

# Air Quality Assessment

Thurrock 2 Flexible Generation Facility  
For Statera Energy

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Air Quality Assessment  
Version 1  
25 February 2026

## AIR QUALITY ASSESSMENT

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### Document status

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25/02/2026

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### Executive summary

This Air Quality Assessment has been undertaken to accompany the permit application for the proposed Thurrock 2 Flexible Energy Plant (T2FGF). The facility would generate electricity during peak periods of demand, thereby reducing grid instability.

The assessment has been undertaken based upon appropriate information on the Proposed Development provided by Statera Energy. In undertaking this assessment, Tetra Tech RPS experts have exercised professional skills and judgement to the best of their abilities and have given professional opinions that are objective, reliable and backed with scientific rigour. These professional responsibilities are in accordance with the code of professional conduct set by the Institution of Environmental Sciences for members of the Institute of Air Quality Management (IAQM).

Regarding the operational-phase, the most important consideration is stack emissions from the gas-fired engines. This assessment predicts that ground-level nitrogen dioxide (NO<sub>2</sub>) and Carbon Monoxide (CO) concentrations will be within acceptable levels at sensitive receptors and will not give rise to any significant adverse effects based on the criteria in the Environment Agency online guidance 'Environmental management – guidance, Air emissions risk assessment for your environmental permit'

The proposed development does not, in air quality terms, conflict with national or local policies. There are no constraints to the development in the context of air quality.

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### 1 Introduction

- 1.1 This report details the air quality assessment undertaken to accompany the permit application for the proposed Thurrock 2 Flexible Energy Facility (T2FGF). The facility would generate electricity during peak periods of demand, thereby reducing grid instability.
- 1.2 The assessment covers an evaluation of the impacts on the local area of emissions from the 22 gas-fired engines routed in pairs through 11 stacks that would run for 1,500 hours per year.
- 1.3 This report begins by setting out the policy and legislative context for the assessment. The methods and criteria used to assess potential air quality effects have then been described. The baseline air quality conditions have been established taking into account Defra estimates and local authority documents. The results of the assessment of air quality impacts have been presented. A conclusion has been drawn on the significance of the residual effects.

## 2 Policy and Legislative Context

### Ambient Air Quality Legislation and National Policy

#### Air Quality Standards Regulations

- 2.1 The Air Quality Standards Regulations 2010 [ 1 ] amended by The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 [2], sets limit values for ambient air concentrations for the main air pollutants: particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), carbon monoxide (CO), lead (Pb) and benzene, certain toxic heavy metals (arsenic, cadmium and nickel) and polycyclic aromatic hydrocarbons (PAHs).
- 2.2 These limit values are legally binding on the Secretary of State. The Government and devolved administrations operate various national ambient air quality monitoring networks to measure compliance and develop plans to meet the limit values.

#### UK Air Quality Strategy

- 2.3 The Environment Act 1995, as amended by the Environment Act 2021, established the requirement for the Government and the devolved administrations to produce a National Air Quality Strategy (AQS) for improving ambient air quality, the first being published in 1997 and having been revised several times since, with the latest published in 2007 [3]. The Strategy sets UK air quality standards\* and objectives† for the pollutants in the Air Quality Standards Regulations plus 1,3-butadiene and recognises that action at national, regional and local level may be needed, depending on the scale and nature of the air quality problem. There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the Air Quality Standards Regulations.
- 2.4 The 1995 Environment Act also established the UK system of Local Air Quality Management (LAQM), that requires local authorities to go through a process of review and assessment of air quality in their areas, identifying places where objectives are not likely to be met, then declaring Air Quality Management Areas (AQMAs) and putting in place Air Quality Action Plans to improve air quality. These plans also contribute, at local level, to the achievement of the limit values in the Air Quality Standards Regulations.
- 2.5 The limit values and objectives relevant to this assessment are summarised in Table 2.1. Although the limit values and the AQS objectives are numerically equal, there are some differences in where they apply and who is responsible for their achievement.
- 2.6 The Environment Agency online guidance entitled ‘Environmental management – guidance, Air emissions risk assessment for your environmental permit’ [4] provides further assessment criteria in the form of Environmental Assessment Levels (EALs).
- 2.7 Where the limit values and the AQS objectives differ, the more stringent has been used.

\* Standards are concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. Standards, as the benchmarks for setting objectives, are set purely with regard to scientific evidence and medical evidence on the effects of the particular pollutant on health, or on the wider environment, as minimum or zero risk levels.

† Objectives are policy targets expressed as a concentration that should be achieved, all the time or for a percentage of time, by a certain date.

**Table 2.1: Summary of Relevant Air Quality Limit Values and Objectives**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>Objectives/ Limit Values</b>	<b>Not to be Exceeded More Than</b>
Nitrogen Dioxide (NO <sub>2</sub> )	1 hour	200 µg.m <sup>-3</sup>	18 times per calendar year
	Annual	40 µg.m <sup>-3</sup>	-
Carbon Monoxide (CO)	1 hour	30,000	-
	8 hour running mean	10,000	-

### **Environmental Permitting Regulations**

- 2.8 The Environmental Permitting Regulations (EPR) 2016 [5] define activities that require an Environmental Permit from the Environment Agency (EA).
- 2.9 EPR is a regulatory system that employs an integrated approach to control the environmental impacts of certain listed industrial activities including the generation of combustion of fuel. The intention of the regulatory system is to ensure that best available techniques (BAT) are used to prevent or minimise the effects of an activity on the environment, having regard to the effects of emissions to air, land and water via a single permitting process.
- 2.10 To gain a permit, Operators have to demonstrate in their applications, in a systematic way, that the techniques they are using or are proposing to use are the BAT for their installation and meet certain other requirements taking account of relevant local factors. The permitting process also places a duty on the regulating body to ensure that the requirements are included for permitted sites to which these apply.
- 2.11 The essence of BAT is that the techniques selected to protect the environment should achieve a high degree of protection of people and the environment taken as a whole. Indicative BAT standards are laid out in national guidance and where relevant, should be applied unless a different standard can be justified for a particular installation. The EA is legally obliged to go beyond BAT requirements where EU Air Quality Limit Values may be exceeded by an existing operator.
- 2.12 The Environment Agency’s on-line guidance entitled ‘Environmental management – guidance, Air emissions risk assessment for your environmental permit’ [4] provides guidelines for air dispersion modelling. The assessment of air quality effects for the gas-fired engines is consistent with this guidance.

### 3 Assessment Methodology

#### Approach

- 3.1 This air quality assessment includes the key elements listed below:
- Establishing the background Ambient Concentration (AC) from consideration of Air Quality Review & Assessment findings and assessment of existing local air quality through a review of available air quality monitoring and Defra background map data in the vicinity of the site.
  - Quantitative assessment of the operational effects on local air quality from stack emissions utilising a “new generation” Gaussian dispersion model, ADMS 6. Assessment of Process Contributions (PC) from the facility in isolation, and assessment of resultant Predicted Environmental Concentrations (PEC), taking into account cumulative impacts through incorporation of the AC.
- 3.2 Air quality guidance advises that the organisation engaged in assessing the overall risks should hold relevant qualifications and/or extensive experience in undertaking air quality assessments. The Tetra Tech RPS air quality team members involved at various stages of this assessment have professional affiliations that include Member of the Institute of Air Quality Management and Member of the Institution of Environmental Science and have the required academic qualifications for these professional bodies.

#### Operational Phase – Methodology

##### Summary of Key Pollutants Considered

- 3.3 The key pollutant emission of local concern associated with the gas fired engines are oxides of nitrogen (NO<sub>x</sub>). Emissions of total NO<sub>x</sub> from combustion sources comprise nitric oxide (NO) and NO<sub>2</sub>. The NO oxidises in the atmosphere to form NO<sub>2</sub>. The assessment of operational impacts therefore focuses on changes in NO<sub>2</sub> concentrations at ground level receptors.
- 3.4 Carbon monoxide (CO) will also be emitted by the gas-fired engines.

##### Atmospheric Dispersion Modelling of Pollutant Concentrations

- 3.5 In urban areas, pollutant concentrations are primarily determined by the balance between pollutant emissions that increase concentrations, and the ability of the atmosphere to reduce and remove pollutants by dispersion, advection, reaction and deposition. An atmospheric dispersion model is used as a practical way to simulate these complex processes; such a model requires a range of input data, which can include emissions rates, meteorological data and local topographical information. The model used and the input data relevant to this assessment are described in the following sub-sections.
- 3.6 The atmospheric pollutant concentrations in an urban area depend not only on local sources at a street scale, but also on the background pollutant level made up of the local urban-wide background, together with regional pollution and pollution from more remote sources brought in on the incoming air mass. This background contribution needs to be added to the fraction from the modelled sources, and is usually obtained from measurements or estimates of urban background concentrations for the area in locations that are not directly affected by local emissions sources. Background pollution levels are described in detail in Section 4.

## Dispersion Model Selection

- 3.7 Several commercially available dispersion models can predict ground level concentrations arising from emissions to atmosphere from elevated point sources. Modelling for this study has been undertaken using ADMS 6, a version of the ADMS (Atmospheric Dispersion Modelling System) developed by Cambridge Environmental Research Consultants (CERC) that models a wide range of buoyant and passive releases to atmosphere either individually or in combination. The model calculates the mean concentration over flat terrain and also allows for the effect of plume rise, complex terrain, buildings and deposition. Dispersion models predict atmospheric concentrations within a set level of confidence and there can be variations in results between models under certain conditions. The ADMS 6 model has been formally validated and is widely used in the UK and internationally for regulatory purposes.
- 3.8 ADMS comprises a number of individual modules each representing one of the processes contributing to dispersion or an aspect of data input and output. Amongst the features of ADMS are:
- An up-to-date dispersion model in which the boundary layer structure is characterised by the height of the boundary layer and the Monin-Obukhov length, a length scale dependent on the friction velocity and the heat flux at the surface. This approach allows the vertical structure of the boundary layer, and hence concentrations, to be calculated more accurately than does the use of Pasquill-Gifford stability categories, which were used in many previous models (e.g. ISCST3). The restriction implied by the Pasquill-Gifford approach that the dispersion parameters are independent of height is avoided. In ADMS the concentration distribution is Gaussian in stable and neutral conditions, but the vertical distribution is non-Gaussian in convective conditions, to take account of the skewed structure of the vertical component of turbulence;
  - Several complex modules including the effects of plume rise, complex terrain, coastlines, concentration fluctuations and buildings; and
  - A facility to calculate long-term averages of hourly mean concentration, dry and wet deposition fluxes and radioactivity, and percentiles of hourly mean concentrations, from either statistical meteorological data or hourly average data.

## Model Input Data

### Stack Parameters and Emissions Rates used in the Model

- 3.9 The Proposed Development comprises 22 engines, combined into 11 stacks with two flues per stack. The stack locations are shown in Figure 3.2. The emissions characteristics for each stack modelled are provided in Table 3.1. A stack height calculation has been performed and is included in Appendix. A.

**Table 3.1: Stack Characteristics (per engine)**

<b>Parameters</b>	<b>Units</b>	<b>Value</b>
Stack height	From ground to the top of the stack (m)	20
Number of engines	-	22
Number of stacks	-	11
Internal diameter of the flue at point of release to air	m	0.87 per individual flue, 1.23 per stack
Temperature of the stack gases	°C	323
Velocity of stack gases	m.s <sup>-1</sup>	29.9

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Actual volumetric flow	Am <sup>3</sup> .s <sup>-1</sup>	17.8
Actual O2 (dry)	%	9.7
Actual H2O	%	9.8
Normalised volumetric flow (0°C, dry, 15% O2)	Nm <sup>3</sup> .s <sup>-1</sup>	13.9
NOx concentration	mg.Nm <sup>-3</sup>	95
NOx mass emission rate	g.s <sup>-1</sup>	1.32
CO concentration	mg.Nm <sup>-3</sup>	400
CO mass emission rate	g.s <sup>-1</sup>	5.58

\*Flue is D shaped but assumed to be circular to include in the model. Effective diameter calculated from stack area of D shaped flue.

\*The emission concentration complies with the Medium Combustion Plant (MCP) Directive limit of 95 mg Nm<sup>-3</sup> (dry, 0oC, 15% O2) for new natural gas engines.

3.10 The locations of the stacks are presented in Table 3.2.

**Table 3.2: Stack Locations**

Stack Number	X	Y
1	566122	176673
2	566131	176671
3	566139	176669
4	566147	176667
5	566156	176664
6	566165	176662
7	566173	176660
8	566182	176658
9	566190	176656
10	566198	176653
11	566207	176651

## Meteorological Data

3.11 The most important meteorological parameters governing the atmospheric dispersion of pollutants are wind direction, wind speed and atmospheric stability as described below:

- wind direction determines the sector of the compass into which the plume is dispersed;
- wind speed affects the distance that the plume travels over time and can affect plume dispersion by increasing the initial dilution of pollutants and inhibiting plume rise; and
- atmospheric stability is a measure of the turbulence of the air, and particularly of its vertical motion.

3.12 It therefore affects the spread of the plume as it travels away from the source. New generation dispersion models, including ADMS, use a parameter known as the Monin-Obukhov length that, together with the wind speed, describes the stability of the atmosphere.

3.13 For meteorological data to be suitable for dispersion modelling purposes, a number of meteorological parameters need to be measured on an hourly basis. These parameters include wind speed, wind direction, cloud cover and temperature. There are only a limited number of sites where the required meteorological measurements are made.

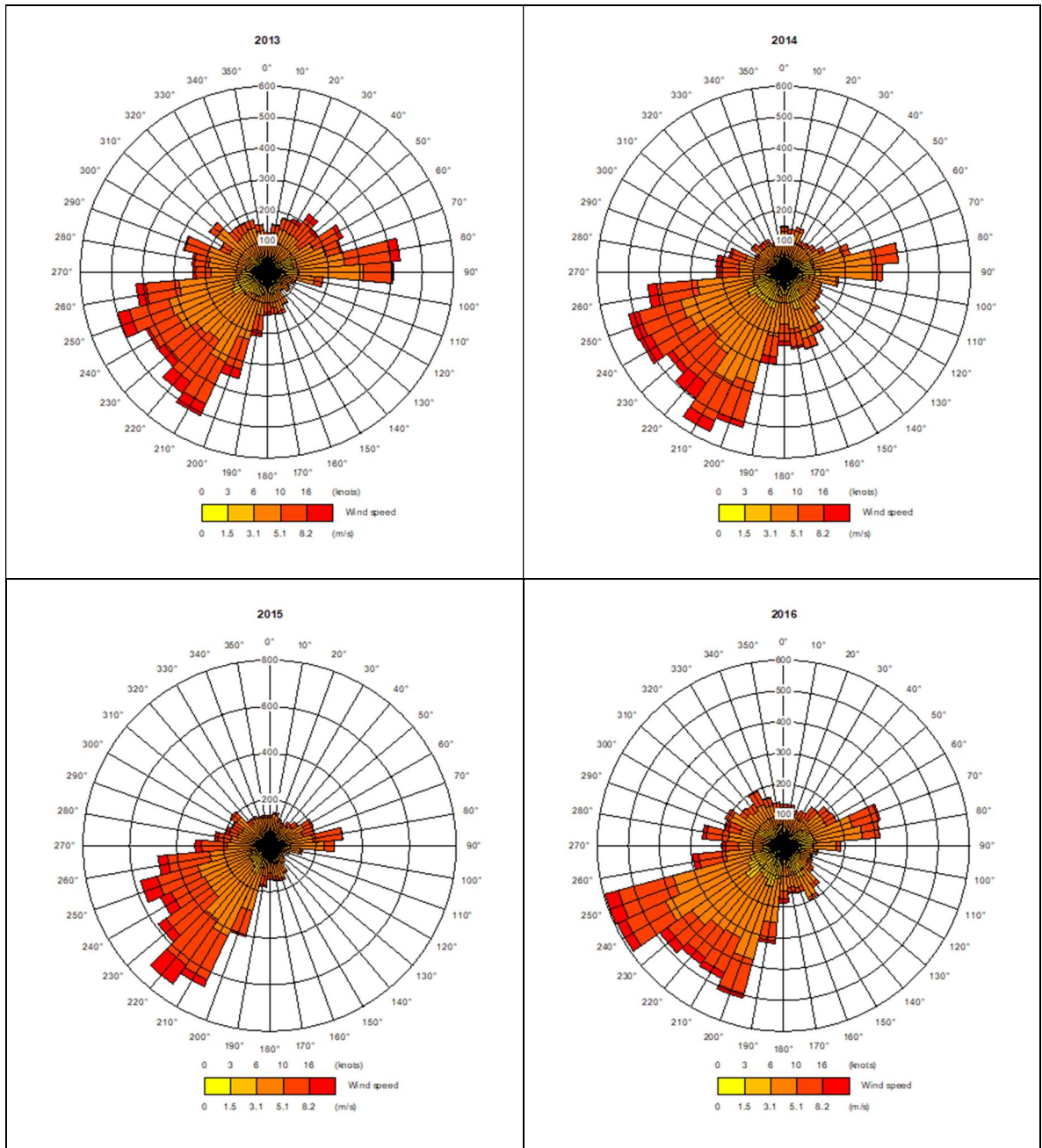
3.14 The year of meteorological data that is used for a modelling assessment can have a significant effect on source contribution concentrations. Dispersion model simulations have

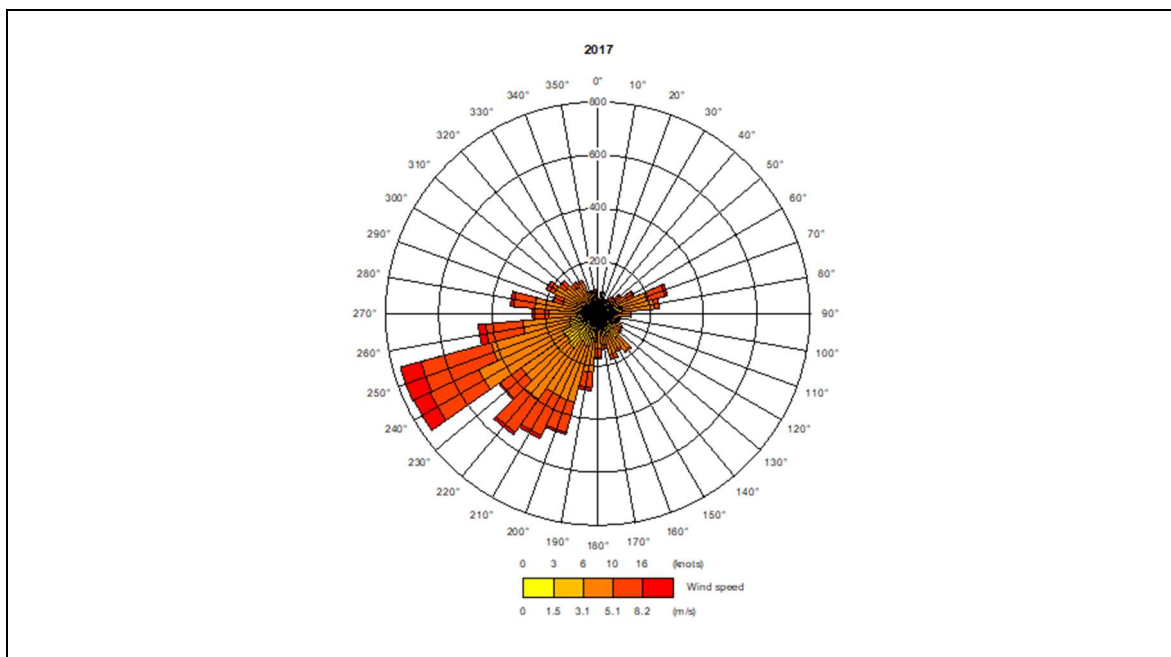
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been performed using five years of data from the Gravesend meteorological station between 2013 and 2017. The Gravesend meteorological site was closed in 2018 so this is the most recent data available.

3.15 Wind roses have been produced for each of the years of meteorological data used in this assessment and are presented in Figure 3.1.

**Figure 3.1: Wind Roses – Gravesend 2013 to 2017**





**Terrain**

3.16 The presence of elevated terrain can significantly affect (usually increase) ground level concentrations of pollutants emitted from elevated sources such as stacks, by reducing the distance between the plume centre line and ground level and by increasing turbulence and, hence, plume mixing. A complex terrain has been included in the model.

**Surface Roughness**

3.17 The roughness of the terrain over which a plume passes can have a significant effect on dispersion by altering the velocity profile with height, and the degree of atmospheric turbulence. This is accounted for by a parameter called the surface roughness length.

3.18 A surface roughness length of 0.5 m has been used within the model to represent the average surface characteristics across the study area

**Building Wake Effects**

3.19 The movement of air over and around buildings generates areas of flow circulation, which can lead to increased ground level concentrations in the building wakes. Where building heights are greater than about 30 - 40% of the stack height, downwash effects can be significant. The dominant structures (i.e. with the greatest dimensions likely to promote turbulence) have been included within the model. The location and dimensions of the structure included in the model are listed in Table 3.3.

**Table 3.3: Dimensions of Buildings Included Within the Dispersion Model**

Building ID	Approximate Building Centre		Height (m)	Length (m)	Width (m)	Angle (Degrees)
	X (m)	Y (m)				
1	566166	176664	4.2	98.0	18.0	105
2	566140	176482	15.0	62.8	100.9	107
3	566291	176461	15.0	69.6	154.6	103
4	566373	176496	15.0	68.6	46.9	103

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5	566155	176584	10.0	90.0	100.0	106
6	566102	176510	15.0	25.0	65.0	105
7	566351	176465	15.0	40.0	18.0	105
8	566377	176786	4.2	17.4	72.7	107
9	566408	176777	4.2	17.4	72.7	107
10	566436	176769	4.2	17.4	72.7	107
11	566351	176699	4.2	17.4	72.7	107
12	566382	176690	4.2	17.4	72.7	107
13	566410	176681	4.2	17.4	72.7	107
14	566366	176747	6.5	16.0	8.9	107
15	566340	176660	6.5	16.0	8.9	107
16	566369	176651	6.5	16.0	8.9	107
17	566399	176642	6.5	16.0	8.9	107
18	566395	176738	6.5	16.0	8.9	107
19	566426	176729	6.5	16.0	8.9	107
20	566113	176674	6.5	8.9	26.0	105

## Model Outputs

### Receptors

3.20 The air quality assessment predicts the impacts at locations that could be sensitive to any changes. For assessing human-health impacts, such sensitive receptors should be selected where the public is regularly present and likely to be exposed over the averaging period of the objective. Local Air Quality Management Technical Guidance, LAQM.TG22 [6], provides examples of exposure locations and these are summarised in Table 3.4.

**Table 3.4: Examples of Where Air Quality Objectives Apply**

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual-mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes.	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's façades), or any other location where public exposure is expected to be short-term.
Daily-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's façade), or any other location where public exposure is expected to be short-term.
Hourly-mean	All locations where the annual and 24 hour mean would apply. Kerbside sites (e.g. 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 to which the public might reasonably be expected to spend 1-hour or longer.	Kerbside sites where the public would not be expected to have regular access.

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3.21 Concentrations have been predicted across a 10 km by 10 km grid with a grid spacing of 50 m. In addition, the effects of the proposed development have been assessed at the façades of local existing receptors. All human receptors have been modelled at a height of 1.5 m, representative of typical head height. The locations of these discrete receptors are listed in Table 3.5 and shown in Figure 3.2. These receptors are the same receptors modelled for the already permitted Thurrock Flexible Generation Facility (TFGF) adjacent. This allows the contribution from the neighbouring already permitted TFGF to be included in the background concentrations.

3.22 Ecological Receptors are considered in Appendix. B.

**Table 3.5: Modelled Sensitive Receptors**

ID	Name	X	Y
1	Fort Road	565364	176620
2	Sandhurst Road	565234	176294
3	School	563917	176252
4	Gateway Academy	564255	177812
5	Gravel Pit Cottages	567414	177570
6	Princess Margaret Rd	568507	177407
7	Walnut Tree Farm	566713	177540
8	The Green	566062	177921
9	West Street	564727	174466
10	Milton School	565429	174069
11	Royal Pier Road	565057	174392
12	West Tilbury Hall	566066	177709
13	Cooper Shore	566322	177515
14	R1	557439	179107
15	R2	557597	181084
16	R3	561350	180920
17	R4	563478	180584
18	R5	563560	180866
19	R6	564894	181056
20	R7	563889	179678
21	R8	563101	177478
22	R9	563399	176576
23	R10	563911	176123
24	R11	564314	175875
25	R12	564434	175856
26	R13	565181	176256
27	R14	565039	176156
28	R15	565339	176504
29	R16	564701	175973
30	R17	564617	175897
31	R18	562008	180949
32	R19	563904	176281
33	R20	560604	180416
34	R21	560035	179870

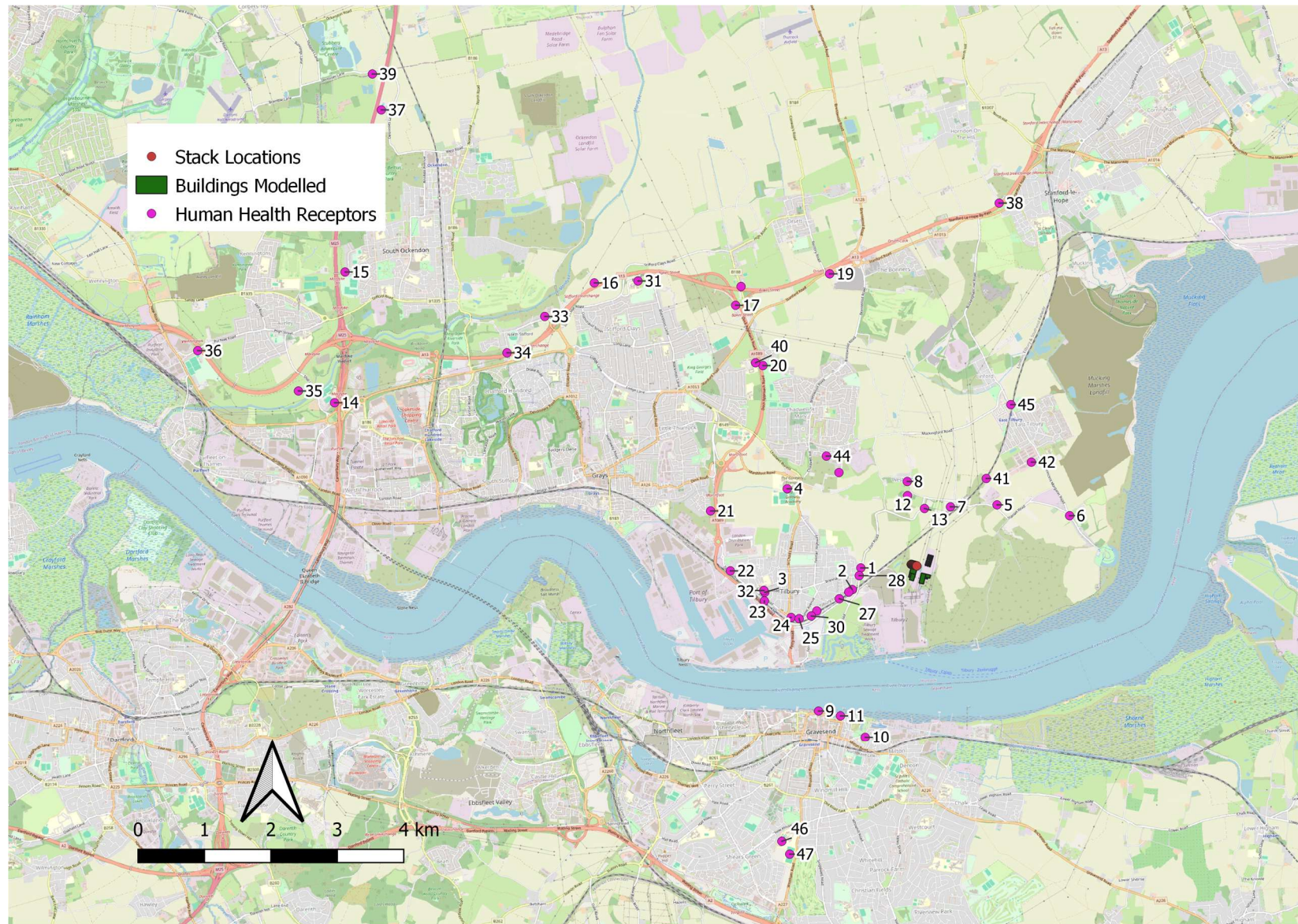
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35	R22	556895	179284
36	R23	555379	179902
37	R24	558144	183519
38	R25	567446	182119
39	R26	558009	184058
40	R27	563778	179720
41	16/01232/OUT (Proposed Development)	567251	177967
42	18/00664/CONDC (Proposed Development)	567931	178212
43	16/00412/OUT (Proposed Development)	565034	178056
44	15/00379/OUT (Proposed Development)	564844	178304
45	16/01475/SCR (Proposed Development)	567622	179079
46	GR/17/674 (Proposed Development)	564174	172500
47	20141214 (Proposed Development)	564292	172307

3.23 The AQS NO<sub>2</sub> and CO objectives for all the different averaging periods apply at the façades of the modelled residential and school receptors.

Figure 3.2: Stacks and Sensitive Receptors Modelled



### NO<sub>x</sub> to NO<sub>2</sub> Assumptions

3.24 The NO<sub>x</sub> emissions will typically comprise approximately 90-95% nitrogen monoxide (NO) and 5-10% nitrogen dioxide (NO<sub>2</sub>) at the point of release. The NO oxidises in the atmosphere in the presence of sunlight, ozone and volatile organic compounds to form NO<sub>2</sub>, which is the principal concern in terms of environmental health effects. The Environment Agency advises [7] that:

*“For combustion processes where no more than 10% of nitrogen oxides are emitted as nitrogen dioxide, you can assume worst case conversion ratios to nitrogen dioxide of:*

- *35% for short-term average concentrations*
- *70% for long-term average concentrations”*

3.25 These ratios have been used in the assessment.

### Modelling of Long-Term and Short-Term Emissions

3.26 Long-term (annual-mean) pollutants have been modelled for comparison with the relevant annual mean objectives. The models were run with the engines assumed to run for all hours in the year. The model output was then multiplied by the percentage of the year each engine is expected to run. The engines have been assumed to operate for 1,500 hours per year and for a maximum of 15 hours each per day (22 engines x 15 hours = 330 engine operational hours total).

3.27 For short-term NO<sub>2</sub>, the objective is for the hourly-mean concentration not to exceed 200 µg.m<sup>-3</sup> more than 18 times per calendar year. As there are 8,760 hours in a non-leap year, the hourly-mean concentration would need to be below 200 µg.m<sup>-3</sup> in 8,742 hours, i.e. 99.79% of the time.

3.28 The model has been run with all generators operating in every hour to test the impacts associated with the widest range of meteorological conditions.

### Significance Criteria

3.29 The on-line Environment Agency online guidance entitled ‘Environmental management – guidance, Air emissions risk assessment for your environmental permit’ [4] provides details for screening out substances for detailed assessment. In particular, it states that:

*“To screen out a PC for any substance so that you don’t need to do any further assessment of it, the PC must meet both of the following criteria:*

- *the short-term PC is less than 10% of the short-term environmental standard*
- *the long-term PC is less than 1% of the long-term environmental standard*

*If you meet both of these criteria you don’t need to do any further assessment of the substance.*

*If you don’t meet them you need to carry out a second stage of screening to determine the impact of the PEC.”*

3.30 It continues by stating that:

*“You must do detailed modelling for any PECs not screened out as insignificant.”*

3.31 It then states that further action may be required where:

*“your PCs could cause a PEC to exceed an environmental standard (unless the PC is very small compared to other contributions – if you think this is the case contact the Environment Agency)*

*The PEC is already exceeding an environmental standard”*

3.32 The EA online guidance ‘Environmental permitting: air dispersion modelling reports’ [7] states:

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

- *10% of a short-term environmental standard*
- *1% of a long-term environmental standard*

*At the detailed modelling stage there are no criteria to determine whether:*

- *PCs are significant*
- *PECs are insignificant or significant*

*You must explain how you judged significance and base this on the site specific circumstances.”*

3.33 On that basis, the results of the detailed modelling presented in this report have been used as follows:

- The effects are not considered significant if the short-term PC is less than 10% of the short-term Environmental Assessment Level (EAL) or the PEC is below the EAL; and
- The effects are not considered significant if the long-term PC is less than 1% of the long-term EAL or the PEC is below the EAL.

## Uncertainty

3.34 All air quality assessment tools, whether models or monitoring measurements, have a degree of uncertainty associated with the results. The choices that the practitioner makes in setting-up the model, choosing the input data, and selecting the baseline monitoring data will decide whether the final predicted impact should be considered a central estimate, or an estimate tending towards the upper bounds of the uncertainty range (i.e. tending towards worst-case).

3.35 The atmospheric dispersion model itself contributes some of this uncertainty, due to it being a simplified version of the real situation: it uses a sophisticated set of mathematical equations to approximate the complex physical and chemical atmospheric processes taking place as a pollutant is released and as it travels to a receptor. The predictive ability of even the best model is limited by how well the turbulent nature of the atmosphere can be represented.

3.36 Each of the data inputs for the model, listed earlier, will also have some uncertainty associated with them. Where it has been necessary to make assumptions, these have mainly been made towards the upper end of the uncertainty range informed by an analysis of relevant, available data.

3.37 The main components of uncertainty in the total predicted concentrations, made up of the background concentration and the modelled fraction, include those summarised in Table 3.6.

**Table 3.6: Approaches to Dealing with Uncertainty used Within the Assessment**

<b>Concentration</b>	<b>Source of Uncertainty</b>	<b>Approach to Dealing with Uncertainty</b>	<b>Comments</b>
Background Concentration	Characterisation of future baseline air quality (i.e. the air quality conditions in the future assuming that the development does not proceed)	The future background concentration used in the assessment is the same as the current background concentration and no reduction has been assumed. This is a conservative assumption as, in reality, background concentrations are likely to reduce over time as cleaner vehicle technologies form an increasing proportion of the fleet.	The background concentration is the major proportion of the total predicted concentration.
Model Input/Output Data	Meteorological Data	Uncertainties arise from any differences between the conditions at the met station and the development site, and between the historical met years and the future years. These have been minimised by using meteorological data collated at a representative measuring site. The model has been run for five full years of meteorological conditions.	The modelled fraction is likely to contribute to the predicted concentrations being towards between a central estimate and the top of the uncertainty range.
	Receptors	The model has been run for a grid of receptors. In addition, receptor locations have been identified where concentrations are highest or where the greatest changes are expected.	

3.38 The analysis of the component uncertainties indicates that, overall, the predicted total concentration is likely to be towards the high end of the range of predictions (i.e. towards worst-case) rather than being a central estimate. The actual concentrations that will be found when the site is operational are unlikely to be higher than those presented within this report and are more likely to be lower.

# 4 Baseline Air Quality Conditions

## Overview

- 4.1 The background concentration often represents a large proportion of the total pollution concentration, so it is important that the background concentration selected for the assessment is realistic. EPUK/IAQM guidance highlight public information from Defra and local monitoring studies as potential sources of information on background air quality.
- 4.2 A detailed review of baseline conditions was undertaken as part of the Air Quality Chapter of the Environmental Statement submitted in 2020 to the Planning Inspectorate for the already permitted TFGF on the neighbouring site. The background air quality was characterised by drawing on information from the following sources:
- Defra maps [8], which show estimated pollutant concentrations across the UK in 1 km grid squares; and
  - published results of local authority Review and Assessment (R&A) studies of air quality, including local monitoring and modelling studies; and
  - The results of the Tilbury 2 Air Quality Assessment (Tilbury2 Project Team, 2017); and
  - The results of the RPS project specific nitrogen dioxide (NO<sub>2</sub>) monitoring study undertaken in 2018.
- 4.3 Modelling of cumulative developments was also undertaken for the 2020 Environmental Statement for the already permitted TFGF to derive a cumulative baseline concentration. This included the following cumulative developments:
- Tilbury 2
  - Lower Thames Crossing
  - Tilbury Green Power Biomass plant
  - Tilbury Peak Reserve plant (gas engines x 14)
  - Thames Enterprise Park Energy Centre (EfW and gas engines)
  - Gateway Energy Centre (CCGT x 2, Auxiliary Boilers x 2)
  - Purfleet Regeneration Centre Energy Centre (Boilers x 8, CHP x 2).

Detailed modelling of the previously permitted TFGF on the neighbouring site was undertaken for the permit application and has been added to the cumulative baseline concentration.

## Review of Local Monitoring

- 4.4 The most recently measured annual-mean NO<sub>2</sub> concentrations for Thurrock Council and Gravesham Borough Council monitors used to establish baseline conditions are presented in Table 4.1. Data for 2020 and 2021 has not been included due to the impact of the COVID-19 pandemic

**Table 4.1: Monitored Annual-Mean NO<sub>2</sub> Concentrations**

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Monit or ID	Concentration ( $\mu\text{g.m}^{-3}$ )										
	2013	2014	2015	2016	2017	Avera ge (2013 to 2017)*	2018	2019	2022	2023**	2024**
<b>Thurrock Council Monitors</b>											
TILE	35.26	35.85	31.68	34.92	36.18	34.8	33.4	35.2	25.5	-	-
TL	37.13	35.56	30.55	35.68	35.81	34.9	32.9	34.8	24.7	-	-
TK4	32.79	31.05	29.50	31.51	30.1	31.0	-	-	-	-	-
TILD	38.08	33.90	31.12	36.85	37.15	35.4	35.0	35.1	22.4	-	-
TSR	31.88	27.17	27.39	28.05	29.02	28.7	26.8	28.5	20.9	-	-
<b>Gravesham Borough Council Monitors</b>											
GR13	45.2	42.5	40	37.5	44	41.8	47.1	46.1	37.6	31.0	29.5
GR62	34	29.7	29.2	30.2	31.2	30.9	30.7	30.8	24.8	21.2	21.6
GR90	37.2	31.5	28.6	30.5	31.2	31.8	-	-	-	-	-

All concentrations have been adjusted for bias

\*Used in 2020 ES chapter.

\*\* Thurrock Council have not published a more recent ASR than 2023

4.5 Data from 2013 to 2017 was used to inform the baseline concentrations used in the 2020 ES chapter. The table above shows that measured concentrations in 2022-2024 are lower than measured in 2013 to 2017 indicating that background concentrations have decreased since the 2020 ES chapter. On that basis, the use of background concentrations from the 2020 ES chapter will be conservative.

### Assumed Background Concentrations

4.6 Table 4.2 summarises the background concentrations used in the assessment.

**Table 4.2: Summary of Assumed Background Concentrations**

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Receptor ID	Receptor Name	Baseline Annual-Mean NO <sub>2</sub> Concentration (µg.m <sup>-3</sup> )	Data Source	Cumulative Annual-Mean Baseline Concentration including already permitted TFGF (µg.m <sup>-3</sup> )
1	Fort Road	26.4	Project specific monitoring location 3	30.4
2	Sandhurst Road	26.4	Project specific monitoring location 3	32.3
3	School	34.0	Thurrock monitoring - Average of TILE, TL, TK4, TILD	36.3
4	Gateway Academy	28.7	Thurrock monitoring - TSR	30.7
5	Gravel Pit Cottages	18.0	Project specific monitoring location 5	21.8
6	Princess Margaret Rd	18.0	Project specific monitoring location 5	19.9
7	Walnut Tree Farm	18.3	Project specific monitoring location 4	23.0
8	The Green	18.3	Project specific monitoring location 4	20.2
9	West Street	41.8	Gravesham monitoring - GR13	42.7
10	Milton School	30.9	Gravesham monitoring - GR62	31.5
11	Royal Pier Road	31.8	Gravesham monitoring - GR90	32.6
12	West Tilbury Hall	18.3	Project specific monitoring location 4	20.3
13	Cooper Shore	18.3	Project specific monitoring location 4	20.9
14	R1	31.1	Tilbury2 Air Quality Assessment (Note: these concentrations are the predicted concentrations with Tilbury2 in place in 2020)	31.6
15	R2	27.6		28.0
16	R3	28.3		28.9
17	R4	26.9		27.8
18	R5	32.2		33.1
19	R6	26.9		30.0
20	R7	28.1		30.2
21	R8	28.9		30.6
22	R9	36.6		37.9
23	R10	30.6		31.9
24	R11	26.6		28.3
25	R12	26.1		27.9
26	R13	26.4		29.0
27	R14	26.8		29.3
28	R15	23.6		27.1
29	R16	25.8		28.0
30	R17	26.2		28.4

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31	R18	24.1		24.7
32	R19	31.6		33.0
33	R20	23.5		24.0
34	R21	34.8		35.3
35	R22	24.8		25.3
36	R23	34.1		34.5
37	R24	28.5		28.9
38	R25	33.8		36.7
39	R26	22.6		22.9
40	R27	24.5		26.6
41	16/01232/OUT	18.0		22.8
42	18/00664/CONDC	29.9	Project specific monitoring location 5	31.8
43	16/00412/OUT	18.3	Thurrock monitoring - ETRS	20.1
44	15/00379/OUT	18.3	Project specific monitoring location 4	20.1
45	16/01475/SCR	29.9	Project specific monitoring location 4	31.4
46	GR/17/674	22.4	Thurrock monitoring - ETRS	23.9
47	20141214	38.6	Gravesham monitoring – GR75	40.1

## 5 Assessment of Air Quality Impacts

### Results of Stack Emissions Modelling

#### Short-term NO<sub>2</sub> Impacts

5.1 Table 5.1 summarises the short-term, predicted PCs at the discrete sensitive receptors. As outlined in section 3, where the PC exceeds 10% of the EAL, the cumulative PEC is considered.

**Table 5.1: Short-term Predicted NO<sub>2</sub> Concentrations (µg.m<sup>-3</sup>) at Sensitive Receptors**

Receptor ID	Receptor Name	Process Contribution (1 hour 99.79 <sup>th</sup> percentile) µg.m <sup>-3</sup>	Process Contribution as % of EAL	Cumulative AC including already permitted TFGF µg.m <sup>-3</sup>	PEC µg.m <sup>-3</sup>	PEC as % of EAL
1	Fort Road	29.6	14.8	148.5	178.1	89
2	Sandhurst Road	23.3	11.7	151.4	174.7	87
3	School	14.0	7.0	-	-	-
4	Gateway Academy	13.1	6.6	-	-	-
5	Gravel Pit Cottages	16.8	8.4	-	-	-
6	Princess Margaret Rd	13.3	6.7	-	-	-
7	Walnut Tree Farm	23.5	11.7	142.3	165.8	83
8	The Green	17.8	8.9	-	-	-
9	West Street	11.4	5.7	-	-	-
10	Milton School	11.1	5.5	-	-	-
11	Royal Pier Road	11.3	5.7	-	-	-
12	West Tilbury Hall	21.0	10.5	121.3	142.3	71
13	Cooper Shore	26.0	13.0	142.2	168.2	84
14	R1	4.0	2.0	-	-	-
15	R2	4.0	2.0	-	-	-
16	R3	6.7	3.3	-	-	-
17	R4	6.5	3.3	-	-	-
18	R5	6.3	3.2	-	-	-
19	R6	6.9	3.5	-	-	-
20	R7	7.8	3.9	-	-	-
21	R8	8.8	4.4	-	-	-
22	R9	11.8	5.9	-	-	-

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23	R10	14.1	7.1	-	-	-
24	R11	15.2	7.6	-	-	-
25	R12	15.9	7.9	-	-	-
26	R13	22.0	11.0	144.6	166.6	83
27	R14	19.5	9.7	-	-	-
28	R15	28.4	14.2	144.9	173.4	87
29	R16	17.2	8.6	-	-	-
30	R17	16.2	8.1	-	-	-
31	R18	6.1	3.1	-	-	-
32	R19	14.1	7.1	-	-	-
33	R20	5.2	2.6	-	-	-
34	R21	5.1	2.5	-	-	-
35	R22	3.9	2.0	-	-	-
36	R23	3.7	1.9	-	-	-
37	R24	4.7	2.4	-	-	-
38	R25	5.6	2.8	-	-	-
39	R26	4.7	2.4	-	-	-
40	R27	7.4	3.7	-	-	-
41	16/01232/OUT	16.0	8.0	-	-	-
42	18/00664/COND C	13.6	6.8	-	-	-
43	16/00412/OUT	14.2	7.1	-	-	-
44	15/00379/OUT	12.5	6.3	-	-	-
45	16/01475/SCR	11.2	5.6	-	-	-
46	GR/17/674	6.6	3.3	-	-	-
47	20141214	6.0	3.0	-	-	-

EAL for 1 hour 99.79<sup>th</sup> percentile (NO<sub>2</sub>) is 200 µg.m<sup>-3</sup>.

- 5.2 The predicted PCs exceed 10% of the EAL at some receptors but when the PC is added to the background concentration the PEC does not exceed 100% of the EAL. On that basis, the impacts can be screened out as insignificant.
- 5.3 This is based on the worst case assumption that all 22 engines will operate all year to ensure the worst case meteorological conditions were assessed. In reality the engines will run for up to 1,500 hours per year and the probability of all engines running at the same time in the hours with the worst case meteorological conditions is low.
- 5.4 The PECs presented are also a worst case scenario as they assume that the already permitted TFGF will be operating at the same time.
- 5.5 Whilst the T2FGF is immediately adjacent to the permitted TFGF, it has been designed as a separate project and the two facilities will be operated by separate legal entities. It is proposed that the two facilities are separately permitted but the two facilities together will comprise a multi-operator installation. Whilst separately operated the T2FGF will not

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operate concurrently with the TFGF other than as a result of a capacity market event. This restriction is capable of being managed through routine liaison between the two operators. However, in the unlikely event that direct communication between the operators of T2FGF and TFGF is not possible, T2FGF will still be able to regulate its operations effectively using the publicly available information on TFGF's proposed running periods provided through the balancing mechanism.

- 5.6 The baseline concentrations used in this assessment are assumed to be the same as used for the 2020 DCO application for already permitted TFGF. This is conservative as background concentrations have decreased significantly as outlined in section 4.

### Long-term NO<sub>2</sub> Impacts

- 5.7 Table 5.2 summarises the long-term maximum PC and PEC values at the selected discrete sensitive receptors. This assumes that the engines will run for 1,500 hours per year.

**Table 5.2: Long-term Predicted NO<sub>2</sub> Concentrations (µg.m<sup>-3</sup>) at Sensitive Receptors**

Receptor ID	Receptor Name	Process Contribution (1 hour 99.79 <sup>th</sup> percentile) µg.m <sup>-3</sup>	Process Contribution as % of EAL	Cumulative AC including already permitted TFGF µg.m <sup>-3</sup>	PEC µg.m <sup>-3</sup>	PEC as % of EAL
1	Fort Road	0.8	1.9	30.4	31.2	78
2	Sandhurst Road	0.5	1.2	32.3	32.8	82
3	School	0.2	0.6	-	-	-
4	Gateway Academy	0.1	0.2	-	-	-
5	Gravel Pit Cottages	0.5	1.3	21.8	22.3	56
6	Princess Margaret Rd	0.4	0.9	-	-	-
7	Walnut Tree Farm	0.8	2.1	23.0	23.9	60
8	The Green	0.2	0.6	-	-	-
9	West Street	0.1	0.2	-	-	-
10	Milton School	0.1	0.2	-	-	-
11	Royal Pier Road	0.1	0.2	-	-	-
12	West Tilbury Hall	0.3	0.7	-	-	-
13	Cooper Shore	0.6	1.4	20.9	21.5	54
14	R1	0.0	0.1	-	-	-
15	R2	0.0	0.1	-	-	-
16	R3	0.0	0.1	-	-	-
17	R4	0.1	0.1	-	-	-
18	R5	0.1	0.1	-	-	-

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19	R6	0.1	0.2	-	-	-
20	R7	0.1	0.2	-	-	-
21	R8	0.1	0.2	-	-	-
22	R9	0.2	0.4	-	-	-
23	R10	0.2	0.5	-	-	-
24	R11	0.2	0.5	-	-	-
25	R12	0.2	0.5	-	-	-
26	R13	0.4	1.1	29.0	29.4	74
27	R14	0.3	0.9	-	-	-
28	R15	0.7	1.9	27.1	27.9	70
29	R16	0.2	0.6	-	-	-
30	R17	0.2	0.6	-	-	-
31	R18	0.0	0.1	-	-	-
32	R19	0.2	0.6	-	-	-
33	R20	0.0	0.1	-	-	-
34	R21	0.0	0.1	-	-	-
35	R22	0.0	0.1	-	-	-
36	R23	0.0	0.1	-	-	-
37	R24	0.0	0.1	-	-	-
38	R25	0.1	0.2	-	-	-
39	R26	0.0	0.1	-	-	-
40	R27	0.1	0.2	-	-	-
41	16/01232/OUT	0.5	1.2	22.8	23.3	58
42	18/00664/COND C	0.3	0.8	-	-	-
43	16/00412/OUT	0.1	0.3	-	-	-
44	15/00379/OUT	0.1	0.3	-	-	-
45	16/01475/SCR	0.2	0.6	-	-	-
46	GR/17/674	0.0	0.1	-	-	-
47	20141214	0.0	0.1	-	-	-

EAL for annual-mean NO<sub>2</sub> is 40 µg.m<sup>-3</sup>.

- 5.8 The predicted PCs exceed 1% of the EAL at some locations but when the PC is added to the background concentration the PEC does not exceed 100% of the EAL and the impacts can be screened out as not significant at all receptors.
- 5.9 It can be informative to see the geographical extent of the impact: Figure 5.1 and Figure 5.2 show the contour plot for the annual mean NO<sub>2</sub> PCs and the 99.79<sup>th</sup> percentile hourly-mean NO<sub>2</sub> PCs. The contours presented are for the worse case meteorological year for the maximum point of impact across the modelled grid. This illustrates that the highest predicted concentration is not at a location where the public would be exposed.

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Figure 5.1: Annual-Mean NO<sub>2</sub> Process Contribution ( $\mu\text{g}\cdot\text{m}^{-3}$ )

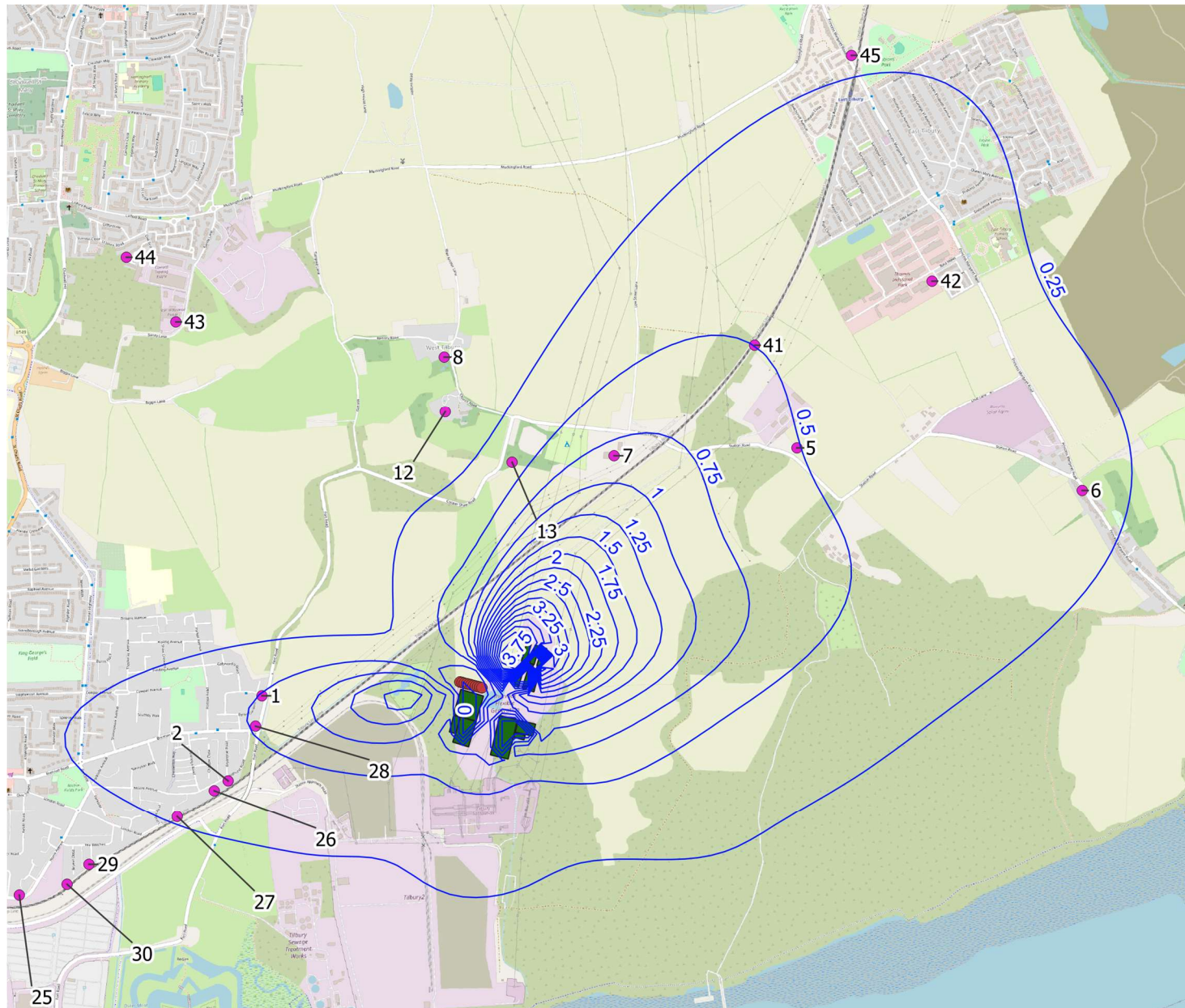
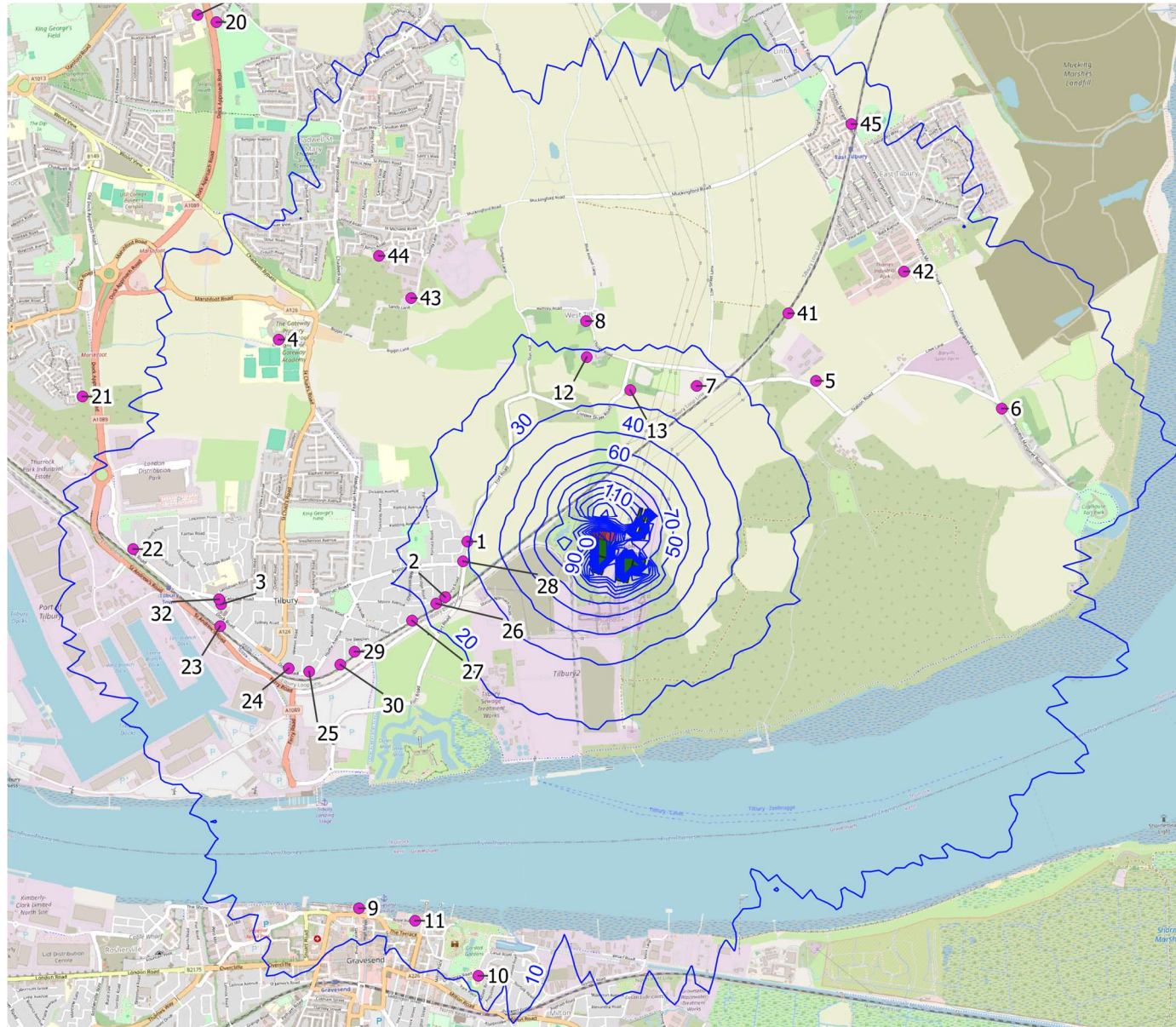


Figure 5.2: 99.79<sup>th</sup> Percentile Hourly-Mean NO<sub>2</sub> Process Contribution ( $\mu\text{g}\cdot\text{m}^{-3}$ )



**Short-term CO Impacts**

5.10 Table 5.3 summarises the maximum hourly mean PCs and 8-hourly mean PC for CO at the selected discrete sensitive receptors.

**Table 5.3: Short-term Predicted CO Concentrations ( $\mu\text{g.m}^{-3}$ ) at Sensitive Receptors**

<b>Receptor Name</b>	<b>Process Contribution (1 hour) <math>\mu\text{g.m}^{-3}</math></b>	<b>Process Contribution as % of EAL</b>	<b>Process Contribution (8 hour running mean) <math>\mu\text{g.m}^{-3}</math></b>	<b>Process Contribution as % of EAL</b>
Fort Road	405.9	1.4	326.1	3.3
Sandhurst Road	409.0	1.4	247.7	2.5
School	289.9	1.0	160.4	1.6
Gateway Academy	339.1	1.1	116.2	1.2
Gravel Pit Cottages	384.2	1.3	155.2	1.6
Princess Margaret Rd	283.5	0.9	134.3	1.3
Walnut Tree Farm	510.7	1.7	258.2	2.6
The Green	393.7	1.3	165.5	1.7
West Street	375.3	1.3	105.7	1.1
Milton School	354.9	1.2	91.4	0.9
Royal Pier Road	361.6	1.2	106.6	1.1
West Tilbury Hall	407.0	1.4	193.1	1.9
Cooper Shore	361.6	1.2	277.7	2.8
R1	81.0	0.3	31.7	0.3
R2	80.7	0.3	24.4	0.2
R3	102.6	0.3	43.7	0.4
R4	140.0	0.5	49.0	0.5
R5	145.6	0.5	54.3	0.5
R6	114.1	0.4	47.5	0.5
R7	192.5	0.6	51.3	0.5
R8	202.8	0.7	73.1	0.7
R9	237.2	0.8	117.7	1.2
R10	296.4	1.0	147.8	1.5
R11	386.7	1.3	125.0	1.2
R12	410.7	1.4	146.7	1.5
R13	431.1	1.4	230.4	2.3
R14	446.4	1.5	187.6	1.9
R15	388.7	1.3	315.0	3.2
R16	445.8	1.5	164.5	1.6

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R17	431.7	1.4	163.9	1.6
R18	116.6	0.4	45.2	0.5
R19	294.9	1.0	157.5	1.6
R20	108.6	0.4	38.7	0.4
R21	104.2	0.3	34.3	0.3
R22	76.3	0.3	29.9	0.3
R23	65.5	0.2	25.9	0.3
R24	66.5	0.2	32.7	0.3
R25	130.1	0.4	39.1	0.4
R26	62.2	0.2	32.2	0.3
R27	188.3	0.6	50.0	0.5
16/01232/OUT	461.2	1.5	153.2	1.5
18/00664/CONDC	330.7	1.1	106.3	1.1
16/00412/OUT	444.6	1.5	113.5	1.1
15/00379/OUT	383.9	1.3	94.7	0.9
16/01475/SCR	267.4	0.9	89.7	0.9
GR/17/674	194.4	0.6	46.2	0.5
20141214	179.5	0.6	46.9	0.5

EAL for hourly-mean CO is 30,000  $\mu\text{g}\cdot\text{m}^{-3}$ .

EAL for 8-hour mean CO is 10,000  $\mu\text{g}\cdot\text{m}^{-3}$ .

- 5.11 The predicted PCs do not exceed 10% of the EAL at any receptor and the impacts can be screened out as not significant at all receptors.

### Significance of Effects

- 5.12 It is generally considered good practice that, where possible, an assessment should communicate effects both numerically and descriptively. Professional judgement by a competent, suitably qualified professional is required to establish the significance associated with the consequence of the impacts. This assessment has therefore used professional judgement to establish the significance of the effects of the development.
- 5.13 The impacts at sensitive receptors are shown to be not significant even for this conservative scenario. Consequently, further sensitivity analysis has not been undertaken and, in practice, the impacts at sensitive receptors are likely to be lower than those reported in this conservative assessment.

## 6 Mitigation

### Operational Phase

- 6.1 Predicted concentrations of pollutants from the operational phase of the proposed facility have been demonstrated by the assessment to meet the relevant air quality standards and objectives. On that basis, no additional mitigation is proposed.

### 7 Conclusions

- 7.1 This report details the air quality assessment undertaken to accompany the permit application for the proposed Thurrock 2 Flexible Energy Facility. The facility would generate electricity during peak periods of demand, thereby reducing grid instability.
- 7.2 The assessment covers an evaluation of the impacts on the local area of NO<sub>2</sub> and CO emissions from the gas-fired engines operating for 1,500 hours a year.
- 7.3 Detailed atmospheric dispersion modelling has been undertaken to predict contributions from the stacks. Modelling has been undertaken using five years of hourly sequential meteorological data. Concentrations have been predicted at selected sensitive receptors and compared with the relevant long and short-term EALs.
- 7.4 The results show that the predicted concentrations associated with operations at the site are below the relevant air quality standards and the impacts can be screened out as insignificant.
- 7.5 Using professional judgement, the resulting air quality effect of the gas-fired engines is considered to be 'not significant' overall.

### Glossary

AC	Ambient Concentration
ADMS	Atmospheric Dispersion Modelling System
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
BAT	Best Available Techniques
EA	Environment Agency
EAL	Environmental Assessment Level
Effect	The consequences of an impact, experienced by a receptor
EPR	Environment Permitting Regulations
EPUK	Environmental Protection UK
IAQM	Institute of Air Quality Management
Impact	The change in atmospheric pollutant concentration and/or dust deposition. A scheme can have an 'impact' on atmospheric pollutant concentration but no effect, for instance if there are no receptors to experience the impact
PC	Process Contribution
PEC	Predicted Environmental Concentration
R&A	Review and Assessment
Receptor	A person, their land or property and ecologically sensitive sites that may be affected by air quality
Risk	The likelihood of an adverse event occurring

## Appendices



## Appendix. A Stack Height Determination

### Stack Height Determination

A.1 A stack height determination has been undertaken to establish the height at which there is minimal additional environmental benefit associated with the cost of further increasing the height of the stack. The Environment Agency removed their detailed guidance, Horizontal Guidance Note EPR H1 [9], for undertaking risk assessments on 1 February 2016; however, the approach used here is consistent with that EA guidance which required the identification of “an option that gives acceptable environmental performance but balances costs and benefits of implementing it.”.

### Methodology

A.2 Model simulations have been run using ADMS 6 to determine what stack height is required to provide adequate dispersion/dilution and to overcome local building wake effects.

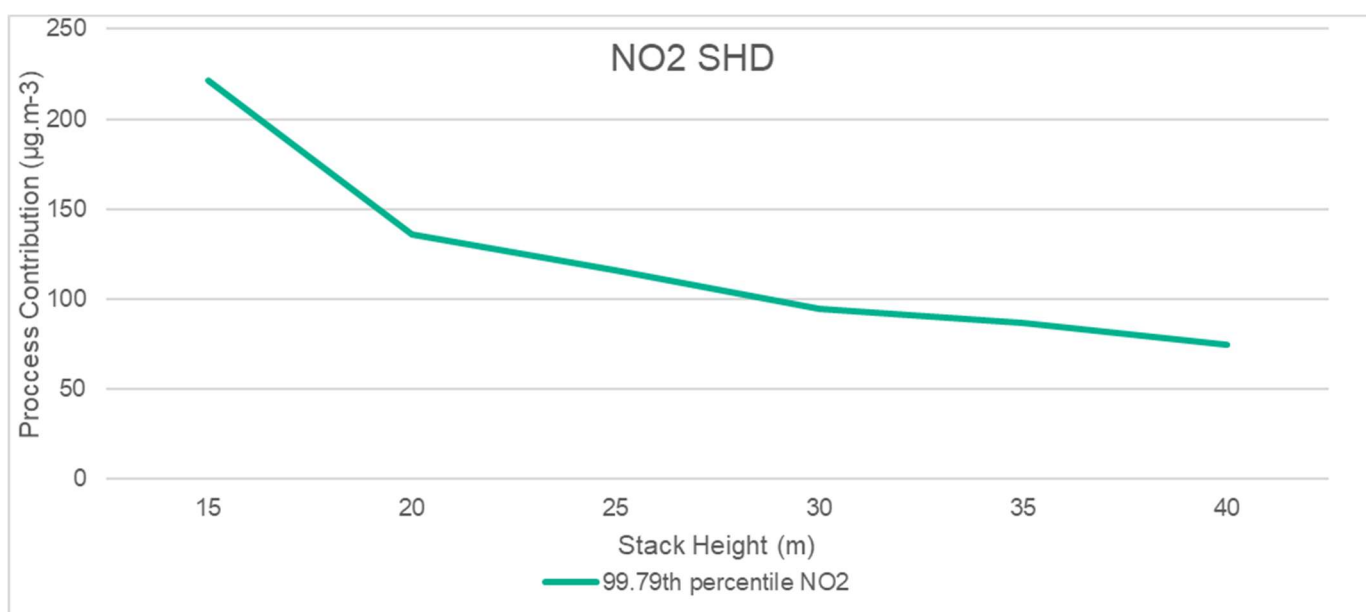
A.3 The stack height determination considers ground level concentrations over the averaging periods relevant to the air quality assessment, together with the full range of all likely meteorological conditions using five years (2013 to 2017) of hourly sequential meteorological data from Gravesend. The model was run for a range of stack heights between 15 m and 40 m, in 5 m increments.

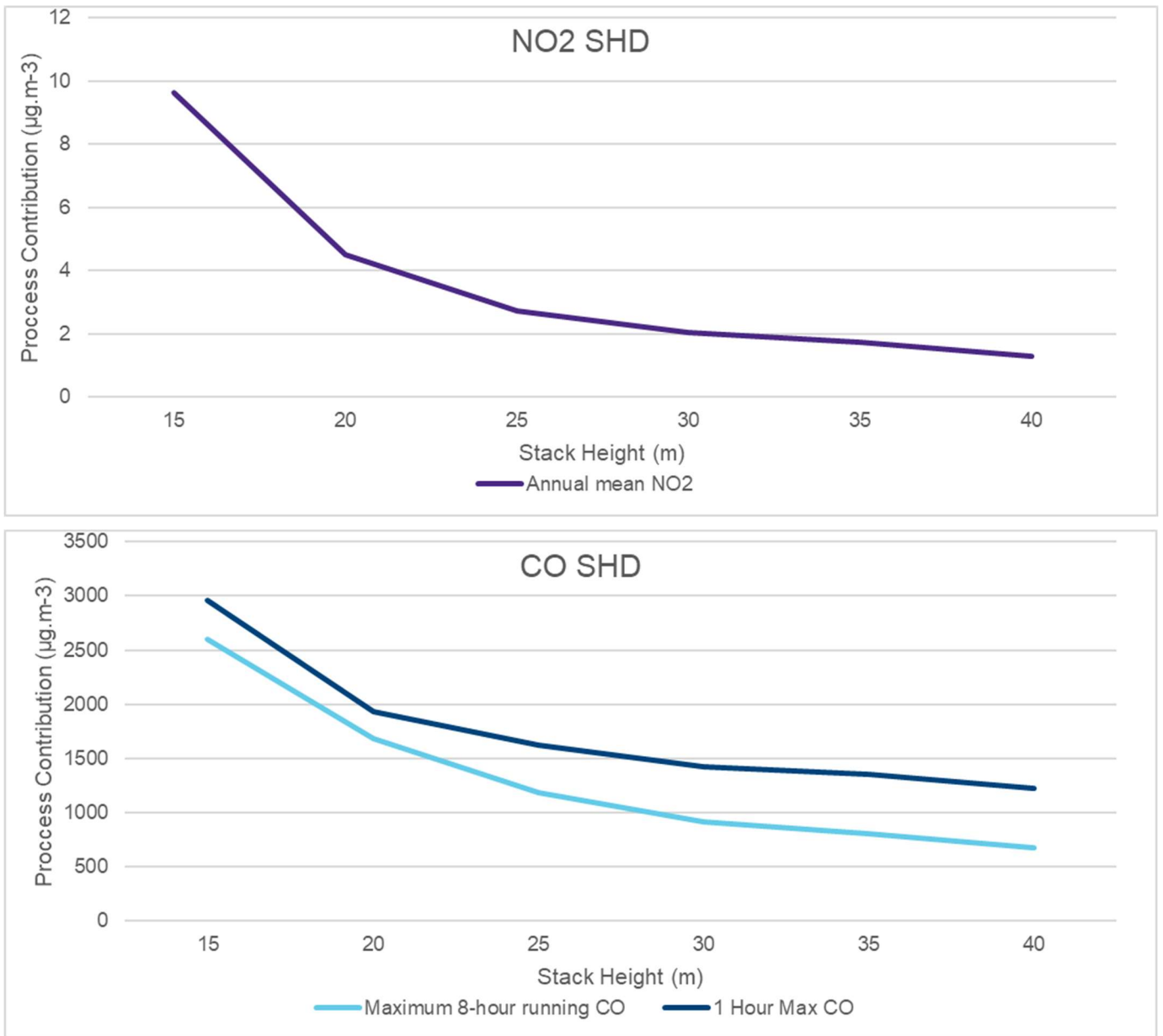
A.4 For the purposes of stack height determination, the modelled domain was 10 km by 10 km centred on the proposed development and with a grid spacing of 50 m. Results have been reported for the location where the highest concentration is predicted and for the worst-case meteorological conditions

### Results

The maximum predicted Process Contributions (PCs) have been plotted against height to determine if there is a height at which no benefit is gained from increases in stack heights.

Figure A.1: Maximum Predicted Process Contributions vs Stack Height





- A.5 Figure 1 indicates that the benefit in terms of improvement in annual mean NO<sub>2</sub> concentration with an increase in stack height is maximised at 20 m.
- A.6 Based on the results of the stack height analysis, a suitable stack height for the engines is considered to be 20 m. In addition, the results of the impact assessment (as outlined in section 5) illustrate that with a stack height of 20 m the impacts are not significant.

### Appendix. B Assessment of Ecological Impacts

#### Ecological Impacts

- B.1 The Environment Agency guidance on 'Screening for protected conservations areas' [10] requires identification of:
- Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites (protected wetlands) within 10 km of the proposed development; and
  - Sites of Special Scientific Interest (SSSIs) and Local Nature sites (ancient woods, local wildlife sites (LWSs) and national and local nature reserves) within 2 km of the proposed development.
- B.2 The relevant sites which have been identified by the EA's Nature and Heritage Conservation Screening Report are listed below:
- North Downs Woodlands SAC
  - Peters Pit SAC
  - Thames Estuary and Marshes SPA & Ramsar
  - Medway Estuary and Marshes Ramsar
  - Tilbury Power Station Local Wildlife Site
  - West Tilbury Hall Local Wildlife Site
  - West Tilbury Church Local Wildlife Site
  - Tilbury Marshes Local Wildlife Site
  - Low Street Pit Local Wildlife Site
  - Broom Hill Local Wildlife Site
  - Hob Hill & Sandy Lane Pit, Chadwell St Mary Local Wildlife Site

#### Approach

- B.3 Concentrations of NO<sub>x</sub> have been predicted using the same model as used in the assessment of impacts at human-health receptors. The receptor points have been modelled at ground level.

#### Critical Levels

- B.4 Critical levels are maximum atmospheric concentrations of pollutants for the protection of vegetation and ecosystems and are specified within relevant European air quality directives and corresponding UK air quality regulations. Annual-mean PCs and PECs of NO<sub>x</sub> have been calculated for comparison with the 30 µg.m<sup>-3</sup> critical level. The maximum daily-mean PCs and PECs of NO<sub>x</sub> have been calculated for comparison with the 200 µg.m<sup>-3</sup> critical level. Where relevant, background concentrations at each designated site have been derived from the UK Air Pollution Information System (APIS) database [11].

#### Critical Loads

- B.5 Critical loads refer to the quantity of pollutant deposited, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

### Critical Loads – Nutrient Nitrogen Deposition

- B.6 Percentage contributions to nutrient nitrogen deposition have been derived from the results of the ADMS dispersion modelling. Deposition rates have been calculated using empirical methods recommended by the Environment Agency, as follows:
- The dry deposition flux ( $\mu\text{g}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ ) has been calculated by multiplying the ground level  $\text{NO}_2$  concentrations ( $\mu\text{g}\cdot\text{m}^{-3}$ ) by the deposition velocity. The Environment Agency guidance provides deposition velocities of  $0.0015\text{ m}\cdot\text{s}^{-1}$  for short habitats and  $0.003\text{ m}\cdot\text{s}^{-1}$  for tall habitats.
  - Units of  $\mu\text{g}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  have been converted to units of  $\text{kg}\cdot\text{ha}^{-1}\cdot\text{year}^{-1}$  by multiplying the dry deposition flux by the standard conversion factor of 96 for  $\text{NO}_x$ .
  - Predicted contributions to nitrogen deposition have been calculated and compared with the relevant critical load range for the habitat types associated with the designated site. These have been derived from the APIS database.

### Critical Loads - Acidification

- B.7 The acid deposition rate, in equivalents  $\text{keq}\cdot\text{ha}^{-1}\cdot\text{year}^{-1}$ , has been calculated by multiplying the dry deposition flux ( $\text{kg}\cdot\text{ha}^{-1}\cdot\text{year}^{-1}$ ) by a conversion factor of 0.071428 for N. This takes into account the degree to which a chemical species is acidifying, calculated as the proportion of N within the molecule.
- B.8 Wet deposition in the near field is not significant compared with dry deposition for N [12] and therefore for the purposes of this assessment, wet deposition has not been considered.
- B.9 Predicted contributions to acid deposition have been calculated and compared with the minimum critical load function for the habitat types associated with the designated site as derived from the APIS database.

### Significance Criteria

- B.10 The PC and PEC of  $\text{NO}_x$  and N/acid deposition have been compared against the relevant critical level/load, for the relevant habitat type/interest feature.
- B.11 For SACs, SPAs, Ramsars and SSSIs, the Environment Agency guidelines [10] state that:  
*"To screen out a PC for any substance so that you don't need to do any further assessment of it, the PC must meet both of the following criteria:*
- *the short-term PC is less than 10% of the short-term environmental standard*
  - *the long-term PC is less than 1% of the long-term environmental standard*
- If you meet both of these criteria you don't need to do any further assessment of the substance.*
- If you don't meet them you need to carry out a second stage of screening to determine the impact of the PEC."*
- B.12 It continues by stating that:  
*"If your long-term PC is greater than 1% and your PEC is less than 70% of the long-term environmental standard, the emissions are insignificant – you don't need to assess them any further. If your PEC is greater than 70% of the long-term environmental standard, you need to do detailed modelling."*

B.13 For LWSs, it states:

*“If your emissions meet both of the following criteria they’re insignificant – you don’t need to assess them any further:*

- *the short-term PC is less than 100% of the short-term environmental standard*
- *the long-term PC is less than 100% of the long-term environmental standard*

*You don’t need to calculate PEC for local nature sites. If your PC exceeds the screening criteria you need to do detailed modelling.”*

### Results

- B.14 The ambient NO<sub>x</sub> concentrations and existing deposition rates have been obtained from APIS [11]. The highest deposition rates have been obtained taking into account the various habitats across the sites.
- B.15 The maximum predicted annual-mean maximum NO<sub>x</sub> concentrations are compared with the critical level in Table B.1.
- B.16 The maximum predicted daily-mean maximum NO<sub>x</sub> concentrations are compared with the critical level in Table B.2.
- B.17 The maximum predicted nutrient N deposition rates are compared with the critical load in Table B.3. The lowest critical loads for nitrogen deposition have been obtained from APIS.
- B.18 The maximum predicted acid deposition rates are compared with the critical load function in Table B.4. The critical loads for the nitrogen component for acid deposition have been also obtained from APIS.

## AIR QUALITY ASSESSMENT

**Table B.1: Predicted Annual-Mean NOx Concentrations at Designated Habitat Sites**

Site	Critical Level	PC	PC/ Critical Level (%)	Cumulative AC including already permitted TFGF ( $\mu\text{g.m}^{-3}$ )	PEC ( $\mu\text{g.m}^{-3}$ )	PEC/ Critical Level (%)
North Downs Woodlands SAC	30	0.02	0.1	-	-	-
Peters Pit SAC		0.02	0.1	-	-	-
Thames Estuary and Marshes SPA/Ramsar		0.37	1.2	19.6	20.0	67
Medway Estuary and Marshes Ramsar		0.03	0.1	-	-	-
Tilbury Power Station Local Wildlife Site		4.21	14.0	-	-	-
West Tilbury Hall Local Wildlife Site		0.49	1.6	-	-	-
West Tilbury Church Local Wildlife Site		0.49	1.6	-	-	-
Tilbury Marshes Local Wildlife Site		0.63	2.1	-	-	-
Low Street Pit Local Wildlife Site		1.03	3.4	-	-	-
Broom Hill Local Wildlife Site		2.41	8.0	-	-	-
Hob Hill & Sandy Lane Pit, Chadwell St Mary Local Wildlife Site		0.16	0.5	-	-	-

## AIR QUALITY ASSESSMENT

**Table B.2: Predicted Daily-Mean NO<sub>x</sub> Concentrations at Designated Habitat Sites**

Site	Critical Level	PC ( $\mu\text{g}\cdot\text{m}^{-3}$ )	PC/ Critical Level (%)
North Downs Woodlands SAC	200	1.7	0.9
Peters Pit SAC		0.8	0.4
Thames Estuary and Marshes SPA/Ramsar		8.4	4.2
Medway Estuary and Marshes Ramsar		1.8	0.9
Tilbury Power Station Local Wildlife Site		189.1	94.5
West Tilbury Hall Local Wildlife Site		25.3	12.6
West Tilbury Church Local Wildlife Site		25.3	12.6
Tilbury Marshes Local Wildlife Site		36.7	18.4
Low Street Pit Local Wildlife Site		25.0	12.5
Broom Hill Local Wildlife Site		94.5	47.2
Hob Hill & Sandy Lane Pit, Chadwell St Mary Local Wildlife Site		10.2	5.1

**Table B.3: Predicted Nutrient N Deposition at Designated Habitat Sites**

Site	Critical Load	PC ( $\text{kgN}\cdot\text{ha}^{-1}\cdot\text{yr}^{-1}$ )	PC/ Critical Load (%)
North Downs Woodlands SAC	10	0.004	<0.1
Peters Pit SAC	10	0.002	<0.1
Thames Estuary and Marshes SPA/Ramsar	5	0.037	0.7

## AIR QUALITY ASSESSMENT

Medway Estuary and Marshes Ramsar	10	0.003	<0.1
Tilbury Power Station Local Wildlife Site	10	0.424	4.2
West Tilbury Hall Local Wildlife Site	5	0.049	1.0
West Tilbury Church Local Wildlife Site	5	0.049	1.0
Tilbury Marshes Local Wildlife Site	20	0.063	0.3
Low Street Pit Local Wildlife Site	5	0.104	2.1
Broom Hill Local Wildlife Site	5	0.242	4.8
Hob Hill & Sandy Lane Pit, Chadwell St Mary Local Wildlife Site	5	0.016	0.3

Notes:

- a. Critical loads (CLs) for nutrient nitrogen deposition are provided as a range. In this case, the lower limit of the CL range has been used in the assessment.

## AIR QUALITY ASSESSMENT

**Table B.4: Predicted Acid Deposition at Designated Habitat Sites**

Site	CLMinN	PC (keq.ha <sup>-1</sup> .yr <sup>-1</sup> )	PC/ Critical Load (%)
North Downs Woodlands	0.142	0.0003	0.2
Peters Pit	0.856	0.0001	<0.1
Thames Estuary and Marshes	0.499	0.0027	0.5
Medway Estuary and Marshes	1.071	0.0002	<0.1
Tilbury Power Station	0.223	0.0303	13.6
West Tilbury Hall	0.438	0.0035	0.8
West Tilbury Church	0.438	0.0074	1.7
Tilbury Marshes	-	0.0045	-
Low Street Pit	0.438	0.0074	1.7
Broom Hill	0.223	0.0173	7.8
Hob Hill & Sandy Lane Pit, Chadwell St Mary	0.357	0.0012	0.3

Notes:

- a. Critical loads (CLs) for acid deposition are provided as a range. In this case, the lower limit of the CLMinN range has been used in the assessment.

### Interpretation of Results

#### Annual-mean NO<sub>x</sub>

Table B.1 shows that the maximum annual-mean NO<sub>x</sub> PC does not exceed 1% of the critical level at the surrounding SACs, SPAs and Ramsar sites nor 100% of the critical level at the surrounding local wildlife sites at all of the sites except for the Thames Estuary and Marshes SPA/Ramsar. When the PC is added to the Cumulative AC, the PEC is below 100% of the critical level. As such, the impact is not likely to have a significant effect.

#### Daily-mean NO<sub>x</sub>

- B.19 Table B.2 shows that the maximum daily-mean NO<sub>x</sub> PC does not exceed 10% of the critical level at the surrounding SACs, SPAs and Ramsar sites nor 100% of the critical level at the surrounding local wildlife sites. As such, the impacts can be screened out as insignificant.
- B.20 Table B.2 shows the maximum daily-mean NO<sub>x</sub> PC as a percentage of a critical level of 200 µg.m<sup>-3</sup>. The EA online guidance 'Air emissions risk assessment for your environmental permit' says the critical level is " 75 micrograms per cubic metre, 200 micrograms per cubic metre (but only for detailed assessments where the ozone is below the AOT40 critical level and sulphur dioxide is below the lower critical level of 10 micrograms per cubic metre). The AOT40 critical level for ozone is 80 µg.m<sup>-3</sup>. Ozone and sulphur dioxide are both monitored at the Thurrock Urban Background location. The five-year average (2021-2025) of recorded data at this location is 47.5 µg.m<sup>-3</sup> for ozone and 1.2 µg.m<sup>-3</sup> for sulphur dioxide.

#### Nutrient N Deposition

- B.21 Table B.3 shows that the maximum nitrogen deposition PC does not exceed 1% of the critical level at the surrounding SACs, SPAs and Ramsar sites nor 100% of the critical level at the surrounding local wildlife sites. As such, the impact is not likely to have a significant effect.

#### Acid Deposition

- B.22 Table B.4 show that the maximum acid deposition PC does not exceed 1% of the critical level at the surrounding SACs, SPAs and Ramsar sites nor 100% of the critical level at the surrounding local wildlife sites. As such, the impact is not likely to have a significant effect.

### References

- 1 Defra, 2010, The Air Quality Standards Regulations.
- 2 The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020
- 3 Defra, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Volume 2.
- 4 Environment Agency (2025) <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#environmental-standards-for-air-emissions>
- 5 OPSI (2016) The Environmental Permitting (England and Wales) Regulations 2016
- 6 Defra, 2022, Local Air Quality Management Technical Guidance, 2022 (LAQM.TG22)
- 7 <https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports>
- 8 Drawn from Defra Maps at <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021>
- 9 Environment Agency (2010) Horizontal Guidance Note EPR H1
- 10 Environment Agency (2025) <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#screening-for-protected-conservation-areas>
- 11 APIS (2021) Air Pollution Information Systems, [www.apis.ac.uk](http://www.apis.ac.uk), Accessed December 2025
- 12 CEH (2011) Approaches to modelling local nitrogen deposition and concentrations in the context of Natura 2000 - Topic 4