39.1%
D13	Holloway Farm	3.23	1.62	71.00	74.23	37.1%
D14	62a Harmondsworth Lane	0.75	0.38	71.00	71.75	35.9%
D15	62 Harmondsworth Lane	1.23	0.61	71.00	72.23	36.1%
D16	21 Zealand Ave	1.52	0.76	71.00	72.52	36.3%
D17	64 Blunts Ave	0.56	0.28	71.00	71.56	35.8%
D18	30 Sipson Close	0.53	0.26	71.00	71.53	35.8%
AQO	**200 µg/m^3**					

Note:

a. *Inclusive of the maximum diffusion tube concentration recorded in 2019.*

As shown in **Table 6-4**, there are no exceedances of the short-term NO_2 AQO at any of the identified sensitive receptors. The predicted impacts are significantly below the AQO of 200 µg/m^3. The percentage changes in process contribution of short-term NO_2 relative to the AQAL are less than 2% and the short-term effect of the engine operations on the local area is considered to be insignificant.

Therefore, the predicted short-term NO_2 concentrations from the CHP operations are considered acceptable for the protection of human health.

The contour plots of the predicted long-term and short-term ground level PCs of NO_2 for all receptors, including discrete and grid receptors are presented in **Figure 6-1** and **Figure 6-2**. The contour plots show that the predicted maximum concentrations occur adjacent to the emission sources, with a predicted decrease in concentration with the increased distance from the stacks.

Figure 6-1. Long-Term NO_2 Ground Level PC – 2020 Met Data

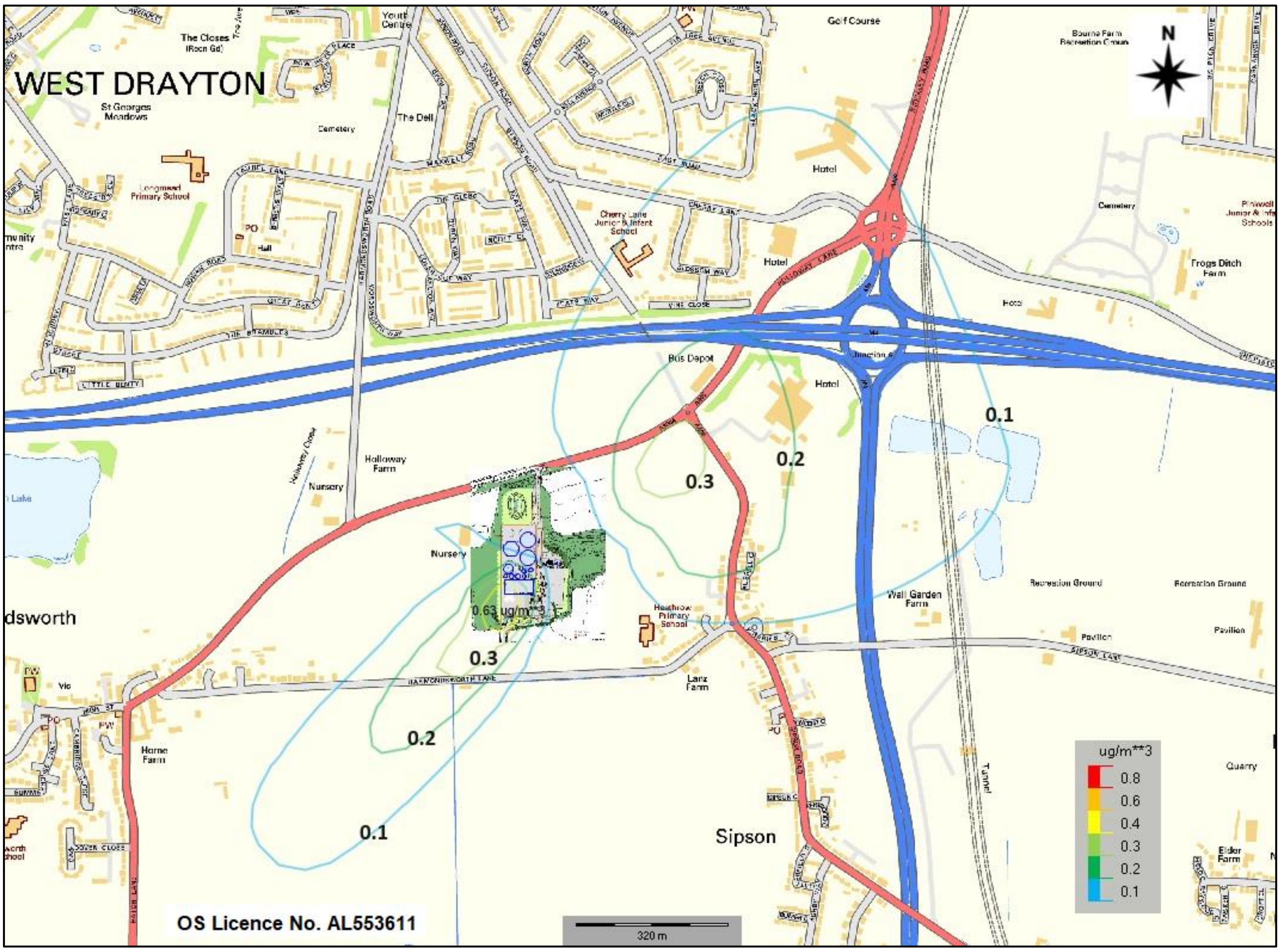
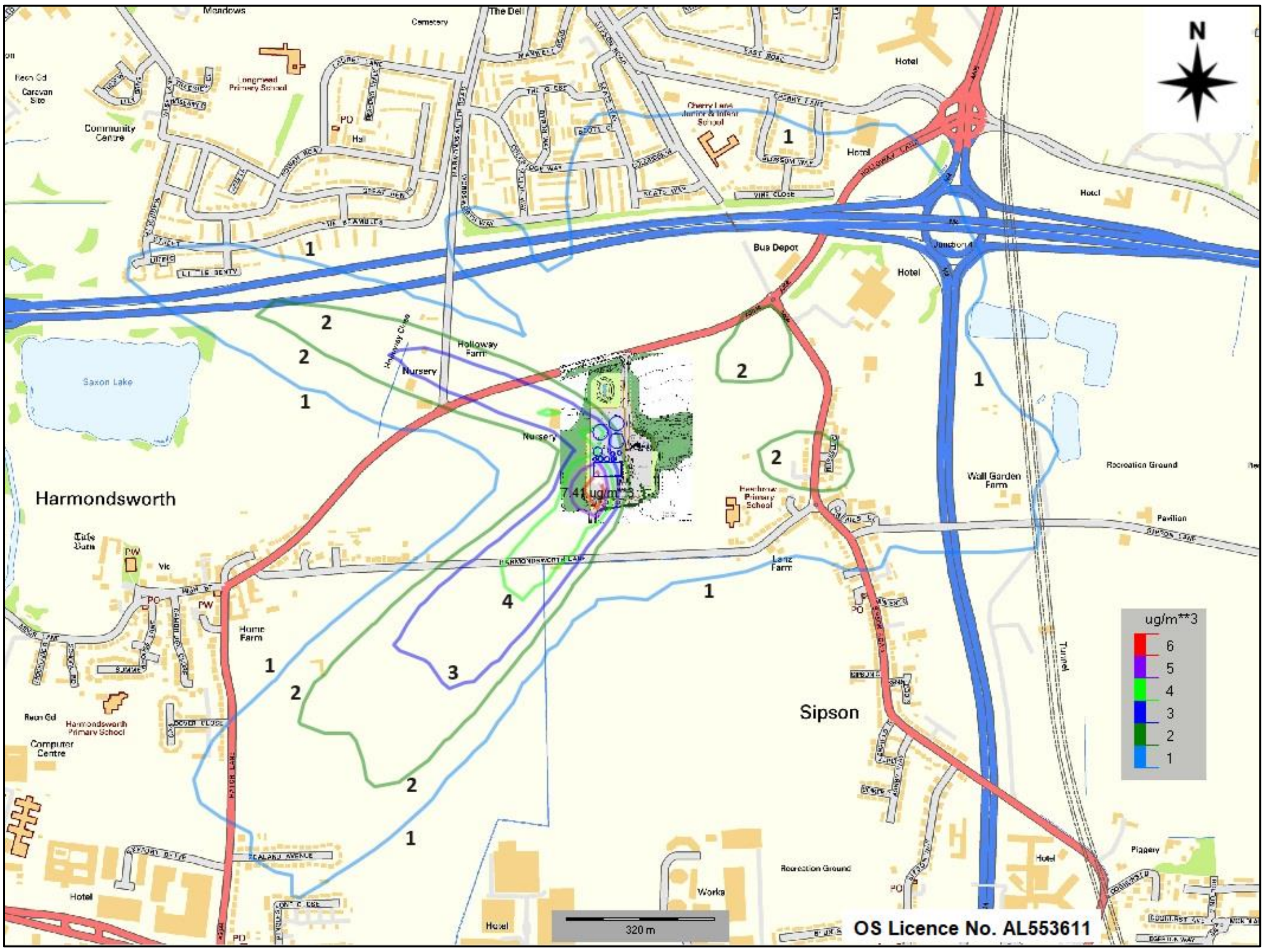


Figure 6-2. Predicted Short-Term NO_2 Ground Level Concentrations (PC, 1-Hour Mean, 99.79th Percentile) - 2022 Met Data



6.2 SULPHUR DIOXIDE (SO_2)

Predicted ground level short-term SO_2 concentrations were assessed against the relevant AQOs using 2022 met data (the year resulting in maximum short-term PC concentration). The results of the model predictions at each discrete receptor, inclusive of background, are summarised in **Table 6-5.**

Table 6-5. Summary of Predicted SO_2 Concentrations

Receptor	Predicted SO_2 Concentration (µg/m^3)			
	24-hour Mean (99.18th Percentile) (a)		1-hour Mean (99.73rd Percentile) (b)	
	Process Contrib'tn (PC)	PEC (PC +Background)	Process Contrib'tn (PC)	PEC (PC +Background)
D1	0.22	2.26	0.64	4.10
D2	0.24	2.28	0.64	4.10
D3	0.25	2.29	1.01	4.47
D4	0.41	2.46	1.35	4.81
D5	0.32	2.37	0.84	4.30
D6	0.43	2.47	1.09	4.55
D7	0.29	2.34	0.69	4.15
D8	0.31	2.35	0.71	4.17
D9	0.27	2.31	0.69	4.15
D10	0.22	2.27	0.74	4.20
D11	0.16	2.20	0.53	3.99
D12	0.17	2.21	0.51	3.97
D13	0.31	2.35	1.64	5.10
D14	0.16	2.20	0.44	3.90
D15	0.22	2.26	0.70	4.16
D16	0.19	2.23	0.60	4.06
D17	0.09	2.13	0.27	3.73
D18	0.10	2.14	0.31	3.77
AQOs and Limit Values	125		350	

Note:

(a) *Inclusive of Background concentration of 2.04 µg/m^3;*
(b) *Inclusive of Background concentration of 3.46 µg/m^3; and*
(c) *Inclusive of Background concentration of 4.46 µg/m^3.*

The maximum PEC of 24-hour mean SO_2 emissions is 2.47 µg/m^3 when using 2022 met data. Therefore, the short-term (24-hour) PECs of SO_2 at all receptors are below the relevant short-term AQS of 125 µg/m^3 for the protection of human health.

The maximum PEC of 1-hour mean SO_2 emissions is 5.10 µg/m^3 when using 2022 met data which does not exceed the relevant short-term AQS of 350 µg/m^3 for the protection of human health.

Considering that the percentage changes in short-term process concentrations of SO_2 are below 1% of relevant short-term AQSs and the short-term impacts on the receptors are insignificant, the short-term SO_2 contour plots have not been presented.

7.0 HABITAT ASSESSMENT

The habitat assessment has been undertaken for the following identified nature conservation sites.

- South West London Waterbodies (Ramsar SSSI, SPA) - located approximately 4.6 km southwest of the site;
- Carp Ponds and Broads Dock (LWS) - located approximately 1.0 km west of the CHP;
- Wordsworth Way Deciduous Woodland - located approximately 580 m northeast of the CHP;
- Holloway Lane Deciduous Woodland - located approximately 650 m northeast of the CHP;
- Holiday Inn Deciduous Woodland - located approximately 600 m northeast of the CHP; and
- M4 Deciduous Woodland - located approximately 420 m north of the CHP.

The long-term and short-term concentrations among those ecological sites have been calculated for habitat assessment against relevant critical loads, using 2020 and 2022 met data (the year resulting in maximum long-term and short-term PC concentrations respectively).

As detailed in Section 4, Windsor Forest and Great Park (SAC) is located approximately 980 m to the south-west, and is further from the development site than the South West London Waterbodies Ramsar (SSSI, SPA)). It can therefore be determined that, due to the prevailing meteorological conditions, Windsor Forest and Great Park (SAC) will be subject to a lesser impact than South West London Waterbodies Ramsar (SSSI, SPA), which can be considered as a worst-case representation of conditions and effects at Windsor Forest And Great Park (SAC).

7.1 PREDICTED NITROGEN OXIDE CONCENTRATIONS

Critical Level of Long-Term and Short-Term NO_x (as NO_2)

Table 7-1 presents a summary of the maximum predicted nitrogen oxide concentrations using 2020 and 2022 met data (the year resulting in maximum long-term and short-term PC concentrations respectively at the ecological receptors).

Table 7-1. Summary of Predicted NO_x (as NO_2) Concentrations for Protection of Vegetation and Ecosystems

Ecological Receptor	Predicted Maximum Annual Mean Concentration (µg/m³) – 2020 Met Data				Predicted 24-hour Mean Concentration (µg/m³) – 2022 Met Data			
	Process Contrib't n (PC)	PC as %age of AQO	BC	PEC[a] (PC +Background)	Process Contrib't n (PC)	PC as %age of AQO	BC	PEC[b] (PC +Background)
South West London Waterbodies Ramsar SSSI, SPA	0.01	0.05	43.00	43.01	0.23	50.74	50.91	67.7%
Carp Ponds and Broads Dock (LWS)	0.03	0.12	35.03	35.06	1.36	41.34	42.36	55.1%
Wordsworth Way Deciduous Woodland	0.24	0.80	39.90	40.14	2.38	47.08	48.87	62.8%
Holloway Lane Deciduous Woodland	0.26	0.88	39.90	40.16	2.26	47.08	48.77	62.8%
Holiday Inn Deciduous Woodland	0.30	1.01	39.90	40.20	2.72	47.08	49.12	62.8%
M4 Deciduous Woodland	0.13	0.44	35.84	35.97	2.38	42.29	44.08	56.4%
AQO/Critical Level (CL)	30[c]				75[d]			

Note:

[a] The Background concentration was taken from http://www.apis.ac.uk/.
[b] The Background concentration was taken from http://www.apis.ac.uk/.
[c] The AQO of 30 µg/m³ is the annual standard for the protection of vegetation and ecosystems; and
[d] The AQO of 75 µg/m³ is the daily standard for the protection of vegetation and ecosystems.

The annual mean NO_x (as NO_2) PC at all ecological receptors range from 0.01 to 0.30 µg/m³ and the PEC are above the annual mean critical level of 30 µg/m³ for the protection of vegetation and ecosystems due to the higher background values.

The NO_x (as NO_2) daily (24 hour) predicted environmental concentration at all ecological receptors are below the daily mean critical levels of 75 µg/m³ for the protection of vegetation and ecosystems.

The significance of changes associated with the operations of the facility with respect to annual mean NO_x (as NO_2) exposure ecological receptors has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 7-2.**

Table 7-2. The Long-Term (Annual Mean) Concentrations of NO_2 and Significance of Effects at Ecological Receptors

Receptor	Predicted Annual Mean Concentration (µg/m³) – 2020 Met Data, and NO_2 Significance Impacts at Ecological Receptors						
	Process Contrib'tn (PC)	PC as %age of AQO	BC	PEC[a] (PC +Background)	PEC as %age of AQO	PEC as %age of AQAL	Significance
South West London Waterbodies Ramsar SSSI, SPA	0.01	0.05	43.00	43.01	143.38	≥110 of AQO	Negligible
Carp Ponds and Broads Dock (LWS)	0.03	0.12	35.03	35.06	116.88	≥110 of AQO	Negligible
Wordsworth Way Deciduous Woodland	0.24	0.80	39.90	40.14	133.80	≥110 of AQO	Negligible
Holloway Lane Deciduous Woodland	0.26	0.88	39.90	40.16	133.88	≥110 of AQO	Negligible
Holiday Inn Deciduous Woodland	0.30	1.01	39.90	40.20	134.01	≥110 of AQO	Negligible
M4 Deciduous Woodland	0.13	0.44	35.84	35.97	119.90	≥110 of AQO	Negligible

Air Quality Impact on Ramsar, European and National Designated Sites

The long-term PC of NOx (as NO_2) at South-West London Waterbodies Ramsar SSSI, SPA is less than 1% of the long-term critical level of 30 µg/m^3 and the short-term PC of NOx (as NO_2) at South-West London Waterbodies Ramsar SSSI, SPA is less than 10% of the short-term critical level of 75 µg/m^3. The long-term critical level is considered inconsequential and further acid deposition assessment has not been undertaken. Air quality impact on the South-West London Waterbodies Ramsar SSSI, SPA is insignificant.

Air Quality Impact on Local Wildlife site and Ancient Woodlands

IAQM guidance of "A guide to the assessment of air quality impacts on designated nature conservation sites", Version 1.1 May 2020 states:

> *"5.5.2.2 For local wildlife sites and ancient woodlands, the Environment Agency uses less stringent criteria in its permitting decisions. Environment Agency policy for its permitting process is that if either the short-term or long-term PC is less than 100% of the critical level or load, they do not require further assessment to support a permit application."*

The long-term PC of NO_x (as NO_2) at Carp Ponds and Broads Dock (LWS) is less than 1% of the long-term critical level of 30 µg/m^3 and the short-term PC of NO_x (as NO_2) at Carp Ponds and Broads Dock (LWS) is less than 10% of the short-term critical level of 75 µg/m^3. The long-term critical level is considered inconsequential and air quality impact on the Carp Ponds and Broads Dock (LWS) is insignificant and further assessment is not required.

The long-term PCs of NO_x (as NO_2) at Wordsworth Way Deciduous Woodland, Holloway Lane Deciduous Woodland, M4 Deciduous Woodland are less than 1% of the long-term critical level of 30 µg/m^3 and the short-term PCs of NO_x (as NO_2) at those ancient woodlands are less than 10% of the short-term critical level of 75 µg/m^3. The long-term critical levels are considered inconsequential and air quality impacts at those ancient woodlands are insignificant and further assessments are not required.

The long-term PC of NO_x (as NO_2) at Holiday Inn Deciduous Woodland is above 1% of the long-term critical level of 30 µg/m^3 but less than 100% of the long-term critical level. The short-term PCs of NO_x (as NO_2) at those ancient woodlands are less than 10% of the short-term critical level of 75 µg/m^3. Air quality impacts at those ancient woodlands are insignificant and further assessments are not required.

In summary, the NO_x impacts from the proposed development on the ecological receptors are insignificant.

7.2 PREDICTED SULPHUR DIOXIDE CONCENTRATIONS

Critical Level of Long-Term SO_2

Table 7-3 presents a summary of the maximum predicted long-term sulphur dioxide concentrations using 2020 met data (the year resulting in maximum long-term PC concentrations).

Table 7-3. Summary of Predicted SO_2 Concentrations for Protection of Vegetation and Ecosystems

Receptor	Predicted Maximum Annual Mean Concentration (µg/m^3) – 2020 Met Data						
	Process Contrib'tn (PC)	PC as %age of AQO	BC	PEC[a] (PC +Background)	PEC as %age of AQO	PEC as %age of AQAL	Significance
South West London Waterbodies Ramsar SSSI, SPA	0.003	0.01	2.17	2.17	10.86	≤75% of AQAL	Negligible
Carp Ponds and Broads Dock (LWS)	0.01	0.04	2.31	2.32	11.59	≤75% of AQAL	Negligible
Wordsworth Way Deciduous Woodland	0.05	0.25	2.03	2.08	10.40	≤75% of AQAL	Negligible
Holloway Lane Deciduous Woodland	0.06	0.28	2.03	2.09	10.43	≤75% of AQAL	Negligible
Holiday Inn Deciduous Woodland	0.06	0.32	2.03	2.09	10.47	≤75% of AQAL	Negligible
M4 Deciduous Woodland	0.03	0.14	1.96	1.99	9.94	≤75% of AQAL	Negligible
AQO/Critical Level (CL)	20 [c]						

Note:

[a] The Background concentration was taken from http://www.apis.ac.uk/; and

[b] The AQO of 20 µg/m^3 is the annual standard for the protection of vegetation and ecosystems.

The annual mean SO_2 PC at all ecological receptors range from 0.003 to 0.06 µg/m^3 and the PEC are below the annual mean critical level of 20 µg/m^3 for the protection of vegetation and ecosystems at all modelled conservation sites.

The percentage change in process concentrations relative to the AQAL as a result of the facility operations at all ecological receptor locations, with respect to exposure, is determined to be 0.32% or less. The effect on the ecological receptors is considered to be insignificant.

As the percentage change in long-term process concentrations relative to the CL is below 1% at all ecological receptor locations, further acid deposition assessment has not been undertaken.

The SO_2 impact from the proposed development on the ecological receptors is insignificant.

8.0 CONCLUSION

The potential impacts from the operations of the CHP at the proposed AD facility have been assessed.

The emission source in the assessment includes 1No. of CHP- a Jenbacher J416GS-B.L generator at the proposed AD facility.

The long-term and short-term predicted environmental concentrations of NO_2 from the operations of the proposed CHP are all below the relevant air quality objectives. The effects of the CHP emissions on the ground level receptors with respect to long-term NO_2 is determined to be insignificant for the protection of human health.

The short-term predicted environmental concentrations of SO_2 from the operations the proposed CHP are below the relevant air quality objectives and the significance of effects on the short-term emissions is negligible.

Both NO_2 and SO_2 emission impacts from the operations of the proposed CHP on the human receptors are not significant.

For habitat assessment, the predicted long-term environmental concentrations of NO_x (as NO_2) from the facility operations are above the relevant air quality critical levels for the protection of vegetation and ecosystems due to the higher background. However, the long-term PC of NOx (as NO_2) at South-West London Waterbodies Ramsar SSSI, SPA is less than 1% of the long-term critical level of 30 µg/m^3 and the short-term PC of NOx (as NO_2) at South West London Waterbodies Ramsar SSSI, SPA is less than 10% of the short-term critical level of 75 µg/m^3. The long-term critical level is considered inconsequential and further acid deposition assessment has not been undertaken. Air quality impact on the South-West London Waterbodies Ramsar SSSI, SPA is insignificant. The air quality impacts on local wildlife site and woodland are insignificant.

The long-term predicted environmental concentrations of SO_2 are all below the relevant air quality critical levels for the protection of vegetation and ecosystems.

The habitat assessment shows that the predicted short-term (24 hour mean) environmental concentrations of NO_x (as NO_2) from the facility operations are below the relevant air quality critical levels for the protection of vegetation and ecosystems. As such, the effects of NO_x and SO_2 emission impacts from the operations of the proposed CHP on the ecological receptors are in significant.

In conclusion, the effect of impact from the operations of the proposed CHP on both human receptors and ecological receptors is considered ‘not significant’.

APPENDIX A REPORT TERMS & CONDITIONS

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