

National Grid Cable Tunnel Replacement Project

Environmental Statement Volume IV

Chapter 20 Air Quality - Gravesend

December 2023



Quality information

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20 Air Quality

20.1 Introduction

- 20.1.1 This chapter of the Environmental Statement (ES) assesses the likely significant effects of the Tilbury to Grain and Tilbury to Kingsnorth (TKRE) Cable Tunnel Replacement Project (hereafter referred to as “the Proposed Development”). It considers the likely effects on air quality receptors during the construction phase. Operational phase emissions are limited to intermittent maintenance activity and therefore, operational impacts are screened out of this assessment.
- 20.1.2 This chapter also identifies any additional mitigation measures to prevent, minimise or control likely adverse effects on air quality receptors arising from the Proposed Development.
- 20.1.3 This chapter should be read together with the introductory chapters of this Environmental Statement (ES) (ES Volume II Chapters 1 – 6). This air quality environmental assessment has also been informed by data from Volume IV Chapter 18: Traffic and Transport.
- 20.1.4 This chapter is supported by the following appendix (in ES Volume VI) and figures:
- Appendix 12.1: Construction Dust Assessment Methodology;
 - Figure 20-1: Air Quality Study Area; and
 - Figure 20.2: Construction Phase Dust Impacts.

20.2 Relevant Legislation, Policy and Guidance

Introduction

- 20.2.1 The section of this chapter provides an overview of the relevant legislation, planning policy and technical guidance relevant to the air quality assessment.

Legislation

- 20.2.2 The relevant legislation that applies specifically to the air quality assessment reported in this chapter are summarised in Table 20-1. Table 20-2 provides the Air Quality Standards (AQS) and Air Quality Objectives (AQO) relevant to this assessment.

Table 20-1: Legislation Relevant to Air Quality

Legislation	Legislation Context
The Air Quality Standards Regulations 2010 as amended 2016 (Ref 20-1)	The Air Quality Standards (AQS) Regulations report limit values at differing averaging periods for certain pollutants. There are limits provided for the protection of human health for sulphur dioxide (SO₂), nitrogen dioxide (NO₂), benzene, carbon monoxide (CO) and lead. Target values have been set for the concentration of PM_{2.5}. A limit value for the concentration of PM_{2.5} is also provided. All limit values included in these Regulations should not be exceeded. This regulation transposes the European Directive 2008/50/EC (as amended) into UK law.
The Non-Road Mobile Machinery (Type-Approval and	The Non-Road Mobile Machinery (NRMM) Regulations provide the requirements relating to gaseous and particulate pollutant

Legislation	Legislation Context
Emission of Gaseous and Particulate Pollutants) Regulations 2018 (Ref 20-2)	emission limits and type-approval for internal combustion engines for non-road mobile machinery. This regulation transposes the European Directive 97/68/EC (as amended) into UK law.
Clean Air Strategy 2019 (Ref 20-3)	In 2019, the UK adopted the Clean Air Strategy 2019 (the "Strategy"), setting out targets and the policies for how it will tackle all sources of air pollution, complementing three other UK government strategies: the Industrial Strategy, the Clean Growth Strategy and the 25 Year Environment Plan. It sets out the Government's long-term target to reduce people's exposure to PM_{2.5}, to 10 µg/m³ in line with the World Health Organisation's (WHO) current guidelines. It sets out how the Government will reduce PM_{2.5} concentrations across the UK, so that the number of people living in locations above the WHO guideline level of 10 µg/m³ is reduced by 50% by 2025. The Clean Air Strategy outlines proposals to tackle emissions from a range of sources. This includes providing clear and effective guidance on how Air Quality Management Areas ("AQMAs"), Clean Air Zones ("CAZ") and Smoke Control Areas interrelate and how they can be used by local government to tackle pollution. New legislation will seek to shift the focus towards prevention of exceedances rather than tackling pollution when limits have been surpassed. The AQS sets out air quality objectives that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. Air quality objectives, as defined by the Air Quality Strategy, are generally in line with the EU limit values, although they have different dates for compliance, and a different legal status as follows: a. EU limit values (as transcribed into UK legislation) are legally binding in the UK. National government compliance at the agglomeration scale is mandatory. b. UK air quality objectives are for the purposes of LAQM and there is no legal obligation for local authorities to achieve them. They do have a responsibility to work towards achieving them.
The Environment Act 2021 (Ref 20-4)	The Environment Act 2021 is made up of eight parts relating to a wide range of environmental issues including air quality. The Act requires the Secretary of State to make Regulations setting a target of the annual level of PM_{2.5}. Section 4(9) requires draft Regulations to be laid before Parliament on or before 31 October 2022, although this has now been deferred to a later date. The Act also contains amendments to Part 4 of the Environment Act 1995 and amendments of the Clean Air Act 1993.
Environmental Improvement Plan 2023 (Ref 20-5)	On the 31 January 2023, the Environmental Improvement Plan (the Plan) was published to build upon the Government's 25 Year Environmental Plan and in accordance with the provisions of the Environment Act 2021. A key target of the Plan is to improve environmental quality, including measures to: <i>"Cut overall air pollution by tackling the key sources of emissions, including reducing the maximum limits for domestic burning appliances in Smoke Control Areas.</i> <i>Tackle specific hotspots by challenging councils to improve air quality more quickly, while supporting them with clear guidance, funding, and tools.</i>

Legislation	Legislation Context
	<i>Reduce ammonia emissions (crucial for sensitive natural habitats) by using incentives in our new farming schemes”.</i> The Plan confirms the legal target to reduce population exposure to PM_{2.5} by 35% in 2040 compared to 2018 levels, with a new interim target to reduce by 22% by the end of January 2028, and a legal target to require a maximum annual mean concentration of 10 micrograms of PM_{2.5} µg/m³ by 2040, with a new interim target of 12 µg/m³ by the end of January 2028.
The Environmental Targets (Fine Particulate Matter) Regulations 2023 (Ref 20-6)	On 30 January 2023, regulations were published regarding the new targets for PM_{2.5} concentrations as required by the Environment Act. The regulations set out the following targets: <i>“The annual mean concentration target is that by the end of 31st December 2040 the annual mean level of PM_{2.5} in ambient air must be equal to or less than 10 µg/m³ (“the target level”).</i> <i>The population exposure reduction target is that there is at least a 35% reduction in population exposure by the end of 31st December 2040 (“the target date”), as compared with the average population exposure in the three-year period from 1st January 2016 to 31st December 2018 (“the baseline period”), determined in accordance with regulation 8”.</i>
The Air Quality Strategy for England 2023 (Ref 20-7)	The Air Quality Strategy fulfils the statutory requirement of the Environment Act 1995 as amended by the Environment Act 2021, to publish an Air Quality Strategy setting out air quality standards, objectives, and measures for improving ambient air quality every 5 years. It provides the framework by which local authorities are to deliver for their communities and contribute to long-term air quality goals, including new targets for fine particulate matter (PM_{2.5}). It does not replicate or replace our other air quality guidance documents relevant to local authorities, including the Clean Air Strategy and Environmental Improvement Plan referred to earlier in this table. The clean air chapter of the Environmental Improvement Plan builds on and updates the 2019 Clean Air Strategy, setting out the delivery plan to achieve our targets.

20.2.3 Table 20-2: sets out the Air Quality Objectives (AQO) relevant to this assessment, as published by the UK Government is the Air Quality Standards (AQS). It also includes the relevant Critical Load for nitrogen depositions, as published by the Air Pollution Information System (APIS).

Table 20-2: Relevant Air Quality Standards and Objectives, and Critical Loads

Pollutant	Averaging Period	Value ($\mu\text{g}/\text{m}^3$) (unless stated)
For the protection of human health		
Nitrogen dioxide (NO_2)	Annual mean (not to be exceeded)	40
	1-hour mean (not to be exceeded more than 18 times per year)	200
Particulate matter (PM_{10})	Annual mean (not to be exceeded)	40
	24-hour mean (not to be exceeded more than 35 times per year)	50
Fine particulate matter ($\text{PM}_{2.5}$)	Annual mean (not to be exceeded)	20
	Annual mean (not to be exceeded) (by 2040)	10
	Interim target (not to be exceeded) (by end of January 2028)	12
Sulphur dioxide (SO_2)	24-hour mean (not to be exceeded more than 3 times per year)	125
	1-hour mean (not to be exceeded more than 24 times per year)	350
	15-minute mean (not to be exceeded more than 35 times per year)	266
1,3 Butadiene	Annual mean (not to be exceeded)	2.25
CO	Running 8-hour mean (not to be exceeded)	10,000
For the protection of sensitive habitats		
NO_x	Annual mean (not to be exceeded)	30
SO_2	Annual mean (not to be exceeded)	20
Nitrogen Deposition	Annual deposition rate (not to be exceeded)	10 – 20 kgN/ha/yr (to represent saltmarsh habitat)

National Policy

20.2.4 National Planning Policies relevant to this air quality assessment are detailed in Table 20-3.

Table 20-3: National Planning Policy

Policy Reference	Policy Context
Overarching National Policy Statement for Energy (EN-1) (Ref 20-7, Ref 20-9)	In the current version of this document: Paragraph 5.2.8 in Section 5.2 Air Quality and Emissions states: “<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 (ES).</i>” Paragraph 5.2.9 (as updated in November 2023) further states that the ES should describe: “...existing air quality concentrations and the relative change in air quality from existing levels; - any significant air quality effects, mitigation action taken and any residual effects, distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project;

Policy Reference	Policy Context
	• <i>the predicted absolute emissions, concentration change and absolute concentrations as a result of the proposed project, after mitigation methods have been applied; and</i> • <i>any potential eutrophication impacts</i> Paragraph 5.2.10 (in the November 2023 draft of this document) also states that: <i>"... applicants should consider the Environment Targets (Fine Particulate Matter) (England) Regulations 2022 and associated Defra guidance."</i>
National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref 20-10)	On review of the current and 2023 draft document, there are no policies which are relevant to this assessment.
National Planning Policy Framework (NPPF) (Ref 20-11)	Paragraph 186 states: <i>"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 (AQMAs) 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 AQMAs and Clean Air Zones is consistent with the local air quality action plan."</i> The assessment will carefully consider the potential impact of the Proposed Development and establish whether it might constitute an obstacle to the achievement of strategic objectives that are set out within the air quality action plans of administrative authorities to bring about improvements in air quality within their AQMAs.

Local Planning Policy

20.2.5 Local Planning Policies relevant to this air quality assessment are detailed in Table 20-4:.

Table 20-4: Local Planning Policy

Policy Reference	Policy Context
Gravesend	
Gravesham Local Plan Core Strategy (Ref 20-12)	(Strategic Objective) <i>“SO17 Increase accessibility, reduce the need to travel, minimise congestion and improve air quality through the improved provision of local public transport and the provision of local jobs and services.”</i> <i>“Policy CS02 on the Distribution of Development sets out the broad location of future development in the Borough over the plan period. The Core Strategy seeks to:</i> ... <i>Improve the local economy to reduce the need for out-commuting. This can also have an impact on air quality;</i> ... <i>Ameliorate the implications of additional traffic for air quality.”</i> <i>“Policy S03: Northfleet Embankment and Swanscombe Peninsula East Opportunity Area</i> 4.4.28 <i>The Northfleet Embankment and Swanscombe Peninsula East Opportunity Area is a substantial opportunity for major riverside regeneration in Gravesham. Development will bring significant benefits to existing adjoining residential communities and the Borough as a whole through the delivery of new house and jobs whilst achieving environmental improvement, especially in air quality, and a high standard of design.</i> 4.4.29 <i>Any future proposals for the Swanscombe Peninsula East Undeveloped Area will be subject to a comprehensive masterplan approach which deals with the issues of flood risk, transport and access, ground conditions, proximity to existing industrial uses, air quality, biodiversity, utilities, navigation and the presence of the HS1 railway line.”</i>

Guidance

20.2.6 This air quality assessment has been carried out in accordance with the guidance documents listed and described in Table 20-5.

Table 20-5: Relevant Guidance Documents

Guidance Document Name	Description
Defra Local Air Quality Management (LAQM) Technical Guidance LAQM.TG22 (Ref 20-19);	Published for the purpose of supporting Local Authorities through their review and assessment of local air quality, LAQM TG(22) includes methodologies widely used by consultants to inform assessments of local air quality reported in ES chapters or standalone reports.
Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction v2.1 (2023) (Ref 20-14);	Industry standard guidance for the assessment of construction phase dust and site plant and Non-Road Mobile Machinery emissions. The principle of the guidance is to identify the level of mitigation required to ensure that any effect is not significant.
Environmental Protection UK & IAQM Land-Use Planning and Development Control: Planning for Air Quality (2017) (Ref 20-15);	Provides a means of screening the detail of air quality assessment required for a development or scheme, based on several parameters, including the change in traffic flows due to the scheme and the introduction of energy plant. The guidance also provides a means of determining whether an air quality effect is significant or not, based on the magnitude of change in pollutant concentration and the total pollutant concentration individual receptors are exposed to, relative to the air quality standards.
IAQM Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v.1.1 (2020) (Ref 20-16); and	This guidance describes how the potential for air quality impacts on sensitive habitats should be screened and provides guidance on how to describe an air quality impact at a sensitive habitat.
Air emissions risk assessment for your environmental permit (Ref 20-17)	Published by the Environment Agency, this guidance provides a methodology for assessment of point source emissions impacts on human health and nature conservations sites.

20.3 Scope of Assessment

Study Area

- 20.3.1 The Study Area for this assessment is the area over which potential direct and indirect effects of the Proposed Development on local air quality are predicted to occur during the construction period, noting that operational phase and decommissioning phase impacts have been screened out of the assessment.
- 20.3.2 The methodological approach to defining the spatial extent of the Study Area for air quality has been informed by the Institute of Air Quality Management (IAQM). The following Study Areas have been used where an assessment of dust emissions generated by construction activities is required:
- An amenity or human health sensitive receptor within:
 - 250 m of the limits of construction activity within the red line boundary; or
 - 50 m of the construction route on the public highway, up to 500 m from the site entrance(s).
 - An ecological receptor within:
 - 50 m of the limits of construction activity within the red line boundary; or
 - 50 m of the construction route on the public highway, up to 500 m from the site entrance(s).

20.3.3 The study area for the assessment of construction phase vehicle emissions is based on the screening criteria set out in IAQM/EPUK guidance, which requires detailed assessment of receptors located within 200m of a road link that experiences the following changes in traffic flows due to the Proposed Development:

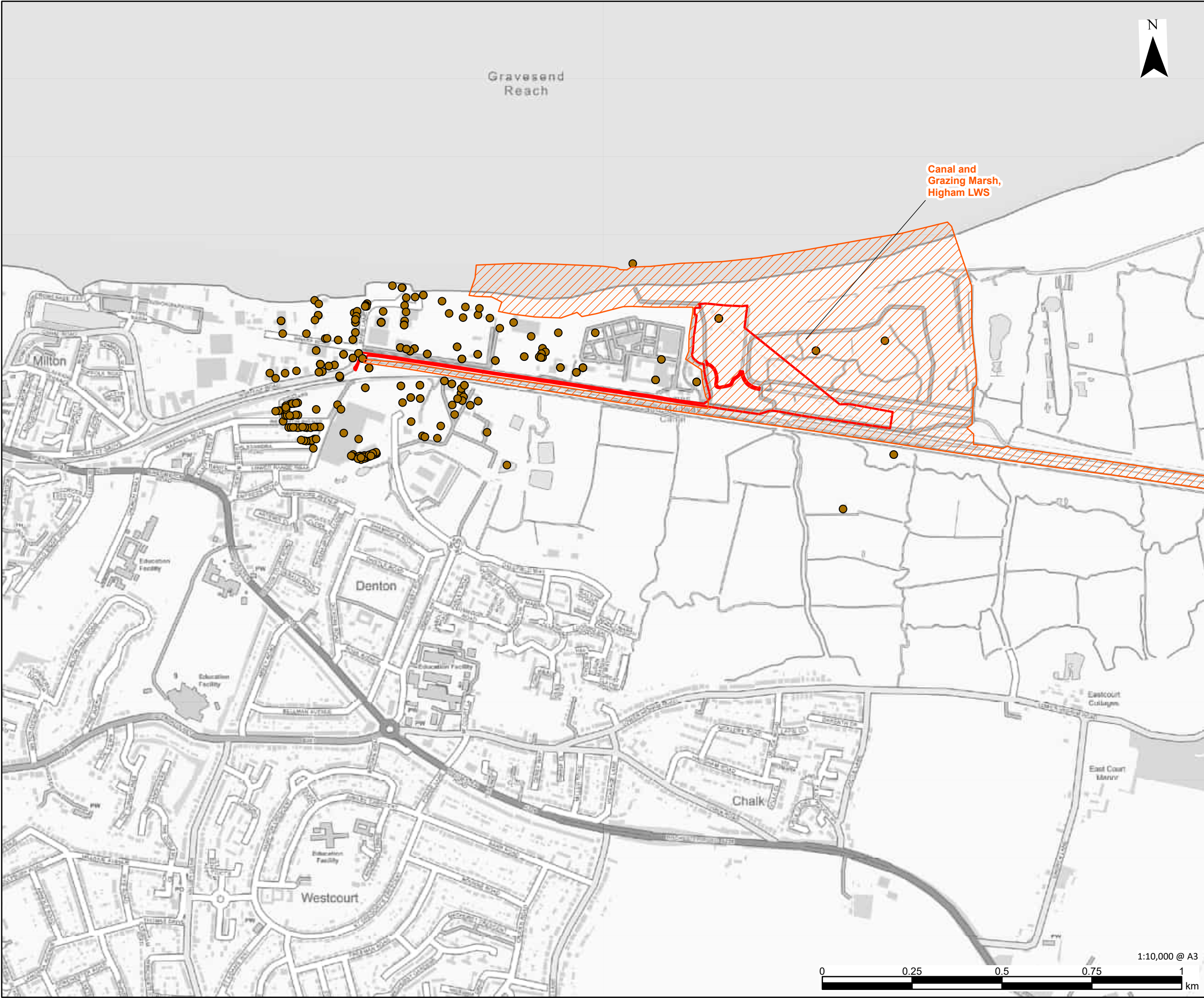
- A change in 2-way Annual Average Daily Traffic (24-hour AADT) Light Duty Vehicle (LDV) (vehicles with a weight of <3.5t) movements of 100 more on roads within or adjacent to an AQMA;
- A change in 2-way 24-hour AADT LDV movements of 500 more on roads not within or adjacent to an AQMA;
- A change in 2-way 24-hour AADT HDV movements of 25 more on roads within or adjacent to an AQMA; and
- A change in 2-way 24-hour AADT HDV movements of 100 more on roads not within or adjacent to an AQMA.

Sensitive Receptors

20.3.4 Air quality sensitive receptors that relate to impacts from construction dust emissions include those located within the study area described above that are sensitive to dust and harm to amenity (e.g. residential properties, commercial property and public spaces), those sensitive to the potential for harm to human health (e.g. residential properties, schools and medical facilities with overnight wards), and sensitive nature conservation sites (e.g. Local Wildlife Site (LWS), Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC) and Special Protection Areas (SPA)).

20.3.5 Air quality sensitive receptors that relate to impacts from construction phase road traffic and generator emissions include those located within the study area defined above that are sensitive to the potential for harm to human health (e.g. residential properties, schools and medical facilities with overnight wards), and sensitive nature conservation sites (e.g. LWS, NR, SSSI, SAC and SPA).

20.3.6 The air quality assessment described in this chapter does not report the impact of emissions from the construction of the Proposed Development on all receptors within the study area. Instead, impacts are quantified at selected receptors, with each receptor representing the impact at other receptors located in their vicinity. The selected receptors that are reported in this chapter include those that experience the worst-case air quality impact as a result of the Proposed Development's construction. Refer to Figure 20-1.



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LEGEND

- Red Line Boundary (Above Ground)
- Construction Dust Receptors
- Local Wildlife Site

NOTES

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ISSUE PURPOSE
Environmental Statement

PROJECT NUMBER
60677311

FIGURE TITLE
Air Quality Study Area

FIGURE NUMBER
Figure 20.1

Assessment Scope and Methodology

Aspects scoped into the assessment

20.3.7 The scope of the assessment considered in this chapter of the ES is as follows:

- Construction phase dust assessment in line with Institute of Air Quality Management (IAQM) guidance (Ref 20-16);
- Construction phase site plant and non-road mobile machinery (NRMM) emissions assessment in line with IAQM guidance (Ref 20-16); and
- Construction phase emissions from onsite power generation, to meet the energy demand of the tunnel boring machines.

Aspects scoped out of the assessment

20.3.8 No aspects have been formally scoped out of this assessment.

20.3.9 Operational emissions have been screened out of the assessment. It is anticipated that during the operational phase, sources of emissions to air are limited to maintenance vehicles and small plant and their usage on site would be minimal. It is considered that such small and intermittent sources of emissions to air quality would not be capable of contribution to a significant effect .

20.3.10 The level of detail of the assessment has been formulated to account for the proportionality of the risk associated with each emission source and the potential for a significant effect to occur.

20.4 Assessment Methodology

20.4.1 The method of assessment for each source of emissions to air considered in this assessment is described in the following sections.

Impact Assessment

Construction Dust

20.4.2 The impacts associated with the Proposed Development's construction phase dust emissions have been qualitatively assessed following the approach set out in the IAQM guidance on the Assessment of Dust from Demolition and Construction (Ref 20-14).

20.4.3 According to the IAQM, the main dust impacts that may arise during demolition and construction activities are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions; and
- Elevated PM₁₀ concentrations resultant of dust generating activities on site.

20.4.4 Activities on construction sites are classified into four types to reflect their different potential impacts:

- Demolition;
- Earthworks;
- Construction (erection of buildings and structures); and

- Track-out (the deposition of material onto the public road network by construction vehicles leaving site).

20.4.5 The following steps, as defined by the IAQM, were followed as part of the construction dust assessment:

- Step 1: Screen the need for a detailed assessment. Human and ecological receptors were identified and distance to the project and construction routes were determined;
- Step 2: Assess the risk of dust impacts arising. The potential risk of dust impacts occurring for each activity was determined, based on the magnitude of the potential dust emissions and the sensitivity of the area;
- Step 3: Identify the need for site-specific mitigation. Based on the risk of impacts occurring, site specific mitigation measures were determined; and
- Step 4: Define impacts and their significance. The significance of the potential residual dust impacts (taking mitigation into account) for each activity was determined.

20.4.6 The full construction dust assessment methodology is set out in ES Volume VI Appendix 12-1, including how the impact magnitude is and sensitivity of the study area are determined.

Site Plant and Non-Road Mobile Machinery

20.4.7 Emissions from construction-related Non-Road Mobile Machinery (NRMM) and site plant (not including the generators required to power the tunnel boring equipment) will have the potential to increase NO₂, PM₁₀ and PM_{2.5} concentrations at locations close to working areas of the site.

20.4.8 IAQM construction dust guidance states, on page 9, that: *“Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed.”*

20.4.9 The assessment of potential emissions from NRMM and site plant is, therefore, qualitative in nature and focuses on the justification as to why impacts from this source can be mitigated to ensure any effect is not significant.

Construction Traffic Emissions

20.4.10 Road traffic emissions can increase public exposure to the pollutants most associated with vehicle exhausts, notably NO_x and particulate matter (PM₁₀ and PM_{2.5}), and the pollutants associated with brake-pad and tyre wear, namely particulate matter (PM₁₀ and PM_{2.5}).

20.4.11 Traffic data for the roads most affected by the construction of the Proposed Development has been provided by the Project Transport Consultant, including data for road links on the approach to and from the Proposed Development site.

20.4.12 Construction phase traffic emissions can be considered in a qualitative or quantitative manner, subject to the traffic impact expected and how that compares to relevant screening criteria set out in the IAQM/EPUK guidance. The purpose of the screening criteria is to identify whether detailed assessment of road traffic emissions may be required to determine the significance of effect. If traffic movements fall below the screening criteria, it is considered that there is no need to undertake a detailed assessment and there is no potential for a significant effect to occur. If data exceeds the criteria, then further consideration is required to determine if a significant air quality effect is possible, which may require detailed modelling. The IAQM/EPUK screening criteria against which traffic data has been considered is set out in Table 20-6.

Table 20-6: Screening criteria for Detailed Air Quality Assessment of Road Traffic Emissions

Nature of Impact	Screening criteria for Detailed Air Quality Assessment
Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors (LDV = cars and small vans <3.5t gross vehicle weight).	A change of LDV flows of: • more than 100 Annual Average Daily (AADT) within or adjacent to an AQMA • more than 500 AADT elsewhere.
Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: • more than 25 AADT within or adjacent to an AQMA; or • more than 100 AADT elsewhere.
Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA.
Introduce a new junction or remove an existing junction near to relevant receptors.	The introduction of a new junction or removal of a junction will lead to a detailed air quality assessment when this addition or removal causes traffic to significantly change vehicle acceleration or deceleration, for example, traffic lights, or roundabouts.
Introduce or change a bus station.	Where bus flows will change by: • more than 25 AADT within or adjacent to an AQMA; or • more than 100 AADT elsewhere.
Introduce or change a bus station.	Where bus flows will change by: • more than 25 AADT within or adjacent to an AQMA; or • more than 100 AADT elsewhere.

Note: Taken from IAQM guidance Land-Use Planning and Development Control: Planning for Air Quality.

Significance Criteria

Construction Dust

20.4.13 For amenity effects from coarser dust ($>PM_{10}$), the aim of the IAQM construction dust guidance method is to bring forward a scheme, including mitigation measures as necessary, that would control impacts so that they give rise to negligible or minor effects (at worst) at the closest sensitive receptors. Measures that reduce dust emissions will also reduce emissions of finer particles (PM_{10} and $PM_{2.5}$). Determination of whether an effect is likely to be significant or not is based on professional judgement (from experience of similar projects), taking account of whether effects are permanent or temporary, direct or indirect, constant or intermittent and whether any secondary effects are caused (in this instance, 'secondary effects' refers to dust that is generated and deposited (primary impact) and then re-suspended and deposited again by further activity).

20.4.14 The classification of dust soiling (amenity), health and ecology effects on receptors exposed to impacts has been assessed using the relationship between the magnitude of impact identified, in combination with overall receptor sensitivity and other related factors where appropriate (as described in the IAQM construction dust guidance and ES Volume VI Appendix 12-1 of this ES, which results in a classification of effects as defined in Table 20-7.

Table 20-7: Construction Dust Impact Descriptors and Effects

Effect	Change in Dust Deposition Rate and Short-term PM ₁₀ Concentrations	Significance
Major	Impact is likely to be intolerable for any more than a very brief period of time and is very likely to cause complaints from local people. Increase in PM ₁₀ concentrations at a location where concentrations are already elevated and to the extent that the short term PM ₁₀ air quality objective is likely to be exceeded. Deposition impact likely to harm habitat within a designated nature conservation area of international importance	A significant effect that is likely to be a material consideration in its own right.
Moderate	Impact is likely to cause annoyance and might cause complaints but may be tolerated if short-term and prior warning and explanation has been given. Increase in PM ₁₀ concentrations at a location where concentrations are already elevated and to the extent that the short term PM ₁₀ air quality objective is at risk of being exceeded. Deposition impact likely to harm habitat within a designated nature conservation area of national importance.	A significant effect that may be a material consideration in combination with other significant effects, but is unlikely to be a material consideration in its own right.
Minor	Impact may be perceptible, but of a magnitude or frequency that is unlikely to cause annoyance to a reasonable person or to cause complaints. Limited increase in PM ₁₀ concentrations. Deposition impact likely to harm habitat within a designated nature conservation area of local importance.	An effect that is not significant but that may be of local concern.
Negligible	Impact is unlikely to be noticed by and/or have an effect on sensitive receptors. Imperceptible increase in PM ₁₀ concentrations and deposition.	An effect that is not significant.

Construction Phase Road Traffic and Generator Emissions

20.4.15 For local air quality impacts from combustion emissions associated with construction traffic and generator emissions, the significance of local air quality effects is determined in line with IAQM/EPUK air quality planning guidance. This approach does not define a graduating scale of human health receptor sensitivity. Instead, human health receptors are considered either sensitive or not, depending on the period of time for which they are exposed to emissions. The absolute magnitude of change in pollutant concentrations between the baseline and assessment scenarios, relative to the air quality objective value, is described and this is used to consider the risk of those objectives being exceeded.

20.4.16 For a change in annual mean concentrations of the pollutants considered, of a given magnitude, the IAQM/EPUK guidance provides recommendations for describing the effects of such impacts at individual receptors, as set out in Table 20-8.

Table 20-8: Impact Descriptors at Individual Receptors – Annual Mean NO₂, PM₁₀ and PM_{2.5}

Annual Mean Concentrations at Receptor in Assessment Year (% of air quality objective)	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)				
	<1 % ¹	1 % ²	2-5% ³	6-10 % ⁴	> 10% ⁵
≤ 75%	Negligible	Negligible	Negligible	Slight	Moderate
76 % - 94 %	Negligible	Negligible	Slight	Moderate	Moderate
95 % - 102%	Slight	Slight	Moderate	Moderate	Substantial
103 % - 109 %	Moderate	Moderate	Moderate	Substantial	Substantial
≥ 110%	Moderate	Moderate	Substantial	Substantial	Substantial
¹ Imperceptible; ² Very low; ³ Low; ⁴ Medium; ⁵ Large					

- 20.4.17 The IAQM/EPUK guidance states that the descriptors are for individual receptors only and that overall significance is determined using professional judgement. It also states that 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 objective value. 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 objective value, rather than being exactly equal to it.
- 20.4.18 A change in predicted long-term (annual mean) concentrations of less than 0.5% of an air quality objective is considered to be 'Imperceptible'. An impact that is 'Negligible', given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant.
- 20.4.19 The guidance suggests the potential for 'Low' air quality impacts arises as a result of changes in pollutant concentrations between 2% and 5% of relevant air quality objective. For example, for annual mean NO₂ and PM₁₀ concentrations, this relates to changes in concentrations ranging from 0.6 – 2.1 µg/m³. In practice, changes in concentration at the lower end of this magnitude band are likely to be very difficult to distinguish from the inter-annual effects of varying meteorological conditions and are therefore not considered likely to be capable of having a direct effect on local air quality that could be considered to be significant.
- 20.4.20 Changes in concentration of more than 5% are considered to be of a magnitude which is far more likely to be discernible above the normal variation in baseline conditions and, as such, carry additional weight within the overall evaluation of significance for air quality. 'Moderate' impacts do not necessarily constitute a significant effect, where they do not contribute to an exceedance or risk of an exceedance of an air quality objective, particularly where such impacts relate to a small minority of receptors when the majority experience lesser impacts. A 'Substantial' impact will almost certainly constitute a significant effect that will require additional mitigation to address.
- 20.4.21 The IAQM/EPUK air quality planning guidance also provide thresholds for determining whether short-term (air quality objectives with an averaging period of less than a year) impacts on human health sensitive receptors have the potential to cause a significant effect or not. The guidance indicates that severity of peak short-term concentrations can be described without the need to reference background concentrations as the source contribution is used to measure impact, not the overall short-term concentration at the receptor. The guidance suggests the following criteria to determine the impact of peak short-term source contributions:

- a) Source contributions ≤ 10 % of the air quality objective represents an Imperceptible impact that is 'Negligible'.
- b) Source contributions between 11-20 % of the air quality objective is Small in magnitude, representing a 'Slight' impact.
- c) Source contributions between 21-50 % of the air quality objective is Medium in magnitude, representing a 'Moderate' impact.
- d) Source contributions ≥ 51 % of the air quality objective is Large in magnitude, representing a 'Substantial' impact.

20.4.22 In addition to the short-term criteria provided by the IAQM/EPUK, the magnitude of the change in the predicted number of exceedances of the short-term 24-hour PM₁₀ objective can be directly derived from the predicted annual average PM₁₀ value using the relationship defined in LAQM.TG (22) (Ref 20-14 Ref 20-14 (Institute of Air Quality Management (IAQM), 2023), Guidance on the assessment of dust from demolition and construction. Accessed: 30/08/23. Available at: <https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-dust-2023-BG-v6-amendments.pdf>). An exceedance of the short-term PM₁₀ air quality objective is unlikely where annual mean PM₁₀ concentrations are less than 32 µg/m³. Likewise, research projects completed on behalf of Defra and the Devolved Administrations (Ref 20-20 and Ref 20-22) have concluded that the short-term 1-hour NO₂ objective is unlikely to be exceeded where annual mean concentrations are predicted to be less than 60 µg/m³.

20.4.23 For impacts at nature conservation receptors, whether the effect is significant or not is determined by a competent expert in ecology and is described in ES Volume IV Chapter 15: Ecology – Gravesend. To inform this judgement, National Highways guidance (

20.4.24 Ref 20-19 Department for Environment Food & Rural Affairs (2022). Local Air Quality Management Technical Guidance (TG22). Available at: <https://iaqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf>

Ref 20-20 AEA Technology. (2008). Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedances of the 1-hour mean AQS Objective.

Ref 20-21 Gravesham Borough Council (2022). Annual Status Report. Available at: <https://kentair.org.uk/report/gravesham-borough-council-annual-status-report-2022>

Ref 20-22 Laxen and Marner (2003), Analysis of the Relationship Between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites

Ref 20-23 (*Highways England, Transport Scotland, Welsh Government and Department for Infrastructure, 2019*). Design Manual for Roads and Bridges (DMRB): LA 105 Air quality. Accessed: 30/08/23. Available at: <https://www.standardsforhighways.co.uk/tses/attachments/10191621-07df-44a3-892e-c1d5c7a28d90?inline=true>

Ref 20-24 (Natural England, 2018). Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations.

Ref 20-25 (B Cornelius, 2022). Maps, KML and GPX showing rights of way. Accessed: 19/09/23. Available at: <https://www.rowmaps.com/>

20.4.25 Ref 20-26 (South Downs Environmental Consultants, 2023). Baker Hicks Ltd National Grid Thames Tunnel 400KV, Gravesend, Kent / Tilbury, Essex: Baseline Air Quality Monitoring Report (Draft)), Natural England guidance (Ref 20-24) and Environment Agency guidance (Ref 20-17) both state that impacts may be considered insignificant ('not significant') where

the impact of a scheme or project alone is less than 1% of the long-term air quality objective or environmental assessment level for the nature conservation site. Natural England guidance (Ref 20-24) also refers to 1% as a screening threshold.

20.4.26 Where the long-term impact at a nature conservation receptor exceeds these criteria, it may also be considered insignificant ('not significant') where the long-term total concentration or deposition rate remains below the relevant environmental assessment level for the nature conservation site.

Assumptions and Limitations

20.4.27 The assessment has been undertaken based on the following assumptions:

- The traffic data reported in this chapter is subject to the uncertainties inherent in the production of such data, as described in the Outline Construction Traffic Management Plan (ES Volume VI Appendix 10.1);
- The consideration of baseline and background air quality conditions relies on secondary data gathered and published by the Local Planning Authorities and Defra. It is assumed that the data made available by these sources has been gathered appropriately and reported accurately;
- Receptors have been identified and counted using the AddressBase dataset and the "rowmaps" website (Ref 20-25). It is assumed that the data within these sources are an accurate reflection of land use within the study area; and
- Dispersion modelling is subject to inherent uncertainties associated with required data input assumptions. These are:
 - The assumption that the generators to be used on site are reasonably represented by the MTU 20V4000 DS3600 diesel-fired generator plant;
 - The assumption that the diesel generators will have a gas exit velocity of around 35 m/s;
 - The assumption that meteorological data from Gatwick Airport adequately represents meteorological conditions within the study area. This was selected as the local authorities in the study area used this data, with sites nearer to the study area either having poor data capture or not being representative of the landscape; and
 - The uncertainty in annual meteorological data due to interannual variation. This is partially addressed by modelling 5-years of meteorological data and reporting the worst-case impact at each receptor over the 5-year period.

Desk Study

20.4.28 The desk study is a review of all existing publicly available air quality information and data relevant to the sites, including:

- Background pollutant concentration data obtained from Defra;
- AddressBase data obtained from 'emapsite.com';
- Publicly available aerial photography; and
- Local authority air quality monitoring reports made available Gravesham Borough Council.

Survey

20.4.29 A survey was commissioned by the applicant to establish baseline conditions at the site. The survey sample NO₂, PM₁₀ and PM_{2.5} concentrations over a 3-month period, at the location of

both Tilbury and Gravesend construction sites. This data has been used to supplement the existing air quality data relied upon for this assessment.

20.4.30 The assessment of construction dust impacts will determine the level of construction phase dust monitoring that is required, should the works be commissioned.

20.5 Consultation

20.5.1 On 22 September 2023, an email was sent to Thurrock Council and Gravesham Borough Council containing the proposed scope of the air quality assessment, requesting comment and agreement. .

20.5.2 Gravesham Borough Council provided the following scoping response on the 13 November 2023:

"It is agreed that only construction impacts require assessment and that there will be no impact on air quality from the operational phase once the proposal is completed. In terms of assessing the air quality impact of the construction phase, the proposed methodology is fine and reference has been made to the appropriate guidance documents.

Any impact of any construction traffic movement that are routed via/through the various AQMA's within the district must be assessed. It should be noted that the Northfleet AQMA has been declared for exceedances of PM₁₀ as opposed to NO₂. Due to the project's location, it is unlikely that traffic will go via this route, but this needs to be checked just in case.

It's noted that the proposal includes movement of spoil from the site via barge. It's assumed that the loading will take place adjacent to the site, but again, if it involves movement by lorry to another point on the Thames, the impact of the lorry movements needs to be considered".

20.5.3 It should be noted that barge movements are only applicable to the Tilbury site, and that HGVs will not be routed through the Northfleet AQMA.

20.6 Baseline Environment

Local Air Quality Management

20.6.1 Under the requirements of the Environment Act, Local Authorities have a duty to review and assess local air quality within their administrative areas. Where Local Authorities identify locations that exceed an air quality objective, where there is sensitive exposure, they are required to declare an Air Quality Management Area (AQMA) and publish an Air Quality Action Plan (AQAP), setting out how emissions will be reduced and improving air quality at these locations.

20.6.2 This section sets out the recent review and assessment of local air quality undertaken by Thurrock and Gravesham Councils. For Gravesham Borough Council (GBC), this refers to their 2023 Annual Status Report, containing monitoring data from 2022 (Ref 20-21).

20.6.3 In 2022, there were three AQMAs located in Gravesend, near the southern construction site. These AQMAs have been declared by GBC due to exceedances of the annual mean NO₂ or PM₁₀ air quality objective:

- Northfleet Industrial Area AQMA (Declared 2005 due to elevated PM₁₀);
- Gravesham A226 One Way System AQMA (Declared 2005 due to elevated NO₂); and
- A227/B621 Wrotham Road/Old Road West Junction AQMA (Declared 2005 due to elevated NO₂).

20.6.4 In 2022, GBC undertook non-automatic monitoring of NO₂ at over 70 sites, with a number of these situated within the above AQMAs. GBC also undertook automatic monitoring of NO₂ at two sites in 2022, with both of these situated within one of the AQMAs. Table 20-9: and Table 20-10: contain the GBC non-automatic and automatic NO₂ monitoring data from 2018 to 2022 within the AQMAs.

20.6.5 Pre-COVID pandemic, in 2019, annual mean concentrations of NO₂ peaked at 46.1 µg/m³, at site GR13, within the “Gravesham A226 One Way System” AQMA. During the pandemic, in 2020, NO₂ concentrations fell to a maximum of 38.2 µg/m³, at site GR31, within the “Gravesham A226 One Way System” AQMA. The 2023 Annual Status Report shows that the maximum NO₂ concentration in 2021 increased slightly to 41.2 µg/m³, remaining relatively stable at 37.6 µg/m³ in 2022 (both at site GR13), suggesting that NO₂ concentrations within the AQMAs near Gravesend are reasonably stable.

Table 20-9: Gravesham Borough Council Non-Automatic NO₂ Monitoring Data within AQMAs

Site ID	OS Grid Ref (X,Y)	AQMA	Site Type	Annual Mean Concentration (µg/m ³)				
				2018	2019	2020*	2021*	2022
GR13	564696, 174431	Gravesham A226 One Way System AQMA	Roadside	47.1	46.1	38.0	41.2	37.6
GR24	565128, 174049	Gravesham A226 One Way System AQMA	Roadside	45.4	42.7	36.7	40.0	35.0
GR31	565052, 174149	Gravesham A226 One Way System AQMA	Roadside	42.9	43.7	38.2	37.4	34.0
GR39	564730, 174030	Gravesham A226 One Way System AQMA	Roadside	35.8	35.0	28.3	31.0	29.3
GR40	564486, 174095	Gravesham A226 One Way System AQMA	Roadside	45.2	43.4	35.0	38.3	35.3
GR47	565043, 174173	Gravesham A226 One Way System AQMA	Roadside	45.4	42.9	36.3	41.0	35.0
GR58	565166, 174036	Gravesham A226 One Way System AQMA	Roadside	37.6	38.0	31.2	33.0	31.6
GR61	564429, 174152	Gravesham A226 One Way System AQMA	Roadside	35.5	35.1	27.7	30.7	30.2
GR128	564727, 174002	Gravesham A226 One Way System AQMA	Roadside	30.9	31.8	26.0	29.6	26.0
GR140	564955, 174098	Gravesham A226 One Way System AQMA	Roadside	38.1	38.5	33.7	34.2	30.8
GR57	564472, 173158	Gravesham A227 Wrotham Road/Old Road West AQMA	Roadside	38.4	40.2	31.1	33.7	31.7

Site ID	OS Grid Ref (X,Y)	AQMA	Site Type	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)				
				2018	2019	2020*	2021*	2022
GR59	564530, 173171	Gravesham A227 Wrotham Road/Old Road West AQMA	Roadside	39.5	37.7	30.2	32.4	28.7
GR124	561338, 174925	Northfleet Industrial Area AQMA	Roadside	30.4	31.0	29.0	27.6	27.7

Values in bold indicate an exceedance of the AQ annual mean objective of $40 \mu\text{g}/\text{m}^3$;

*NO₂ concentrations in 2020 and 2021 are likely to have been influenced by Covid-19 lockdowns.

Table 20-10: Gravesham Borough Council Automatic NO₂ Monitoring Data within AQMAs

Site ID	OS Grid Ref (X,Y)	AQMA	Site Type	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)				
				2018	2019	2020*	2021*	2022
ZG3	562155, 174360	Northfleet Industrial Area AQMA	Industrial	23.5	24.5	22.0	21.0	18.2

Values in bold indicate an exceedance of the AQ annual mean objective of $40 \mu\text{g}/\text{m}^3$; Values underlined indicate a concentration higher than $60 \mu\text{g}/\text{m}^3$. Where concentrations are higher than $60 \mu\text{g}/\text{m}^3$ there is a risk that the 1-hour NO₂ objective may be exceeded.

*NO₂ concentrations in 2020 and 2021 are likely to have been influenced by Covid-19 lockdowns.

Project-Specific Monitoring

- 20.6.6 Monitoring of NO₂, PM₁₀ and PM_{2.5} has been undertaken within the red line boundary at Gravesend (Ref 20-26). This was undertaken for a period of 3 months, between the 18th of April and 24th of July 2023, using Turnkey Osiris monitors (for PM₁₀ and PM_{2.5}) and diffusion tubes (for NO₂). The results are summarised in Table 20-11.

Table 20-11: Project-Specific Monitoring at Gravesend Construction Site

Statistic	Gravesend Site		
	PM ₁₀	PM _{2.5}	NO ₂
Max 15-minute mean concentration ($\mu\text{g}/\text{m}^3$)	238	21	-
Max 24-hour mean concentration ($\mu\text{g}/\text{m}^3$)	18	13	-
3-month mean ($\mu\text{g}/\text{m}^3$)	7.3	4.5	11.3
Annualised and bias adjusted annual mean concentration ($\mu\text{g}/\text{m}^3$) – Gravesend Substation	-	-	10.0

- 20.6.7 The 24-hour mean PM₁₀ and PM_{2.5} concentrations given in Table 20-11 are only representative of the averaging periods presented over the course of the 3-month monitoring period, rather than across a full year. However, based on the max 24 hour and 3-month period mean values presented, annual and daily mean PM₁₀ and annual mean PM_{2.5} concentrations

are likely to be well below the respective air quality objective values for those pollutants. The elevated max 15-minute concentrations reported are not unusual when monitoring particulates and likely represent spikes in the monitoring data due short-term emissions events occurring close to the particulate monitors during the survey.

- 20.6.8 Annual mean concentrations of NO₂, following annualisation – the process of projecting a 3-month mean concentration into an annual mean concentration – at both substations were well below the relevant air quality objective value (40 µg/m³).

DEFRA Background Pollutant Concentration Data

- 20.6.9 The UK-AIR website, hosted by Defra, provides data for background concentrations for the pollutants harmful to human health, including NO_x, NO₂, PM₁₀ and PM_{2.5}. These background concentrations represent conditions across each 1 km² grid square across the UK. Table 20-12: summarises the estimated background concentrations for the five grid squares surrounding the Tilbury and Gravesend sites.
- 20.6.10 The Air Pollution Information System (APIS), maintained by the UK Centre for Hydrology and Ecology, provides background pollutant concentrations for pollutants harmful to sensitive habitat, provides background data for nitrogen deposition, for the majority of 1 km² across the UK. The most recent values presented by APIS, used to represent existing baseline conditions for that pollutant, are given for the nearest grid square to the two construction sites for which data is available.

Table 20-12: DEFRA Background Pollutant Concentrations and APIS Background Nitrogen Deposition for Grid Squares Surrounding Gravesend Site (2023)

OS Grid Reference for Grid Cell (x,y)	Annual Mean Concentration (µg/m ³)				Annual Deposition Rate (kgN/ha/yr)
	NO ₂	NO _x	PM ₁₀	PM _{2.5}	
567500, 174500	25.9	41.7	13.9	9.5	13.4
567500, 173500	15.4	21.5	14.8	9.9	

20.7 Key Parameters for Assessment

- 20.7.1 A detailed description of the Proposed Development is provided in ES Volume II Chapter 3 - Project Description. The following aspects of the Proposed Development relevant to this chapter comprise:
- The site preparation and construction works, especially:
 - Dust generated by vegetation clearance and removal of top soil;
 - PM₁₀ emissions generated by vegetation clearance and removal of top soil;
 - NO_x, PM₁₀ and PM_{2.5} emissions from construction phase traffic; and
 - Emissions associated with the on-site generators used to supply the energy required for high energy demand construction activities such as shaft sinking and tunnelling.

20.8 Mitigation

Embedded Mitigation

Construction Dust and Site Emissions

20.8.1 The construction phase assessment reported in section 12.10 has identified the level of mitigation required to reduce impacts to the extent that any effect is not significant. The identification of mitigation presents Step 3 of the IAQM construction dust guidance.

20.8.2 The construction dust mitigation measures are included here as embedded mitigation. This section summarises the mitigation measures that will be required to mitigate against the effects on local air quality.

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site
- 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.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), 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 as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM10 continuous monitoring and/or visual inspections.
- 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.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.
- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency 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.
- Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.

- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.
- 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.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- 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.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Avoid bonfires and burning of waste materials.
- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.
- Avoid scabbling (roughening of concrete surfaces) if possible.
- 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.

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Construction Vehicle Emissions

- 20.8.3 An Outline Construction Traffic Management Plan (ES Volume VI Appendix 10.1) has been produced with the intention of mitigating traffic impacts on the local road network. Good traffic management will have a positive impact on vehicle emissions, by avoiding congested routes and congested periods of the day; and
- 20.8.4 It is National Grid's intention to reduce additional traffic movements as far as reasonably practical. The spoil generated by the tunnelling works will be removed from the Tilbury construction site by barge, from either an existing jetty to the southeast of the main construction worksite, or via a berth at the Port of Tilbury. This means traffic movements are significantly less on the Gravesend side thus reducing the impact of construction traffic movements on the local road network and through the nearby AQMA.

Additional Mitigation

- 20.8.5 Beyond the embedded mitigation described above, it has been determined that no additional mitigation will be required.

20.9 Potential Impacts and Assessment of Effects

Introduction

20.9.1 This section contains an assessment of the potential impacts to air quality during the construction phase of the Proposed Development. The following sources of emissions have been considered:

- Construction dust emissions;
- Site plant and non-road mobile machinery (NRMM) emissions;
- Construction traffic emissions; and
- Emissions from diesel-fired generators that may be required to meet the energy demand of the tunnel boring equipment.

Construction Dust Emissions

20.9.2 As described in ES Volume VI Appendix 12.1, the construction dust and particulate matter assessment follows the step-by-step approach set out in relevant IAQM guidance (Ref 20-16). This process is summarised in the sub-sections below.

20.9.3 The construction dust and particulate matter assessment has been carried out for the sites in Gravesend.

Step 1: Screen the requirements for a detailed assessment

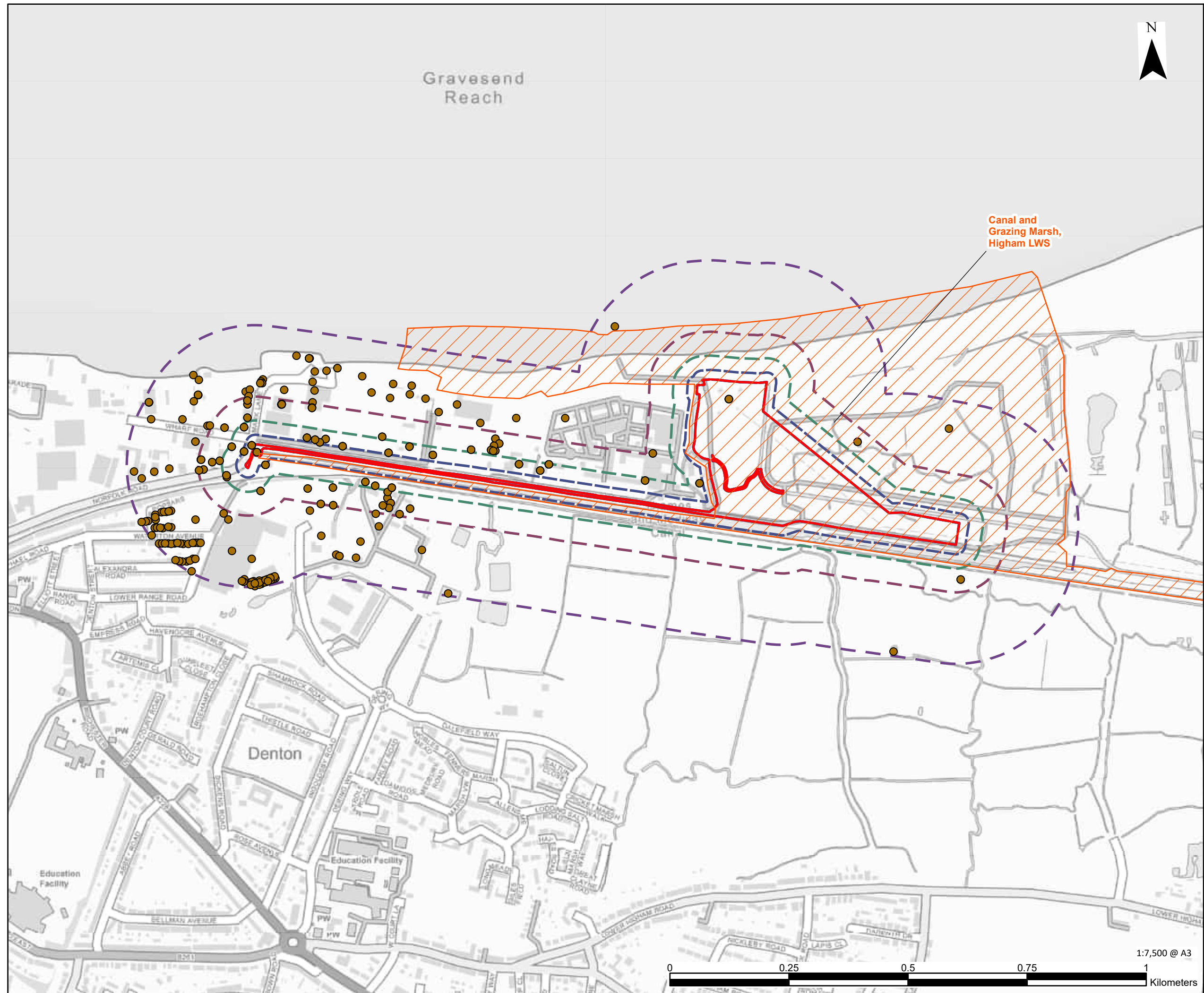
20.9.4 Step 1 of the IAQM construction dust guidance is to screen the requirement for a more detailed assessment. According to the guidance, no further assessment is required if there are no receptors within a specified distance of the works. The screening distances set by the IAQM guidance are:

- Receptors sensitive to amenity and human health impacts within 250 m of the construction site boundary and/or within 50 m of a public road used by construction traffic that is within 250 m of the site entrance; and
- Nature conservation receptors located within 50 m of the construction site boundary and/or within 50 m of a public road used by construction traffic that is within 250 m of the site entrance.

20.9.5 These screening distances are shown on Figure 20-2. Table 20-13 and Table 20-14 provide details of the receptors within 250 m of the red line boundary, which are sensitive to dust soiling and human health effects.

20.9.6 The Eastcourt Marshes Electricity Substation in Gravesend has been assigned a medium sensitivity to dust soiling and human health impacts, based on the assumption that this site will house sensitive equipment/apparatus, as well as being an occasional place of work.

20.9.7 There is also a National Maritime Training Centre and a Metropolitan Police Training Centre within 250 m of the red line boundary. These have both been assigned medium sensitivities to dust soiling and human health impacts. There is potential for dust soiling of the properties at these sites, and the presence of people and their vehicles mean that there is also potential for construction dust to harm their amenities, as well as their health.



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LEGEND

-  Red Line Boundary (Above Ground)
-  20m Buffer From Boundary
-  50m Buffer From Boundary
-  100m Buffer From Boundary
-  250m Buffer From Boundary
-  Construction Dust Receptors
-  Local Wildlife Site

FIGURE NUMBER
Figure 20.2

Table 20-13: Receptors sensitive to dust soiling within 250 m of the red line boundary

Site	Receptor Sensitivity	Number of Receptors
Gravesend	High	48
	Medium	
	Low	48

Table 20-14: Receptors sensitive to human health effects from PM₁₀ within 250 m of the red line boundary

Site	Receptor Sensitivity	Number of Receptors
Gravesend	High	48
	Medium	55
	Low	48

20.9.8 Table 20-15 provides details of the receptors within 250 m of the red line boundary, which are sensitive to ecological impacts.

20.9.9 Within 20 m of the red line boundary, there is the Canal and Grazing Marsh, Higham Local Wildlife Site, which is designated as having low sensitivities, in line with IAQM construction dust guidance.

Table 20-15: Receptors sensitive to ecological impacts within 250 m of the red line boundary

Site	Receptor Sensitivity	Number of Receptors
Gravesend	High	0
	Medium	1
	Low	1

Step 2: Assess the Risk of Dust Impacts

Step 2A: Determine the Dust Emissions Magnitude

20.9.10 Step 2A requires the determination of the dust emission magnitude, as set out in ES Volume VI Appendix 12.1, which the guidance states is based on the anticipated works in the following activities: demolition; earthworks, construction (i.e. the building and erection of structures); and trackout (the deposition of dust and particulate matter onto public roads by construction vehicles), and should be classified as Small, Medium or Large.

20.9.11 Construction activities associated with the Proposed Development at Gravesend a new sealing end compound (SEC) including a new tunnel headhouse and overhead line modifications, alongside the construction of the new cable shaft and tunnel driven from the Tilbury side. A full description of the construction works is provided in ES Volume II Chapter 3: Project Description.

Demolition

- 20.9.12 Demolition activities associated with the Proposed Development at Gravesend is limited to the dismantling and removal of existing terminal pylon at the existing Gravesend site using cranes. Gas torches or a hydraulic shearer mounted on a 360-degree excavator will then be used to break up the pylon into small sections and load into skips for re-use or recycling. This will be undertaken as the final phase of the project in 2028.
- 20.9.13 It should be noted that the decommissioning of the existing tunnel and associated infrastructure does not form part of this project.
- 20.9.14 In light of the above, and in line with the IAQM construction dust guidance criteria (as summarised in ES Volume VI Appendix 12-1), the dust emission magnitude for the proposed demolition works is **Small**.

Earthworks

- 20.9.15 Earthworks will be required to facilitate and enable works at the Gravesend construction site. The IAQM construction dust guidance assigns a dust emission magnitude for earthworks based on a number of criteria, including the area of the construction site, the nature of materials being handled and the number of earthmoving vehicles required.
- 20.9.16 The individual area of the Gravesend construction site is approximately 84,000m² which, according to the IAQM guidance, falls within the medium dust emissions magnitude.
- 20.9.17 At the Gravesend construction site, approximately 12,850 m³ of spoil will be generated by the construction of the shaft only and, as such, there will be the need for fewer earthmoving vehicles than at Tilbury.
- 20.9.18 In light of the above, and in line with the IAQM construction dust guidance criteria, an earthworks dust emission magnitude of **medium** has been assumed for the Gravesend construction site.

Construction

- 20.9.19 The IAQM construction dust guidance assigns a dust emission magnitude for construction based on a number of criteria, including the volume of buildings and structures to be put up, the potential dustiness of the construction materials and whether concrete batching will be required on site.
- 20.9.20 Above ground construction operations associated with the Proposed Development will comprise the construction of a new SECs containing a new tunnel shaft and headhouse at the Gravesend construction site.
- 20.9.21 Each SEC will accommodate:
- 12 new XLPE cables;
 - 12 new cable terminations (polymeric);
 - 12 new cable support steel structures with buried concrete foundations;
 - Concrete surface troughs for new cables;
 - 1 water tank for fire fighting purposes
 - 6 Surge Arresters for protection of underground cables;
 - 6 earth switches; and
 - Gravesend headhouse.

20.9.22 The headhouses will accommodate:

- Tunnel dampers room with access hatch for shaft hoist;
- Electric room; containing Low Voltage (LV) switch gear, communication panels, Motor Control Centre (MCC) panels;
- Tally Room;
- 110V Battery / Uninterruptible Power Supply Room;
- Shaft access via a staircase;
- Changing and shower room; and
- WC.

20.9.23 Based on the above, it is assumed that the total building volume of the above-ground structures outlined above will be less than 12,000 m³ at the Gravesend construction site. This value being the volume below which the dust emission magnitude is considered to be small (see Appendix 12-1).

20.9.24 It is also noted that the majority of construction material will be precast with low potential to generate emissions of dust.

20.9.25 In light of the above, and in line with the IAQM construction dust guidance criteria set out in Appendix 12-1, the dust emission magnitude for the proposed construction works is **small**.

Trackout

20.9.26 Trackout is associated with the deposition of mud and potentially dusty material onto the public network from construction vehicles leaving site.

20.9.27 The IAQM construction dust guidance defines the dust emissions magnitude of this activity based on the number of vehicle movements leaving the site and surface material of site roads.

20.9.28 On average, there is anticipated to be less than 20 outward construction-related HDV (all vehicles >3.5 tonnes) movements per day at the Gravesend construction site. However, peak daily movements may exceed that number on occasion. As such, the dust emission magnitude for trackout is assigned as **medium**.

Step 2B: Determine the Sensitivity of the Area

20.9.29 Step 2B of the IAQM construction dust guidance, as described in Volume VI Appendix 12.1, requires the determination of the sensitivity of the area to construction dust impacts. According to the guidance, this is based on the sensitivity of individual receptors, the number and proximity of those receptors to the construction site, background PM₁₀ concentrations and site-specific factors such as local terrain, meteorology and natural and existing windbreaks.

20.9.30 Table 20-16 summarises the distribution of receptors which are sensitive to effects from dust soiling impacts and Table 20-17 summarises the distribution of receptors which are sensitive to the human health effects of PM₁₀. Table 12-21 provides the same distribution but for nature conservation receptors.

Table 20-16: Distance distribution of receptors sensitive to dust soiling effects

Site	Receptor Sensitivity	Distance from Red Line Boundary			
		0-20m	20-50m (0-50m)	50-100m (0-100m)	100m-250m (0-250m)
Gravesend	High	0	0 (0)	1 (1)	47(48)
	Medium	2	10 (12)	10 (22)	33(55)
	Low	1	10 (11)	15(26)	22(48)

Table 20-17: Distance distribution of receptors sensitive to human health effects from PM₁₀

Site	Receptor Sensitivity	Distance from Red Line Boundary			
		0-20m	20-50m (0-50m)	50-100m (0-100m)	100m-250m (0-250m)
Gravesend	High	0	0 (0)	1 (1)	47(48)
	Medium	2	10(12)	10 (22)	33(55)
	Low	1	10(11)	15(26)	22(48)

Table 20-18: Distance distribution of receptors sensitive to ecological impacts

Site	Receptor Sensitivity	Distance from Red Line Boundary	
		0-20m	20-50m (0-50m)
Gravesend	High	0	0
	Medium	0	0
	Low	1	0 (1)

20.9.31 In Gravesend, there are 22 medium sensitivity amenity and human health receptors within 100 m of the red line boundary. There is also 2 medium and 1 low sensitivity receptor within 20 m of the red line boundary. In line with IAQM construction dust guidance, this equates to an area of **medium** sensitivity for dust soiling amenity impacts.

20.9.32 Background PM₁₀ concentrations at and around the site in Gravesend is provided in Table 20-12:. Data suggests that shows that background PM₁₀ concentrations around the sites in Gravesend are estimated to be below 24 µg/m³ level suggested by the IAQM construction dust guidance to determine the sensitivity of the area to human health impacts, along with the number of receptors present and their proximity to the site. A PM₁₀ concentration of <24 µg/m³, coupled with the limited low number of low and medium sensitivity receptors in close proximity to the red line boundary, means that the overall sensitivity of the area to human health impacts is **low**.

20.9.33 With regards to impacts on ecology, the IAQM construction dust guidance states that dust deposition has the potential to affect sensitive habitats and plant communities (ES Volume VI Appendix 12.1).

20.9.34 At the Gravesham construction site, 1 low sensitivity receptor, The Canal and Grazing Marsh, Higham Local Wildlife Site, is situated within 20 m of the red line boundary.

Step 2C: Determine the Risk of Dust Impacts

20.9.35 Step 2C of the IAQM construction guidance concerns the determination of the risk of dust impacts, which is informed by the dust emission magnitude identified in Step 2A and the sensitivity of the area identified in Step 2B.

20.9.36 The risk from dust impacts for dust soil amenity, human health and ecology impacts are shown in Table 20-19:.

Table 20-19: Magnitude of Risk from Dust Impacts

Impact		Gravesend
Dust Soiling	Demolition	Low Risk
	Earthworks	Medium Risk
	Construction	Low Risk
	Trackout	Low Risk
Human Health	Demolition	Negligible
	Earthworks	Low Risk
	Construction	Negligible
	Trackout	Low Risk
Ecological	Demolition	Negligible
	Earthworks	Low Risk
	Construction	Negligible
	Trackout	Low Risk

20.9.37 Step 3 of the guidance is to use the information in Table 20-19 to inform the level of mitigation that should ensure that significant effects do not occur. The mitigation measures identified by this assessment are listed in Section 20.8.

Construction Site Plant and NRMM Emissions

20.9.38 According to the IAQM construction dust guidance, exhaust emissions from on-site plant (and NRMM) and site traffic are unlikely to make a significant impact on local air quality, and in the vast majority of cases they do not need to be quantitatively assessed. This is considered to be the case for the construction of the Proposed Development, due to the distance between the red line boundary and the nearest high sensitivity receptors, and the limited number of lesser of sensitivity receptors in close proximity to either site.

20.9.39 The exact specifics of construction activity within the red line boundary will only be confirmed with certainty once the construction contractor has been appointed. Before that appointment, the assessment can only be based on reasonably precautionary assumptions. As such, the exact number and type of onsite plant and non-road mobile machinery (NRMM) is currently unknown. However, it is known that the operation of onsite plant and NRMM is intermittent, transient and short-term, not impacting on any one location for a prolonged period of time. It is therefore unlikely that emissions from this source will contribute to a significant effect on local air quality.

Construction Traffic Emissions

20.9.40 The Outline Construction Traffic Management Plan (CTMP) Volume VI Appendix 10.1 includes a route analysis, whereby potential routes for construction traffic have been reviewed. The CTMP identifies the most suitable route for the construction vehicles to access the construction site at Gravesend to and from the strategic road network (SRN).

- 20.9.41 For the Gravesend construction site, the CTMP considered three route options and the most suitable was deemed to be along the A289 and A2226 (on exiting the M2), followed by Norfolk Road and Mark Lane.
- 20.9.42 In line with the methodology set out in Section 12.4, construction traffic movements generated by the Proposed Development to both construction sites were compared against the screening criteria set out in guidance.
- 20.9.43 On the approach to and from the Gravesend construction site, the number of two-way construction traffic movements is anticipated to also be below the screening criteria set by IAQM/EPUK, National Highways and Natural England guidance. Two-way construction-related HGV movements peak at 30 per day during the construction of the tunnel shaft which is programmed to have a duration of 24-weeks. Over an annual period, this results in a peak two-way average construction-related HGV flow of around 13 per day.
- 20.9.44 In line with the IAQM/EPUK guidance, fewer than 25 two-way movements per day would not contribute to a significant impact on air quality, meaning that a quantitative assessment is not required. With regards to construction-related road traffic impacts on sensitive nature conservation sites, the Design Manual for Roads and Bridges air quality screening criteria is used as guide to screen the potential for a significant effect to occur, as reported in the National Highways guidance, and also in Natural England guidance. Construction-related traffic movements fall well below the DMRB screening criteria on all roads that pass within 200m of a sensitive nature conservation site.
- 20.9.45 In light of the above, given that the increase in traffic flows due to the construction of the Proposed Development do not exceed any of the relevant screening criteria, it is considered that the impact of construction phase vehicle movements will not have a significant effect on local air quality.

20.10 Residual Effects

20.10.1 This assessment of air quality effects has been undertaken after the implementation of embedded and additional mitigation. Please see Table 20-20 below.

Table 20-20: Assessment of Air Quality Environment Effects - Gravesend

Receptor	Value/Sensitivity	Potential Impact	Embedded Mitigation	Additional Mitigation	Magnitude	Significance
Construction Phase						
Amenity sensitive receptors	Overall low sensitivity to dust and PM ₁₀ from construction activities.	Dust soiling	Good working practices on site, considerate site layout	The assessment has identified the level of dust (and PM ₁₀) mitigation required to control dust impacts from having a significant effect. These are secured through the CEMP.	Negligible to Low	Insignificant
Human health sensitive receptors	High sensitivity	Construction PM ₁₀ emissions	Good working practices on site, considerate site layout	As above.	Negligible to low	Insignificant
		Construction-related traffic emissions	Construction Traffic Management Plan	None required	Negligible to low	Insignificant
Nature conservation receptors	Low	Dust soiling	Good working practices on site, considerate site layout	The assessment has identified the level of dust (and PM ₁₀) mitigation required to control dust impacts from having a significant effect. These are	Negligible to Low	Insignificant

Receptor	Value/Sensitivity	Potential Impact	Embedded Mitigation	Additional Mitigation	Magnitude	Significance
				secured through the CEMP.		
	High	Construction-related traffic emissions	Construction Traffic Management Plan	None required	Negligible to low	Insignificant
Operational Phase						
Human health Sensitive receptors	High	Maintenance vehicle emissions	N/A	None required	Negligible	Insignificant
Nature conservation receptors	High	Maintenance vehicle emissions	N/A	None required	Negligible	Insignificant

20.11 Summary

20.11.1 The Proposed Development has the potential to impact on local air quality through construction phase dust emissions and construction phase traffic emissions. These impacts have the potential to impact on amenity, human health and nature conservation receptors close to the site, and human health sensitive receptors adjacent to the road network on the construction traffic route. In the absence of the mitigation, there is potential for increased emissions from construction to result in likely significant effects on local air quality. However, it is considered that the proposed mitigation measures to be incorporated into design and construction will reduce effects such that they are unlikely to be significant.

20.12 References

Ref 20-1 (*Parliament of the United Kingdom, 2010*). The Air Quality Standards Regulations 2010. Accessed: 30/08/23. Available at: <https://www.legislation.gov.uk/ukxi/2010/1001/contents/made>

Ref 20-2 (*Parliament of the United Kingdom, 2018*). The Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018. Accessed: 30/08/23. Available at: <https://www.legislation.gov.uk/ukxi/2018/764/made/data.pdf>

Ref 20-3 (*Department for Environment Food and Rural Affairs (Defra), 2023*). Clean Air Strategy 2023. Accessed: 30/08/23. Available at: <https://www.gov.uk/en/publication/927e0-clean-air-strategy/>

Ref 20-4 (*Parliament of the United Kingdom, 2021*). The Environment Act 2021. Accessed: 20/09/23. Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>

Ref 20-5 Department for Environment, Food & Rural Affairs (2023). Environmental Improvement Plan 2023. Available at: <https://www.gov.uk/government/publications/environmental-improvement-plan>

Ref 20-6 *Parliament of the United Kingdom, 2023*). The Environmental Targets (Fine Particulate Matter) Regulations 2023. Available at: <https://www.legislation.gov.uk/ukxi/2023/96/made#:~:text=Regulation%204%20sets%20the%20target,the%20population%20exposure%20reduction%20target>

Ref 20-7 (Department for Environment, Food & Rural Affairs, 2023). The air quality strategy for England. Available at: <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england>

Ref 20-8 (*Department of Energy and Climate Change, 2011*). Overarching National Policy Statement for Energy (EN-1). Accessed: 30/08/2023. Available at: [1938-overarching-nps-for-energy-en1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf) ([publishing.service.gov.uk](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf))

Ref 20-9 (*Department for Energy Security and Net Zero, 2023*). Overarching National Policy Statement for Energy (EN-1). Accessed 30/08/2023. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf

Ref 20-10 (*Department of Energy and Climate Change, 2011*). National Policy Statement for Electricity Networks Infrastructure (EN-5). Accessed 30/08/2023. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf

Ref 20-11 (*Ministry of Housing, Communities and Local Government, 2019*). National Planning Policy Framework. Accessed: 30/08/23. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

Ref 20-12 (Gravesham Borough Council, 2014), Gravesham Local Plan Core Strategy. Accessed: 30/08/23. Available at: <https://www.gravesham.gov.uk/local-plan-policy/local-plan>

Ref 20-13 (Department for Environment, Food & Rural Affairs (DEFRA), 2022), Local Air Quality Management Technical Guidance (TG22). Accessed: 30/08/23, Available at: <https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf>

Ref 20-14 (Institute of Air Quality Management (IAQM), 2023), Guidance on the assessment of dust from demolition and construction. Accessed: 30/08/23. Available at: <https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-dust-2023-BG-v6-amendments.pdf>

Ref 20-15 (Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM), 2017), Land-Use Planning & Development Control: Planning for Air Quality. Accessed: 30/08/23. Available at: <http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf>

Ref 20-16 (Institute of Air Quality Management (IAQM), 2020), A guide to the assessment of air quality impacts on designated nature conservation sites. Accessed: 30/08/23. Available at: <https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf>

Ref 20-17 Environment Agency and DEFRA (2016, updated 2023). Air emissions risk assessment for your environmental permit. Available at: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>

Ref 20-18 Institute of Air Quality Management (IAQM) (2023). Guidance on the assessment of dust from demolition and construction. Available at: <https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-dust-2023-BG-v6-amendments.pdf>

Ref 20-19 Department for Environment Food & Rural Affairs (2022). Local Air Quality Management Technical Guidance (TG22). Available at: <https://iaqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf>

Ref 20-20 AEA Technology. (2008). Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedances of the 1-hour mean AQS Objective.

Ref 20-21 Gravesham Borough Council (2022). Annual Status Report. Available at: <https://kentair.org.uk/report/gravesham-borough-council-annual-status-report-2022>

Ref 20-22 Laxen and Marner (2003), Analysis of the Relationship Between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites

Ref 20-23 (*Highways England, Transport Scotland, Welsh Government and Department for Infrastructure, 2019*). Design Manual for Roads and Bridges (DMRB): LA 105 Air quality. Accessed: 30/08/23. Available at: <https://www.standardsforhighways.co.uk/tses/attachments/10191621-07df-44a3-892e-c1d5c7a28d90?inline=true>

Ref 20-24 (Natural England, 2018). Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations.

Ref 20-25 (B Cornelius, 2022). Maps, KML and GPX showing rights of way. Accessed: 19/09/23. Available at: <https://www.rowmaps.com/>

Ref 20-26 (South Downs Environmental Consultants, 2023). Baker Hicks Ltd National Grid Thames Tunnel 400KV, Gravesend, Kent / Tilbury, Essex: Baseline Air Quality Monitoring Report (Draft)

20.13 Abbreviations

Abbreviation	Meaning
AADT	Annual Average Daily Traffic
APIS	Air Pollution Information System
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Standards
C ₆ H ₆	Benzene
CEMP	Construction Environmental Management Plan
CO	Carbon Dioxide
CTMP	Construction Traffic Management Plan
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
EPUK	Environmental Protection UK
ES	Environmental Statement
ESG	Environmental, Social and Governance
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
LWS	Local Wildlife Site
NO ₂	Nitrogen Dioxide
NO _x	Nitric oxide
NRMM	Non-Road Mobile Machinery
PM	Particulate Matter
SAC	Special Area of Conservation
SEC	sealing end compound
SPA	Special Protection Area
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
TBM	Tunnel Boring Machine
GBC	Gravesham Borough Council

