



## **Thurrock Flexible Generation Plant**

**Environmental Statement Volume 3  
Chapter 12: Air Quality**

**Date:** February 2020

**Environmental Impact Assessment**

**Environmental Statement**

**Volume 3**

**Chapter 12**

---

Report Number: OXF10872

Version: Final

Date: February 2020

This report is also downloadable from the Thurrock Flexible Generation Plant website at:

<http://www.thurrockpower.co.uk>

Thurrock Power Ltd

1st Floor

145 Kensington Church Street

London W8 7LP

**Copyright © RPS**

The material presented in this report is confidential. This report has been prepared for the exclusive use of Thurrock Power Ltd and shall not be distributed or made available to any other company or person without the knowledge and written consent of RPS.

Prepared by: Kathryn Barker

Contributors: Rosemary Challen

Checked by: Fiona Prismall

## Table of Contents

1. Introduction.....	1
1.1 Purpose of this chapter .....	1
1.2 Planning policy context .....	1
1.3 Legislation .....	5
1.4 Consultation .....	6
2. Assessment Approach.....	10
2.1 Guidance.....	10
2.2 Assessment Methodology .....	10
2.3 Baseline study.....	11
2.4 Study area.....	11
2.5 Uncertainties and/or data limitations .....	13
2.6 Impact assessment criteria .....	14
2.7 Maximum design envelope parameters for assessment .....	19
2.8 Impacts scoped out of the assessment.....	20
2.9 Measures adopted as part of Thurrock Flexible Generation Plant .....	23
3. Baseline environment .....	25
3.1 Current baseline.....	25
3.2 Future baseline .....	26
4. Assessment of Effects .....	27
4.1 Construction phase .....	27
4.2 Operational and maintenance phase .....	31
4.3 Decommissioning phase .....	38
4.4 Cumulative effects.....	38
4.5 Transboundary effects .....	38
4.6 Inter-related effects .....	38
5. Conclusion and summary .....	39
6. References .....	41

## List of Tables

Table 1.1: Summary of NPS EN-1 and EN-2 provisions relevant to this chapter. ....	1
Table 1.2: Summary of NPS EN-1 and NPS EN-2 policy on decision making relevant to this chapter. ....	2
Table 1.3: Summary of Relevant Air Quality Limit Values and Objectives. ....	6
Table 1.4: Key points raised during scoping and consultation to date.....	7
Table 2.1: Summary of key desktop reports.....	11
Table 2.2: Summary of site-specific surveys undertaken. ....	11
Table 2.3: Example of Where Air Quality Objectives Apply.....	12

Table 2.4: Modelled Sensitive Receptors. ....	12
Table 2.5: Approaches to Dealing with Uncertainty in the Assessment. ....	13
Table 2.6: Risk allocation – source (dust emission magnitude).....	14
Table 2.7: Sensitivities of people and property receptors to dust. ....	15
Table 2.8: Sensitivities of people and property receptors to PM <sub>10</sub> .....	15
Table 2.9: Sensitivities of ecological receptors to dust.....	15
Table 2.10: Sensitivity of the Area to Dust Soiling Effects on People and Property. ....	16
Table 2.11: Sensitivity of the Area to Human Health Impacts. ....	16
Table 2.12: Sensitivity of the Area to Ecological Impacts. ....	17
Table 2.13: Risk of dust impacts – demolition. ....	17
Table 2.14: Risk of dust impacts – earthworks.....	17
Table 2.15: Risk of dust impacts – construction.....	17
Table 2.16: Risk of dust impacts – trackout.....	17
Table 2.17: Annual-mean Descriptors for Individual Sensitive Receptors.....	18
Table 2.18: Maximum design envelope parameters assessed.....	21
Table 2.19: Impacts scoped out of the assessment. ....	22
Table 2.20: Designed-in measures. ....	23
Table 3.1: Summary of Baseline Annual-Mean (Long-term) NO <sub>2</sub> Concentrations used in the Assessment.....	25
Table 4.1: Dust emission magnitude for earthworks, construction and trackout.....	27
Table 4.2: Sensitivity of the surrounding area for earthworks and construction .....	28
Table 4.3: Sensitivity of the surrounding area for trackout .....	28
Table 4.4: Dust impact risk for earthworks, construction and trackout .....	28
Table 4.5: Long-term Predicted NO <sub>2</sub> Concentrations (µg.m <sup>-3</sup> ) at Sensitive Receptors.....	31
Table 4.6: Annual-mean NO <sub>2</sub> Concentrations at GR13 (µg.m <sup>-3</sup> ). ....	32
Table 4.7: Short-term Predicted NO <sub>2</sub> Concentrations (µg.m <sup>-3</sup> ) at Sensitive Receptors. ....	35
Table 5.1: Summary of potential environment effects, mitigation and monitoring. ....	40

## List of Figures

Figure 1.1: Air Quality Management Areas and Modelled Sensitive Receptors. ....	9
Figure 4.1: Construction Dust Assessment Buffers.....	30
Figure 4.2: Annual-mean NO <sub>2</sub> Concentrations at GR13 (µg.m <sup>-3</sup> ). ....	33
Figure 4.3: Annual-mean NO <sub>2</sub> Process Contributions (µg.m <sup>-3</sup> ).....	34
Figure 4.4: Hourly-mean NO <sub>2</sub> Process Contributions (µg.m <sup>-3</sup> ) .....	37

## Summary

This chapter assesses the effect of the proposed development on air quality. It considers the effects from emissions of the gas engines and the effect of dust from the construction phase on sensitive receptors.

## Qualifications

This chapter has been prepared by Kathryn Barker, a Member of the Institute of Air Quality Management (IAQM) and an associate member of the Institution of Environmental Sciences.

It has been checked by Rosemary Challen, a Member of the Institution of Environmental Sciences and Member of the IAQM.

It has been reviewed by Fiona Prismall, a Chartered Environmentalist, Member of the Institution of Environmental Sciences and Fellow of the IAQM. Fiona is the IAQM committee secretary. Fiona was a member of the working groups that produced the IAQM 2014 'Guidance on the assessment of dust from demolition and construction', the Environmental Protection UK & IAQM 2017 'Land-use Planning & Development Control: Planning for Air Quality' guidance and the IAQM 2019 'A guide to the assessment of air quality impacts on designated nature conservation sites'.

# 1. Introduction

## 1.1 Purpose of this chapter

- 1.1.1 This chapter of the Environmental Statement presents the findings of Environmental Impact Assessment (EIA) work concerning potential impacts of Thurrock Flexible Generation Plant on air quality.
- 1.1.2 For the construction phase, the most important consideration is dust. Without appropriate mitigation, dust could cause temporary soiling of surfaces, particularly windows, cars and laundry. The mitigation measures provided within this report should ensure that the risk of adverse dust effects is reduced to a level categorised as “not significant”.
- 1.1.3 During the operational phase, the most important consideration is the emissions from the proposed gas-fired plant. The proposed development is not expected to significantly change traffic flows on the surrounding road network.
- 1.1.4 This chapter summarises information contained within the following technical reports, which are included in Volume 6:
- Appendix 12.1: Assessment of Air Quality Impacts on Ecological Receptors.
  - Appendix 12.2: Baseline Air Quality Conditions.
  - Appendix 12.3: Stack Height Determination.
  - Appendix 12.4: Model Inputs and Outputs.
  - Appendix 12.5: Results of Other Scenarios.
  - Appendix 12.6: Assessment of Traffic-related Emissions.
  - Appendix 12.7: Assessment of Plume Visibility.
  - Appendix 12.8 Further Analysis of Air Quality in Gravesend.
- 1.1.5 In particular, this chapter:
- presents the existing environmental baseline established from desk studies, surveys and consultation to date;
  - presents the potential environmental effects on air quality arising from Thurrock Flexible Generation Plant, based on the information gathered and the analysis and assessments;
  - identifies any assumptions and limitations encountered in compiling the environmental information; and

- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

## 1.2 Planning policy context

- 1.2.1 Planning policy for energy generation Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to Air Quality, is contained in the Overarching National Policy Statement (NPS) for Energy (EN-1; DECC, 2011a) and the NPS for Fossil Fuel Electricity Generating Infrastructure (EN-2, DECC, 2011b).
- 1.2.2 NPS EN-1 and NPS EN-2 include guidance on what matters are to be considered in the assessment. These are summarised in Table 1.1 below.

**Table 1.1: Summary of NPS EN-1 and EN-2 provisions relevant to this chapter.**

Summary of NPS EN-1 and NPS EN-2 provision	How and where considered in the ES
<b>Air Quality</b>	
<p>NPS EN-1 includes generic guidance on the assessment of air quality impacts for major energy projects:</p> <p><i>“Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement.”</i> (Paragraph 5.2.6).</p> <p>This requires the Environmental Statement to describe:</p> <ul style="list-style-type: none"> <li>• <i>“any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project;</i></li> <li>• <i>the predicted absolute emission levels of the proposed project, after mitigation methods have been applied;</i></li> <li>• <i>existing air quality levels and the relative change in air quality from existing levels; and</i></li> <li>• <i>any potential eutrophication impacts.”</i> (Paragraph 5.2.7)</li> </ul>	<p>The potential air quality impacts which may arise as a result of Thurrock Flexible Generation Plant have been described and considered within this chapter. This chapter focuses on the potential impacts from dust during the construction phase and emissions from the gas engines.</p> <p>This Chapter describes:</p> <ul style="list-style-type: none"> <li>• The potential impacts from dust during the construction phase and emissions from the gas engines, mitigation measures and residual emissions which are described in Section 2.9 and Section 4.2. The effects of emissions from road traffic generated by the proposed development have been scoped out on the basis that traffic generated by the development will be below the thresholds set out in the Environmental Protection UK (EPUK) &amp; Institute of Air Quality Management (IAQM) Land Use Planning &amp; Development Control: Planning for Air Quality guidance;</li> <li>• The predicted absolute emission levels which are presented in Table 4.5 and Table 4.7 and considered in the Residual Effects section;</li> <li>• Existing air quality levels and the relative change in air quality which are shown in Table 4.5 and Table 4.7; and</li> <li>• The air quality impacts at ecological sites which have been considered in Volume 6, Appendix 12.1: Assessment of Air Quality Impacts on Ecological Receptors.</li> </ul>

Summary of NPS EN-1 and NPS EN-2 provision	How and where considered in the ES
<p>Section 2.5 of NPS EN-2 follows a similar structure to EN-1 and refers to relevant sections of EN-1.</p> <p>Paragraph 2.5.5 states: <i>“The applicant should carry out an assessment as required in EN-1, consulting the EA and other statutory authorities at the initial stages of developing their proposals, as set out in EN-1 Section 4.2. If the applicant requests a scoping opinion from the IPC [now PINS] before an application is submitted, any views received from the EA [Environment Agency] should be made known to the IPC so that they can take account of the EA’s advice on potential emissions.”</i></p>	<p>A summary of consultation undertaken for this proposed development is shown in Section 1.4.</p>

1.2.3 NPS EN-1 and EN-2 also highlight several factors relating to the determination of an application and in relation to mitigation. These are summarised in Table 1.2 below.

Table 1.2: Summary of NPS EN-1 and NPS EN-2 policy on decision making relevant to this chapter.

Summary of NPS EN-1 and NPS EN-2 policy on decision making (and mitigation)	How and where considered in the ES
<b>Air Quality</b>	
<p>Paragraph 5.2.9 and 5.2.10, NPS EN-1 states:</p> <p><i>“The IPC should generally give air quality considerations substantial weight where a project would lead to a deterioration in air quality in an area, or leads to a new area where air quality breaches any national air quality limits. However air quality considerations will also be important where substantial changes in air quality levels are expected, even if this does not lead to any breaches of national air quality limits.</i></p> <p><i>In all cases the IPC must take account of any relevant statutory air quality limits. Where a project is likely to lead to a breach of such limits the developers should work with the relevant authorities to secure appropriate mitigation measures to allow the proposal to proceed. In the event that a project will lead to non-compliance with a statutory limit the IPC should refuse consent.”</i></p>	<p>Section 4.2 discusses the change in concentrations and the absolute concentrations with the proposed development.</p>

Summary of NPS EN-1 and NPS EN-2 policy on decision making (and mitigation)	How and where considered in the ES
<p>Paragraphs 5.2.11 to 5.2.13 of NPS EN-1 outlines the approach the IPC (now PINS) should take in regards to mitigation:</p> <p><i>“The IPC should consider whether mitigation measures are needed both for operational and construction emissions over and above any which may form part of the project application. A construction management plan may help codify mitigation at this stage.</i></p> <p><i>In doing so the IPC may refer to the conditions and advice in the Air Quality Strategy or any successor to it.</i></p> <p><i>The mitigations identified in Section 5.13 on traffic and transport impacts will help mitigate the effects of air emissions from transport.”</i></p>	<p>Mitigation measures proposed as part of the proposed development are outlined in Section 2.9.</p>
<p>Paragraph 2.5.6 of NPS SEN-2 states:</p> <p><i>“In considering whether to grant consent, the IPC should take account of likely environmental impacts resulting from air emissions and that in the case of SO<sub>x</sub>, NO<sub>x</sub> or particulates in particular, it follows the advice in EN-1 on interaction with the EA’s regulatory processes.”</i></p> <p>Paragraphs 5.2.7 and 5.2.8 outlines the approach the IPC should take in regards to mitigation:</p> <p><i>“Mitigation will depend on the type and design of a generating station. However Flue Gas Desulphurisation (FGD) and Selective Catalytic Reduction (SCR) – which reduces NO<sub>x</sub> by the injection of a suitable reagent into flue gas over a catalyst – will have additional adverse impacts for noise and vibration, release of dust and handling of potentially hazardous materials, for example the ammonia used as a reagent.</i></p> <p><i>In line with Section 5.2 of EN-1 the IPC [now PINS], in consultation with EA, should be satisfied that any adverse impacts of mitigation measures for emissions proposed by the applicant have been described in the ES and taken into account in the assessments.”</i></p>	<p>Section 4.2 discusses the likely environmental impacts resulting from air emissions of NO<sub>x</sub>, SO<sub>x</sub> and particulates are not relevant to this assessment.</p>

## National Planning Policy Framework

1.2.4 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019) is a material consideration for local planning authorities and decision-takers in determining applications. At the heart of the NPPF is a presumption in favour of sustainable development, subject to caveats where a plan or project affects a habitats site. For determining planning applications, this means approving development proposals if they accord with an up-to-date local development plan, unless material considerations indicate otherwise. If the development plan does not contain relevant policies, or the policies are out of date, then planning permission should be granted unless the application of policies in the NPPF that protect areas or assets of particular importance provides a clear reason for refusing the development, or any adverse impacts would significantly outweigh the benefits.

1.2.5 The NPPF sets out three overarching objectives to achieve sustainable development. The relevant objective in the context of this air quality assessment is:

*“an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution and adapting to climate change, including moving to a low carbon economy”* (Paragraph 8c).

1.2.6 Under the heading ‘Promoting sustainable transport’, the NPPF states:

*“The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making.”* (Paragraph 103)

1.2.7 Under the heading ‘Conserving and enhancing the natural environment’, the NPPF states:

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

a) ...

e) *Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil,*

*air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; ...”* (Paragraph 170)

*“Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.”* (Paragraph 181)

## National Planning Practice Guidance

1.2.8 The National Planning Practice Guidance (NPPG) was issued on-line in March 2014 and is updated periodically by government as a live document (Ministry of Housing, Communities & Local Government, 2014). The Air Quality section of the NPPG describes the circumstances when air quality, odour and dust can be a planning concern, requiring assessment.

1.2.9 The NPPG advises that whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).

1.2.10 The NPPG states that when deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

- *“Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry*

park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.

- Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP [Combined Heat and Power] plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area;
- Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.
- Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.
- Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites.”

1.2.11 The NPPG provides advice on how air quality impacts can be mitigated and notes; “Mitigation options where necessary will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact. It is important therefore that local planning authorities work with applicants to consider appropriate mitigation so as to ensure the new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations can be used to secure mitigation where the relevant tests are met.”

### Local Planning Policy

1.2.12 The Thurrock Local Development Framework document (Thurrock Council, 2015) was adopted in January 2015 and sets out four policies related to air quality. Three of the four policies relate to traffic generated by a development and ensuring its impact on air quality is minimised. The fourth policy, PMD1, also relates more specifically to air quality and so it relevant for the point source emissions.

#### **PMD1 – Minimising Pollution and Impacts on Amenity, Health, Safety and the Natural Environment**

“1. Development will not be permitted where it would cause or is likely to cause unacceptable effects on:

- i. the amenities of the area;
- ii. the amenity, health or safety of others;

iii. the amenity, health or safety of future occupiers of the site; or

iv. the natural environment.

2. Particular consideration will be given to the location of sensitive land uses, especially housing, schools and health facilities, and nationally, regionally and locally designated biodiversity sites, and areas of recreational and amenity value which are relatively undisturbed by noise and valued for this reason.

3. The Council will require assessments to accompany planning applications where it has reasonable grounds to believe that a development may suffer from, or cause:

i. Air pollution;

ii. Noise pollution;

iii. Contaminated land/soil;

iv. Odour;

v. Light pollution and shadow flicker;

vi. Water pollution;

vii. Invasion of privacy;

viii. Visual intrusion;

ix. Loss of light;

x. Ground instability;

xi. Vibration

Where the assessment confirms such potential harm, planning permission will only be granted if satisfactory solutions can be achieved through design, or suitable mitigation measures can be put in place through conditions or a planning obligation.

Where an assessment is not forthcoming the Council may refuse permission on a precautionary basis.

5. The Council will seek compliance with, and contribution to, EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality in local areas arising from individual sites.



6. In the interests of supporting legitimate business activity pursuant to policy CSSP2 the Council will resist the introduction of sensitive uses in locations where their presence would be likely to lead to unreasonable restrictions over business activity having to be imposed in order to avoid unacceptable nuisance to those sensitive uses. Exceptionally the Council may accept co-location of sensitive uses with business uses where the sensitive uses are part of approved proposals for the redevelopment of a wider area from business use to a predominantly residential use.”

## 1.3 Legislation

### Industrial Emissions Directive Limits

- 1.3.1 The plant would be designed and operated in accordance with the requirements of the Industrial Emissions Directive (2010/75/EU), known hereafter as the IED, which requires adherence to emission limits for a range of pollutants.

### Air Quality Directive and Air Quality Standards Regulations

- 1.3.2 The 2008 Ambient Air Quality Directive (2008/50/EC) aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants; it sets legally binding concentration-based limit values, as well as target values. There are also information and alert thresholds for reporting purposes. These are to be achieved 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. This Directive replaced most of the previous EU air quality legislation and in England was transposed into domestic law by the Air Quality Standards Regulations 2010, which in addition incorporates the 4<sup>th</sup> Air Quality Daughter Directive (2004/107/EC) that sets targets for ambient air concentrations of certain toxic heavy metals (arsenic, cadmium and nickel) and polycyclic aromatic hydrocarbons (PAHs). Member states must comply with the limit values (which are legally binding on the Secretary of State) and 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

- 1.3.3 The Environment Act 1995 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 (Department for Environment, Food and Rural Affairs (DEFRA), 2007). 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.
- 1.3.4 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.
- 1.3.5 There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the EU Directives.
- 1.3.6 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 (AQMA) and putting in place Air Quality Action Plans to improve air quality. These plans also contribute, at local level, to the achievement of EU limit values. DEFRA is currently reviewing the LAQM process.
- 1.3.7 For the purposes of this assessment, the limit values set out in the Air Quality Standards Regulations 2010 and the objective levels specified under the current UK AQS have been used. There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the EU Directives.
- 1.3.8 The limit values and objectives relevant to this assessment are summarised in Table 1.3.

**Table 1.3: Summary of Relevant Air Quality Limit Values and Objectives.**

Pollutant	Averaging Period	Objectives/ Limit Values	Not to be Exceeded More Than
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>	-
Particulate Matter (PM <sub>10</sub> )	Annual	40 µg.m <sup>-3</sup>	-

1.3.9 In July 2017, DEFRA and the Department for Transport published the ‘*UK plan for tackling roadside nitrogen dioxide concentrations*’. This describes the Government’s plan for bringing roads with NO<sub>2</sub> concentrations above the EU Limit Value back into compliance within the shortest possible time, covering five cities, the Greater London Authority and 23 other local authorities. A Supplement to the plan was published in October 2018, which sets out measures to bring forward compliance in a further 33 local authorities that had not been covered by actions in the July 2017 plan because they had been projected to comply with the EU Limit Value by 2021.

1.3.10 On 14 January 2019, DEFRA published the ‘*Clean Air Strategy 2019*’. The report sets out actions that the Government intends to take to reduce emissions from transport, in the home, from farming and from industry.

## 1.4 Consultation

1.4.1 Key issues raised during scoping and consultation to date specific to Air Quality are listed in Table 1.4, together with details of how these issues have been considered in the production of this ES and cross-references to where this information may be found.

Table 1.4: Key points raised during scoping and consultation to date.

Date	Consultee and type of response	Points raised	How and where addressed
September 2018	Scoping opinion – Inspectorate's Comments	<ul style="list-style-type: none"> <li>i. The Inspectorate is content that assessment of operational traffic is scoped out but the ES should address cumulative impacts from operational traffic emissions with other developments including Tilbury2, Tilbury Energy Centre and the Lower Thames Crossing.</li> <li>ii. The Inspectorate requires specific details of the likely construction traffic flows to determine if construction traffic can be scoped out. If the option to transport construction materials/abnormal loads via water is pursued, the ES should assess the associated impacts where significant effects are likely.</li> <li>iii. AQMAs should be illustrated on a plan and the projects effect on AQMAs should be assessed.</li> <li>iv. The Applicant should discuss and agree with relevant consultation bodies whether diffusion tube monitoring (supplemented by local authority NO<sub>2</sub> monitoring data and DEFRA mapped NO<sub>2</sub> concentrations) is sufficient to inform a robust assessment.</li> <li>v. The ES should explain which construction activities are likely to generate dust and assess the impacts which are likely to result in significant effects on sensitive human and ecological receptors. This should include consideration of cumulative impacts. The construction dust study area should be defined and justified.</li> <li>vi. The ES should model and assess NO<sub>x</sub>, deposition of nitrogen, acid and ammonia.</li> <li>vii. A stack height and stack diameter assessment should be undertaken.</li> <li>viii. Sensitive receptors should be described and identified in the ES, including receptors on the south side of the river and neighbouring local authorities.</li> <li>ix. The study area for ecological receptors should be justified and the ES should assess the likely effects on the North Downs Woodlands Special Area of Conservation (SAC).</li> <li>x. For the cumulative assessment, the Inspectorate recommends used of a quantitative assessment methodology, particularly in respect of other point-source emitters.</li> <li>xi. The ES should describe the plant which is likely to be required for construction/decommissioning, the likely location and duration of their use and any mitigation measures to be implemented. The ES should assess any impacts on sensitive receptors as a result of emissions to air from plant required for construction/decommissioning.</li> </ul>	<ul style="list-style-type: none"> <li>i. Cumulative effects are discussed in Section 4.4 and cumulative traffic emissions considered in Volume 4, Chapter 25: Air Quality.</li> <li>ii. Emissions from construction traffic flows have been assessed in Volume 6: Appendix 12.6. An assessment of emissions from the use of water transport for construction materials is has been scoped out in Table 2.19.</li> <li>iii. Figure 1.1 shows the AQMAs and identifies the modelled sensitive receptors located within/adjacent to the AQMAs.</li> <li>iv. The proposed scope and methodology (including the baseline monitoring) was agreed with Thurrock Borough Council Environmental Health. The baseline concentrations are discussed in Volume 6, Appendix 12.2: Baseline Air Quality Conditions.</li> <li>v. Construction dust activities and the construction dust study area are described in Section 4.1 and cumulative construction dust effects are considered in Volume 4, Chapter 25: Air Quality.</li> <li>vi. The impacts of NO<sub>2</sub> and NH<sub>3</sub> on human-health receptors have been assessed and the results shown in Section 4.2. The impacts of NO<sub>x</sub>, NH<sub>3</sub>, nitrogen deposition and acid deposition on ecological receptors are assessed in Volume 6, Appendix 12.1: Assessment of Air Quality Impacts on Ecological Receptors.</li> <li>vii. A stack height assessment has been undertaken in Volume 6, Appendix 12.3: Stack Height Determination. The air quality assessment (including the stack height determination) are based on stack characteristics provided by the applicant. No specific stack diameter assessment has been undertaken, however, the stack diameter affects the vertical velocity of emissions from the stack and, therefore, the momentum of emissions. The air quality effects for the determined stack height are not considered to be significant. The velocity of the stack emissions, and therefore the stack diameter, are considered to be appropriate.</li> <li>viii. Table 2.4 and Figure 1.1 outlines the sensitive receptors modelled. This includes receptors on the south side of the river in the neighbouring borough of Gravesham.</li> <li>ix. Justification for the study area for ecological receptors is outlined in 2.4.6 and Volume 6, Appendix 12.1: Assessment of Air Quality Impacts on Ecological Receptors. This includes the North Downs Woodlands SAC.</li> <li>x. The cumulative assessment methodology is described in Volume 4, Chapter 25: Air Quality. This includes quantitative assessment of the Tilbury2, Lower Thames Crossing, Tilbury Green Power, Tilbury Peak Reserve, Thames Enterprise Park, Gateway Energy Centre, Purfleet Regeneration Centre.</li> <li>xi. The plant likely to be used during the construction period is provided in Volume 2, Chapter 2: Project Description. Mitigation measures are summarised in Table 2.20. The impacts from construction activities on sensitive receptors is provided in Section 27.</li> </ul>

Date	Consultee and type of response	Points raised	How and where addressed
	Scoping Opinion – Gravesham Borough Council Comments	The ES should provide sufficient information to determine any potential impacts on air quality with the Gravesham area, including the AQMAs.	Sensitive receptors have been considered in Gravesham adjacent to the AQMA that covers the Gravesend town Centre one-way system. Table 2.4 and Figure 1.1 outline the sensitive receptors modelled. Further Analysis of Air Quality in Gravesend is outlined Volume 6: Appendix 12.8.
	Scoping Opinion – Port of London Authority Comments	The ES should consider the effects of the transport of materials by barge and an assessment of the appropriateness, as a mitigation, of providing shore power should also be included within the ES.	Scoped out in Table 2.19.
	Scoping Opinion – Tilbury2	Tilbury2 do not anticipate that there will be any significant cumulative effects between Thurrock Flexible Generation Plant and Tilbury2 during construction but dust emissions should be adequately mitigated through CEMPs.	Table 2.20 sets out the dust mitigation measures to be implemented during the construction phase. These measures are set out in the Code of Construction Practice (CoCP) (Volume 6, Appendix 2.2: Code of Construction Practice).
	Scoping Opinion – Thurrock Borough Council Comments	Thurrock Council was satisfied with the proposed methodology outline and the proposal to scope out the operational traffic air pollutant emissions.	N/A
September 2018	Thurrock Borough Council Environmental Health Officer - email	Purpose of email was to agree scope and methodology. The Officer questioned whether daily-mean NO <sub>2</sub> would be considered and highlighted that cumulative effects should be considered including “ <i>the proposed 2,500 MW Gas Fired Power Station</i> ”, “ <i>Tilbury Green Power site, and any other activities which give rise to significant emissions of NOx nearby such as the Dock activities if appropriate</i> ”.	Hourly-mean NO <sub>2</sub> has been considered as shown in Table 4.7 and Volume 4, Chapter 25: Air Quality. Cumulative developments including the Tilbury Green Power Site have been considered as described in Volume 4, Chapter 25: Air Quality. The 2,500 MW Gas Fired Power Station ( <i>Tilbury Energy Centre</i> ) has been withdrawn so has not been included in the assessment.

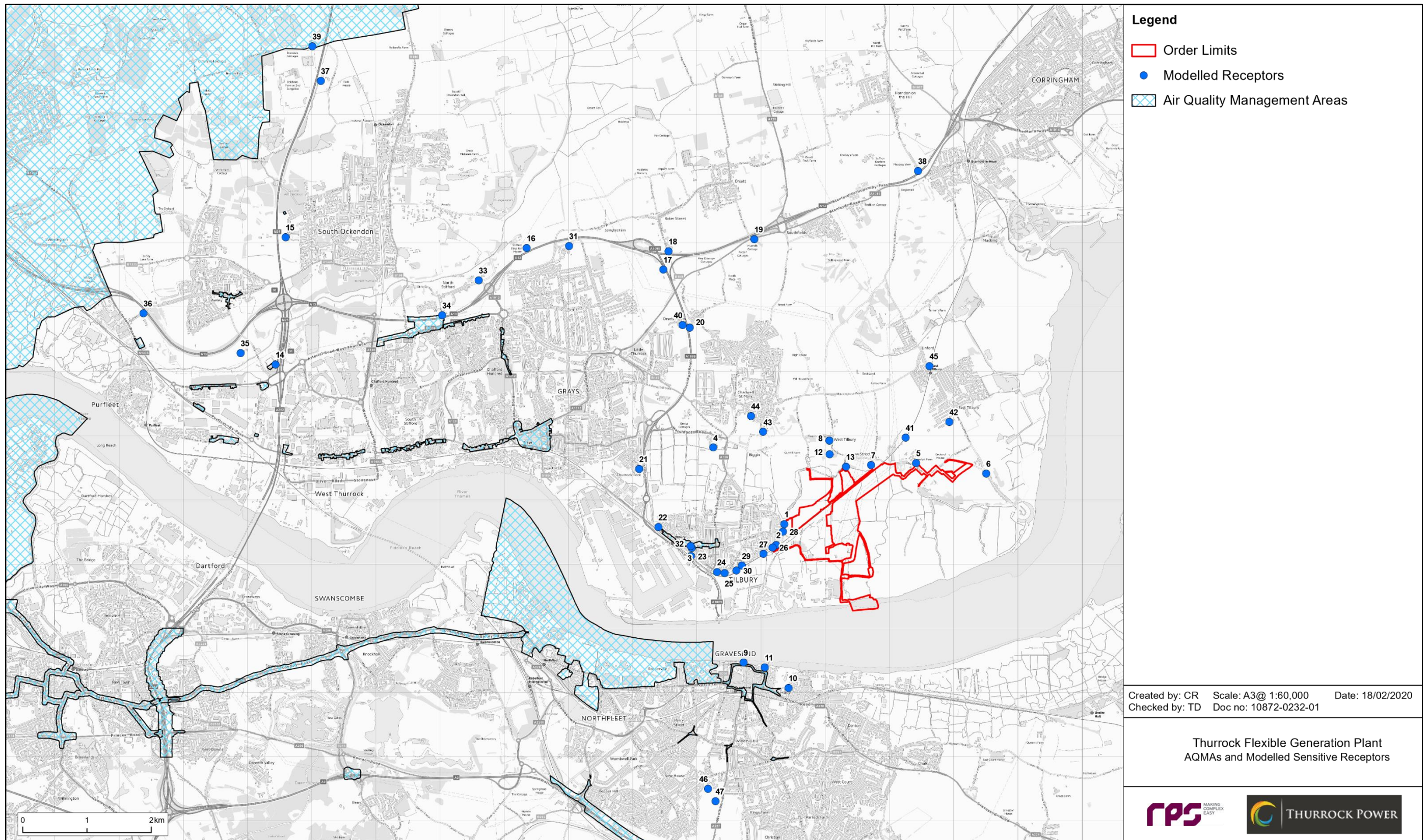


Figure 1.1: Air Quality Management Areas and Modelled Sensitive Receptors.

## 2. Assessment Approach

### 2.1 Guidance

2.1.1 Neither the NPPF nor the NPPG is prescriptive on the methodology for assessing air quality effects or describing significance; practitioners continue to use guidance provided by DEFRA and non-governmental organisations, including Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM). However, the NPPG does advise that;

*“Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific. The scope and content of supporting information is therefore best discussed and agreed between the local planning authority and applicant before it is commissioned.”*

2.1.2 The guidance lists a number of areas that might be usefully agreed at the outset.

2.1.3 This air quality assessment covers the elements recommended in the NPPG. The approach is consistent with the EPUK & IAQM Land-Use Planning & Development Control: Planning for Air Quality document (EPUK & IAQM, 2017), the IAQM Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014) and, where relevant, DEFRA’s Local Air Quality Management Technical Guidance: LAQM.TG16 (DEFRA, 2016). It includes the key elements listed below:

- Establishing the background Ambient Concentration (AC).
- Qualitative assessment of likely construction-phase impacts with mitigation and controls in place.
- Quantitative assessment of the effects from the completed development on local air quality from stack emissions utilising a “new generation” Gaussian dispersion model, ADMS 5. The assessment has considered both the Process Contributions (PC) from the facility in isolation, and the resultant Predicted Environmental Concentrations (PEC) that includes the AC.

2.1.4 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 RPS air quality team members involved at various stages of this assessment have professional affiliations that include Fellow and Member of the Institute of Air Quality Management, Chartered Chemist, Chartered Scientist, Chartered Environmentalist and Member of the Royal Society of Chemistry and have the required academic qualifications for these professional bodies. In addition, the Director responsible for authorising all deliverables has over 15 years’ experience.

### 2.2 Assessment Methodology

#### Construction Phase Methodology

2.2.1 Volume 6: Appendix 12.6 Assessment of Traffic-related Emissions outlines the methodology and results of the assessment of emissions from traffic generated by the construction phase.

2.2.2 Dust is the generic term used to describe particulate matter in the size range 1-75 µm in diameter (British Standards Institute, 1983). Particles greater than 75 µm in diameter are termed grit rather than dust.

2.2.3 Dusts can contain a wide range of particles of different sizes. The normal fate of suspended (i.e. airborne) dust is deposition. The rate of deposition depends largely on the size of the particle and its density; together these influence the aerodynamic and gravitational effects that determine the distance it travels and how long it stays suspended in the air before it settles out onto a surface. In addition, some particles may agglomerate to become fewer, larger particles; whilst others react chemically.

2.2.4 The effects of dust are linked to particle size and two main categories are usually considered:

- PM<sub>10</sub> particles, those up to 10 µm in diameter, remain suspended in the air for long periods and are small enough to be breathed in and so can potentially impact on health; and
- Dust, generally considered to be particles larger than 10 µm which fall out of the air quite quickly and can soil surfaces (e.g. a car, window sill, laundry). Additionally, such deposited dust can potentially have adverse effects on vegetation and fauna at sensitive habitat sites.

2.2.5 Concentration-based limit values and objectives have been set for the PM<sub>10</sub> suspended particle fraction, but no statutory or official numerical air quality criterion for deposited dust annoyance or nuisance has been set at a UK, European or World Health Organisation (WHO) level. Construction dust assessments have tended to be risk based, focusing on the appropriate measures to be used to keep dust impacts at an acceptable level.

2.2.6 Consistent with the recommendations in the IAQM guidance (IAQM, 2014), a risk-based assessment has been undertaken, using the well-established source-pathway-receptor approach:

- The dust impact (the change in dust levels attributable to the development activity) at a particular receptor will depend on the magnitude of the dust source and the effectiveness of the pathway (i.e. the route through the air) from source to receptor.
- The effects of the dust are the results of these changes in dust levels on the exposed receptors, for example annoyance or adverse health effects. The effect experienced for a given exposure depends on the sensitivity of the particular receptor to dust. An assessment of the overall dust effect for the area as a whole has been made using professional judgement taking into account both the change in dust levels (as indicated by the dust impact risk for individual receptors) and the absolute dust levels, together with the sensitivities of local receptors and other relevant factors for the area.

## Operational Phase Methodology

### Summary of Key Pollutants Considered

2.2.7 The key pollutant emissions associated with combustion processes in general are oxides of nitrogen (NO<sub>x</sub>), CO, SO<sub>2</sub>, volatile organic compounds (VOCs), water and other pollutants in trace quantities. However, for reciprocating engines specifically, the pollutants of local concern are NO<sub>x</sub>.

2.2.8 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>.

## 2.3 Baseline study

### Desktop study

2.3.1 Information on air quality within the construction phase and operational phase study areas was collected through a detailed desktop review of existing studies and datasets. These are summarised at Table 2.1 below.

**Table 2.1: Summary of key desktop reports.**

Title	Source	Year	Author
DEFRA, which produces projections of pollutant concentrations for years from 2017 to 2030 for each 1 km grid square in the UK.	<a href="https://uk-air.defra.gov.uk/data/laqm-background-home">https://uk-air.defra.gov.uk/data/laqm-background-home</a>	2017	DEFRA (2019)
Air Quality Review and Assessment documents prepared by Thurrock Borough Council	<a href="https://www.thurrock.gov.uk/air-quality/air-quality-monitoring">https://www.thurrock.gov.uk/air-quality/air-quality-monitoring</a>	2018	Thurrock Borough Council (2018)
Air Quality Review and Assessment documents prepared by Gravesham Borough Council	<a href="http://www.kentair.org.uk/Pagesfiles/Gravesham%20ASR%202018%20Final.pdf">http://www.kentair.org.uk/Pagesfiles/Gravesham%20ASR%202018%20Final.pdf</a>	2018	Gravesham Borough Council (2018)

### Site specific surveys

2.3.2 In order to inform the EIA, the site-specific surveys listed in in Table 2.2 have been undertaken.

**Table 2.2: Summary of site-specific surveys undertaken.**

Title	Extent of survey	Overview of survey	Survey provider	Year	Reference to further information
NO <sub>2</sub> monitoring	Six months of NO <sub>2</sub> monitoring at five locations	Monitoring of NO <sub>2</sub> using passive diffusion tubes at five locations around the site to characterise the baseline conditions.	RPS	2018	Volume 6, Appendix 12.2: Baseline Air Quality Conditions

## 2.4 Study area

2.4.1 For the construction phase the study area is up to 350 m from the site boundary and up to 50 m from roads within 500 m of the site based on the IAQM dust guidance (IAQM, 2014).

2.4.2 For the operational phase, 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. LAQM.TG16 (DEFRA, 2016) provides examples of exposure locations and these are summarised in Table 2.3.

**Table 2.3: Example 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.

2.4.3 Representative sensitive receptors for this assessment have been selected at properties where pollutant concentrations and/or changes in pollutant concentrations are anticipated to be greatest, as listed in Table 2.4.

**Table 2.4: Modelled Sensitive Receptors.**

ID	Description	x	y
1	Fort Road	565364	176620
2	Sandhurst Road	565234	176294

ID	Description	x	y
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
35	R22	556895	179284
36	R23	555379	179902
37	R24	558144	183519
38	R25	567446	182119
39	R26	558009	184058
40	R27	563778	179720



ID	Description	x	y
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

2.4.4 The annual, daily and hourly-mean AQS objectives apply at the front and rear façades of all residential properties and at the schools.

2.4.5 The study area for ecological receptors is up to 15 km from the stacks. This is based on the EA online guidance (DEFRA and EA, 2016) which recommends that:

*“some larger (greater than 50 megawatt) emitters may be required to screen to 15km for European sites and to 10km or 15km for SSSIs.”*

2.4.6 To ensure that the study area is broad enough, the impacts at ecological receptors within 15 km of the stacks have been included in the dispersion modelling.

## 2.5 Uncertainties and/or data limitations

2.5.1 All air quality assessment tools, whether models or monitoring measurements, have limitations. 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).

2.5.2 The atmospheric dispersion model itself has limitations, 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.

2.5.3 Each of the data inputs for the model 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 range informed by an analysis of relevant, available data.

2.5.4 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 2.5.

**Table 2.5: Approaches to Dealing with Uncertainty in the Assessment.**

Concentration	Source of Uncertainty	Approach to Dealing with Uncertainty	Comments
Background Concentration	Characterisation of current baseline air quality conditions	The background concentration used within the assessment is the most representative value for each receptor.	The background concentration is the major proportion of the total predicted 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 conservative assumptions adopted ensure that the background concentration used within the model should lead to a forecast concentration that is towards the top of the uncertainty range, rather than a central estimate.
Model Input/Output Data	Stack emissions	The modelling has been undertaken assuming that the stack emissions are released at the IED emission concentration limits. In reality, emission concentrations are likely to be lower.	The modelled fraction is likely to contribute to the result being between a central estimate and the top of the uncertainty range.
	Stack characteristics	As the plant will use an exhaust energy recovery system, the temperature of the exhaust gas would decrease. Modelling has been undertaken assuming that the exhaust gas temperature was at the lower end of the range of temperatures to ensure the assessment is conservative.	
	Meteorological Data	Uncertainties arise from any differences between the conditions at the meteorological station and the development site, and between the historical meteorological 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 5 full years of meteorological conditions.	
	Receptors	Receptor locations have been identified where concentrations are highest or where the greatest changes are expected.	

2.5.5 The analysis of the component uncertainties indicates that, notwithstanding the limitations of the assessment, the predicted total concentration is likely to be towards the top of the uncertainty range rather than being a central estimate. The actual concentrations that will be found when the development is completed are unlikely to be higher than those presented within this report and are more likely to be lower.

## 2.6 Impact assessment criteria

### Assessment of Construction Dust

2.6.1 The significance of an effect is determined based on the magnitude of an impact and the sensitivity of the receptor affected by the impact of that magnitude. This section describes the criteria applied in this chapter to characterise the magnitude of potential impacts and sensitivity of receptors. For other chapters in this ES, the terms used to define magnitude and sensitivity are based on those used in the Design Manual for Roads and Bridges (DMRB) methodology, which is described in further detail in Volume 2, Chapter 4: Environmental Impact Assessment Methodology.

2.6.2 For this air quality chapter, the IAQM dust guidance has its own methodology to determine the significance of an effect. It follows a similar approach in that the magnitude of an impact is considered in the context of the sensitivity of air quality at each receptor to determine the risk of dust to allow the appropriate level of mitigation to be recommended. This then allows the significance of effect to be determined.

#### Source Magnitude

2.6.3 The IAQM guidance gives examples of the dust emission magnitudes for demolition, earthworks and construction activities and track-out. These example dust emission magnitudes are based on the site area, building volume, number of Heavy Duty Vehicle (HDV) movements generated by the activities and the materials used. These example magnitudes have been combined with the duration of construction activities and the resulting ranking of source magnitude is set out in Table 2.6.

Table 2.6: Risk allocation – source (dust emission magnitude).

Features of the source of dust emissions	Dust emission magnitude
<p><b>Demolition</b> – building over 50,000 m<sup>3</sup>, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities &gt; 20 m above ground level.</p> <p><b>Earthworks</b> – total site area over 10,000 m<sup>2</sup>, potentially dusty soil type (e.g. clay), &gt;10 heavy earth moving vehicles active at any one time, formation of bunds &gt; 8 m in height, total material moved &gt; 100,000 tonnes.</p> <p><b>Construction</b> – total building volume over 100,000 m<sup>3</sup>, activities include piling, on-site concrete batching, sand blasting. Period of activities more than two years.</p> <p><b>Track-out</b> – 50 HDV outwards movements in any one day, potentially dusty surface material (e.g. High clay content), unpaved road length &gt; 100 m.</p>	Large
<p><b>Demolition</b> – building between 20,000 to 50,000 m<sup>3</sup>, potentially dusty construction material and demolition activities 10 to 20 m above ground level.</p> <p><b>Earthworks</b> – total site area between 2,500 to 10,000 m<sup>2</sup>, moderately dusty soil type (e.g. silt), five to ten heavy earth moving vehicles active at any one time, formation of bunds 4 to 8 m in height, total material moved 20,000 to 100,000 tonnes.</p> <p><b>Construction</b> – total building volume between 25,000 and 100,000 m<sup>3</sup>, use of construction materials with high potential for dust release (e.g. concrete), activities include piling, on-site concrete batching. Period of construction activities between one and two years.</p> <p><b>Track-out</b> – 10 to 50 HDV outwards movements in any one day, moderately dusty surface material (e.g. High clay content), unpaved road length 50 – 100 m.</p>	Medium
<p><b>Demolition</b> – building less than 20,000 m<sup>3</sup>, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities &lt; 10 m above ground, demolition during winter months.</p> <p><b>Earthworks</b> – total site area less than 2,500 m<sup>2</sup>. Soil type with large grain size (e.g. sand), &lt; 5 heavy earth moving vehicles active at any one time, formation of bunds &lt; 4 m in height, total material moved &lt; 10,000 tonnes earthworks during winter months.</p> <p><b>Construction</b> – total building volume below 25,000 m<sup>3</sup>, use of construction materials with low potential for dust release (e.g. metal cladding or timber). Period of construction activities less than one year.</p> <p><b>Track-out</b> – &lt; 10 HDV outwards movements in any one day, surface material with low potential for dust release, unpaved road length &lt; 50 m.</p>	Small

#### Pathway and receptor – sensitivity of the area

2.6.4 Pathway means the route by which dust and particulate matter may be carried from the source to a receptor. The main factor affecting the pathway effectiveness is the distance from the receptor to the source. The orientation of the receptors to the source compared to the prevailing wind direction is a relevant risk factor for long-duration construction projects; however, short-term construction projects may be limited to a few months when the most frequent wind direction might be quite different, so adverse effects can potentially occur in any direction from the site.

2.6.5 As noted in the IAQM guidance, a number of attempts have been made to categorise receptors into high, medium and low sensitivity categories; however, there is no unified sensitivity classification scheme that covers the quite different potential effects on property, human health and ecological receptors. Table 2.7 and Table 2.8 set out the IAQM basis for categorising the sensitivity of people, property and ecological receptors to dust and PM<sub>10</sub>.

**Table 2.7: Sensitivities of people and property receptors to dust.**

Receptor	Sensitivity
<p>Principles:</p> <ul style="list-style-type: none"> <li>Users can reasonably expect enjoyment of a high level of amenity; or</li> <li>The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods as part of the normal pattern of use of the land.</li> </ul> <p>Indicative examples:</p> <ul style="list-style-type: none"> <li>Residential properties.</li> <li>Museums and other culturally important collections.</li> <li>Medium and long-term car parks and car showrooms.</li> </ul>	High
<p>Principles:</p> <ul style="list-style-type: none"> <li>Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or</li> <li>The appearance, aesthetics or value of their property could be diminished by soiling; or</li> <li>The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.</li> </ul> <p>Indicative examples:</p> <ul style="list-style-type: none"> <li>Parks, places of work.</li> </ul>	Medium
<p>Principles:</p> <ul style="list-style-type: none"> <li>The enjoyment of amenity would not reasonably be expected; or</li> <li>There is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or</li> <li>There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.</li> </ul> <p>Indicative examples:</p> <ul style="list-style-type: none"> <li>Playing fields, farmland (unless commercially-sensitive horticultural)</li> <li>Footpaths and roads</li> <li>Short-term car parks.</li> </ul>	Low

**Table 2.8: Sensitivities of people and property receptors to PM<sub>10</sub>.**

Receptor	Sensitivity
<p>Principles:</p> <ul style="list-style-type: none"> <li>Locations where members of the public are exposed over a time period relevant to the air quality objective (in the case of the 24-hour objective for PM<sub>10</sub>, a relevant location would be one where individuals may be exposed for eight hours or more in a day).</li> </ul> <p>Indicative examples:</p> <ul style="list-style-type: none"> <li>Residential properties.</li> <li>Schools, hospitals and residential care homes.</li> </ul>	High
<p>Principles:</p> <ul style="list-style-type: none"> <li>Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective (in the case of the 24-hour objective for PM<sub>10</sub>, a relevant location would be one where individuals may be exposed for eight hours or more in a day).</li> </ul> <p>Indicative examples:</p> <ul style="list-style-type: none"> <li>Office and shop workers (but generally excludes workers occupationally exposed to PM<sub>10</sub> as protection is covered by Health and Safety at Work legislation).</li> </ul>	Medium
<p>Principles:</p> <ul style="list-style-type: none"> <li>Locations where human exposure is transient.</li> </ul> <p>Indicative examples:-</p> <ul style="list-style-type: none"> <li>Public footpaths, playing fields, parks.</li> <li>Shopping streets.</li> </ul>	Low

2.6.6 Table 2.9 sets out the basis for determining the sensitivity of ecological receptors to dust.

**Table 2.9: Sensitivities of ecological receptors to dust.**

Receptor	Sensitivity
<p>Principles:</p> <ul style="list-style-type: none"> <li>Locations with an international or national designation and the designated features may be affected by dust soiling; or</li> <li>Locations where there is a community of a particularly dust sensitive species such as vascular plant species included in the Red Data List For Great Britain.</li> </ul> <p>Examples:</p> <ul style="list-style-type: none"> <li>Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.</li> </ul>	High

Receptor	Sensitivity
Principles:- <ul style="list-style-type: none"> <li>Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition.</li> </ul> Examples:- <ul style="list-style-type: none"> <li>Site of Special Scientific Interest (SSSI) with dust sensitive features.</li> </ul>	Medium
Principles:- <ul style="list-style-type: none"> <li>Locations with a local designation where the features may be affected by dust deposition</li> </ul> Examples:- <ul style="list-style-type: none"> <li>A Local Nature Reserve, with dust sensitive features.</li> </ul>	Low

2.6.7 The IAQM methodology combines consideration of the pathway and receptor to derive the sensitivity of the area. Table 2.10, Table 2.11 and Table 2.12 show how the sensitivity of the area has been derived for this assessment using the IAQM approach.

**Table 2.10: Sensitivity of the Area to Dust Soiling Effects on People and Property.**

Receptor Sensitivity	Number of Receptors <sup>a</sup>	Distance from the Source (m) <sup>b</sup>			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

The sensitivity of the area has been derived for demolition, construction, earthworks and trackout.

<sup>a</sup> The total number of receptors within the stated distance has been estimated. Only the highest level of area sensitivity from the table has been recorded.

<sup>b</sup> For trackout, the distances have been measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and trackout impacts have only been considered up to 50 m from the edge of the road.

**Table 2.11: Sensitivity of the Area to Human Health Impacts.**

Receptor Sensitivity	Annual Mean PM <sub>10</sub> Concentration <sup>a</sup>	Number of Receptors <sup>b, c</sup>	Distance from the Source (m) <sup>d</sup>				
			<20	<50	<100	<200	<350
High	> 32 µg.m <sup>-3</sup>	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28 - 32 µg.m <sup>-3</sup>	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24 - 28 µg.m <sup>-3</sup>	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	< 24 µg.m <sup>-3</sup>	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	> 32 µg.m <sup>-3</sup>	>10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32 µg.m <sup>-3</sup>	> 10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	< 28 µg.m <sup>-3</sup>	>1	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

The sensitivity of the area has been derived for demolition, construction, earthworks and trackout.

<sup>a</sup> This refers to the background concentration derived from the assessment of baseline conditions later in this report. The concentration categories listed in this column apply to England, Wales and Northern Ireland but not to Scotland.

<sup>b</sup> The total number of receptors within the stated distance has been estimated. Only the highest level of area sensitivity from the table has been recorded.

<sup>c</sup> For high sensitivity receptors with high occupancy (such as schools or hospitals), the approximate number of occupants has been used to derive an equivalent number of receptors.

<sup>d</sup> For trackout, the distances have been measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and trackout impacts have only been considered up to 50 m from the edge of the road.

**Table 2.12: Sensitivity of the Area to Ecological Impacts.**

Receptor Sensitivity	Distance from the Source (m) <sup>a</sup>	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

The sensitivity of the area has been derived for demolition, construction, earthworks and trackout and for each designated site.  
<sup>a</sup> Only the highest level of area sensitivity has been recorded.

2.6.8 The matrices in Table 2.13, Table 2.14, Table 2.15 and Table 2.16 have been used to assign the risk for each activity, which has been used to determine the level of mitigation that should be applied. For those cases where the risk category is negligible, no dust controls beyond those required by legislation are considered necessary.

**Table 2.13: Risk of dust impacts – demolition.**

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

**Table 2.14: Risk of dust impacts – earthworks.**

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

**Table 2.15: Risk of dust impacts – construction.**

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

**Table 2.16: Risk of dust impacts – trackout.**

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

2.6.9 The dust risk categories that have been determined for each of the four activities above have been used to define the appropriate site-specific dust control measures based on those described in the IAQM guidance. The guidance states that provided the dust control measures are successfully implemented, the resultant effects of the dust exposure will normally be “not significant”.

### Assessment of Operational-Phase Effects

2.6.10 The significance of an effect is determined based on the magnitude of an impact and the sensitivity of the receptor affected by the impact of that magnitude. This section describes the criteria applied in this chapter to characterise the magnitude of potential impacts and sensitivity of receptors. For other chapters in this ES, the terms used to define magnitude and sensitivity are based on those used in the DMRB methodology, which is described in further detail in Volume 2, Chapter 4: Environmental Impact Assessment Methodology.

2.6.11 For this air quality chapter, the EPUK & IAQM (2017) guidance has its own methodology to determine the significance of an effect. It follows a similar approach in that the magnitude of an impact is considered in the context of the sensitivity of air quality at each receptor to determine the significance of effect. However, the matrix used to determine the significance of effect for air quality is the same as outlined in the EPUK & IAQM guidance, not the matrix outlined in Volume 2, Chapter 4: Environmental Impact Assessment Methodology.

2.6.12 Volume 6, Appendix 12.4: Model Inputs and Outputs sets out the model inputs and outputs.

**Magnitude of impact**

2.6.13 For the purposes of this assessment, the magnitude of impact is considered to be the change in concentration relative to the Air Quality Assessment Level (AQAL).

**Sensitivity of the receptor**

2.6.14 For the purposes of this assessment, the sensitivity of the receptor is indicated by the long term average concentration at each receptor. Receptors with a higher baseline concentration are therefore considered to be more sensitive to changes in air quality concentrations.

**Significance of effect**

2.6.15 The change in concentration relative to the Air Quality Assessment Level is considered with the long term average concentration at each receptor to determine an impact descriptor as outlined in the EPUK & IAQM Land-Use Planning & Development Control: Planning For Air Quality document (EPUK & IAQM, 2017).

2.6.16 The EPUK & IAQM guidance advises that:

*“The significance of the effects arising from the impacts on air quality will depend on a number of factors and will need to be considered alongside the benefits of the development in question. Development under current planning policy is required to be sustainable and the definition of this includes social and economic dimensions, as well as environmental. Development brings opportunities for reducing emissions at a wider level through the use of more efficient technologies and better designed buildings, which could well displace emissions elsewhere, even if they increase at the development site. Conversely, development can also have adverse consequences for air quality at a wider level through its effects on trip generation.”*

2.6.17 When describing the air quality impact at a sensitive receptor, the change in magnitude of the concentration should be considered in the context of the absolute concentration at the sensitive receptor. Table 2.17 provides the EPUK & IAQM approach for describing the long-term human-health air quality impacts on sensitive receptors in the surrounding area.

**Table 2.17: Annual-mean Descriptors for Individual Sensitive Receptors.**

Long term average concentration at receptor in assessment year (sensitivity)	% Change in concentration relative to Air Quality Assessment Level			
	1	2-5	6-10	>10
75 % or less of AQAL	Negligible	Negligible	Slight	Moderate
76 -94 % of AQAL	Negligible	Slight	Moderate	Moderate
95 - 102 % of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109 % of AQAL	Moderate	Moderate	Substantial	Substantial
110 % or more than AQAL	Moderate	Substantial	Substantial	Substantial

\*AQAL for NO<sub>2</sub> and PM<sub>10</sub> = 40 µg.m<sup>-3</sup>, for PM<sub>2.5</sub> = 25 µg.m<sup>-3</sup>

2.6.18 The following notes accompany Table 2.17:

- (1) AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
- (2) The table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5% will be described as negligible.
- (3) The table is only designed to be used with annual mean concentrations.
- (4) Descriptors for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
- (5) When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
- (6) The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be

small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.

- (7) It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

2.6.19 The human-health impact descriptors above apply at individual receptors. The EPUK & IAQM guidance states that the impact descriptors;

*“are not, of themselves, a clear and unambiguous guide to reaching a conclusion on significance. These impact descriptors are intended for application at a series of individual receptors. Whilst it maybe that there are ‘slight’, ‘moderate’ or ‘substantial’ impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances.”*

2.6.20 The above criteria and matrix are for assessing the long-term impacts; for short term impacts the EPUK & IAQM guidance states in paragraphs 6.36 and 6.39 that:

*“The Environment Agency uses a threshold criterion of 10% of the short term AQAL as a screening criterion for the maximum short term impact. This is a reasonable value to take and this guidance also adopts this as a basis for defining an impact that is sufficiently small in magnitude to be regarded as having an insignificant effect. Background concentrations are less important in determining the severity of impact for short-term concentrations, not least because the peak concentrations attributable to the source and the background are not additive.*

*Where such peak short term concentrations from an elevated source are in the range 10-20% of the relevant AQAL, then their magnitude can be described as small, those in the range 20-50% medium and those above 50% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. That is not to say that background concentrations are unimportant, but they will, on an annual average basis, be a much smaller quantity than the peak concentration caused by a substantial plume and it is the contribution that is used as a measure of the impact, not the overall concentration at a receptor. This approach is intended to be a streamlined and pragmatic assessment procedure that avoids undue complexity.”*

2.6.21 Professional judgement by a competent, suitably qualified professional is required to establish the significance associated with the consequence of the impacts. This judgement is likely to take into account the extent of the current and future population exposure to the impacts and the influence and/or validity of any assumptions adopted during the assessment process.

2.6.22 In assigning significance levels to the likely effects, the following terms have been used:

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision making process with regard to planning consent;
- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision making process;
- Moderate: These beneficial or adverse effects may be important, but are not likely to be key decision making factors;
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision making process, but are important in enhancing the subsequent design of the project; and
- Negligible: No effects or those that pose a very small risk in comparison to normal risks in everyday life, or are beneath levels of perception, or are within normal bounds of variation or within the margin of forecasting error.

2.6.23 Effects assessed as moderate or above are considered within this assessment to be significant in terms of the EIA Regulations.

## 2.7 Maximum design envelope parameters for assessment

2.7.1 The maximum design envelope parameters identified in Table 2.18 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These parameters have been identified based on the overview description of the development provided in Volume 2, Chapter 2: Project Description, including all potential development options where these are under consideration by the applicant.

2.7.2 Effects of greater adverse significance are not predicted to arise should any other development scenario within the project design envelope be taken forward in the final design scheme.

## **2.8 Impacts scoped out of the assessment**

- 2.8.1 The impacts listed in Table 2.19 have been scoped out of the assessment for air quality as agreed through the EIA scoping process detailed in Volume 2, Chapter 5: Scoping and Consultation.



Table 2.18: Maximum design envelope parameters assessed.

Potential impact	Maximum design scenario	Justification
<b>Construction</b>		
Increase in suspended particulate matter concentrations and deposited dust	Earthworks and construction assumed to occur simultaneously in all working areas during first 18 month phase of total six year construction programme.	Reasonable maximum for potential construction dust generation; construction work in subsequent phases would have lower dust generation potential.
	Total site area for earthworks exceeds 10,000 m <sup>2</sup> . During construction, total building volume >100,000 m <sup>3</sup> and/or use of on-site concrete batching is assumed.	Reasonable maximum for potential construction dust generation.
<b>Operation and maintenance</b>		
Increase in NO <sub>2</sub> and NH <sub>3</sub> concentrations due to emissions from gas engines	Gas engine maximum operating hours 4,000 per annum with NO <sub>x</sub> emission rate at IED limit (75 mg/Nm <sup>3</sup> ) and NH <sub>3</sub> emission rate at BAT-AEL (annual emission limit associated with best available techniques) for Selective Catalytic Reduction (SCR) of 3 mg/Nm <sup>3</sup> .	Maximum potential long-term (annual mean) air quality impact.
	Maximum of six gas start-ups (with temporary higher emissions) during any 24 hour period.	Reasonable maximum potential short-term (hourly mean) air quality impact.
	Up to 48 gas engines with individual exhaust stacks or 12 groups of four clustered stacks assessed with exhaust flow characteristics of MAN 12.4 MWe engine.	Reasonable maximum potential air pollutant impact from larger number of smaller gas engines.
	Up to 33 gas engines with individual exhaust stacks or six groups of five clustered stacks and one of three, assessed with exhaust flow characteristics of MAN 18.4 MWe engine.	Reasonable maximum potential air pollutant impact from smaller number of larger gas engines.
	Gas engine exhaust stacks modelled at locations specified in Table 1.3 of Volume 6, Appendix 12.4: Model Input and Outputs with up to 5 m limit of deviation for absolute stack locations or locations relative to modelled buildings.	Proposed design with reasonable limit of deviation within which impact on air pollutant concentrations would not be materially affected.
	Maximum building envelopes as shown in the Works Plans limits of deviation and the following maximum heights: <ul style="list-style-type: none"> <li>• 48 gas engine stacks up to 40 m high</li> <li>• Gas engine buildings up to 20 m high to ridgeline;</li> <li>• Battery units or building up to 10 m high to ridgeline; and</li> <li>• On-site substation components up to 15 m high.</li> </ul>	Maximum potential building wake effect on air pollutant dispersion.
<b>Decommissioning</b>		
Increase in suspended particulate matter concentrations and deposited dust	Duration and dust-generating activities of deconstruction work no greater than construction but may involve demolition activity.	Reasonable maximum assumption; in practice with deconstruction and potential re-use of recycling of components, <i>impacts from decommissioning are likely to be less than during construction.</i>
Increase in NO <sub>2</sub> concentrations due to emission from gas engines	Ongoing operation of all or part of flexible generation plant after 35 years.	Greatest ongoing, long-term impact.

Table 2.19: Impacts scoped out of the assessment.

Potential impact	Justification
<b>Construction phase</b>	
Increase in NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations from shipping generated by the construction of the development.	<p>LAQM.TG16 indicates that air quality assessments should include developments that meet either of the following criteria:  <i>“Is there more than 5,000 large ship movements per year, with relevant exposure within 250 m of the berths and main areas of manoeuvring; or  Is there more than 15,000 large ship movements per year, with relevant exposure within 1 km of these area?”</i></p> <p>LAQM.TG16 states <i>“If one of the above criteria is matched then the local authority should conclude that there is a risk of exceedance of the short-term objectives for NO<sub>2</sub>, PM<sub>10</sub> and SO<sub>2</sub>...”</i>.</p> <p>The proposed development will generate approximately 60 two-way movements per year during the construction phase. This is well below the thresholds listed in LAQM.TG16. Furthermore, the nearest residential receptors are more than 1 km from the berth and main areas of manoeuvring. On that basis, an assessment of shipping emissions has been scoped out.</p>
<b>Operation and maintenance</b>	
Increase in NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations from traffic generated by the operation of the development.	<p>During operation, access is needed mainly for occasional maintenance, as the plant is designed for remote operation and will not have a large regular workforce on site day to day. As such, the EPUK &amp; IAQM thresholds are highly unlikely to be exceeded; therefore, the impacts from operational-vehicle exhaust emissions have not been assessed and can be considered negligible. The assessment of the completed development focuses on emissions from the gas-fired engines.</p>
<b>Decommissioning phase</b>	
Increase in NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> concentrations from traffic generated by the decommissioning phase of the development.	<p>Traffic generated during the decommissioning phase is expected to be the same or lower than the construction phase. As such, the EPUK &amp; IAQM thresholds are highly unlikely to be exceeded; therefore, the impacts from construction-vehicle exhaust emissions have not been assessed and can be considered negligible.</p>

## 2.9 Measures adopted as part of Thurrock Flexible Generation Plant

2.9.1 A number of measures have been designed in to the Thurrock Flexible Generation Plant to reduce the potential for impacts on air quality.

2.9.2 For the construction phase, the mitigation is based on the 'highly recommended' and 'desirable' (indicated by a \*) mitigation measures recommended in the IAQM dust guidance (IAQM, 2014) and are subject to refinement based on practical experience obtained during construction on site. These measures are listed in Table 2.20.

Table 2.20: Designed-in measures.

Measures adopted as part of Thurrock Flexible Generation Plant	Justification
<b>Construction Phase</b>	
Implementation of recommended construction dust control measures listed in Volume 6, Appendix 2.2: Code of Construction Practice.	Ensures that the effects from dust during the construction phase are 'not significant'.
<p><b>Communications</b></p> <p>Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.</p> <p>Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.</p> <p>*Display the head, regional or local office contact information.</p>	To facilitate community engagement and a proactive approach to complaints regarding nuisance dusts.
<p><b>Dust Management</b></p> <p>*Develop and implement a Dust Management and Monitoring Plan (DMMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include where relevant the 'highly-recommended' measures in the IAQM guidance. The 'desirable' measures may be included as appropriate for the site. The DMMP will include visual inspections.</p>	To document controls to prevent or control the generation and release of nuisance dusts during construction.
<p><b>Site Management</b></p> <p>Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.</p> <p>Make the complaints log available to the local authority when asked.</p> <p>Record any exceptional incidents that cause dust and/or abnormal air emissions, based on the environmental manager's judgement, either on- or off-site, and the action taken to resolve the situation in the log book.</p>	To facilitate community engagement and a proactive approach to complaints regarding nuisance dusts.

Measures adopted as part of Thurrock Flexible Generation Plant	Justification
<p><b>Monitoring</b></p> <p>Visual Checks:</p> <p>*Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby (within 100 m of the site boundary) and along access roads for up to 500 m, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular checks of surfaces such as street furniture, cars and window sills within 100 m of the site boundary, including a photographic record.</p> <p>*Carry out regular site inspections to monitor compliance with the DMMP, record inspection results, and make an inspection log available to the local authority when asked.</p> <p>Increase the duration of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.</p> <p>Quantitative Monitoring:</p> <p>It is not proposed to undertake dust deposition, dust flux and/or real-time PM<sub>10</sub> continuous monitoring for this project at this location, given the distance to sensitive receptors. The principal method of monitoring will be the log of daily visual inspections during construction hours.</p>	To verify the effective control of dust releases at the site.
<p><b>Preparing and maintaining the site</b></p> <p>Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.</p> <p>Enclose specific operations where there is a high potential for dust production and the site is active for an extended period.</p> <p>Avoid site runoff of water or mud.</p> <p>Keep site fencing, barriers and scaffolding clear</p> <p>Remove materials that have a high potential to produce dust from site as soon as practical, unless being re-used on site.</p> <p>Cover, seed or fence stockpiles to prevent wind whipping in dry conditions.</p>	To minimise generation of nuisance dusts during construction.

Measures adopted as part of Thurrock Flexible Generation Plant	Justification
<p><b>Operating vehicle/machinery and sustainable travel</b></p> <p>Ensure all vehicles switch off engines when stationary – no idling vehicles. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.</p> <p>*Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, with the agreement of the local authority, where appropriate).</p> <p>Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.</p> <p>*Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).</p>	To minimise generation of nuisance dusts during construction.
<p><b>Operations</b></p> <p>Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction (e.g. suitable local exhaust ventilation systems).</p> <p>Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.</p> <p>Use enclosed chutes and conveyors and covered skips.</p> <p>Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.</p> <p>Ensure equipment is readily available on site to clean any dry spillages, and clean up such spillages as soon as reasonably practicable after the event using wet cleaning methods where practical.</p>	To minimise generation of nuisance dusts during construction.
<p><b>Waste management</b></p> <p>Avoid bonfires and burning of waste materials.</p>	To minimise generation of nuisance dusts during construction.
<p><b>Measures specific to earthworks</b></p> <p>*Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.</p> <p>*Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.</p> <p>*Where practicable, only remove the cover in small areas during work and not all at once.</p>	To minimise generation of nuisance dusts during construction.

Measures adopted as part of Thurrock Flexible Generation Plant	Justification
<p><b>Measures specific to construction</b></p> <p>*Avoid scabbling (roughening of concrete surfaces) if possible.</p> <p>Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.</p> <p>*Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.</p> <p>*For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.</p>	To minimise generation of nuisance dusts during construction.
<p><b>Measures specific to trackout</b></p> <p>Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site.</p> <p>Avoid dry sweeping of large areas.</p> <p>Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.</p> <p>Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.</p> <p>Record all inspections of haul routes and any subsequent action in a site log book.</p> <p>Install hard surfaced haul routes where practicable, which are regularly damped down in dry weather with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.</p> <p>Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).</p> <p>Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.</p> <p>Access gates to be located at least 10 m from receptors where possible.</p>	To minimise generation of nuisance dusts during construction.
<b>Operational Phase</b>	
The heights of the built stacks will be an optimum stack height for the final engines type and configuration.	To allow appropriate dispersion of stack emissions.
Selective Catalytic Reduction will be used.	To reduce NOx emissions.

## 3. Baseline environment

### 3.1 Current baseline

3.1.1 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. NPPG and EPUK & IAQM guidance highlight public information from DEFRA and local monitoring studies as potential sources of information on background air quality. LAQM.TG16 recommends that DEFRA mapped concentration estimates are used to inform background concentrations in air quality modelling and states that:

*“Where appropriate these data can be supplemented by and compared with local measurements of background, although care should be exercised to ensure that the monitoring site is representative of background air quality”.*

3.1.2 For this assessment, the background air quality has been characterised by drawing on information from the following public sources:

- DEFRA maps, which show estimated pollutant concentrations across the UK in 1 km grid squares;
- Published results of local authority Review and Assessment (R&A) studies of air quality, including local monitoring and modelling studies; and
- Project specific NO<sub>2</sub> monitoring.

3.1.3 A detailed description of how the baseline air quality has been derived for this proposed development site is summarised in Volume 6, Appendix 12.2: Baseline Air Quality Conditions.

3.1.4 For the construction dust assessment, the annual-mean PM<sub>10</sub> baseline concentration is 19.3 µg.m<sup>-3</sup>, the average concentration monitored at the Gravesham ZG3, between 2013 and 2017. More detail on the PM<sub>10</sub> baseline concentrations are shown in Volume 6, Appendix 12.2: Baseline Air Quality Conditions.

3.1.5 Table 3.1 summarises the annual-mean NO<sub>2</sub> baseline concentrations for each modelled receptor. The locations of the modelled receptors are presented in Figure 1.1.

Table 3.1: Summary of Baseline Annual-Mean (Long-term) NO<sub>2</sub> Concentrations used in the Assessment.

Receptor ID	Receptor Name	Data Source	Concentration (µg.m <sup>-3</sup> )
1	Fort Road	Project specific monitoring location 3	26.4
2	Sandhurst Road	Project specific monitoring location 3	26.4
3	School	Thurrock monitoring - Average of TILE, TL, TK4, TILD monitoring locations	34.0
4	Gateway Academy	Thurrock monitoring – TSR monitoring location	28.7
5	Gravel Pit Cottages	Project specific monitoring location 5	18.0
6	Princess Margaret Rd	Project specific monitoring location 5	18.0
7	Walnut Tree Farm	Project specific monitoring location 4	18.3
8	The Green	Project specific monitoring location 4	18.3
9	West Street	Gravesham monitoring - GR13 monitoring location	41.8
10	Milton School	Gravesham monitoring - GR62 monitoring location	30.9
11	Royal Pier Road	Gravesham monitoring - GR90 monitoring location	31.8
12	West Tilbury Hall	Project specific monitoring location 4	18.3
13	Cooper Shore	Project specific monitoring location 4	18.3
14	R1	Tilbury2 Air Quality Assessment (Note: these concentrations are the predicted concentrations with Tilbury2 in place in 2020 (Tilbury2, 2017))	31.1
15	R2		27.6
16	R3		28.3
17	R4		26.9
18	R5		32.2
19	R6		26.9
20	R7		28.1
21	R8		28.9
22	R9		36.6
23	R10		30.6
24	R11		26.6
25	R12		26.1

Receptor ID	Receptor Name	Data Source	Concentration ( $\mu\text{g.m}^{-3}$ )
26	R13		26.4
27	R14		26.8
28	R15		23.6
29	R16		25.8
30	R17		26.2
31	R18		24.1
32	R19		31.6
33	R20		23.5
34	R21		34.8
35	R22		24.8
36	R23		34.1
37	R24		28.5
38	R25		33.8
39	R26		22.6
40	R27		24.5
41	16/01232/OUT	Project specific monitoring location 5	18.0
42	18/00664/CONDC	Thurrock monitoring – ETRS monitoring location	29.9
43	16/00412/OUT	Project specific monitoring location 4	18.3
44	15/00379/OUT	Project specific monitoring location 4	18.3
45	16/01475/SCR	Thurrock monitoring - ETRS monitoring location	29.9
46	GR/17/674	Gravesham monitoring – GR75 monitoring location	22.4
47	20141214	Gravesham Monitoring – GR57 monitoring location	38.6

## 3.2 Future baseline

3.2.1 To ensure that the assessment presents conservative results, no reduction in the background has been applied for future years and the concentrations presented in Table 3.1 are considered to be the future baseline.

### Climate change

3.2.2 The Met Office Hadley Centre (MOHC) UK Carbon Projections ('UKCP18') dataset (MOHC, 2018) provides probabilistic projections of change in climatic parameters over time for 25 km grid squares across the UK. Projected changes for a RCP8.5<sup>1</sup> future global greenhouse gas emissions scenario have been reviewed for the 2050–2069 and 2080–2099 periods, representing changes towards the end of the proposed development's initial 35-year operating lifetime and changes for the period beyond that should operation continue.

3.2.3 The dispersion modelling of operational effects has been undertaken for five years of hourly meteorological conditions. The assessment therefore already takes into account a wide range of ambient temperatures and wind speeds. The assessment has been undertaken using the relevant technical guidance and based on current knowledge, the results of the assessment are not expected to be significantly influenced by climate change effects within the reasonably expected operational lifetime of the development.

<sup>1</sup> RCP8.5 refers to a high-emissions scenario assuming 'business as usual' growth globally with little additional mitigation. This is a conservative (worst-case) approach for the assessment

## 4. Assessment of Effects

### 4.1 Construction phase

#### Construction traffic

4.1.1 Volume 6: Appendix 12.6: Assessment of Traffic-Related Emissions sets out the results of the assessment of traffic-related emissions during the construction.

#### Magnitude of impact

4.1.2 For the purposes of this assessment, the magnitude of impact is considered to be the change in concentration relative to the AQAL due to additional traffic generated by the development during construction i.e. the During Construction – Without Dev as % of the AQS Objective column in Tables 1.4 to 1.6 in Volume 6, Appendix 12.6.

#### Sensitivity of the receptor

4.1.3 For the purposes of this assessment, the sensitivity of the receptor is indicated by the long term average concentration at each receptor i.e the During Construction column in Tables 1.4 to 1.6 in Volume 6, Appendix 12.6.

#### Significance of effect

4.1.4 The results set out in Volume 6: Appendix 12.6 shows that the impact descriptor for all receptors for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> is negligible, which is not significant in EIA terms.

#### Further mitigation or enhancement

4.1.5 No further mitigation or enhancement is considered necessary.

#### Residual effect

4.1.6 The residual effects are negligible, which is not significant in EIA terms.

#### Construction dust

4.1.7 The types of activities that could cause fugitive dust emissions are:

- Earthworks;
- Handling and disposal of spoil;
- Wind-blown particulate material from stockpiles;
- Handling of loose construction materials; and

- Movement of vehicles, both on and off site.

4.1.8 The level and distribution of construction dust emissions will vary according to factors such as the type of dust, duration and location of dust-generating activity, weather conditions and the effectiveness of suppression methods.

4.1.9 The main effect of any dust emissions, if not mitigated, could be annoyance due to soiling of surfaces, particularly windows, cars and laundry. However, it is normally possible, by implementation of proper control, to ensure that dust deposition does not give rise to significant adverse effects, although short-term events may occur (for example, due to technical failure or exceptional weather conditions). The following assessment, using the IAQM methodology, predicts the risk of dust impacts and the level of mitigation that is required to control the residual effects to a level that is “not significant”.

#### Magnitude of impact

4.1.10 To follow the methodology outlined in the IAQM dust guidance, this section defines the unmitigated dust emission magnitude for demolition, earthworks, construction and trackout.

4.1.11 There is no demolition proposed for the development so demolition is not considered further.

4.1.12 The site area is greater than 10,000 m<sup>2</sup>, the dust emission magnitude for the earthworks phase is classified as **large**.

4.1.13 The total volume of the buildings to be constructed would be greater than 100,000 m<sup>3</sup>, the dust emission magnitude for the construction phase is classified as **large**.

4.1.14 Assuming that the maximum number of outwards movements in any one day is greater than 50 HDVs, the dust emission magnitude for trackout would be classified as **large**.

**Table 4.1: Dust emission magnitude for earthworks, construction and trackout**

Earthworks	Construction	Trackout
Large	Large	Large

4.1.15 The dust emission magnitude is predicted to be of local spatial extent, short term duration, intermittent and reversible. It is predicted that the impact will affect the receptors directly.

**Sensitivity of the receptor**

4.1.16 All earthworks and construction activities are assumed to occur across all zones within the site boundary except for the exchange Common Land areas (Zone E in Figure 1.5 of Volume 2, Chapter 2: Project Description). In practice, earthworks and construction will only occur in stages, so assuming that activities will occur simultaneously is a worst-case approach. As such, receptors at distances within 20 m, 50 m, 100 m, 200 m and 350 m of the site boundary (excluding Zone E), as described in the IAQM dust guidance, have been identified and are illustrated in Figure 4.1. The IAQM methodology requires that the collective sensitivity of the surrounding area to construction and earthworks is categorised. The results are provided in Table 4.2 below.

**Table 4.2: Sensitivity of the surrounding area for earthworks and construction**

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust soiling	Medium	1 – 10 residential/high sensitivity receptors located within 20 m of the site boundary (Table 2.10).
Human health	Low	Background PM <sub>10</sub> concentrations for the assessment = 19.3 µg.m <sup>-3</sup> 1 – 10 residential/high sensitivity receptors located within 20 m of the site boundary and PM <sub>10</sub> concentrations below 24 µg.m <sup>-3</sup> (Table 2.11).
Ecological	Low	Low Street Pit and Broom Pit Local Wildlife Sites (low sensitivity receptors) are within 20 m of site boundary. (Table 2.12).

4.1.17 The Dust Emission Magnitude for trackout is classified as large and trackout may occur on roads up to 200 m from the site. The major routes within 200 m of the site are Station Road, Church Road, Fort Road and Cooper Shaw Road. The sensitivity of the area has been classified and the results are provided in Table 4.3 below.

**Table 4.3: Sensitivity of the surrounding area for trackout**

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust soiling	Medium	1 – 10 residential/high sensitivity receptors located within 20 m of the roads (Table 2.10)

Human health	Low	Background PM <sub>10</sub> concentrations for the assessment = 19.3 µg.m <sup>-3</sup> 1 – 10 residential/high sensitivity receptors located within 20 m of the roads and PM <sub>10</sub> concentrations below 24 µg.m <sup>-3</sup> (Table 2.11)
Ecological	Low	Low Street Pit and Broom Pit Local Wildlife Sites (low sensitivity receptors) are within 20 m of the roads. (Table 2.12)

**Significance of effect**

4.1.18 The dust emission magnitude has been considered in the context of the sensitivity of the area to give the risk of dust impacts. Table 4.4 summarises the risk of dust impacts for the three activities.

**Table 4.4: Dust impact risk for earthworks, construction and trackout**

Source	Earthworks	Construction	Trackout
Dust soiling	Medium	Medium	Medium
Human health	Low	Low	Low
Ecology	Low	Low	Low
Risk	Medium	Medium	Medium

4.1.19 Taking the site as a whole, the overall risk is deemed to be medium. The mitigation measures appropriate to a level of risk for the site as a whole and for each of the phases are set out in Table 2.20.

4.1.20 Provided this package of mitigation measures is implemented, the residual construction dust effects will not be significant. The IAQM dust guidance states that:

*“For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be ‘not significant’.”*

4.1.21 The IAQM dust guidance recommends that significance is only assigned to the effect after the activities are considered with mitigation in place.

4.1.22 Overall, it is predicted that the **large** impact on the **low and medium** sensitivity of the surrounding area would result in a **negligible** effect once the recommended IAQM mitigation measures are implemented, which is not significant in EIA terms.



*Further mitigation or enhancement*

- 4.1.23 No significant adverse effects have been predicted once the mitigation measures presented in Table 2.20 are implemented and therefore no further mitigation is considered to be required.

*Residual effect*

- 4.1.24 No further mitigation or enhancement is considered to be required so the residual effect would be **negligible** once the recommended IAQM mitigation measures are implemented, which is not significant in EIA terms.

**Future monitoring**

- 4.1.25 With the exception of dust monitoring set out in Table 2.20 and the outline CoCP, no other monitoring is considered necessary.

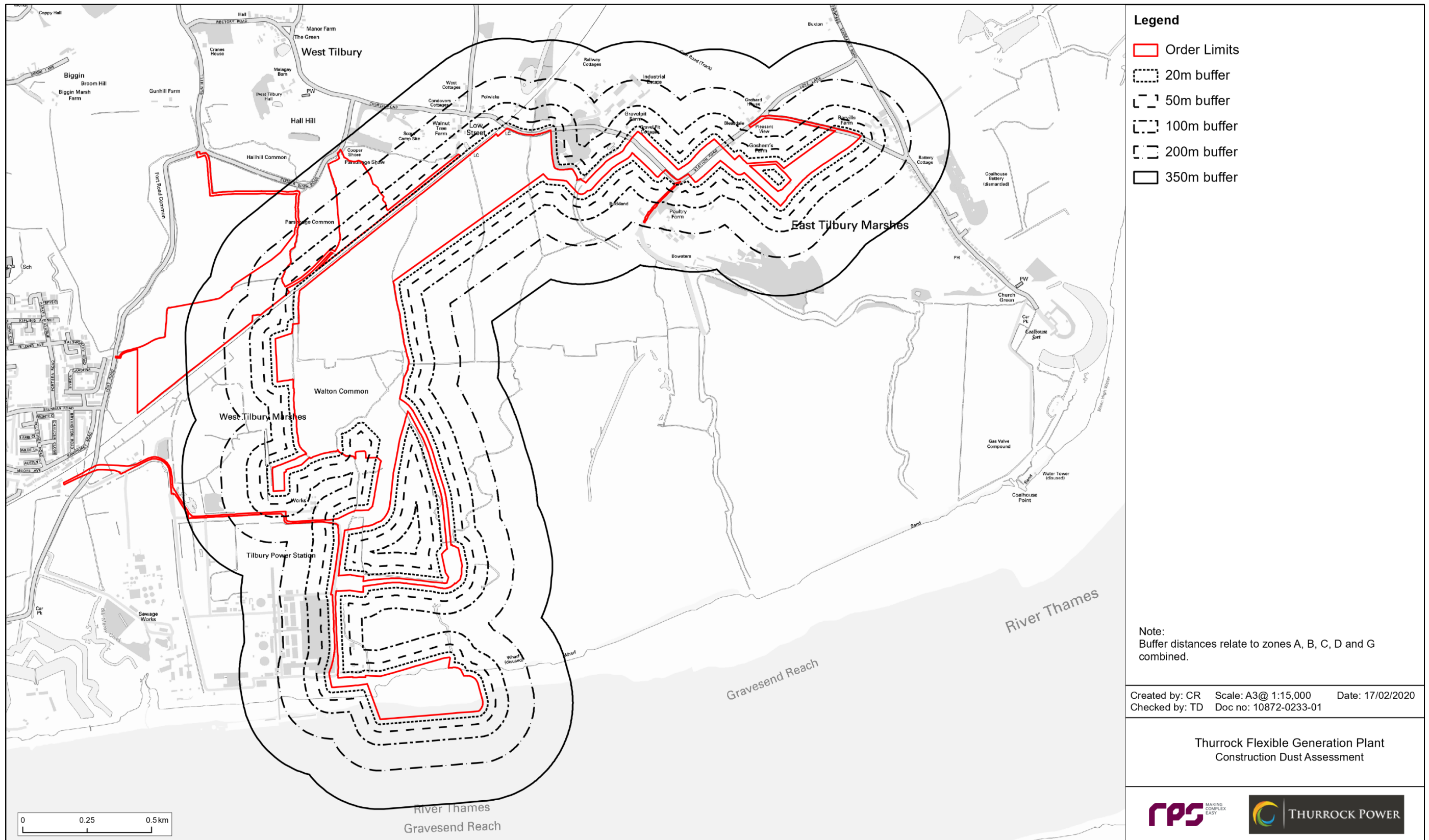


Figure 4.1: Construction Dust Assessment Buffers.

## 4.2 Operational and maintenance phase

4.2.1 As outlined in Table 2.18, four scenarios have been modelled. The results presented in this chapter are for scenario 1: 48 x 12.4 MW engines, each with its own stack (48 stacks) as the predicted concentrations for this scenario were highest. The results for the other three scenarios are presented in Volume 6, Appendix 12.5: Results of Other Scenarios.

### Magnitude of impact

4.2.2 For the purposes of this assessment, the magnitude of impact is considered to be the change in concentration relative to the AQAL i.e. the PC as a % of AQAL column in Table 4.5 and Table 4.7.

### Sensitivity of the receptor

4.2.3 For the purposes of this assessment, the sensitivity of the receptor is indicated by the long term average concentration at each receptor i.e. the Predicted Environmental Concentrations (PEC) as a % of the AQAL column in Table 4.5 and Table 4.7.

### Significance of effect

#### Long-term Impacts

#### NH<sub>3</sub>

4.2.4 The highest predicted annual-mean process contribution is 0.27 µg.m<sup>-3</sup> at Walnut Tree Farm. When rounded, this represents 0% of the EAL of 180 µg.m<sup>-3</sup>. On this basis, the long-term impacts at all receptors fall into the 'negligible' category, regardless of the background concentration.

#### NO<sub>2</sub>

4.2.5 Table 4.5 summarise the long-term maximum PC and PEC values at the selected discrete sensitive receptors. The EPUK & IAQM impact descriptors are also shown. Figure 4.3 shows the contours for the annual-mean NO<sub>2</sub> PC.

**Table 4.5: Long-term Predicted NO<sub>2</sub> Concentrations (µg.m<sup>-3</sup>) at Sensitive Receptors.**

Receptor ID	Receptor Name	AC (µg.m <sup>-3</sup> )*	PC (µg.m <sup>-3</sup> )	PC as % of AQAL	PEC (µg.m <sup>-3</sup> )	PEC as % of AQAL	Impact Descriptor
1	Fort Road	26.4	3.6	9	30.1	75	Slight
2	Sandhurst Road	26.4	2.7	7	29.1	73	Slight

Receptor ID	Receptor Name	AC (µg.m <sup>-3</sup> )*	PC (µg.m <sup>-3</sup> )	PC as % of AQAL	PEC (µg.m <sup>-3</sup> )	PEC as % of AQAL	Impact Descriptor
3	School	34.0	1.3	3	35.3	88	Slight
4	Gateway Academy	28.7	0.5	1	29.2	73	Negligible
5	Gravel Pit Cottages	18.0	4.1	10	22.1	55	Slight
6	Princess Margaret Rd	18.0	2.3	6	20.3	51	Slight
7	Walnut Tree Farm	18.3	4.8	12	23.1	58	Moderate
8	The Green	18.3	1.5	4	19.8	50	Negligible
<b>9</b>	<b>West Street</b>	<b>41.8</b>	<b>0.6</b>	<b>2</b>	<b>42.4</b>	<b>106</b>	<b>Moderate</b>
10	Milton School	30.9	0.5	1	31.4	78	Negligible
11	Royal Pier Road	31.8	0.6	2	32.4	81	Slight
12	West Tilbury Hall	18.3	1.8	5	20.2	50	Negligible
13	Cooper Shore	18.3	2.7	7	21.1	53	Slight
14	R1	31.1	0.2	0	31.3	78	Negligible
15	R2	27.6	0.1	0	27.7	69	Negligible
16	R3	28.3	0.2	1	28.5	71	Negligible
17	R4	26.9	0.3	1	27.2	68	Negligible
18	R5	32.2	0.3	1	32.5	81	Negligible
19	R6	26.9	0.5	1	27.4	68	Negligible
20	R7	28.1	0.4	1	28.5	71	Negligible
21	R8	28.9	0.4	1	29.3	73	Negligible
22	R9	36.6	0.9	2	37.5	94	Slight
23	R10	30.6	1.2	3	31.8	79	Slight
24	R11	26.6	1.1	3	27.7	69	Negligible
25	R12	26.1	1.2	3	27.3	68	Negligible
26	R13	26.4	2.4	6	28.8	72	Slight
27	R14	26.8	2.0	5	28.8	72	Negligible
28	R15	23.6	3.6	9	27.2	68	Slight

Receptor ID	Receptor Name	AC ( $\mu\text{g.m}^{-3}$ )*	PC ( $\mu\text{g.m}^{-3}$ )	PC as % of AQAL	PEC ( $\mu\text{g.m}^{-3}$ )	PEC as % of AQAL	Impact Descriptor
29	R16	25.8	1.4	4	27.2	68	Negligible
30	R17	26.2	1.3	3	27.5	69	Negligible
31	R18	24.1	0.3	1	24.4	61	Negligible
32	R19	31.6	1.3	3	32.9	82	Slight
33	R20	23.5	0.2	1	23.7	59	Negligible
34	R21	34.8	0.2	0	35.0	87	Negligible
35	R22	24.8	0.2	0	25.0	62	Negligible
36	R23	34.1	0.1	0	34.2	86	Negligible
37	R24	28.5	0.2	0	28.7	72	Negligible
38	R25	33.8	0.4	1	34.2	86	Negligible
39	R26	22.6	0.2	0	22.8	57	Negligible
40	R27	24.5	0.4	1	24.9	62	Negligible
41	16/01232/OUT	18.0	3.5	9	21.5	54	Slight
42	18/00664/CONDC	29.9	2.3	6	32.2	80	Moderate
43	16/00412/OUT	18.3	0.7	2	19.0	47	Negligible
44	15/00379/OUT	18.3	0.6	1	18.9	47	Negligible
45	16/01475/SCR	29.9	1.4	4	31.3	78	Slight
46	GR/17/674	22.4	0.3	1	22.7	57	Negligible
47	20141214	38.6	0.3	1	38.9	97	Slight

\*For receptors R1 to R27, the AC includes the PC from Tilbury2. Receptors in bold exceed the AQAL.

4.2.6 Predicted annual-mean NO<sub>2</sub> concentrations at the facades of existing receptors are below the AQS objective for NO<sub>2</sub> for all but one receptor. At West Street (receptor 9), the predicted NO<sub>2</sub> concentration exceeds the AQS objective of 40  $\mu\text{g.m}^{-3}$  both with and without the development. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor ranges from ‘negligible’ to ‘moderate adverse’ for all receptors.

4.2.7 There are three receptors where the impact is ‘moderate adverse’: Walnut Tree Farm (receptor 7), West Street (receptor 9) and 18/00664/CONDC (receptor 42). As stated in the footnote to Table 2.17, the EPUK & IAQM guidance makes it clear that:

*“a moderate adverse impact at one receptor may not mean that the overall impact has a significant effect.”*

4.2.8 With reference to the impacts at Walnut Tree Farm and 18/00664/CONDC, the Environment Agency’s on-line guidance states that:

*“You don’t need to take further action if your assessment has shown that both of the following apply:*

- *Your proposed emissions comply with BAT associated emission levels (AELs) or the equivalent requirements where there is not BAT AEL*
- *... the resulting PECs won’t exceed environmental standards”.*

4.2.9 At Walnut Tree Farm the PEC is only 58% of the AQAL and at 18/00664/CONDC the PEC is only 80% of the AQAL. This demonstrates that there is considerable headroom between the AQAL and the PEC.

4.2.10 At West Street, the PEC is 106% of the AQAL. This is in large part due to the Ambient Concentration (AC) which itself exceeds the AQAL. The AC is based on the average measured concentrations between 2013 and 2017<sup>2</sup> at the nearest monitoring location, GR13. The table and graph below show the measured concentrations at GR13 in the last ten years.

**Table 4.6: Annual-mean NO<sub>2</sub> Concentrations at GR13 ( $\mu\text{g.m}^{-3}$ ).**

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GR13	50	51	48	46	48.2	45.2	42.5	40.0	37.5	44	47.1

<sup>2</sup> Monitoring data for 2018 for locations in Thurrock was not available at the time of assessment. Therefore, the AC for receptors in Gravesham are based on the average between 2013 and 2017 rather than 2014 to 2018 for consistency.

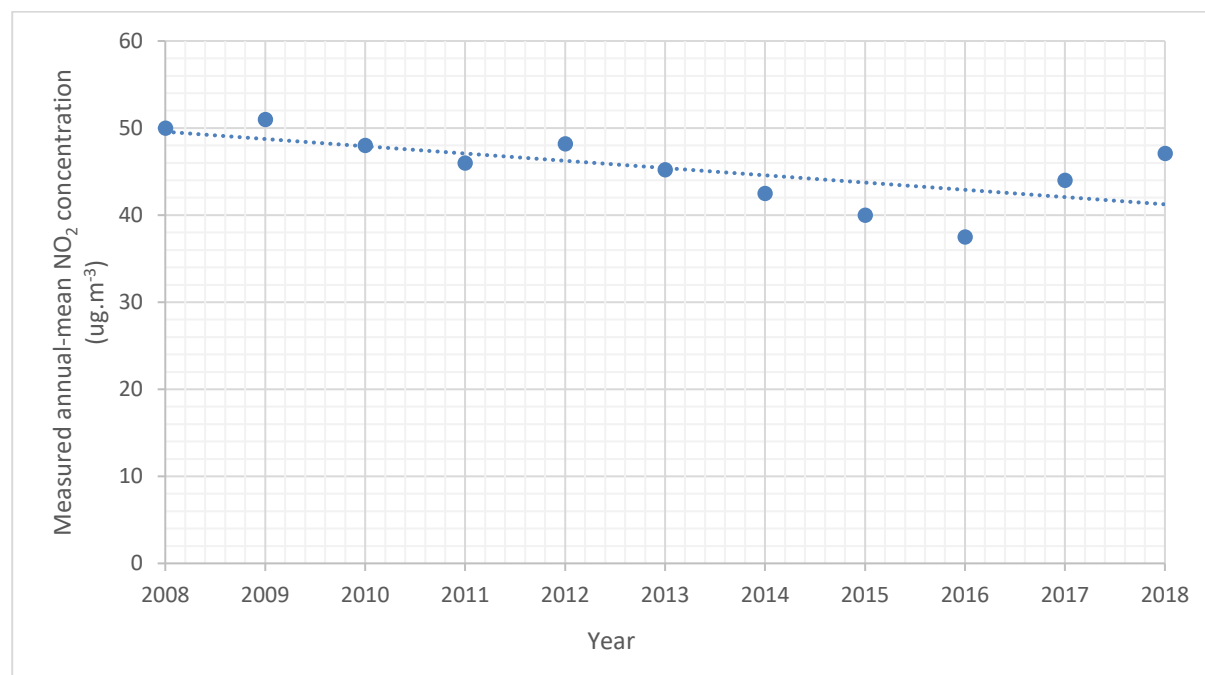


Figure 4.2: Annual-mean NO<sub>2</sub> Concentrations at GR13 ( $\mu\text{g.m}^{-3}$ ).

- 4.2.11 The results show that at this location, measured concentrations have decreased. Therefore, an AC of  $41.8 \mu\text{g.m}^{-3}$  is likely to be a conservative assumption and, in reality, the AC in the opening year is likely to be lower. This is in line with the view that background traffic-related NO<sub>2</sub> concentrations in the UK would reduce over time, due to the progressive introduction of improved vehicle technologies and increasingly stringent limits on emissions. The opening year of the proposed development is likely to be 2022 at the earliest and so concentrations are expected to decrease even further.
- 4.2.12 If the AC at West Street is assumed to be  $37.5 \mu\text{g.m}^{-3}$  (the measured concentration in 2016), the PEC is only 95% of the AQAL and based on the Environment Agency's on-line guidance, further action would not be required. Further analysis of air quality in Gravesham is provided in Volume 6: Appendix 12.8.
- 4.2.13 On that basis and using professional judgement, the overall significance of effect is considered to be **minor adverse**, which is not significant in EIA terms.

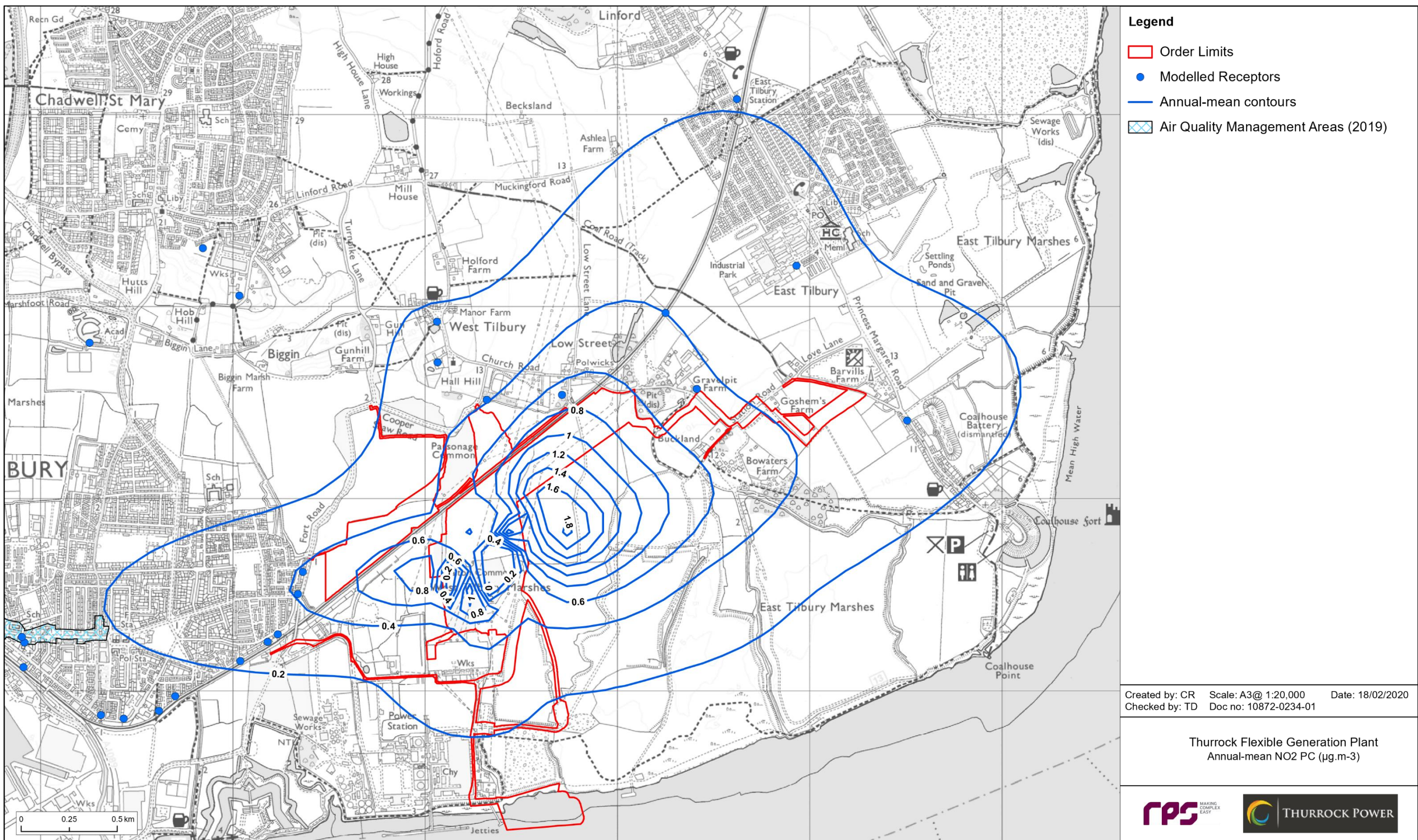


Figure 4.3: Annual-mean NO<sub>2</sub> Process Contributions (µg.m<sup>-3</sup>).

Short-term Impacts

**NH<sub>3</sub>**

4.2.14 The highest predicted hourly-mean process contribution is 15.8 µg.m<sup>-3</sup> at Walnut Tree Farm. When rounded, this represents 1% of the EAL of 2,500 µg.m<sup>-3</sup>. On this basis, the short-term impacts at all receptors fall into the 'negligible' category, regardless of the background concentration.

**NO<sub>2</sub>**

4.2.15 Table 4.7 summarise the short-term maximum PC and PEC values at the selected discrete sensitive receptors. The EPUK & IAQM impact descriptors are also shown. Figure 4.4 shows the contours for the hourly-mean NO<sub>2</sub> PC.

**Table 4.7: Short-term Predicted NO<sub>2</sub> Concentrations (µg.m<sup>-3</sup>) at Sensitive Receptors.**

Receptor ID	Receptor Name	AC (µg.m <sup>-3</sup> )*	PC (µg.m <sup>-3</sup> )	PC as % of AQAL	PEC (µg.m <sup>-3</sup> )	PEC as % of AQAL	Impact Descriptor
1	Fort Road	52.9	58.6	29	111.5	56	Moderate
2	Sandhurst Road	52.9	49.4	25	102.3	51	Moderate
3	School	68.1	29.0	15	97.1	49	Slight
4	Gateway Academy	57.4	26.6	13	84.0	42	Slight
5	Gravel Pit Cottages	36.0	47.3	24	83.3	42	Moderate
6	Princess Margaret Rd	36.0	32.8	16	68.8	34	Slight
7	Walnut Tree Farm	36.7	75.7	38	112.4	56	Moderate
8	The Green	36.7	48.0	24	84.6	42	Moderate
9	West Street	83.7	23.9	12	107.6	54	Slight
10	Milton School	61.7	23.7	12	85.4	43	Slight
11	Royal Pier Road	63.6	26.7	13	90.3	45	Slight
12	West Tilbury Hall	36.7	56.6	28	93.2	47	Moderate
13	Cooper Shore	36.7	72.9	36	109.6	55	Moderate
14	R1	62.2	10.9	5	73.1	37	Negligible
15	R2	55.2	10.4	5	65.6	33	Negligible
16	R3	56.6	18.1	9	74.7	37	Negligible

Receptor ID	Receptor Name	AC (µg.m <sup>-3</sup> )*	PC (µg.m <sup>-3</sup> )	PC as % of AQAL	PEC (µg.m <sup>-3</sup> )	PEC as % of AQAL	Impact Descriptor
17	R4	53.8	17.3	9	71.1	36	Negligible
18	R5	64.4	16.2	8	80.6	40	Negligible
19	R6	53.8	17.8	9	71.6	36	Negligible
20	R7	56.2	18.8	9	75.0	37	Negligible
21	R8	57.8	19.1	10	76.9	38	Negligible
22	R9	73.2	24.1	12	97.3	49	Slight
23	R10	61.2	28.5	14	89.7	45	Slight
24	R11	53.2	32.4	16	85.6	43	Slight
25	R12	52.2	32.4	16	84.6	42	Slight
26	R13	52.8	47.2	24	100.0	50	Moderate
27	R14	53.6	43.5	22	97.1	49	Moderate
28	R15	47.2	56.4	28	103.6	52	Moderate
29	R16	51.6	36.6	18	88.2	44	Slight
30	R17	52.4	35.4	18	87.8	44	Slight
31	R18	48.2	18.7	9	66.9	33	Negligible
32	R19	63.2	28.9	14	92.1	46	Slight
33	R20	47.0	12.5	6	59.5	30	Negligible
34	R21	69.6	12.3	6	81.9	41	Negligible
35	R22	49.6	10.7	5	60.3	30	Negligible
36	R23	68.2	9.7	5	77.9	39	Negligible
37	R24	57.0	12.2	6	69.2	35	Negligible
38	R25	67.6	12.9	6	80.5	40	Negligible
39	R26	45.2	12.6	6	57.8	29	Negligible
40	R27	49.0	17.9	9	66.9	33	Negligible
41	16/01232/OUT	36.0	42.8	21	78.8	39	Moderate
42	18/00664/CONDC	59.8	33.2	17	93.0	46	Slight
4.3	16/00412/OUT	36.7	32.4	16	69.0	35	Slight

Receptor ID	Receptor Name	AC ( $\mu\text{g.m}^{-3}$ )*	PC ( $\mu\text{g.m}^{-3}$ )	PC as % of AQAL	PEC ( $\mu\text{g.m}^{-3}$ )	PEC as % of AQAL	Impact Descriptor
44	15/00379/OUT	36.7	28.1	14	64.7	32	Slight
45	16/01475/SCR	59.8	26.9	13	86.7	43	Slight
46	GR/17/674	44.8	15.8	8	60.7	30	Negligible
47	20141214	77.3	14.6	7	91.9	46	Negligible

\*The short-term AC is twice the long-term AC.  
For receptors R1 to R27, the AC includes the PC from Tilbury2.

4.2.16 The results show that the highest PC as a percentage of the AQAL at any discrete receptor is 38% (at Walnut Tree Farm). The EPUK & IAQM impact descriptor for an increase between 20% and 50% is 'moderate adverse'. There are ten other receptors where the impact descriptor is 'moderate adverse'. As such, the impacts at these locations are considered to be potentially significant.

4.2.17 With reference to the impacts at these locations, the Environment Agency's on-line guidance referred to in turn by the EPUK & IAQM guidance states that where the PCs exceed 10% of the AQAL, the impacts are not considered significant if the PEC is below the AQAL. The Environment Agency's on-line guidance continues by stating that:

*"When you calculate background concentration, you can assume that the short-term background concentration of a substance is twice its long-term concentration."*

4.2.18 For all receptors, the PEC is less than 60% of the AQAL of  $200 \mu\text{g.m}^{-3}$ . This demonstrates that there is considerable headroom between the short-term AQAL and the PEC.

4.2.19 On that basis and using professional judgement, the overall significance of effect is considered to be **minor adverse**, which is not significant in EIA terms.

#### **Further mitigation or enhancement**

4.2.20 At this stage the specifics of the engine types, layout and building dimensions are subject to further detailed design. Several worse-case scenarios have been modelled as outlined in Table 2.18. Further mitigation or enhancement could include the aggregation of stacks and will include a reduction in  $\text{NO}_x$  emissions due to the use of SCR technology. The results presented in this chapter are based on the assumption that there is no aggregation of stacks and that no SCR is used, to be conservative as the performance of the SCR system is not confirmed at this stage. With SCR it is likely that the PCs would more than halve in practice.

#### **Residual effect**

4.2.21 Assuming that no further mitigation or enhancement was employed, the residual effects would be **minor adverse**, which is not significant in EIA terms.

#### **Future monitoring**

4.2.22 The proposed development will be subject to air pollutant emission monitoring (from its stack exhaust) under the requirements of its Environmental Permit. No additional future monitoring is considered to be required.



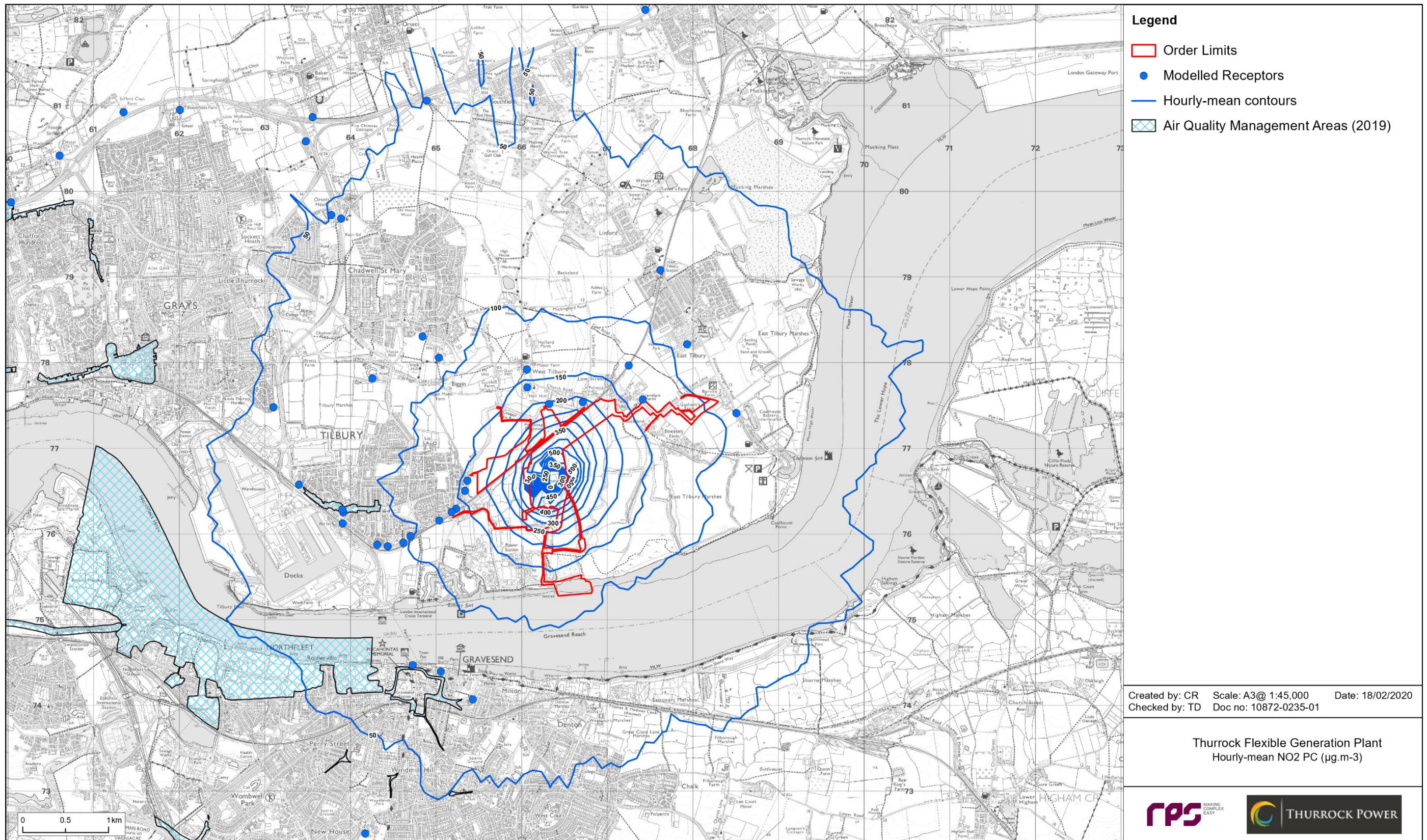


Figure 4.4: Hourly-mean NO<sub>2</sub> Process Contributions (µg.m<sup>-3</sup>)

## 4.3 Decommissioning phase

### *Magnitude of impact*

- 4.3.1 If the plant is deconstructed, the magnitude of impact for the decommissioning phase is expected to be the same or lower than the magnitude of impact for the construction phase.
- 4.3.2 If the operation of the plant is ongoing after 35 years, the magnitude of impact is expected to be the same or lower than the magnitude of impact for the operational phase.

### *Sensitivity of the receptor*

- 4.3.3 If the plant is deconstructed, it is assumed that the sensitivity of surrounding area during the decommissioning phase is the same as the construction phase.
- 4.3.4 If the operation of the plant is ongoing after 35 years, the sensitivity of the surrounding area is likely to be the same as the operational phase.

### *Significance of effect*

- 4.3.5 Overall, if the plant is deconstructed, it is predicted that the decommissioning phase would be similar to the construction phase and would result in a **negligible** effect once the recommended IAQM mitigation measures are implemented, which is not significant in EIA terms.
- 4.3.6 If the operation of the plant is ongoing after 35 years, the significance of effect would be similar to the operational phase and would result in a **minor adverse** effect which is not significant in EIA terms.

### *Further mitigation or enhancement*

- 4.3.7 No significant adverse effects have been predicted and no further mitigation is considered to be required.

### *Residual effect*

- 4.3.8 No further mitigation or enhancement is considered to be required so the residual effect is predicted to be **negligible**, which is not significant in EIA terms.

### **Future monitoring**

- 4.3.9 No future monitoring is considered to be required.

## 4.4 Cumulative effects

- 4.4.1 Cumulative effects are those arising from impacts of the proposed development in combination with impacts of other proposed or consented development projects that are not yet built or operational. An assessment of cumulative effects for Air Quality has been made and is reported in Volume 4, Chapter 25.

## 4.5 Transboundary effects

- 4.5.1 A screening of transboundary impacts has been carried out and is presented in Volume 6, Appendix 4.1: Transboundary Impacts Screening Note. This screening exercise identified that there was no potential for significant transboundary effects with regard to air quality from Thurrock Flexible Generation Plant upon the interests of other European Economic Area (EEA) States.

## 4.6 Inter-related effects

- 4.6.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of the construction, operation or decommissioning of Thurrock Flexible Generation Plant on the same receptor. The following assessments have been made and a description of the likely inter-related effects on air quality is provided in Volume 5, Chapter 31: Summary of Inter-Related Effects.

### *Project lifetime effects*

- 4.6.2 Assessment of the potential for effects that occur during more than one stage of the development's lifetime (construction, operation or decommissioning) to interact such that they may create a more significant effect on a receptor than when assessed in isolation for each stage.

### *Receptor-led effects*

- 4.6.3 Assessment of the potential for effects via multiple environmental or social pathways to interact, spatially and temporally, to create a greater inter-related effect on a receptor than is predicted for each pathway (in its respective topic chapter) individually.

## 5. Conclusion and summary

- 5.1.1 Impacts during the construction of the proposed development, such as dust generation and plant vehicle emissions, are predicted to be of short duration and only relevant during the construction phase. The results of the risk assessment of construction dust impacts undertaken using the IAQM dust guidance indicates that before the implementation of mitigation and controls, the risk of dust impacts will be medium. Implementation of the highly-recommended mitigation measures described in the IAQM construction dust guidance would, under normal conditions, reduce the residual dust effects to a level categorised as 'not significant'.
- 5.1.2 Emissions from vehicle movements generated by construction activities has been assessed and the impacts are considered to be 'not significant'.
- 5.1.3 Emissions from operation of the proposed development have been assessed through detailed dispersion modelling using best practice approaches. The assessment has been undertaken based on a number of conservative assumptions. This is likely to result in an over-estimate of the contributions that will arise in practice from the facility. The results of dispersion modelling reported in this assessment indicate that predicted contributions and resultant environmental impact for all pollutants considered are 'negligible' to 'moderate adverse' at individual receptor locations.
- 5.1.4 The effect from decommissioning or ongoing operation of the proposed development after its initial 35-year operating life would be negligible or minor adverse, which is not significant in EIA terms.
- 5.1.5 Using professional judgement, the resulting air quality effect of the proposed development is considered to be 'not significant' overall.
- 5.1.6 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.

Table 5.1: Summary of potential environment effects, mitigation and monitoring.

Description of impact	Measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
<b>Construction</b>							
Increase in suspended particulate matter concentrations and deposited dust.	Best practice measures for a medium risk site as recommended in the IAQM dust guidance. The measures are listed in Table 2.20.	Large for construction, earthworks and trackout	All low, medium and high sensitivity receptors within 350 m of the site boundary were considered. The sensitivity of the area was low or medium.	Negligible (not significant in EIA terms)	None	Negligible (not significant in EIA terms)	Listed in Table 2.20 and includes visual checks of dust, monitoring of dust complaints and potentially quantitative monitoring of dust.
Increase in traffic-related emissions	None	Negligible	Specific to each receptor	Negligible (not significant in EIA terms)	None	Negligible (not significant in EIA terms)	None
<b>Operation</b>							
Increase in NO <sub>2</sub> concentrations	None	Negligible to moderate	Specific to each receptor	Minor Adverse (not significant in EIA terms)	None	Minor Adverse (not significant in EIA terms)	As required by Environmental Permit. No additional monitoring proposed.
<b>Decommissioning</b>							
If plant is deconstructed - Increase in suspended particulate matter concentrations and deposited dust.	Assumed to be the same as for the construction phase	Large for construction, earthworks and trackout (assumed to be the same as for the construction phase)	All low, medium and high sensitivity receptors within 350 m of the site boundary were considered.	Negligible (not significant in EIA terms)	None	Negligible (not significant in EIA terms)	None
If operation of plant is ongoing - Increase in NO <sub>2</sub> concentrations	None	Negligible to moderate	Specific to each receptor	Minor Adverse (not significant in EIA terms)	None	Minor Adverse (not significant in EIA terms)	As required by Environmental Permit. No additional monitoring proposed.

## 6. References

British Standards Institute (BSI) (1983) BS 6069:Part 2:1983, ISO 4225-1980 Characterization of air quality. Glossary. London, BSI.

Department for Environment, Food and Rural Affairs (DEFRA) (2007) The air quality strategy for England, Scotland, Wales and Northern Ireland: Volume 1. London, The Stationary Office.

Department for Environment, Food and Rural Affairs (DEFRA) (2016) Local Air Quality Management Technical Guidance, 2016 (LAQM.TG16). [Online]. Available at: <https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf> [Accessed 07 October 2019]

Department for Environment, Food and Rural Affairs (DEFRA) (2017) Background Mapping data for local authorities - 2017 [Online]. Available at: <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017> [Accessed 07 October 2019]

Department for Environment, Food and Rural Affairs (DEFRA) (2019) Clean Air Strategy 2019. [Online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/770715/clean-air-strategy-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf) [Accessed 07 October 2019]

Department for Environment, Food & Rural Affairs (DEFRA) and Environment Agency (EA) (2016) Air emissions risk assessment for your environmental permit. [Online]. Available at: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit> [Accessed 07 October 2019]

Department for Environment, Food and Rural Affairs (DEFRA) and Department for Transport (2017) UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations [Online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/633269/air-quality-plan-overview.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/633269/air-quality-plan-overview.pdf) [Accessed 07 October 2019]

Department of Energy and Climate Change (DECC) (2011a). Overarching National Policy Statement for Energy (EN-1). London, The Stationary Office.

Department of Energy and Climate Change (DECC) (2011b). National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (NPS EN-2). London, The Stationary Office.

Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) (2017) Land-use Planning & Development Control: Planning for Air Quality. London, IAQM.

Gravesham Borough Council (2018) Annual Status Report 2018 [Online]. Available at: <http://www.kentair.org.uk/Pagesfiles/Gravesham%20ASR%202018%20Final.pdf> [Accessed 07 October 2019]

Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction. [Online]. Available at: [http://iaqm.co.uk/wp-content/uploads/guidance/iaqm\\_guidance\\_report\\_draft1.4.pdf](http://iaqm.co.uk/wp-content/uploads/guidance/iaqm_guidance_report_draft1.4.pdf) [Accessed 07 October 2019]

Ministry of Housing, Communities & Local Government (2014) Guidance: Air quality. [Online]. Available at: [Accessed 07 October 2019]

Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework. UK, APS Group.

MOHC (2018) UK Climate Projections User Interface v1.1.2, available <https://ukclimateprojections-ui.metoffice.gov.uk/ui/home>, accessed 24 December 2019  
Thurrock Council (2015) Local Development Framework. Core Strategy and Policies for Management of Development (as amended). [Online] Available at: [https://www.thurrock.gov.uk/sites/default/files/assets/documents/core\\_strategy\\_adopted\\_2011\\_amended\\_2015.pdf](https://www.thurrock.gov.uk/sites/default/files/assets/documents/core_strategy_adopted_2011_amended_2015.pdf) [Accessed 04 October 2019]

Thurrock Council (2018) Air Quality Report 2018. [Online]. Available at: <https://www.thurrock.gov.uk/air-quality/air-quality-monitoring> [Accessed 07 October 2019]