

National Grid Cable Tunnel Replacement Project

Environmental Statement Volume III

Chapter 12 Air Quality - Tilbury

December 2023



Quality information

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12 Air Quality

12.1 Introduction

- 12.1.1 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, assessment of the operational air quality effects were screened out of this assessment.
- 12.1.2 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 during construction.
- 12.1.3 This chapter should be read together with the introductory chapters of this Environmental Statement (ES) (ES Volume II Chapters 1 – 6). This air quality assessment has also been informed by data from ES Volume III Chapter 10: Traffic and Transport - Tilbury.
- 12.1.4 This chapter is supported by the following appendices (in Volume VI) and figures:
- Appendix 12.1: Construction Dust Assessment Methodology;
 - Appendix 12.2: Detailed Dispersion Modelling Methodology;
 - Figure 12-1: Air Quality Study Area;
 - Figure 12-2: Construction Phase Dust Impacts.

12.2 Relevant Legislation, Policy and Guidance

Introduction

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

Legislation

- 12.2.2 The relevant legislation that applies specifically to the air quality assessment reported in this chapter are summarised in Table 12-1. Table 12-2 provides the Air Quality Standards (AQS) and Air Quality Objectives (AQO) relevant to this assessment.

Table 12-1: Legislation Relevant to Air Quality

Legislation	Legislation Context
The Air Quality Standards Regulations 2010 as amended 2016 (Ref 12-1)	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.

Legislation	Legislation Context
The Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018 (Ref 12-2)	The Non-Road Mobile Machinery (NRMM) Regulations provide the requirements relating to gaseous and particulate pollutant 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 12-3)	In 2019, the UK adopted the Clean Air 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 ("AQMA's"), 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 for England (Ref 12-7 (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 12-8), are generally in line with the EU limit values, although they have different dates for compliance, and a different legal status as follows: - EU limit values (as transcribed into UK legislation) are legally binding in the UK. National government compliance at the agglomeration scale is mandatory. - 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 12-4)	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 12-5)	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>

Legislation	Legislation Context
	<i>Tackle specific hotspots by challenging councils to improve air quality more quickly, while supporting them with clear guidance, funding, and tools.</i> <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 12-6)	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 12-7)	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.

12.2.3 Table 12-2: sets out the AQOs relevant to this assessment, as published by the UK Government is the AQS. It also includes the relevant Critical Load for nitrogen depositions, as published by the Air Pollution Information System (APIS).

Table 12-2: Relevant Air Quality Standards and Objectives, and Critical Loads

Pollutant	Averaging Period	Value (µg/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 (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
	24-hour mean (not to be exceeded more than 3 times per year)	125

Pollutant	Averaging Period	Value (µg/m³) (unless stated)
Sulphur dioxide (SO ₂)	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 likely habitat)

National Policy

12.2.4 National Planning Policies relevant to this air quality assessment are detailed in Table 12-3.

Table 12-3: National Planning Policy

Policy Reference	Policy Context
Overarching National Policy Statement for Energy (EN-1) (Ref 12-9)	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 the November 2023 draft of this document) further states that the ES should describe: • <i>“...existing air quality concentrations and the relative change in air quality from existing levels;</i> • <i>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;</i> • <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 12-10)	On review of the November 2023 document, there are no policies which are relevant to this assessment.
National Planning Policy Framework (NPPF) (Ref 12-11)	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</i>

Policy Reference	Policy Context
	<i>(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

12.2.5 Local Planning Policies relevant to this air quality assessment are detailed in Table 12-4:.

Table 12-4: Local Planning Policy

Policy Reference	Policy Context
Thurrock Council Local Development Framework – Core Strategy and Policies for Management of Development (as amended) 2015 (Ref 12-12)	• <i>"Policy CSTP14 – Transport in the Thurrock Urban Area</i> ... <i>vi. Employ Smarter Choices measures to change travel behaviour to achieve a reduction in forecast traffic and help to deliver better air quality and a better environment for job creation. Priority areas for Smarter Choice programmes include Grays and Lakeside</i> <i>vii Identify priority areas such as Grays town centre and Lakeside Basin, for network efficiency improvement measures to address congestion and air quality issues. Other Air Quality Management Areas as well as growth/regeneration areas will undergo transport network improvements, including where improved access is required."</i> • <i>"Policy PMD1 – Minimising Pollution and Impacts on Amenity, Health, Safety and the Natural Environment</i> ... <i>1. Development will not be permitted where it would cause or is likely to cause unacceptable effects on:</i> <i>....iv. the natural environment.</i> <i>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> <i>i. Air pollution;....</i> <i>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."</i> • <i>"Policy PMD9 – Road Network Hierarchy</i> <i>1. Routes of all levels</i>

Policy Reference	Policy Context
	<i>The Council will only permit the development of new accesses or increases use of existing accesses where:</i> ... <i>v. The development avoids causing congestion as measured by link and junction capacities.</i> <i>vi. Measures are taken to mitigate all adverse air quality impacts in or adjacent to Air Quality Management Areas.</i> <i>vii. The development will minimise adverse impacts on the quality of life of local residents, such as noise, air pollution, and the general street environment.</i> <i>viii. The development will make a positive contribution to accessibility by sustainable transport."</i>

Guidance

- 12.2.6 This air quality assessment has been carried out in accordance with the guidance documents listed and described in Table 12-5.

Table 12-5: Relevant Guidance Documents

Guidance Document Name	Description
Defra Local Air Quality Management (LAQM) Technical Guidance LAQM.TG22 (Ref 12-13)	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 12-14)	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 (EPUK) & IAQM Land-Use Planning and Development Control: Planning for Air Quality (2017) (Ref 12-15)	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 12-16)	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 12-17)	Published by the Environment Agency, this guidance provides a methodology for assessment of point source emissions impacts on human health and nature conservations sites.

12.3 Scope of Assessment

Study Area

- 12.3.1 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.
- 12.3.2 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).
- 12.3.3 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 with 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 Air Quality Management Area (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.
- 12.3.4 In addition, there is also a study area defined by the impact of combustion emissions from the on-site generators that may need to be used to power the tunnel boring equipment. For this source of emissions, a study area of 10km from the location of the generator stacks has been assumed, in line with the Environment Agency permitting guidance (Ref).

Sensitive Receptors

- 12.3.5 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 Sites (LWS), Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC) and Special Protection Areas (SPA)).

- 12.3.6 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, SSSI, SAC and SPA).
- 12.3.7 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 12-1.

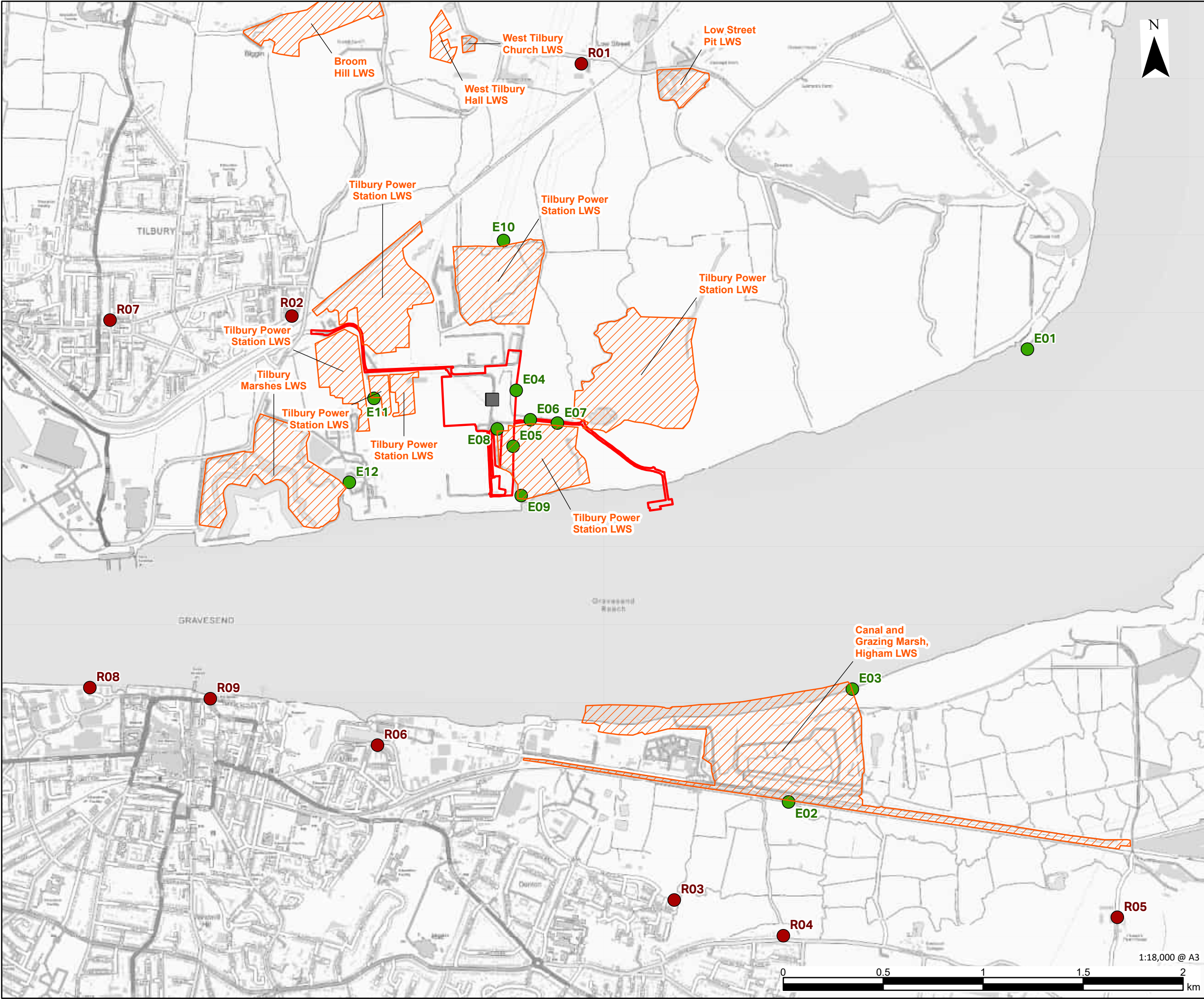
Assessment Scope

Aspects scoped into the assessment

- 12.3.8 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 12-14);
 - Construction phase site plant and non-road mobile machinery (NRMM) emissions assessment in line with IAQM guidance (Ref 12-14); and
 - Construction phase emissions from onsite power generation, to meet the energy demand of the tunnel boring machines.

Aspects scoped out of the assessment

- 12.3.9 No aspects have been formally scoped out of this assessment.
- 12.3.10 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.
- 12.3.11 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.



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LEGEND

- Red Line Boundary (Above Ground)
- Nature Conservation Receptors
- Human Health Receptors
- Generator Stacks
- Local Wildlife Site

NOTES

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ISSUE PURPOSE
Environmental Statement

PROJECT NUMBER
60677311

FIGURE TITLE
Air Quality Study Area

FIGURE NUMBER
Figure 12.1

12.4 Assessment Methodology

- 12.4.1 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

- 12.4.2 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 12-14).
- 12.4.3 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.
- 12.4.4 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).
- 12.4.5 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.
- 12.4.6 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

- 12.4.7 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, and particulate matter (PM₁₀ and PM_{2.5}) concentrations at locations close to working areas of the site.

12.4.8 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.”*

12.4.9 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

12.4.10 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}).

12.4.11 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.

12.4.12 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 12-6.

Table 12-6: 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

Nature of Impact	Screening criteria for Detailed Air Quality Assessment
	• 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.

12.4.13 With regard to sensitive ecological receptors, should the number of additional traffic movements exceed the screening criteria provided by National Highways Design Manual Roads and Bridges (DMRB) guidance, a change in AADT flows of 1,000 vehicles or 200 HDV, then a detailed assessment of road traffic emissions and their impact on designated sensitive habitat will be required.

Construction Generator Emissions

12.4.14 The tunnel boring equipment required to facilitate the construction of the Proposed Development will require a variable but constant supply of energy for a 6 to 8 month period that it is currently anticipated to be operational for.

12.4.15 National Grid's preferred approach is to utilise connection to the electricity grid via the nearby substation, located to the north of the Tilbury construction site. However, should connection to the electricity grid not be feasible, the backup option is the use of diesel-fired generators to meet the energy demand of the tunnel boring equipment for their period of operation. It should be noted that National Grid has internal Environmental, Social and Governance (ESG) targets to remove diesel generators from all construction sites, so this approach is last resort.

12.4.16 Diesel-fired generator emissions have the potential to impact on sensitive receptors by increasing exposure to the pollutants most commonly associated with combustion emissions, namely NO_x, which is a precursor for NO₂ and nitrogen deposition and particulates (PM₁₀ and PM_{2.5}). Other pollutants, such as CO, SO₂ and volatile organic carbons (VOCs) such as benzene (C₆H₆), are also released, but a quantities not likely to risk their relevant air quality standards.

12.4.17 To provide a precautionary assessment, this chapter reports the potential impact of emissions associated with the diesel-fired generators. At this stage of the design, the type of tunnel boring machine (TBM) is unconfirmed but will be one of two – Earth-Pressure Balance (EPB) TBM or Slurry TBM. Therefore, the exact type of generator plant to be used, should it be required, is also unconfirmed, although the power demand of the tunnelling equipment is understood for both possible tunnelling methods. In the absence of a defined generator, emissions parameters for a representative generator that can meet the required power demand of the tunnelling equipment, for both methods, has been used as a proxy.

12.4.18 The assessment of construction phase generator emissions has considered the following scenarios:

- Scenario 1 – EPB TBM requiring up to 4.0 MWe of power demand over a period of 34 weeks;
- Scenario 2 – Slurry TBM requiring up to 6.2 MWe of power demand over a period of 34 weeks.

12.4.19 Due to the proximity of nearby nature conservation site receptors to the construction site and the potential generator emissions, it has been assumed that some form of mitigation is required to reduce impacts on those receptors.

12.4.20 A detailed methodology for this element of the assessment is provided in ES Volume VI Appendix 12-2.

Significance Criteria

Construction Dust

12.4.21 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).

12.4.22 The classification of dust soiling (amenity), health and biodiversity 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 12-7.

Table 12-7: 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.

Effect	Change in Dust Deposition Rate and Short-term PM ₁₀ Concentrations	Significance
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

12.4.23 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.

12.4.24 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 12-8.

Table 12-8: 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%	Negligible	Slight	Moderate	Moderate	Substantial
103 % - 109 %	Negligible	Moderate	Moderate	Substantial	Substantial
≥ 110%	Negligible	Moderate	Substantial	Substantial	Substantial
¹ Imperceptible; ² Very low; ³ Low; ⁴ Medium; ⁵ Large					

12.4.25 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.

12.4.26 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.

12.4.27 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 $\mu\text{g}/\text{m}^3$. 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.

12.4.28 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.

12.4.29 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.

12.4.30 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 PM_{10} objective can be directly derived from the predicted annual average PM_{10} value using the relationship defined in LAQM.TG (22) (Ref 12-13). An exceedance of the short-term PM_{10} air quality objective is unlikely where annual mean PM_{10} concentrations are less than 32 $\mu\text{g}/\text{m}^3$. Likewise, research projects completed on behalf of Defra and the Devolved Administrations (Ref 12-18 and Ref 12-19) have concluded that the short-term 1-hour NO_2 objective is unlikely to be exceeded where annual mean concentrations are predicted to be less than 60 $\mu\text{g}/\text{m}^3$.

12.4.31 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 III Chapter 7: Biodiversity – Tilbury. To inform this judgement, Institute of Air Quality Management guidance (Ref 12-16), National Highways guidance (Ref 12-20) and Natural England guidance (Ref 12-21), refer to $\leq 1\%$ (of the relevant Critical Level or Critical Load) as a screening threshold. Impacts of $>1\%$ of the relevant Critical Level of Critical Load do not necessarily mean that the effect such an impact is significant, but it does mean more detailed consideration is required to justify non-significance.

12.4.32 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

12.4.33 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 12-22). 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 CAT 3516C 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 most adequately represents meteorological conditions within the study area. This station was selected due to it having an appropriate level of data capture over the 5-years modelled, and the fact that the conditions there are not influenced by proximity to the coast. Other, closer meteorological sites could not meet this criteria; 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

12.4.34 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 by Tilbury and Gravesham Councils.

Survey

12.4.35 A survey was commissioned by National Grid 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.

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

12.5 Consultation

- 12.5.1 On 22 September 2023, an email was sent to Thurrock Council and Gravesham Borough Council containing the proposed scope of the air quality assessment and asking for feedback and agreement.
- 12.5.2 At the time of finalisation for submission, no response had been received from Thurrock Council.

12.6 Baseline Environment

Local Air Quality Management

- 12.6.1 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.
- 12.6.2 This section sets out the recent review and assessment of local air quality undertaken by Thurrock Council. Thurrock Council (TC) have not yet published their 2023 Annual Status report, meaning that their 2022 Annual Status report, containing monitoring data from 2021 (Ref 12-23) is the most recent publicly available document for reference in this chapter.
- 12.6.3 There is currently one AQMA in Tilbury, AQMA 24, declared by TC due to exceedances of the annual mean nitrogen dioxide (NO₂) air quality objective. The AQMA is located in an area which encompasses Calcutta Road, Dock Road and St Chads Road, in Tilbury. This AQMA is situated approximately 1 km from the site boundary, and approximately 30 m from the A1089 (the construction traffic route).
- 12.6.4 In 2022, TC undertook non-automatic monitoring of NO₂ at over 60 sites, with six of these situated within AQMA 24. TC also undertook automatic monitoring of NO₂ at four sites in 2022, with one of these situated within AQMA 24 (TK9; located on Dock Road, Tilbury). Table 12-9 and Table 12-10 contain the TC NO₂ non-automatic and automatic monitoring data from 2017 to 2022 within AQMA 24.
- 12.6.5 Pre-COVID pandemic, in 2019, annual mean concentrations of NO₂ peaked at 41.2 µg/m³ within this AQMA. During the pandemic, in 2020, NO₂ concentrations fell to 32.8 µg/m³. The 2022 Annual Status Report shows that the maximum NO₂ concentration within AQMA 24 fell further in 2021, to 29.1 µg/m³. In 2022, concentrations at that same location saw a very small increase to 29.2 µg/m³. The monitoring data suggests that traffic levels have not yet recovered back to pre-pandemic levels, if they ever will.

Table 12-9: Thurrock Council Non-Automatic NO₂ Monitoring Data within AQMA 24 (Tilbury)

Site ID	OS Grid Ref (X,Y)	Site Type	Annual Mean NO ₂ Concentration (µg/m ³)					
			2017	2018	2019	2020*	2021*	2022
TL	563867, 176293	Roadside	35	32.9	34.8	28	23.8	24.7
TILA	563498, 176483	Roadside	40.9	38	39.8	31.1	23.4	25.7
TILB	563645, 176348	Roadside	37.6	42.4	41.2	32.8	26.8	28.3
TILD	563995, 176291	Roadside	36.3	35	35.1	31.3	25.3	22.4
TILE	563870, 176305	Roadside	35.4	33.4	35.2	31.7	22.8	25.5

Site ID	OS Grid Ref (X,Y)	Site Type	Annual Mean NO ₂ Concentration (µg/m ³)					
			2017	2018	2019	2020*	2021*	2022
TK9A, TK9B	563489, 176497	Roadside	-	-	-	29.4	23.1	25.9

Values in bold indicate an exceedance of the AQ annual mean objective of 40 µg/m³; Values underlined indicate a concentration higher than 60µg/m³. Where concentrations are higher than 60µg/m³ 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.

** Site was commissioned in December 2020, data capture too low to provide an annual mean (< 25%)

Table 12-10: Thurrock Council Automatic NO₂ Monitoring Data within AQMA 24 (Tilbury)

Site ID	OS Grid Ref (X,Y)	Site Type	Annual Mean NO ₂ Concentration (µg/m ³)					
			2017	2018	2019	2020	2021*	2022
TK9	563489, 176497	Roadside	-	-	-	-	29.1**	29.2

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

** Site was commissioned in December 2020, data capture too low to provide an annual mean (< 25%).

12.6.6 TC undertook automatic monitoring of PM₁₀ at three locations in 2022. However, none were in Tilbury or close to the Proposed Development site.

12.6.7 TC undertook automatic monitoring of PM_{2.5} at three sites in 2022, with one of those situated in Tilbury (Site TK9). PM_{2.5} monitoring data in Tilbury is shown in Table 12-11:.

Table 12-11: Thurrock Council PM_{2.5} Monitoring Data within AQMA 24 (Tilbury)

Site ID	OS Grid Ref (X,Y)	Site Type	Annual Mean PM _{2.5} Concentration (µg/m ³)					
			2017	2018	2019	2020	2021*	2022
TK9	563489, 176497	Roadside	-	-	-	-	10.8	11.2

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

** Site was commissioned in December 2020, data capture too low to provide an annual mean (< 25%).

Project-Specific Monitoring

12.6.8 Monitoring of NO₂, PM₁₀ and PM_{2.5} has been undertaken within the red line boundary at both Gravesend and Tilbury sites (Ref 12-24). 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 12-12.

Table 12-12: Project-Specific Monitoring at Tilbury Construction Sites

Statistic	Tilbury Site		
	PM ₁₀	PM _{2.5}	NO ₂
Max 15-minute mean concentration (µg/m ³)	867	55	-
Max 24-hour mean concentration (µg/m ³)	33	12	-
3-month mean (µg/m ³)	9.8	4.6	11.8

12.6.9 The 24-hour mean PM₁₀ and PM_{2.5} concentrations given in Table 12-12 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.

12.6.10 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).

Background Pollutant Concentration Data

12.6.11 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 12-13: summarises the estimated background concentrations for the five grid squares surrounding the Tilbury site.

12.6.12 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, 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 12-13: DEFRA Background Pollutant Concentrations and APIS Background Nitrogen Deposition for Grid Squares Surrounding Tilbury Site (2023)

OS Grid Reference for Grid Cell (x,y)	Annual Mean Concentration (µg/m ³)					Annual Deposition Rate (kgN/ha/yr) ¹
	NO _x	NO ₂	PM ₁₀	PM _{2.5}	NH ₃	
566500, 176500	23.2	16.4	15.1	9.6	1.3	13.9
566500, 175500	32.7	21.5	13.9	9.4		
567500, 175500	37.3	23.8	14.4	9.6		

¹ For short vegetation.

12.7 Key Parameters for Assessment

12.7.1 A detailed description of the Proposed Development is provided in ES Volume II Chapter 3 Project Description. 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.

12.8 Mitigation

Embedded Mitigation

Construction Dust and Site Emissions

12.8.1 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.

12.8.2 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, which are secured via the Outline Construction Environmental Management Plan (CEMP) (ES Volume VI Appendix 3.1):

- 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.
- Avoid site runoff of water or mud.
- 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.

Construction Vehicle Emissions

- 12.8.3 An Outline Construction Traffic Management Plan (CTMP) (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
- 12.8.4 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 a pier to the southeast of the main construction worksite. The barge will transport spoil to a disposal site on the south shore of the river, thus mitigating the impact of construction traffic movements on the local road network in Tilbury and through the nearby AQMA.

Construction Generator Emissions

- 12.8.5 The preferred option for powering the tunnel boring equipment will be connection to the existing electrical grid, if feasible, thus removing the need for a local power source and associated emissions.
- 12.8.6 However, if this is not feasible, onsite generators will be required to provide power to the tunnel boring equipment. Should this be the case, embedded mitigation will comprise of a stack with an emission release height that does not cause a significant effect for ecological receptors.

12.9 Potential Impacts and Assessment of Effects

Introduction

12.9.1 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

12.9.2 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 12.16). This process is summarised in the sub-sections below.

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

Step 1: Screen the requirements for a detailed assessment

12.9.4 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.

12.9.5 These screening distances are shown on Figure 12-2. Table 12-14 and Table 12-15 provide details of the receptors within 250 m of the red line boundary, which are sensitive to dust soiling and human health effects.

12.9.6 Receptor R01 is the Tilbury Power Station site. It has been designated low sensitivity to dust impacts, as it is currently a brownfield site with minimal use. This land use may be developed during the construction phase. However, this is likely to be of low sensitivity to dust impacts.

Table 12-14: Receptors sensitive to dust soiling within 250 m of the red line boundary

Site	Receptor Sensitivity	Number of Receptors
Tilbury	High	139
	Medium	15
	Low	9

Table 12-15: Receptors sensitive to human health effects from PM₁₀ within 250 m of the red line boundary

Site	Receptor Sensitivity	Number of Receptors
Tilbury	High	139
	Medium	15
	Low	9

- 12.9.7 Table 12-16 provides details of the receptors within 250 m of the red line boundary (above ground), which are sensitive to ecological impacts.
- 12.9. Within 20 m of the red line boundary (above ground), there is the Tilbury Power Station Local Wildlife Site (LWS), which is all designated as having low sensitivity, in line with IAQM construction dust guidance.
- 12.9.9 The Tilbury Power Station LWS has also been highlighted as part of future proposed SSSI, however this is not yet under formal consultation. The sensitivities assigned in Table 12-6 are based on the designation of R10 as a proposed SSSI (medium/low). However, should this receptor be designated as a formal SSSI before or during the construction phase, it would be assigned a greater sensitivity.

Table 12-16: Receptors sensitive to ecological impacts within 250 m of the red line boundary (above ground)

Site	Receptor Sensitivity	Number of Receptors
Tilbury	High	0
	Medium/Low	1
	Low	1

Step 2: Assess the Risk of Dust Impacts

Step 2A: Determine the Dust Emissions Magnitude

12.9.10 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.

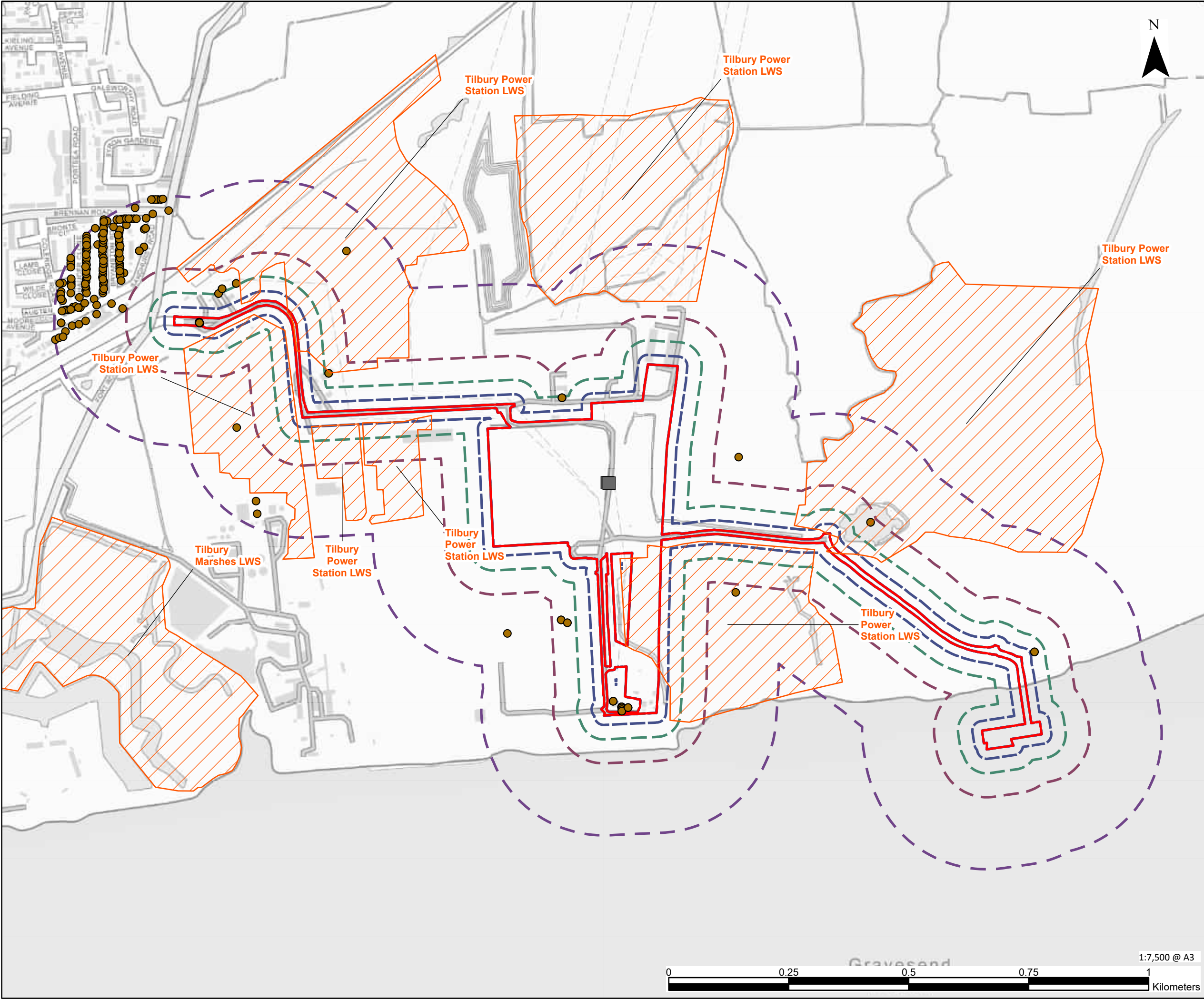
12.9.11 Construction activities associated with the Proposed Development at Tilbury include a new sealing end compound (SEC) including a new tunnel headhouse and overhead line modifications, alongside the construction of the new cable shaft and tunnel driven from the Tilbury side. A full description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

Demolition

12.9.12 Demolition activities associated with the Proposed Development at Tilbury is limited to the dismantling and removal of existing pylons at the Tilbury 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.

12.9.13 It should be noted that the decommissioning of the existing tunnel and associated infrastructure does not form part of this project.

12.9.14 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**.



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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
- Generator Stacks
- Local Wildlife Site

NOTES

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ISSUE PURPOSE

Environmental Statement

PROJECT NUMBER

60677311

FIGURE TITLE

Construction Phase Dust Impacts

FIGURE NUMBER

Figure 12.2

Earthworks

- 12.9.15 Earthworks will be required to facilitate and enable works at Tilbury 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.
- 12.9.16 The individual area of the Tilbury construction site is approximately 47, 200m² which, according to the IAQM guidance, falls within the **large** dust emissions magnitude.
- 12.9.17 The earthworks and tunnel boring activities at the Tilbury construction site will require the storage and handling of high volumes of spoil, utilising a number of earthmoving vehicles to transport spoil from a temporary storage area close to the tunnel shaft, to a temporary storage area at the barge jetty. This includes approximately 72,700 m³ of spoil from the construction of the tunnel, and approximately 13,000 m³ from the construction of the shaft.
- 12.9.18 The type of tunnel boring equipment will affect the nature of the spoil extracted and the likelihood of dust emissions from that material. With either approach, the spoil will be wet when it leaves the tunnel portal and dust emissions naturally suppressed. Only when the spoil material is allowed to dry out could it become a potential source of dust emissions.
- 12.9.19 It should be noted that dust generated by the tunnel boring equipment itself will be naturally mitigated by containment within the tunnel.
- 12.9.20 In light of the above, and in line with the IAQM construction dust guidance criteria, an earthworks dust emission magnitude of **large** has been precautionarily assumed for the Tilbury construction site.

Construction

- 12.9.21 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.
- 12.9.22 Tunnel boring equipment will be used to create the tunnel. The construction of the tunnel will be undertaken through use of precast segments which will be lined behind through the tunnel behind the tunnel boring equipment. The use of precast materials will reduce the potential for dust emissions to occur. Furthermore, much of the construction activity associated with the tunnelling works will be undertaken within the tunnel itself and therefore inherently mitigated.
- 12.9.23 Above ground construction operations associated with the Proposed Development will comprise the construction of a new sealing end compound (SEC) containing a new tunnel shaft and headhouse.
- 12.9.24 The 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

- Tilbury headhouse.

12.9.25 The headhouse will accommodate:

- Ventilation plant for the tunnel and shafts;
- A control room, with tally room, communications control, panels, mechanical plant and control panels;
- Low Voltage (LV) Switch Room;
- 110V Battery / Uninterruptible Power Supply Room;
- Main fans room;
- Shaft access via a staircase (but with space allocation for a lift, and lift motor room (if required);
- Changing and shower room; and
- Water Closet (WC).

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

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

12.9.28 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

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

12.9.30 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.

12.9.31 On average, there is anticipated to be less than 20 outward construction-related HDV (all vehicles >3.5 tonnes) movements per day at the Tilbury 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

12.9.32 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.

12.9.33 Table 12-17 summarises the distribution of receptors which are sensitive to effects from dust soiling impacts and Table 12-18 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 12-17: 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)
Tilbury	High	0	0 (0)	0 (0)	139(139)
	Medium	0	1(1)	5 (6)	9 (15)
	Low	4	0(4)	1(5)	2 (7)

Table 12-18: 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)
Tilbury	High	0	0 (0)	0 (0)	139 (139)
	Medium	01 (1)	5 (6)	9(15)	
	Low	4	0(4)	1(5)	2(7)

Table 12-19: Distance distribution of receptors sensitive to ecological impacts

Site	Receptor Sensitivity	Distance from Red Line Boundary	
		0-20m	20-50m (0-50m)
Tilbury	High	0	0
	Medium/Low	0	0
	Low	2	0 (2)

12.9.34 There are 6 medium sensitivity amenity and human health receptor within 100 m of the red line boundary (above ground). There is also 4 low sensitivity amenity and human health receptor within 20 m of the red line boundary. In line with IAQM construction dust guidance, this equates to an area of **low** sensitivity for dust soiling amenity impacts.

12.9.35 Background PM₁₀ concentrations at and around the site in Tilbury are provided in Table 12-13:. Data suggests that shows that background PM₁₀ concentrations around the site in Tilbury 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**.

12.9.36 With regards to impacts on biodiversity, the IAQM construction dust guidance states that dust deposition has the potential to affect sensitive habitats and plant communities (ES Volume VI Appendix 11.1).

12.9.37 At the Tilbury construction site, 1 low/medium sensitivity receptor, Tilbury Power Station Local Wildlife Site is situated within 20 m of the red line boundary (above ground).

12.9.38 The Tilbury Power Station LWS and wider area has also been identified as a proposed SSSI. The sensitivities assigned in Table 12-19 are based on the identification of this receptor of as a proposed SSSI (**medium/low**). However, should this receptor be formally designated as a SSSI before or during the construction phase, it would be assigned a greater level of sensitivity (**Medium**). This would result in an overall sensitivity of the area to ecological impacts to Medium, based on the IAQM construction guidance. However, this change in designation status has not occurred before submission of the ES, meaning that the overall sensitivity of the area to ecological impacts is considered **low**.

Step 2C: Determine the Risk of Dust Impacts

12.9.39 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.

12.9.40 The risk from dust impacts for dust soil amenity, human health and biodiversity impacts are shown in Table 12-20:.

Table 12-20: Magnitude of Risk from Dust Impacts

Impact		Tilbury
Dust Soiling	Demolition	Negligible
	Earthworks	Low 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

Step 3: Site-Specific Mitigation

12.9.41 Step 3 of the guidance is to use the information in Table 12-20 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 12.8.

Construction Site Plant and NRMM Emissions

12.9.42 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 both 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.

12.9.43 The exact specifics of construction activity within the red line boundary (above ground) 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

- 12.9.44 The Outline CTMP (ES 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 Tilbury to and from the strategic road network (SRN).
- 12.9.45 Due to the location of the Tilbury construction site and the local road network, there is only one route for the construction traffic to take, to access the site from the SRN. This route would follow the A13 and A1089 roads.
- 12.9.46 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.
- 12.9.47 On the approach to and from the Tilbury construction site, the number of two-way construction traffic movements is anticipated to be below the screening criteria set by IAQM/EPUK, National Highways and Natural England guidance. Two-way construction-related HGV movements peak at 80 per day during the delivery of tunnel lining segments but will average out at 40 per day over the 23-weeks programmed for this activity. Prior to that, 5 two-way construction-related HGV movements per day are associated with the tunnel construction. After the delivery of tunnel lining segments, up to 3 two-way construction related HGV movements per day are then associated with the delivery of shaft lining segments. Over an annual period, this results in a two-way average construction-related HGV flow of around 20 per day.
- 12.9.48 Construction-related HGV movements and associated emissions at the Tilbury construction site are mitigated, to some extent, by use of a barge to transport spoil away from site. During the tunnel construction phase of the works, this reduces two-way HGV movements by 33 per day over a 32-week period. This helps keep HGV movements below the lowest screening criteria set by the IAQM/EPUK guidance.
- 12.9.49 Incidentally, the barge itself will also introduce a source of combustion emissions to air. However, due to the size of the barge and rate of spoil extraction, less than 1 two-way barge movement per day will be required. There is no guidance available for the screening or assessment of emissions from vessel movements. In the absence of guidance, it is the authors professional opinion that, due to the limited number of barge movements and the transient nature of the emission source, the impact of emissions from this source will be negligible and will not contribute to a significant effect.
- 12.9.50 With regards to construction-related road traffic impacts on sensitive nature conservation sites, the Design Manual for Roads and Bridges (DMRB) 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.
- 12.9.51 In light of the above, given that the increase in traffic flows due to the construction of the Proposed Development exceed none of the relevant screening criteria, and the limited barge movements, it is considered that the impact of construction phase vehicle movements will not have a significant effect on local air quality.

Construction Generator Emissions

- 12.9.52 Dispersion modelling of US EPA Stage II compliant generator emissions has been undertaken for a number of stack heights for both the EPB TBM and the Slurry TBM options. The full results of the dispersion modelling assessment are provided in Appendix 12.2.
- 12.9.53 At human health receptors, impacts of the pollutants of concern are negligible, both at the nearest sensitive receptors and within the nearest AQMAs, even at the lowest stack height modelled (5m). The impact of unmitigated construction phase generator emissions would not have a significant effect on local air quality for human health sensitive receptors.
- 12.9.54 Plate 12-1 and Plate 12.2 provide the EPB TBM generator emissions impacts on annual mean NO_x and annual nitrogen deposition rates for the stack heights considered at selected nature conservation receptors, including those worst affected. They demonstrate that the impact on the worst affected designated SSSI site (E01) is less than 1% of the Critical Level for annual mean NO_x and less than 1% of the Critical Load for nitrogen deposition. Such a negligible impact does not have a significant effect on local air quality.
- 12.9.55 The pSSSI, to the northeast of the construction site (E04), and the LWS, directly to the west of the construction site (E06), experience a much greater impact due to their proximity to and orientation downwind of the generators. Impacts on the pSSSI and LWS cannot be screened as insignificant, even with a stack height of 30m. The modelling undertaken suggests a stack height of around >50m may be required to bring impacts at the LWS down to less than 1% of both the Critical Level for NO_x and the Critical Load for nitrogen deposition. It is noted that the pSSSI habitat is not yet formally designated as an SSSI. It is also noted that the LWS most affected by generator emissions is a post-industrial habitat and not semi-natural habitat as intended of the relevant Critical Levels and Critical Load.
- 12.9.56 Refer to ES Volume III Chapter 7 Biodiversity – Tilbury for the full assessment of effects on the LWS.

Plate 12-1: Annual Mean NO_x Impact of Generator Emissions at Worst-Affected Receptors

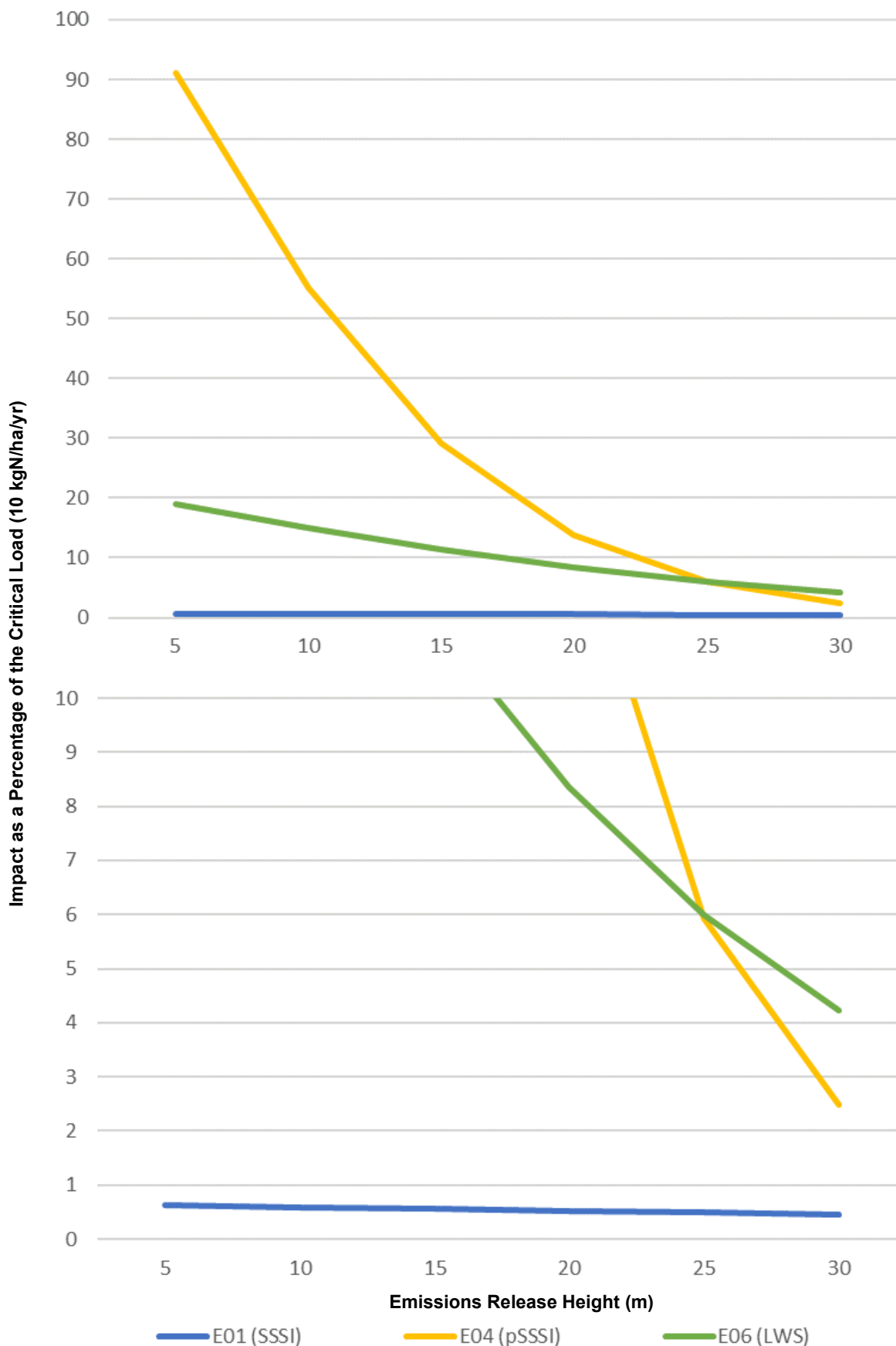
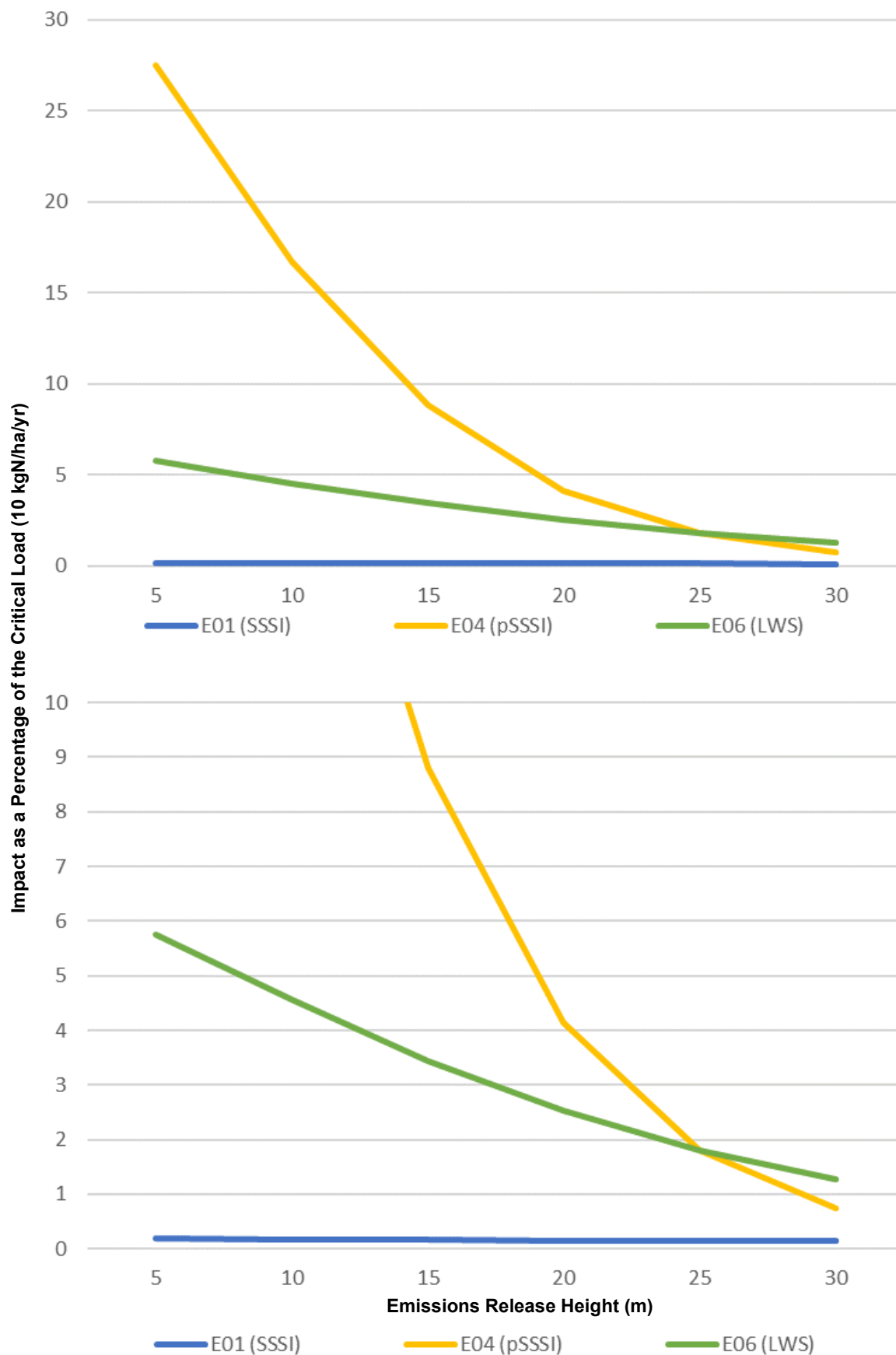


Plate 12-2: Annual Nitrogen Deposition Rate Impact of Generator Emissions at Worst-Affected Receptors (EPB Method of Tunnelling)



12.10 Additional Mitigation

Construction Generator Emissions

- 12.10.1 The dispersion modelling of US EPA Tier II compliant generator emissions suggests that impacts at the nearby pSSSI and LWS are well above either the Critical Level for annual mean NO_x and/or the relevant Critical Load for nitrogen deposition, even with a notable stack height.
- 12.10.2 Subject to the selection of the generator specification, additional mitigation is likely to be required. Such mitigation would likely involve a suitable emissions release height and the use of Selective Catalytic Reduction (SCR) technology to bring NO_x emissions in line with the EU Stage 5 (US EPA Tier IV) emission standard for NO_x .
- 12.10.3 The use of SCR technology is proven to reduce NO_x emissions from generator stacks by 90-95%. However, such technology also introduces a small amount of ammonia (NH_3) emissions (typically around 5 parts per million (PPM)). NH_3 emissions themselves can be harmful to sensitive habitats, and also contribute to nitrogen deposition at a greater rate than NO_x (as NO_2) does.
- 12.10.4 Dispersion modelling of EU Stage 5 (US EPA Tier IV) compliant generator emissions has been undertaken for a number of stack heights for both the EPB TBM and the Slurry TBM, to determine the height at which emissions can be released without causing a potentially significant effect. The results of the dispersion modelling assessment are provided in Appendix 12.2.
- 12.10.5 Plate 12-3 and Plate 12.4 provide the EPBM generator emissions impacts and STM generator emissions impacts respectively, on annual mean NO_x , annual nitrogen deposition rates and annual mean NH_3 , for the stack heights considered at the selected worst affected nature conservation receptors. They demonstrate that the use of SCR technology does mitigate the impacts reported in Section 12.10 and that the main constraint from the generator use is the impact on annual nitrogen deposition rates.
- 12.10.6 For the EPB TBM, a stack height of approximately 20m will be sufficient to ensure that impacts of all the pollutants of concern for the nature conservation sites are $\leq 1\%$ of the relevant Critical Levels and Critical Load. This noting the fact that the IAQM state that when comparing impacts at nature conservation sites to the relevant Critical Levels and Critical Loads, impacts should not be considered to a numerical precision greater than the expression of the criteria themselves. As such, a change in concentration or deposition rate that can be rounded down to 1% of the relevant Critical Level or Critical Load is considered a negligible impact.
- 12.10.7 For the STM method of tunnelling, a stack height of approximately 23m will be sufficient to ensure that impacts of all the pollutants of concern for the nature conservation sites are $\leq 1\%$ of the relevant Critical Levels and Critical Load. Such an impact is negligible and the effect not significant.

Plate 12-3: Annual Mean NO_x and NH₃ and Nitrogen Deposition Rate Impact of Generator Emissions at Worst-Affected Receptors (EPB Method of Tunnelling)

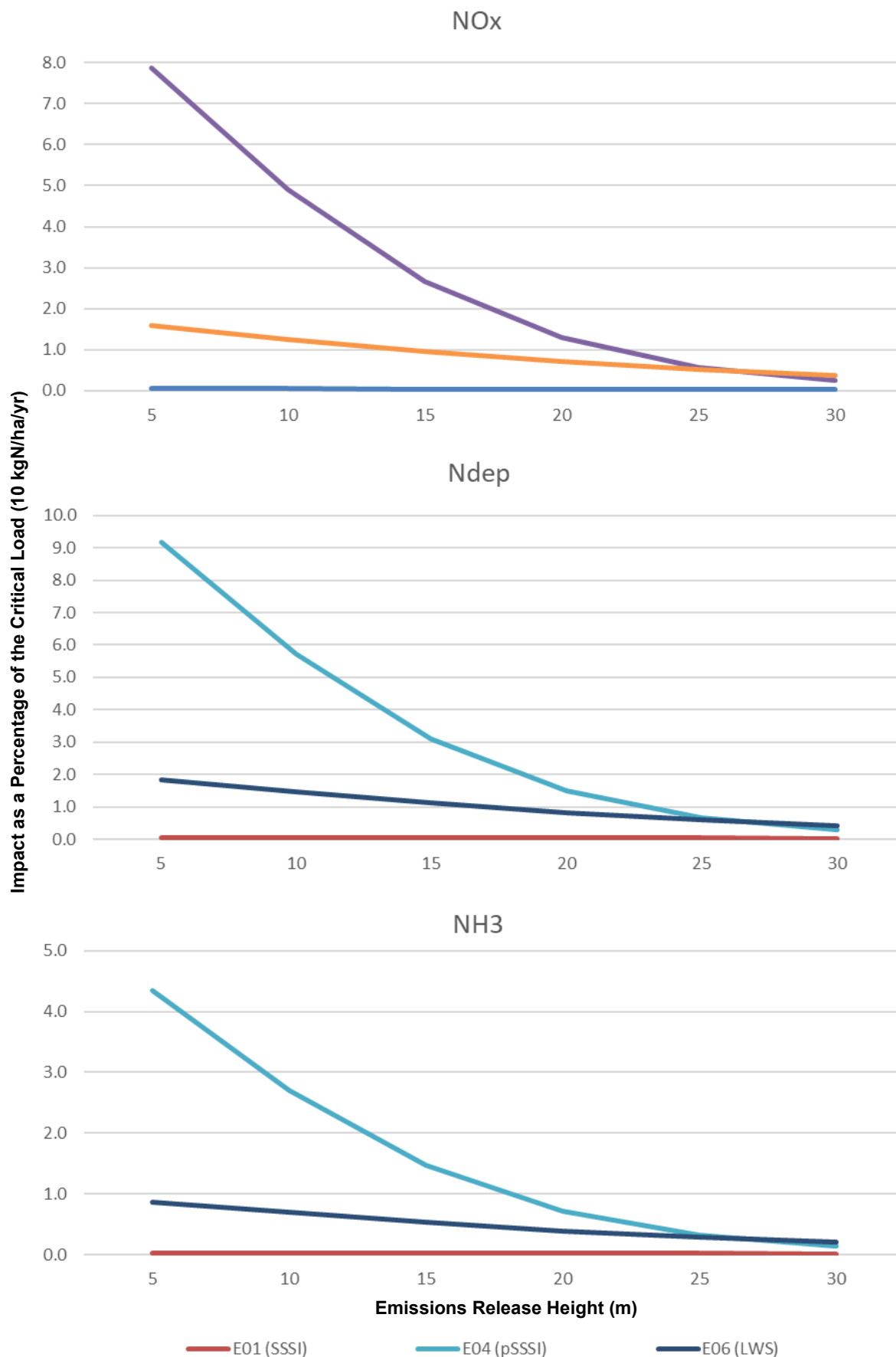
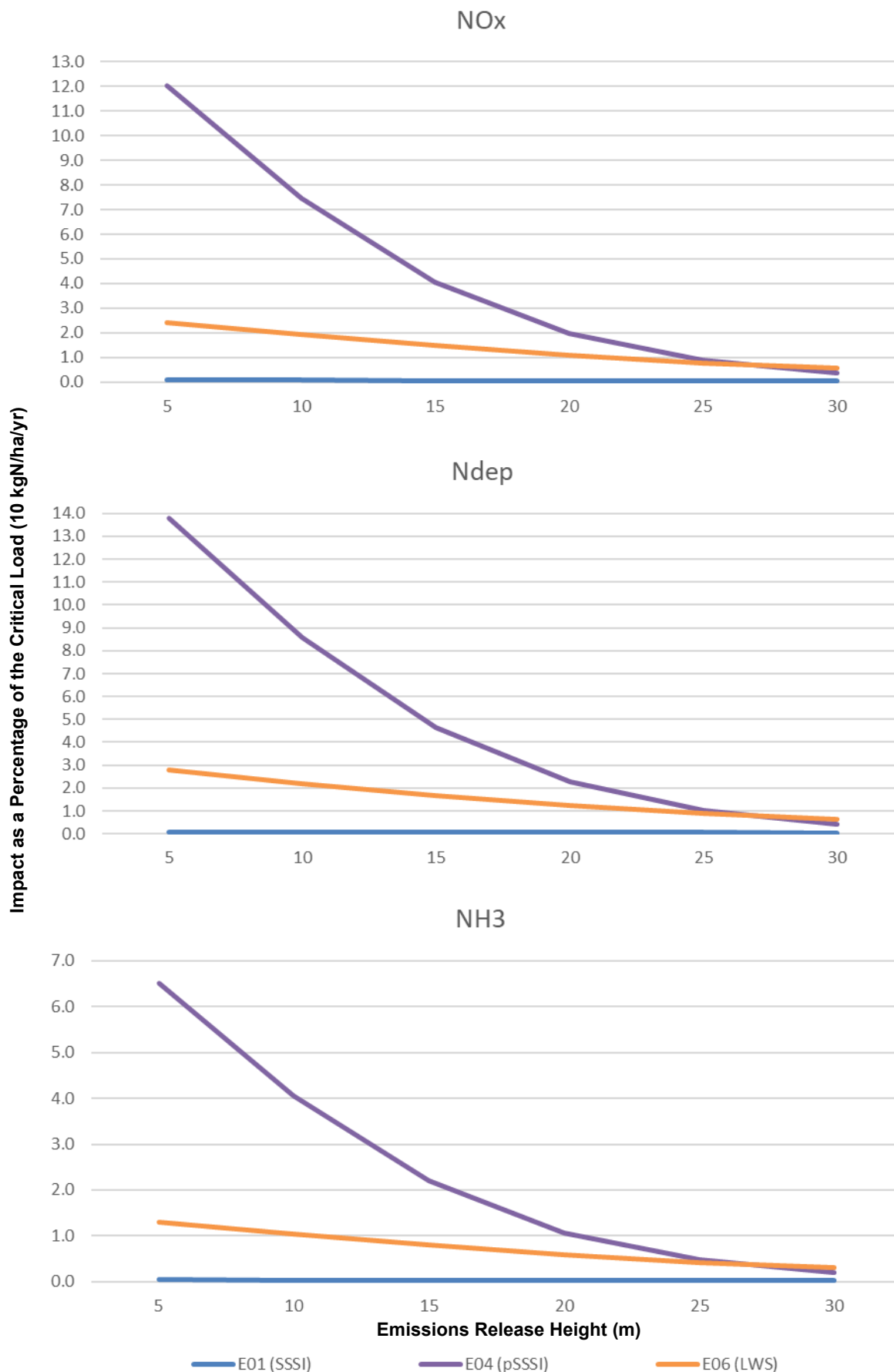


Plate 12-4: Annual Mean NO_x and NH₃ and Nitrogen Deposition Rate Impact of Generator Emissions at Worst-Affected Receptors (ST Method of Tunnelling)



12.11 Residual Effects

12.11.1 This assessment of air quality effects has been undertaken after the implementation of embedded and additional mitigation. Please see Table 12-21 below.

Table 12-21: Assessment of Air Quality Environment Effects - Tilbury

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	Not significant
Human health sensitive receptors	High sensitivity	Construction PM ₁₀ emissions	Good working practices on site, considerate site layout	As above.	Negligible to low	Not significant
		Construction-related traffic emissions	Construction Traffic Management Plan and use of barge to transport spoil from site	None required	Negligible to low	Not significant
		Tunnel boring equipment generator emissions	Increased stack heights due to nature conservation impact	None required	Negligible	Not significant
Nature conservation receptors	Low (to medium ¹)	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	Not significant

Receptor	Value/Sensitivity	Potential Impact	Embedded Mitigation	Additional Mitigation	Magnitude	Significance
	High	Construction-related traffic emissions	Construction Traffic Management Plan and use of barge to transport spoil from site	None required	Negligible to low	Not significant
		Tunnel boring equipment generator emissions	Increased stack heights	Selective Catalytic Reduction technology, plus increased stack heights	Negligible	Not significant
Operational Phase						
Human health Sensitive receptors	High	Maintenance vehicle emissions	N/A	None required	Negligible	Not significant
Nature conservation receptors	High	Maintenance vehicle emissions	N/A	None required	Negligible	Not significant

12.12 Summary

12.12.1 The Proposed Development has the potential to impact on local air quality through construction phase dust emissions, construction phase traffic emissions and construction phase generator plant 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, and additional mitigation should it be required, will reduce effects such that they are unlikely to be significant alone or in combination with other projects. Operation phase air quality effects were scoped out.

12.13 References

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12.14 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
EPB	Earth-Pressure Balance
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
NH ₃	Ammonia
NO ₂	Nitrogen Dioxide
NO _x	Nitric oxide
NRMM	Non-Road Mobile Machinery
PM	Particulate Matter
PPM	Parts Per Million
pSSSI	Proposed Site of Special Scientific Interest
SAC	Special Area of Conservation
SCR	Selective Catalytic Reduction
SEC	sealing end compound
SPA	Special Protection Area
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
STM	Slurry Tunnel Method
TBM	Tunnel Boring Machine
TC	Thurrock Council
VOC	Volatile organic carbons

