

Chapter 8: Air Quality

AIR QUALITY	
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SUPPORTING APPENDIX	ES Volume 3: Appendix: Air Quality: Annex 1: Glossary; Annex 2: Legislative and Planning Policy Context; Annex 3: EPUK & IAQM Planning for Air Quality Guidance; Annex 4: Professional Experience; Annex 5: Construction Dust Assessment Procedure; Annex 6: Air Quality Modelling Methodology; and Annex 7: Construction Mitigation.
KEY CONSIDERATIONS	Gravesham Borough Council (GBC) has declared multiple Air Quality Management Areas (AQMAs), including the Northfleet Industrial Area AQMA for exceedances of the 24-hour particulate matter (PM₁₀) objective; the Proposed Development is located within this area. The neighbouring Dartford Borough Council (DBC) has also declared multiple AQMAs, including the Dartford AQMA No.2 along the A226 corridor for exceedances of the annual mean nitrogen dioxide (NO₂) objective; the Proposed Development is also partially within this area. There is also an AQMA declared across the River Thames in Thurrock (no. 24) for exceedances of the annual mean NO₂ objective as a result of road traffic emissions. Activities associated with the demolition and construction works of the Proposed Development will give rise to a risk of dust impacts at existing sensitive receptors during the demolition, earthworks and construction stages, as well as from trackout of dust and dirt by vehicles onto the public highway. A qualitative construction dust risk assessment has thus been carried out. In addition, the potential for construction vehicles to impact upon local air quality has been quantitatively considered. During the operational phase, the Proposed Development will lead to changes in vehicle flows on local roads, which may impact on air quality at existing residential properties. The introduced residential units will also be subject to the impacts of road traffic emissions from the adjacent road network. The main air pollutants of concern related to road traffic emissions are NO₂ and fine particulate matter (PM₁₀ and PM_{2.5}). The Proposed Development includes the provision of heat and hot water using fully-electric technology, and there will be no emissions to air associated with these. The Proposed Development will also aim to utilise alternatives to diesel-fired emergency life-safety generators which do not result in emissions that could impact upon air quality. Consequently, a detailed assessment of the impacts of proposed point source emissions has been scoped out. In terms of the potential air quality effects, the assessment will consider: - the impacts of demolition and construction of the Proposed Development on dust soiling and concentrations of PM₁₀ at existing sensitive receptors during the construction period; - the impact of emissions from heavy duty construction traffic generated during the construction period of the Proposed Development on concentrations of NO₂, PM₁₀ and PM_{2.5}; - the impact of the operation of the Proposed Development on concentrations of NO₂, PM₁₀ and PM_{2.5} from road traffic at existing sensitive receptors in the first year of occupation; and - the impacts of existing and proposed sources of NO₂, PM₁₀ and PM_{2.5} on future introduced residents of the Proposed Development. The cumulative impacts on air quality of the Proposed Development in combination with cumulative schemes identified in the local area have also been considered.
CONSULTATION	An EIA Scoping Report was prepared and submitted to Gravesham Borough Council (GBC) on the 11th August 2022 requesting a Scoping Opinion from GBC. A copy of the EIA Scoping Report is provided in ES Volume 3, Appendix: EIA Methodology – Annex 1. A Scoping Opinion was received on 16th September 2022, as provided in ES Volume 3, Appendix: EIA Methodology – Annex 2. The Scoping Opinion noted: The assessment “should include consideration of key pollutants such as Nitrogen dioxide (NO₂), and Particulate Matter (PM₁₀ and PM_{2.5}), as well as the activities of nearby industrial and aggregate users e.g., Britannia

¹ Defra (2022) UK Pollutant Release and Transfer Register, [Online], Available: prtr.defra.gov.uk.

² Defra (2022) Local Air Quality Management (LAQM) Support Website, [Online], Available: <http://laqm.defra.gov.uk/>.

³ AQC (2020) Calibrating Defra's 2018-based Background NOx and NO₂ Maps against 2019 Measurements, Available: <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=163e7362-578e-4a4c-8feb-0006f1531ff1>.

	<i>Refined Metals</i>”. This is addressed throughout by the methodology outlined above. Nearby industrial uses are addressed in paragraph 8.71. “Thurrock also mention that they are considering an application for the ‘Construction and operation of a cementitious products manufacturing facility’ located at berth 40A, Tilbury Freeport (their reference 22/00466/FUL). Therefore, given the sensitive land uses proposed within the proposed development that this should also be factored into the EIA given possible impacts in terms of noise and air quality.” This has been considered in paragraph 8.73. “there is an Air Quality Management Area (no. 24) also located c.2.1km to the north-east of the application site, at Dock Road / Calcutta Road / St. Chads Road, Tilbury. This AQMA is designated for NO₂ from road traffic;”. This has been considered in paragraph 8.75.
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ASSESSMENT METHODOLOGY

Defining the Baseline

Current Baseline Conditions

- 8.1** Existing sources of emissions within the study area have been defined using a number of approaches. The study area is effectively defined by the extent of the road network included in the air quality modelling assessment of the construction and operational road traffic impacts of the Proposed Development. Industrial and waste management sources that may affect the area have been identified using the Department for the Environment, Food and Rural Affairs (Defra) Pollutant Release and Transfer Register¹. Local sources have also been identified through examination of Gravesham Borough Council's (GBC) and Dartford Borough Council's (DBC) Air Quality Review and Assessment reports and a review of aerial mapping.
- 8.2** Information on existing air quality has been obtained by collating the results of monitoring carried out by GBC and DBC. Background concentrations have been defined using the national pollution maps published by Defra². These cover the whole country on a 1x1 km grid. The background annual mean NO₂ maps for 2019 have been calibrated against concurrent measurements from national monitoring sites³. Data for 2019 have been used rather than 2020 as this is the latest year of representative monitoring data (i.e. prior to restrictions imposed during the Covid-19 pandemic). The calibration factor calculated has also been applied to future year backgrounds. Mapped background concentrations of PM₁₀ and PM_{2.5} have not been adjusted. Further details are provided in **ES Volume 3, Appendix: Air Quality – Annex 6**.
- 8.3** Exceedances of the annual mean European Union (EU) limit value for NO₂ in the study area has been identified using the maps of roadside concentrations published by Defra^{4,5}. These are the maps used by the UK Government, together with results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to EU data quality standard, to report exceedances of the limit value to the EU. The national maps of roadside PM₁₀ and PM_{2.5} concentrations, which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.
- 8.4** Current baseline concentrations have been modelled using the ADMS-Roads dispersion model. Details of the model inputs, assumptions and the verification are provided in **ES Volume 3, Appendix: Air Quality – Annex 6**. Where assumptions have been made, a realistic worst-case approach has been adopted, as discussed in paragraphs 8.41 to 8.43.

Future Baseline Conditions

- 8.5** Future baseline concentrations have also been predicted using the ADMS-Roads dispersion model for the first full year of construction (2024) and the first year of occupation of the Proposed Development (2026). Details of the model inputs, assumptions and the verification are provided in **ES Volume 3, Appendix: Air Quality – Annex 6**, together with the method used to derive future year background concentrations. Where assumptions have been made, a realistic worst-case approach has been adopted, as discussed in paragraphs 8.41 to 8.43.

Evolution of the Baseline

- 8.6** If the Proposed Development was not to come forward, it is expected that the site would remain in its current state. Air quality is generally expected to improve with time, due to, for example, more stringent emissions

⁴ Defra (2020) 2020 NO₂ projections data (2018 reference year), Available: <https://uk-air.defra.gov.uk/library/no2ten/2020-no2-pm-projections-from-2018-data>.

⁵ Defra (2022) UK Ambient Air Quality Interactive Map, Available: <https://uk-air.defra.gov.uk/data/gis-mapping>

standards for motor vehicles and the uptake of cleaner vehicles. The likely evolution of the baseline conditions if the Proposed Development did not come forward has been considered in this assessment and is hereafter referred to as the 'Without Proposed Development' scenario. Baseline conditions in the absence of the Proposed Development, but allowing for natural evolution and the inclusion of all relevant cumulative schemes in the surrounding area, are provided in **Table 8.8** and **Table 8.9**.

Impact Assessment Methodology

Assessment Criteria

- 8.7** The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations 2000⁶ and the Air Quality (England) (Amendment) Regulations 2002⁷.
- 8.8** The UK-wide objectives for NO₂ and PM₁₀ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM_{2.5} objective was to be achieved by 2020. Measurements across the UK have shown that the 1-hour NO₂ objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60µg/m³. Where relevant, this value has been used as an indication of the likelihood of the 1-hour mean NO₂ objective being exceeded in the study area. Measurements have also shown that the 24-hour PM₁₀ objective could be exceeded at roadside locations where the annual mean concentration is above 32µg/m³⁸. The predicted annual mean PM₁₀ concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM₁₀ objective. Where predicted annual mean concentrations are below 32µg/m³ it is unlikely that the 24-hour mean objective will be exceeded.
- 8.9** The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. The Department for Environment, Food and Rural Affairs (Defra) explains where these objectives will apply in its Local Air Quality Management Technical Guidance (TG22)⁸. The annual mean objectives for NO₂ and PM₁₀ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for NO₂ applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.
- 8.10** EU Directive 2008/50/EC⁹ sets limit values for NO₂, PM₁₀ and PM_{2.5}, and is implemented in UK law through the Air Quality Standards Regulations¹⁰ (2010)¹¹. The limit values for NO₂ and PM₁₀ are the same numerical concentrations as the UK objectives, whilst the limit value for PM_{2.5} is 20µg/m³. Achievement of these values is a national obligation rather than a local one. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and the Department for Transport's ('DfT's') Joint Air Quality Unit ('JAQU'). This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.
- 8.11** In March 2022, Defra began consultation on new targets for PM_{2.5} concentrations in England. One proposed target is to achieve PM_{2.5} concentration of 10µg/m³ at relevant national monitoring sites by 2040. This would be accompanied by a target to reduce overall population exposure to PM_{2.5}, which will be assessed by national government using its own measurements. If adopted, these targets will apply to national government; it is not yet clear how these will apply to local government and, as such, are not considered further in this assessment.
- 8.12** The relevant air quality criteria for this assessment are provided in **Table 8.1**.

Table 8.1 Air Quality Criteria for NO₂, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Objective
Nitrogen Dioxide (NO ₂)	1-hour mean	200µg/m ³ not to be exceeded more than 18 times a year
	Annual mean	40µg/m ³ ^a
PM ₁₀	24-hour mean	50µg/m ³ not to be exceeded more than 35 times a year
	Annual mean	40µg/m ³ ^b
PM _{2.5} ^c	Annual mean	25µg/m ³

^a A proxy value of 60µg/m³ as an annual mean can be used to assess the likelihood of the 1-hour mean NO₂ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 1-hour mean NO₂ objective are possible⁸

^b A proxy value of 32µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM₁₀ objective are possible⁸

^c The PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Road Traffic Screening Criteria

- 8.13** Environmental Protection UK (EPUK) and the IAQM¹² recommend a two-stage screening approach to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in **ES Volume 3, Appendix: Air Quality - Annex 3**, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5ha, or is non-residential and will provide less than 1,000m² of floorspace or cover a site area of less than 1ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.
- 8.14** The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in **ES Volume 3, Appendix Air Quality: Annex 3**) inside an AQMA are a change in flows of more than 25 heavy duty vehicles or 100 light duty vehicles per day; outside of an AQMA the thresholds are 100 heavy duty vehicles or 500 light duty vehicles. Where these criteria are exceeded, a detailed assessment is required, although the guidance advises that "*the criteria provided are precautionary and should be treated as indicative*", and "*it may be appropriate to amend them on the basis of professional judgement*".
- 8.15** While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also be used them to identify the extent of the road network that requires assessment; where the change in traffic on a given road link is less than the relevant screening threshold, it is unlikely that a significant impact would occur, and these links can be disregarded unless there are additional sources affecting the link (e.g. emissions from a point source).

Demolition and Construction

- 8.16** **ES Volume 1, Chapter 5: Demolition and Construction** outlines the proposed demolition, enabling and construction works. Consideration has been given to the potential for significant effects from the following impacts that will occur during the demolition, enabling and construction stage:
- Dust emissions;
 - Demolition and construction traffic emissions; and
 - Demolition and construction site plant.

⁶ The Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000), HMSO, Available: <http://www.legislation.gov.uk/ukSI/2000/928/contents/made>.

⁷ The Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043 (2002), HMSO, Available: <https://www.legislation.gov.uk/ukSI/2002/3043/contents/made>.

⁸ Defra (2022) Review & Assessment: Technical Guidance LAQM.TG22 August 2022 Version, Defra, Available: <https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf>.

⁹ The European Parliament and the Council of the European Union (2008) Directive 2008/50/EC of the European Parliament and of the Council, Available: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0050>.

¹⁰ The Air Quality Standards Regulations 2010 Statutory Instrument 1001 (2010), HMSO, Available: http://www.legislation.gov.uk/ukSI/2010/1001/pdfs/ukSI_20101001_en.pdf

¹¹ As amended through The Air Quality Standards (Amendment) Regulations 2016 (Available: <https://www.legislation.gov.uk/ukSI/2016/1184/contents/made>) and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (Available: <https://www.legislation.gov.uk/ukSI/2020/1313/contents/made>).

¹² Moorcroft and Barrowcliffe et al. (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2, IAQM, London, Available: <http://iaqm.co.uk/guidance/>.

Demolition and Construction Dust and Particulate Matter Emissions

8.17 The demolition and construction dust assessment considers the potential for impacts within 350m of the site boundary; or within 50m of roads used by construction vehicles. The assessment methodology is that provided by IAQM. This follows a sequence of steps.

- Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required.
- Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site.
- Step 2b defines the sensitivity of the area to any dust that may be raised.
- Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation.
- Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant effects.

8.18 **ES Volume 3, Appendix Air Quality – Annex 5** explains the approach in more detail.

8.19 Demolition and construction will be completed in two phases, as summarised in **ES Volume 1, Chapter 5: Demolition and Construction** as:

- Phase 1 – Plots 1-8, 15-19 and improvements to infrastructure and on-site open space;
- Phase 2 – Plots 9-14 and further open space; and
- Public realm works to be delivered within each phase.

8.20 However, it should be noted that for the purposes of assessment, both phases have been considered as if they were taking place concurrently as a 'worst case' assumption.

Demolition and Construction Traffic

8.21 As set out in paragraph 8.14, EPUK & IAQM¹² consider that a detailed assessment is required where a development leads to an increase in HDV of more than 25 Annual Average Daily Traffic (AADT) in an AQMA. The average number of HDVs accessing the site per day throughout the demolition and construction phase is provided in **ES Volume 1, Chapter 5: Demolition and Construction**. The demolition and construction phase of the Proposed Development will generate, on average, 205 HDV annual average daily trips (AADT) during the peak year of construction works (2026), which exceeds the EPUK/IAQM screening criteria; thus, a detailed assessment of impacts has been carried out to determine the impacts that construction traffic emissions could have on existing sensitive receptors located along the affected routes.

8.22 The main air pollutants of concern related to traffic emissions are NO₂, PM₁₀ and PM_{2.5}. The methodology employed to quantify impacts from construction vehicles emissions is the same as that employed to determine operational road traffic impacts, described in the 'Road Traffic Emissions' section of this ES chapter below. The impacts on annual mean NO₂, PM₁₀ and PM_{2.5} concentrations have been predicted for 2024 (the anticipated first full year of construction works) using traffic flows associated with the peak year of construction (2026); this is considered to be worst-case for the purposes of assessment as air quality is expected to improve over time.

Demolition and Construction Site Plant

8.23 Demolition and construction plant emissions will not be explicitly modelled or assessed, as the relevant guidance from the IAQM states that "experience from assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) [...] 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". However, suitable mitigation measures for Site plant are presented as part of the mitigation measures based on advice presented in the IAQM guidance documents.

8.24 The use of a Construction Environmental Management Plan (CEMP) will ensure emissions generated by Non-Road Mobile Machinery (NRMM) are controlled. It is judged that there will be no risk of significant effects at existing receptors as a result of on-site machinery emissions, and this is not considered further.

Completed Development

8.25 Once operational, the Proposed Development will lead to changes in traffic on the local roads, which may affect air quality at existing sensitive receptors, including nearby residential properties. Emissions associated with

road traffic on local roads may also impact on air quality for future residents and users of the Proposed Development itself. The main air pollutants of concern related to traffic emissions are NO₂, PM₁₀ and PM_{2.5}. An assessment of the operational impacts that the Proposed Development will have on concentrations of these pollutants has been carried out following the methodology presented below.

Road Traffic Emissions

Screening Stage

8.26 The first step in considering the road traffic impacts of the Proposed Development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance¹², as described in **ES Volume 3, Appendix Air Quality – Annex 3**. Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of road traffic emissions, which has been required for this project, as the Proposed Development leads to an increase in traffic greater than the screening criteria on multiple roads, and to determine future air quality conditions at the Proposed Development.

Assessment Scenarios

8.27 NO₂, PM₁₀ and PM_{2.5} concentrations have been predicted for a base year of 2019 (the most recent full calendar year of monitoring data available unaffected by restrictions imposed during the Covid-19 pandemic) and the proposed first year of occupation (2026). For 2026, predictions have been made assuming both that the Proposed Development does proceed ('With Scheme') and does not proceed ('Without Scheme'). It has also been assumed that the traffic generated by the Proposed Development when it is fully complete and operational (anticipated to be 2031) is generated in 2026. This will have overestimated the traffic emissions and hence the predicted 2026 concentrations. In reality, the Proposed Development will not be fully completed until 2031 at the earliest.

8.28 Predictions for 2026 are based on a return to 'typical' activity levels and assume no impact as a result of the Covid-19 pandemic in this year, to ensure a worst-case assessment (as the influence of the pandemic has generally been to reduce concentrations of the pollutants considered in this assessment); see paragraphs 8.35 and 8.36.

Modelling Methodology

8.29 Concentrations NO₂, PM₁₀ and PM_{2.5} have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's latest Emission Factor Toolkit (EFT) (v11.0)². Details of the model inputs and the verification are provided in **ES Volume 3, Appendix: Air Quality – Annex 6**, together with the method used to derive base and future year background concentrations. Where assumptions have been made, a realistic worst-case approach has been adopted.

Traffic Data

8.30 Traffic data for the assessment have been provided by the transport consultant, who have undertaken the Transport Assessment (TA) for the Proposed Development (see **ES Volume 3, Appendix: Traffic and Transport – Annex 1**). Further details of the traffic data used in this assessment are provided in **ES Volume 3, Appendix: Air Quality – Annex 6** and **ES Volume 1, Chapter 7: Traffic and Transport**.

8.31 The traffic data provided for 2031 includes the predicted baseline and development flows for when the Proposed Development is fully complete and operational. These flows have been used for the assessment of concentrations and impacts in 2026 (first year of occupation). This provides a conservative assessment as pollutant concentrations are expected to decline in the future. The data also includes contributions from all Tier 1 cumulative schemes (**ES Volume 1, Chapter 2: EIA Methodology**), which would affect flows on the roads included in this assessment. As such, predictions of future pollutant concentrations presented in this ES chapter are considered to be worst-case and take account of any cumulative effects.

Uncertainty

8.32 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

8.33 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see **ES Volume 3, Appendix: Air Quality – Annex 6**). This can only be done for the road traffic model. Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2019) concentrations.

8.34 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions. Historically, Defra's EFT had a tendency to over-state emissions reductions into the future. However, analysis of the most recent versions of Defra's EFT carried out by AQC^{13,14} suggest that, on balance, these versions are unlikely to over-state the rate at which NOx emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NOx concentrations are most likely to decline more quickly in the future, on average, than predicted by the EFT, especially against a base year of 2016 or later. Using EFT v11.0 for future-year forecasts in this report thus provides a robust assessment, given that the model has been verified against measurements made in 2019.

8.35 Forecasts of future-year concentrations are usually based on measurements made during a recent year. They then take account of projected changes over time to factors such as the composition of the vehicle fleet and the uptake of other new technologies, as well as population increases etc. In early 2020, activity in the UK was disrupted by the Covid-19 pandemic. As a result, concentrations of traffic-related air pollutants fell appreciably¹⁵. While the pandemic may cause long-lasting changes to travel activity patterns, it is reasonable to expect a return to more typical activity levels in the future. 2020 is thus likely to present as an atypically low pollution year for roadside pollutant concentrations, as is 2021.

8.36 It is not currently possible to make robust predictions of the rate at which travel activity patterns will return to historically-normal levels; or the extent of any long-lasting changes to travel behaviour. The most robust approach to making future-year projections is thus to base these on measurements made during 2019, and to use activity forecasts made before the impact of the pandemic was understood, which is the approach that has been taken in this assessment.

Shipping Emissions

8.37 Seacon Terminals Ltd, which operates a small fleet of cargo ships, is located immediately to the north of the Site. Shipping is associated with emissions of sulphur dioxide (SO₂), which could impact the air quality conditions experienced by future residents of the proposed development. However, Defra's LAQM Technical Guidance document (TG22)⁸ states that *"it is likely that all sources of concern have been assessed in previous round of Review and Assessment. However, in case of port extension, leading to a likely increase in shipping activity, or new exposure near existing emissions sources, local authorities may need to reassess these, by checking the following:*

- *Are there more than 5,000 large ship movements per year, with relevant exposure within 250m of the berths and main areas of manoeuvring; or*
- *Are there more than 15,000 large ship movements per year, with the relevant exposure within 1km of these areas?"*

8.38 The main areas of emissions associated with the operations of Seacon Terminals Ltd are within 250m of the nearest proposed new receptor within the Proposed Development, however the activities are much smaller in magnitude than those set out above; Seacon Terminals Ltd operates a fleet of two ships. It is therefore considered very unlikely that emissions associated with shipping activities would lead to unacceptable air quality conditions for future residents of the Proposed Development.

8.39 Tilbury Docks are located approximately 850m to the northeast of the Proposed Development. While this is a larger operation than Seacon Terminals Ltd, it is located downwind of the Proposed Development under prevailing wind condition; pollutants from shipping activities in Tilbury Docks will predominantly affect locations to the northeast of the Docks. Thurrock District Council (TDC) has declared AQMA no 24 adjacent to Tilbury Docks, as a result of emissions from road traffic. As part of the Local Air Quality Management (LAQM) regime, TDC has a duty to consider emissions from shipping activities and where there is a risk of concentrations exceeding the relevant objectives, to declare an AQMA. On the basis that there are existing residential properties within 250m / 1km of berths and main areas of manoeuvring within Tilbury Docks, and that TDC has not declared an AQMA as a result of shipping emissions, it can be concluded that shipping emissions from Tilbury Docks have been found in previous rounds of Review and Assessment to not result in a risk of causing objective exceedances. Taking these factors into consideration, it is therefore considered very unlikely that

emissions associated with shipping activities at Tilbury Docks would lead to unacceptable air quality conditions for future residents of the Proposed Development.

8.40 Emissions from shipping have therefore not been considered further in this assessment.

Assumptions and Limitations

Demolition and Construction

8.41 The demolition and construction dust risk assessment has assumed that measures described in **ES Volume 1, Chapter 5: Demolition and Construction** and **ES Volume 1, Chapter 18: Environmental Mitigation and Monitoring Schedule** will be in place.

8.42 The assessment of construction traffic impacts has assumed that peak construction traffic flows will be generated in 2024. In reality, peak construction traffic flows will not be generated until 2026, thus the assessment has overestimated traffic emissions, and consequently concentrations and impacts associated with construction traffic. This provides a conservative assessment as air quality is expected to improve over time.

Completed Development

8.43 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:

- That the Proposed Development and all relevant cumulative schemes are complete and fully operational in 2026. This will have overestimated the traffic emissions and the predicted 2026 concentrations. In reality, the Proposed Development will not be fully completed until 2031 at the earliest, thus it will not be generating its full traffic volumes until this year. Also, not all relevant cumulative schemes will be complete and operational by 2026;
- That the maximum parameters are sought for approval, representing the maximum building footprint and massing. This would lead to the largest possible operational traffic flows and construction activities. Proposed receptors have also been placed along the façade at locations closest to road sources. This represents a worst-case scenario;
- That the London City meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in **ES Volume 3, Appendix Air Quality – Annex 6**); and
- The assumption that travel activity patterns in the future year of 2026 will return to historically-normal levels (i.e. pre-pandemic) with no long-lasting changes to travel behaviour.

Methodology for Defining Effects

Receptors and Receptor Sensitivity

Demolition and Construction Works

8.44 The IAQM, in their guidance on construction dust, provides criteria to define receptor sensitivity to dust soiling or health effects of PM₁₀ (see **Table A4.2 in ES Volume 3, Appendix: Air Quality – Annex 5**). Residential properties are considered as high sensitivity receptors to both dust soiling and health effects of PM₁₀, while commercial properties are medium sensitivity. The Proposed Development is therefore also considered to introduce high sensitivity receptors.

Completed Development

8.45 The 2007 Air Quality Strategy¹⁶ explains that air quality standards and objectives were determined based on expert recommendations, and represent *"levels at which no significant health effects would be expected in the population as a whole"*. The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance². The annual mean objectives for NO₂ and PM₁₀ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do

¹³ AQC (2020) Performance of Defra's Emission Factor Toolkit 2013-2019, Available:

<https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=7fba769d-f1df-49c4-a2e7-f3dd6f316ec1>.

¹⁴ AQC (2020) Comparison of EFT v10 with EFT v9, Available: <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=9d6b50e1-3897-46cf-90f1-3669c6814f1d>.

¹⁵ Defra Air Quality Expert Group (2020) Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK- Rapid evidence review, Available: https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2007010844_Estimation_of_Changes_in_Air_Pollution_During_COVID-19_outbreak_in_the_UK.pdf.

¹⁶ Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra.

not apply at hotels. The 24-hour mean objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for NO₂ applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

- 8.46 Within this ES chapter, all receptors where the air quality objectives apply are considered to be of high sensitivity. Locations where the objectives do not apply must be considered not to be sensitive, therefore there are no medium or low sensitivity receptors within the context of this assessment.

Magnitude of Impact

Demolition and Construction Works

- 8.47 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the IAQM has been used. The risk of dust impacts for each activity (i.e. demolition, earthworks, construction and the trackout of material from the site onto the local road network) is determined by:

- firstly, the 'dust emission magnitude' is determined for each of the four activities listed above, and is defined as 'small', 'medium' or 'large' (Step 2a, see **Table A5.1** in **ES Volume 3, Appendix Air Quality – Annex 5**); then
- the sensitivity of the area to dust soiling and human health effects is determined based on the number of receptors located within certain distances from the site, and their sensitivity (Step 2b, see **Tables A5.2** to **A5.5** in **ES Volume 3, Appendix Air Quality – Annex 5**). Area sensitivities are defined for each type of effect (dust soiling or human health) and are described as 'low', 'medium' or 'high'; then
- the dust emission magnitudes determined at Step 2a are combined with the sensitivities of the area determined at Step 2b to determine the risk of dust soiling and human health impacts for each activity, with no mitigation applied. Risks are defined as 'negligible', 'low', 'medium' or 'high'.

- 8.48 Full details of this approach are provided in **ES Volume 3, Appendix: Air Quality – Annex 5**.

- 8.49 For the assessment of enabling and construction traffic impacts, the approach described below and summarised in **Table 8.2** has been adopted, utilising the EPUK & IAQM guidance¹².

Completed Development

- 8.50 There is no official guidance in the UK in relation to development control on how to describe air quality impacts and effects, nor how to assess their significance. The approach developed jointly by EPUK & IAQM¹² has therefore been used. This includes defining descriptors of the impacts at individual receptors, which take account of the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective.

- 8.51 **Table 8.2** sets out how impact descriptors have been determined within this assessment, being an adapted version of the table presented in **ES Volume 3, Appendix: Air Quality – Annex 3**. For the assessment criterion the term Air Quality Assessment Level (AQAL) has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 8.2 Air Quality Impact Scale Descriptors for Individual Receptors for All Pollutants ^a

Long-term average concentration at receptor in assessment year ^{b,c}				Change in concentration relative to AQAL ^{c,d}				
% of AQAL	Annual Mean NO ₂ (µg/m ³)	Annual Mean PM ₁₀ (µg/m ³)	Annual Mean PM _{2.5} (µg/m ³) ^e	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Less than 30.2	Less than 30.2	Less than 18.9	Negligible	Negligible	Negligible	Minor	Moderate
76-94% of AQAL	30.2 – 37.8	30.2 – 37.8	18.9 – 23.6	Negligible	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	37.8 – 41.0	37.8 – 41.0	23.6 – 25.6	Negligible	Minor	Moderate	Moderate	Major

Long-term average concentration at receptor in assessment year ^{b,c}				Change in concentration relative to AQAL ^{c,d}				
% of AQAL	Annual Mean NO ₂ (µg/m ³)	Annual Mean PM ₁₀ (µg/m ³)	Annual Mean PM _{2.5} (µg/m ³) ^e	0%	1%	2-5%	6-10%	>10%
103-109% of AQAL	41.0 – 43.8	41.0 – 43.8	25.6 – 27.4	Negligible	Moderate	Moderate	Major	Major
110% or more of AQAL	More than 43.8	More than 43.8	More than 27.4	Negligible	Moderate	Major	Major	Major

^a Values are rounded to the nearest whole number.
^b This is the 'Without Proposed Development' concentration where there is a decrease in pollutant concentration and the 'With Proposed Development' concentration where there is an increase.
^c AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
^d Minor and Major are used as standard EIA terminology, and correspond to Slight and Substantial respectively in relevant guidance¹².
^e For annual mean PM_{2.5} concentrations, these have been assessed against both the air quality objective (25 µg/m³).

Defining the Effect

Geographic Extent of Effects

Demolition and Construction Works

- 8.52 Dust generated by the Proposed Development during enabling, demolition and construction has the potential to cause effects at a local and borough level (up to 350m from the site boundary).

- 8.53 Emissions of pollutants associated with development-generated vehicle movements during the demolition and construction phase of the Proposed Development have the potential to cause air quality effects at a local and borough level.

Completed Development

- 8.54 Emissions of pollutants associated with operation of the Proposed Development have the potential to cause air quality effects at a local and borough level.

Effect Duration

Demolition and Construction Works

- 8.55 Dust generated by the Proposed Development during demolition and construction has the potential to cause temporary medium-term effects over the approximate 8-year construction period.

Completed Development

- 8.56 Emissions of pollutants associated with operation of the Proposed Development have the potential to cause permanent long-term effects.

Direct and Indirect Effects

Demolition and Construction Works

- 8.57 Dust generated by the Proposed Development during demolition and construction has the potential to cause direct effects.

- 8.58 Emissions of pollutants associated with Development-generated vehicle movements during the demolition and construction phase of the Proposed Development have the potential to cause direct effects.

Completed Development

- 8.59 Emissions of pollutants associated with operation of the Proposed Development (namely, from road traffic) and impacts of air quality on the Proposed Development have the potential to cause direct effects.

Categorising the Likely Significant Effects

Demolition and Construction Dust

- 8.60** Guidance from the IAQM is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. The assessment thus focuses on determining the appropriate level of mitigation to ensure that effects will normally be 'not significant'.

Completed Development

- 8.61** It is important to differentiate between the terms impact and effect with respect to the assessment of air quality. The term impact is used to describe a change in pollutant concentration at a specific location. The term effect is used to describe an environmental response resulting from an impact, or series of impacts. Within this ES chapter, the air quality assessment has used published guidance and criteria to determine the likely air quality impacts at a number of sensitive locations (see **Table 8.2**). The overall significance of the air quality effects is then determined using professional judgement, giving consideration to various factors including the magnitude of the predicted impacts, the conservative assumptions made in the assessment and the presence of any objective exceedances; full details of the EPUK/IAQM approach are provided in **ES Volume 3, Appendix: Air Quality – Annex 3**.

Site Suitability

- 8.62** The assessment considers the suitability of the site for residential development. If pollutant concentrations are anticipated to be above any national air quality objectives the effects will be considered significant. If there is not anticipated to be any breaches of the national air quality objectives, when the Proposed Development is first occupied, the effects will be considered to be not significant.

RECEPTORS AND RECEPTOR SENSITIVITY

Existing Receptors

Demolition and Construction Works

- 8.63** The guidance followed when carrying out the construction dust assessment requires the number of receptors within certain distance bands to be established in order to determine the sensitivity of the surrounding area, rather than focussing on impacts at individual receptors. It is, therefore, not necessary to set out specific receptors for the assessment of impacts during the construction and demolition works.
- 8.64** The construction dust assessment considers the potential for impacts within 350m of the site boundary, or within 50m of roads used by construction vehicles within 500m of the site.
- 8.65** For the assessment of demolition and construction traffic, the contribution of construction traffic emissions to local concentrations has been predicted at all existing receptor locations within the study area (see receptors in **Table 8.3**) for consistency.

Completed Development

- 8.66** Concentrations of NO₂, PM₁₀ and PM_{2.5} have been predicted at a number of locations close to the Proposed Development. Receptors have been identified to represent worst-case exposure, being located on the façades of the sensitive properties closest to the local road network. When selecting roadside receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links.
- 8.67** Twenty-one existing properties have been identified as receptors for the assessment. All receptors considered in the operational impact assessment are of high sensitivity, as set out in paragraph 8.46. Selected receptor locations are described in **Table 8.3** and displayed on **Figure 8.1**.

Table 8.3 Description of Existing Receptor Locations

Receptor	Description	Heights (m) ^a
R1	Existing residential property at 49/50 Stonebridge Road	1.5
R2	Existing residential property at 50 Railway Street	1.5
R3	Existing residential property at 36/37 Railway Street	1.5
R4	Existing residential property at 3A High Street, Swanscombe	1.5

Receptor	Description	Heights (m) ^a
R5	Existing residential property (10 Galley Hill Rd) adjacent to Proposed Development and A226	1.5
R6	Existing residential property adjacent to A226	1.5
R7	Existing nursery adjacent to A226	1.5
R8	Existing residential first-floor flat at junction between A226/High St/Pilgrims' Road	4.5
R9	Existing residential property at junction between A226/High St/Pilgrims' Road	1.5
R10	Existing residential property at junction between A226 and Craylands Ln	1.5
R11	Existing residential property adjacent to A226	1.5
R12	Existing residential property adjacent to A226	1.5
R13	Existing residential property adjacent to junction of A226/Ingress Park Ave	1.5
R14	Existing residential property on raised bank adjacent to A226	2.5
R15	Existing residential property adjacent to roundabout of A226 & B255	1.5
R16	Existing residential property adjacent to A226	1.5
R17	Existing residential property adjacent to A226	1.5
R18	Existing residential property adjacent to A226	1.5
R19	Existing residential property adjacent to A226	1.5
R20	Existing residential property adjacent to roundabout of A226 & B255	1.5
R21	Existing residential property adjacent to A226	1.5

^a A height of 1.5m is used to represent ground-floor level exposure, whilst 4.5m represents first floor level. R14 has ground floor level exposure but is elevated relative to the adjacent road, and a height of 2.5m has been utilised in the model.

Figure 8.1 Existing Receptor Locations



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8.68 Selected receptors may be representative of air quality conditions at a number of properties; consideration has been given to how many sensitive locations each modelled receptor represents when considering the impacts of the Proposed Development and the overall significance of effects.

Introduced Receptors

Demolition and Construction

8.69 The construction dust assessment has given consideration to the potential for new receptors (both residential and commercial) to be introduced within the Proposed Development while works are ongoing. As explained in paragraph 8.63, it is not necessary to set out specific receptors for the assessment of impacts during the construction and demolition works.

Completed Development

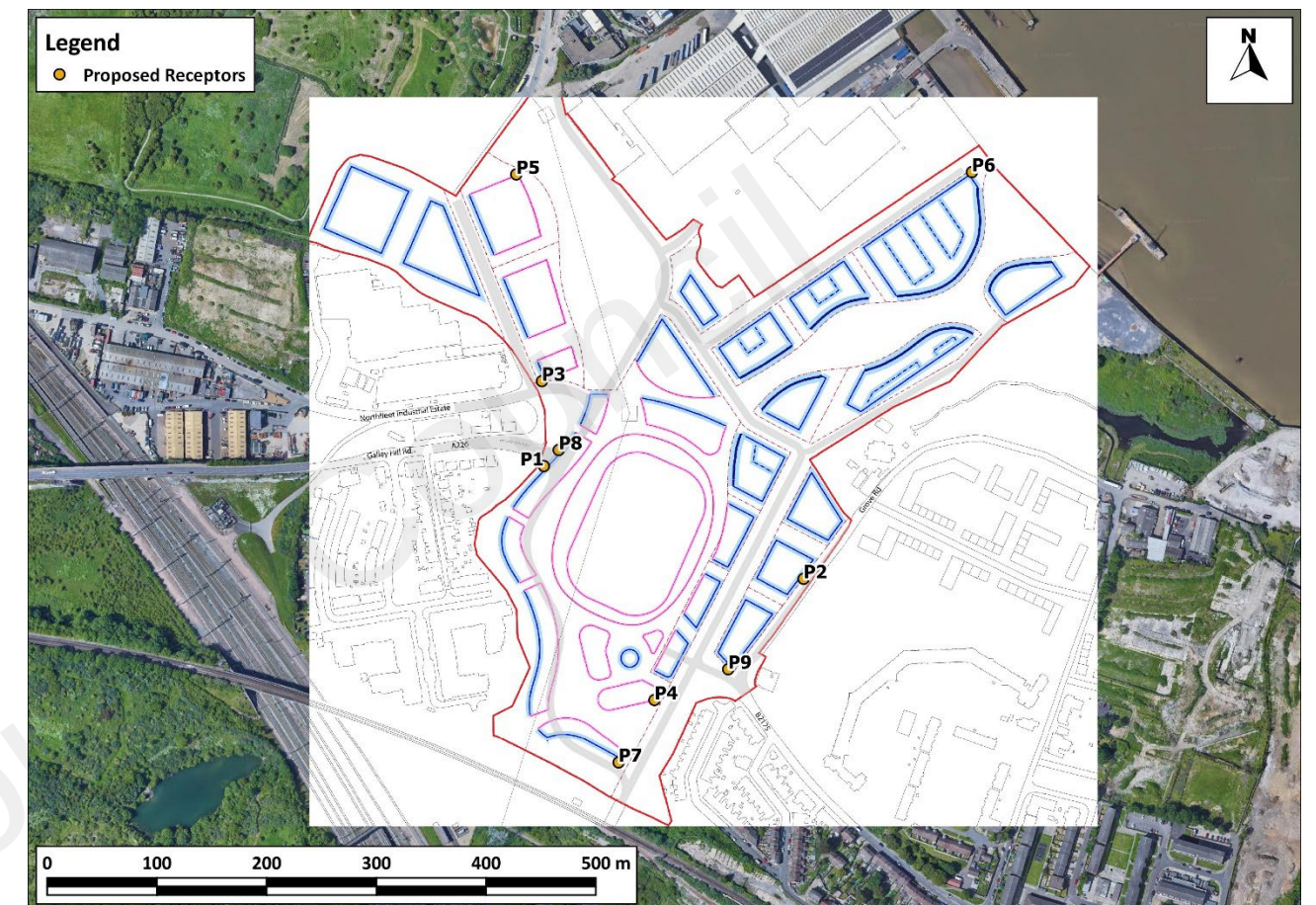
8.70 Nine receptor locations have been identified within the Proposed Development (as set out in **Table 8.4** and **Figure 8.2**), which will be exposed to existing and proposed sources. These receptors are again all of high sensitivity.

Table 8.4 Description of Introduced Receptor Locations

Receptor	Description	Heights (m) ^a
P1	Building façade in Plot 2 above proposed podium 'tunnel' (northwest entrance/exit)	9.5
P2	Building façade in Plot 7 adjacent to Grove Rd	1.5
P3	Building façade in Plot 17 adjacent to proposed new road layout	1.5
P4	Building façade in Plot 2 adjacent to proposed new road layout	1.5
P5	Building façade in Plot 18 (closest to nearby industrial sources)	1.5
P6	Building façade in Plot 12 closest to Seacon Ferry terminal	1.5
P7	Building façade in Plot 2 above proposed tunnel (southern entrance/exit)	9.5
P8	Building façade in Plot 2 above proposed tunnel (northwest entrance/exit)	9.5
P9	Building façade in Plot 6 adjacent to proposed B2175 junction	1.5

^a A height of 1.5m is used to represent ground-floor level exposure; receptors at 9.5m represent exposure above the proposed podium tunnel.

Figure 8.2 Proposed Receptor Locations ^a



Imagery ©2022 Bluesky, Getmapping plc, Infoterra Ltd, Maxar Technologies, The GeoInformation Group. Contains data from unstudio architects, drawing code: NFH-UNS-MAST-DR-1010

^a Proposed receptors placed at worst-case locations based on the maximum footprint and massing sought for approval.

BASELINE CONDITIONS

Current Baseline Conditions

Industrial Sources

8.71 A search of the UK Pollutant Release and Transfer Register (PRTR) website¹ has identified one industrial source in proximity to the Proposed Development. Britannia Refined Metals is located immediately to the northernmost extent of the site and carries out a number of metal refining processes that potentially result in emissions of particulate matter and heavy metals. Information on the impacts of these emissions on the surrounding area was requested from the Environment Agency; at the time of writing, a response had not been received, however, based upon professional judgement, it is not anticipated that this source would contribute significantly to any air quality objective exceedances. The Proposed Development is upwind of Britannia Refined Metals and it is also understood that the activities at this location are a permitted process regulated by the EA, whereby activities are a contained process, with emissions managed via abatement on extraction systems, etc.

8.72 A number of light industrial processes exist within the site boundary, and will be removed as the Proposed Development is built out. Based on the Indicative Construction Timetable (presented in **ES Volume 1, Chapter 5: Demolition and Construction**), the entire area within Phase 1 will be demolished prior to construction commencing (and thus prior to any occupation). Aggregate Industries Asphalt is located within Phase 2; demolition of buildings within Phase 2 will commence in Q1 of Year 6, and therefore industrial activities in this area will cease prior to this date. The majority of Phase 1, including the closest Plots to Phase 2, will not be completed (and thus occupied) until Year 5. Only a small number of Plots, furthest from Phase 2 will be completed prior to Year 5; this includes residential properties in Plots 18 and 19, at least 200m from the boundary of Phase 2. These Plots will be shielded from any ongoing activities in Phase 2 by hoarding erected

around the ongoing construction areas, as well as by new buildings being constructed in later Plots. Phase 2 is also downwind of Phase 1 for the majority of the time. Taking account of the distance between occupied residential Plots, the prevailing wind direction, and the short period of overlap of occupation and the potential ongoing industrial activities within Phase 2, it is judged unlikely that these temporary activities will result in any significant effects.

- 8.73** TDC requested that consideration be given to the potential impacts of a cementitious products manufacturing facility proposed at berth 40A of Tilbury Freeport (planning reference: 22/00466/FUL). This facility would be over 1.4km to the northeast of the Proposed Development, on the opposite side of the River Thames. The air quality assessment submitted in support of the application considered road traffic impacts only and found that impacts at the closest residential properties would be negligible. The impact of any additional road traffic emissions generated by the proposed manufacturing facility would therefore have a negligible impact on the Proposed Development, particularly as there is no direct route from Tilbury to the Study Area. No other potential emissions were identified.

Air Quality Management Areas

- 8.74** GBC has declared multiple Air Quality Management Areas (AQMAs), including the Northfleet Industrial Area AQMA for exceedances of the 24-hour particulate matter (PM₁₀) objective; the Proposed Development is located within this area. The neighbouring DBC has also declared multiple AQMAs, including the Dartford AQMA No.2 along the A226 corridor for exceedances of the annual mean nitrogen dioxide (NO₂) objective; the Proposed Development is also partially within this area. The nearby AQMAs are shown in **Figure 8.3**.
- 8.75** There is also an AQMA (no. 24) declared across the River Thames in Thurrock for exceedances of the annual mean NO₂ objective; although this is within 2.1 km of the Proposed Development, it is located on the opposite side of the River Thames, with no direct route, and is outside of the Study Area. The assessment has considered impacts of Development-generated traffic within the nearest AQMA, where impacts will be greatest.

Local Air Quality Monitoring

- 8.76** GBC operates two automatic (NO₂ and PM₁₀) monitoring stations within the Borough, of which one (ZG3) is located approximately 750m south-east of the Proposed Development. GBC also operates a number of NO₂ monitoring sites closer to the Proposed Development using diffusion tubes, including seven monitoring sites within approximately 2km. Additionally, DBC operates a number of NO₂ diffusion tube monitoring sites, including four within approximately 2km of the site.
- 8.77** The latest monitoring data are shown in **Table 8.5** and the monitoring locations are displayed in **Figure 8.3**.

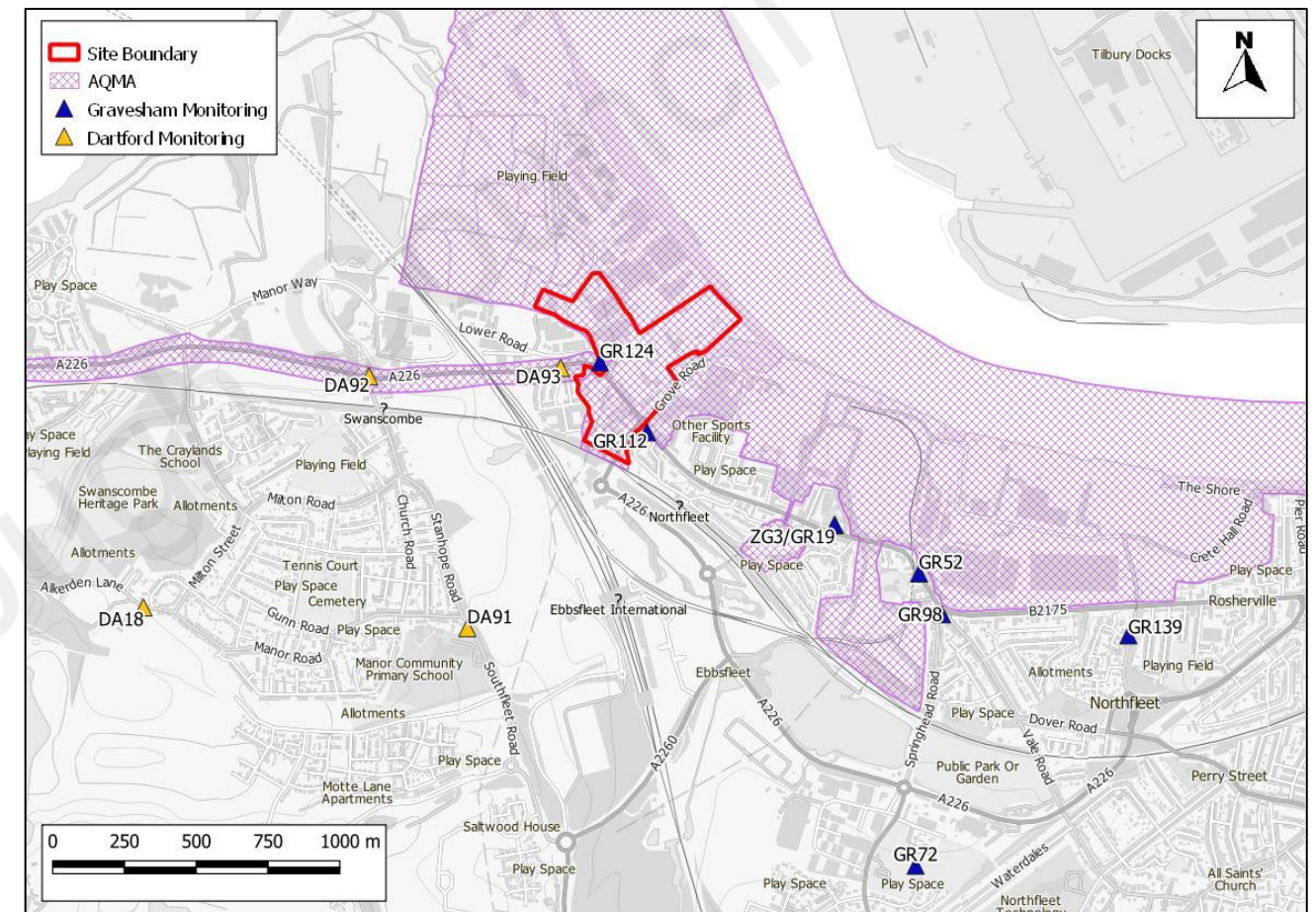
Table 8.5 Summary of Annual Mean NO₂ Monitoring (µg/m³) (2016-2020) ^a

Site ID	Site Type	Location	2016	2017	2018	2019	2020
GBC Monitoring Results ¹⁷							
ZG3	Industrial Background	Lawn Primary School	24.1	23.9	23.5	24.5	22.0
GR19	Industrial Background	Lawn Primary School (co-located with ZG3)	23.2	23.2	23.3	23.2	20.6
GR52	Roadside	32 The Hill	32.9	34.7	36.4	32.6	27.5
GR72	Background	Northfleet Cemetery	24.1	25.2	23.9	24.4	20.8
GR98	Roadside	The Leather Bottle PH	32.7	32.0	33.5	33.2	28.5
GR112	Roadside	50 Stonebridge	33.2	34.3	34.8	35.7	30.1
GR124	Roadside	Stonebridge Road	31.1	32.7	30.4	31.0	29.0
GR139	Roadside	Rosherville Way	-	37.6	30.5	34.0	31.5
DBC Monitoring Results ¹⁸							
DA18	Urban Background	Alkerdane Lane	26.1	25.3	25.8	26.3	26.2
DA91	Roadside	13 Southfleet Road	33.6	33.3	33.4	32.6	30.9
DA92	Roadside	Pilgrims Road/London Road	44.3	41.6	42.5	35.2	38.1

¹⁷ Gravesham Borough Council (2021) Air Quality Annual Status Report 2020

Site ID	Site Type	Location	2016	2017	2018	2019	2020
DA93	Roadside	Snowden Hill/London Road	42.9	40.3	41.0	38.2	40.1
Objective			40				
^a Exceedances of the objective are shown in bold.							

Figure 8.3 Site Boundary, Nearby Monitoring Locations and AQMAs



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- 8.78** As shown in **Table 8.5**, monitoring sites DA92 and DA93 recorded exceedances of the annual mean NO₂ objective between 2016 and 2018, and DA93 recorded a marginal exceedance in 2020. Concentrations have, however, remained well below 60µg/m³ at all sites, indicating exceedances of the 1-hour mean objective are unlikely. There was no clear overall trend in concentrations between 2016 and 2019.
- 8.79** While 2020 results have been presented for completeness, they will not be relied upon in any way as they are not representative of 'typical' air quality conditions due to the impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations. Data for 2021 have not yet been published. Therefore, concentrations measured in 2019 are used as the baseline for the assessment presented in this ES chapter.
- 8.80** GBC also measures PM₁₀ concentrations at all automatic monitoring stations within its administrative boundary, including the ZG3 automatic monitor. The latest PM₁₀ monitoring data are shown in **Table 8.6**.

¹⁸ Dartford Borough Council (2021) Air Quality Annual Status Report 2021

Table 8.6 Summary of PM₁₀ Monitoring (2016-2020)

Site ID	Site Type	Location	2016	2017	2018	2019	2020
Annual Mean PM ₁₀ Concentrations (µg/m³)							
ZG3	Industrial Background	Lawn Primary School	18.0	19.4	21.9	22.3	21.2
Objective			40				
No. of Daily Exceedances of 50 µg/m³							
ZG3	Industrial Background	Lawn Primary School	2	4	3	10	8
Objective			35				

8.81 As shown in **Table 8.6**, no exceedances of the annual or daily mean PM₁₀ objectives have been recorded in recent years.

Exceedances of EU Limit Values

8.82 There are no AURN monitoring sites within the study area with which to identify exceedances of the annual mean NO₂ limit value¹⁹. Defra's roadside annual mean NO₂ concentrations maps, which are used to report exceedances of the limit value to the EU, do not identify exceedances of this limit value in the study area in 2019. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the Proposed Development by the time that it is operational.

Background Concentrations

8.83 Estimated background concentrations in the study area are set out in **Table 8.7** and have been derived as described in **ES Volume 3, Appendix Air Quality – Annex 6**. The background concentrations are all well below the objectives.

Table 8.7 Estimated Annual Mean Background Pollutant Concentrations in 2019, 2024 and 2026 (µg/m³)

Year	NO ₂	PM ₁₀	PM _{2.5}
2019	19.6 – 26.0	15.5 – 17.2	10.5 – 11.7
2024	16.5 – 23.1	14.5 – 16.1	9.7 – 10.9
2026	15.6 – 22.3	14.3 – 15.9	9.6 – 10.8
Objective	40	40	25
A range of values is presented as the study area covers multiple 1x1 km grid squares. ^a The 25µg/m ³ PM _{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.			

Future Baseline Conditions / Do Nothing Scenario

8.84 Baseline concentrations of NO₂, PM₁₀ and PM_{2.5} have been modelled at each of the existing receptor locations (see **Figure 8.1** and **Table 8.3** for receptor locations). The results, which cover both the existing (2019) and future year (2024 and 2026) baseline (Without Scheme), are set out in **Table 8.8** and **Table 8.9**. The modelled road components of nitrogen oxides, PM₁₀ and PM_{2.5} have been increased from those predicted by the model based on a comparison with local measurements (see **ES Volume 3, Appendix Air Quality – Annex 6** for the verification methodology).

Table 8.8 Modelled Annual Mean Baseline Concentrations of NO₂ (µg/m³) at Existing Receptors ^a

Receptor	2019	2024 Without Scheme	2026 Without Scheme
R1	34.3	26.1	24.1
R2	32.8	24.9	23.1

¹⁹ Defra (2021) Defra AURN Archive, Available: <https://uk-air.defra.gov.uk/interactive-map?network=aurn>.

Receptor	2019	2024 Without Scheme	2026 Without Scheme
R3	27.5	22.0	20.6
R4	25.9	20.6	19.2
R5	34.8	26.3	24.2
R6	34.3	26.0	24.0
R7	35.2	26.6	24.5
R8	26.2	20.5	19.1
R9	33.1	24.4	22.3
R10	32.4	23.8	21.7
R11	29.1	22.0	20.2
R12	29.4	22.2	20.4
R13	37.7	27.0	24.4
R14	36.1	26.7	24.3
R15	39.9	29.5	26.7
R16	36.4	27.4	25.0
R17	34.7	26.3	24.1
R18	29.0	22.7	21.0
R19	41.3	29.5	26.7
R20	40.5	29.5	26.7
R21	32.0	23.7	21.7
Objective	40		
^a Exceedances of the objective are shown in bold.			

Table 8.9 Modelled Annual Mean Baseline Concentrations of PM₁₀ and PM_{2.5} (µg/m³) at Existing Receptors

Receptor	PM ₁₀			PM _{2.5}		
	2019	2024 Without Scheme	2026 Without Scheme	2019	2024 Without Scheme	2026 Without Scheme
R1	16.8	15.8	15.6	11.4	10.5	10.4
R2	16.7	15.7	15.5	11.3	10.5	10.3
R3	16.5	15.5	15.3	11.2	10.4	10.2
R4	17.4	16.3	16.2	11.9	11.1	10.9
R5	16.8	15.7	15.6	11.4	10.5	10.4
R6	16.8	15.7	15.6	11.4	10.5	10.4
R7	16.9	15.9	15.7	11.4	10.6	10.4
R8	17.3	16.2	16.1	11.9	11.0	10.9
R9	17.7	16.6	16.4	12.1	11.2	11.1
R10	17.2	16.1	15.9	11.6	10.8	10.7
R11	17.2	16.1	15.9	11.6	10.8	10.6
R12	17.2	16.1	16.0	11.6	10.8	10.7
R13	17.5	16.4	16.2	11.8	10.9	10.8

Receptor	PM ₁₀			PM _{2.5}		
	2019	2024 Without Scheme	2026 Without Scheme	2019	2024 Without Scheme	2026 Without Scheme
R14	18.2	17.1	17.0	12.2	11.3	11.2
R15	18.3	17.2	17.1	12.3	11.4	11.3
R16	18.1	17.0	16.9	12.3	11.4	11.3
R17	18.1	17.0	16.8	12.3	11.4	11.3
R18	17.7	16.7	16.5	11.9	11.1	10.9
R19	18.3	17.2	17.0	12.3	11.4	11.2
R20	18.3	17.2	17.1	12.3	11.4	11.3
R21	17.4	16.3	16.2	11.8	10.9	10.8
Assessment Criterion	32 ^a			25 ^b		
^a While the annual mean PM ₁₀ objective is 40µg/m ³ , 32µg/m ³ is the annual mean concentration above which an exceedance of the 24-hour mean PM ₁₀ objective is possible, as outlined in LAQM.TG22. A value of 32µg/m ³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM ₁₀ objective, as recommended in EPUK & IAQM guidance.						
^b The 25µg/m ³ PM _{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.						

8.85 The predicted annual mean concentrations of NO₂ are above the objective in 2019 at two receptors, but by 2024 and 2026 baseline concentrations at every receptor are predicted to be well below the objective. The annual mean NO₂ concentrations are below 60µg/m³ at every receptor in all years; it is, therefore, unlikely that the 1-hour mean NO₂ objective will be exceeded (see paragraph 8.8).

8.86 The predicted annual mean concentrations of PM₁₀ and PM_{2.5} are well below the objectives in all years at all receptors. The annual mean PM₁₀ concentrations are below 32µg/m³ and it is, therefore, unlikely that the 24-hour mean PM₁₀ objective will be exceeded.

POTENTIAL EFFECTS

Demolition and Construction Traffic

8.87 Predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} in 2024 for existing receptors, taking account of emissions from the adjacent road network, are set out in **Table 8.10** to **Table 8.12** for both the “Without Development” and “With Development” scenarios. These tables also describe the impacts at each receptor using the impact descriptors given in **Table 8.2**.

NO₂

Table 8.10 Predicted Impacts on Annual Mean NO₂ Concentrations in 2024 (µg/m³)

Receptor	Without Development (µg/m ³)	With Development (µg/m ³)	% Change ^a	Impact Descriptor
R1	26.1	26.2	0	Negligible
R2	24.9	25.1	0	Negligible
R3	22.0	22.0	0	Negligible
R4	20.6	20.7	0	Negligible
R5	26.3	26.4	0	Negligible
R6	26.0	26.2	0	Negligible
R7	26.6	26.7	0	Negligible
R8	20.5	20.6	0	Negligible
R9	24.4	24.5	0	Negligible
R10	23.8	23.8	0	Negligible

Receptor	Without Development (µg/m³)	With Development (µg/m³)	% Change ^a	Impact Descriptor
R11	22.0	22.0	0	Negligible
R12	22.2	22.2	0	Negligible
R13	27.0	27.1	0	Negligible
R14	26.7	26.7	0	Negligible
R15	29.5	29.5	0	Negligible
R16	27.4	27.4	0	Negligible
R17	26.3	26.4	0	Negligible
R18	22.7	22.7	0	Negligible
R19	29.5	29.6	0	Negligible
R20	29.5	29.6	0	Negligible
R21	23.7	23.8	0	Negligible
Objective	40		-	-
^a % changes are relative to the objective and have been rounded to the nearest whole number.				

8.88 As shown in **Table 8.10**, the annual mean NO₂ concentrations predicted to be well below the objective at all of the modelled receptors in 2024. The percentage changes, when rounded, are predicted to be 0%, resulting in *negligible* impacts at all receptors.

PM₁₀ and PM_{2.5}

Table 8.11 Predicted Impacts on Annual Mean PM₁₀ Concentrations in 2024 (µg/m³)

Receptor	Without Development (µg/m ³)	With Development (µg/m ³)	% Change ^a	Impact Descriptor
R1	15.8	15.8	0	Negligible
R2	15.7	15.7	0	Negligible
R3	15.5	15.5	0	Negligible
R4	16.3	16.3	0	Negligible
R5	15.7	15.7	0	Negligible
R6	15.7	15.7	0	Negligible
R7	15.9	15.9	0	Negligible
R8	16.2	16.2	0	Negligible
R9	16.6	16.6	0	Negligible
R10	16.1	16.1	0	Negligible
R11	16.1	16.1	0	Negligible
R12	16.1	16.2	0	Negligible
R13	16.4	16.4	0	Negligible
R14	17.1	17.1	0	Negligible
R15	17.2	17.2	0	Negligible
R16	17.0	17.0	0	Negligible
R17	17.0	17.0	0	Negligible
R18	16.7	16.7	0	Negligible
R19	17.2	17.2	0	Negligible
R20	17.2	17.2	0	Negligible

Receptor	Without Development (µg/m³)	With Development (µg/m³)	% Change ^a	Impact Descriptor
R21	16.3	16.3	0	Negligible
Criterion	32 ^b		-	-
^a % changes are relative to the objective and have been rounded to the nearest whole number.				
^b While the annual mean PM ₁₀ objective is 40µg/m³, 32µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM ₁₀ objective is possible, as outlined in LAQM.TG22. A value of 32µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM ₁₀ objective, as recommended in EPUK & IAQM guidance.				

Table 8.12 Predicted Impacts on Annual Mean PM_{2.5} Concentrations in 2024 (µg/m³)

Receptor	Without Development (µg/m³)	With Development (µg/m³)	% Change ^a	Impact Descriptor
R1	10.5	10.5	0	Negligible
R2	10.5	10.5	0	Negligible
R3	10.4	10.4	0	Negligible
R4	11.1	11.1	0	Negligible
R5	10.5	10.5	0	Negligible
R6	10.5	10.5	0	Negligible
R7	10.6	10.6	0	Negligible
R8	11.0	11.0	0	Negligible
R9	11.2	11.2	0	Negligible
R10	10.8	10.8	0	Negligible
R11	10.8	10.8	0	Negligible
R12	10.8	10.8	0	Negligible
R13	10.9	10.9	0	Negligible
R14	11.3	11.3	0	Negligible
R15	11.4	11.4	0	Negligible
R16	11.4	11.4	0	Negligible
R17	11.4	11.4	0	Negligible
R18	11.1	11.1	0	Negligible
R19	11.4	11.4	0	Negligible
R20	11.4	11.4	0	Negligible
R21	10.9	10.9	0	Negligible
Objective	25 ^b		-	-

^a % changes are relative to the objective and have been rounded to the nearest whole number.

^b The 25µg/m³ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

8.89 As presented in **Table 8.11** and **Table 8.12**, annual mean PM₁₀ and PM_{2.5} concentrations will be well below the objectives at all receptor locations and the impacts associated with the Proposed Development traffic are *negligible* at all receptors.

8.90 The assessment has assumed that peak construction traffic is generated in 2024. This will have overestimated the traffic emissions and hence the predicted 2024 concentrations and impacts. In reality, peak construction activities will not occur until 2026. Taking these conservative assumptions into account, and that predicted

concentrations remain well below the objective, it is judged that the effect of construction road traffic generated emissions (NO₂, PM₁₀ and PM_{2.5}) will be 'not significant'.

Demolition and Construction Works

8.91 The demolition and construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see **ES Volume 3, Appendix Air Quality: Annex 5**), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

8.92 There will be a requirement to demolish all existing structures within the site boundary with a total volume of approximately 200,000m³. Demolition works are anticipated to be phased over 18 months and take place year-round. There will also be a need to break up existing concrete or blacktop hardstanding across most of the site.

8.93 Based on the example definitions set out in Table A4.1 in **ES Volume 3, Appendix Air Quality – Annex 5**, the dust emission class for demolition is considered to be large.

Earthworks

8.94 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website²⁰, as set out in **Table 8.13**. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 8.13 Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Intermediate - Shallow
Soil Parent Material Grain Size	Mixed (Argillaceous ^a – Arenaceous ^b)
European Soil Bureau Description	Chalk
Soil Group	Light (silty) to Medium (sandy)
Soil Texture	Chalky, Silty Loam ^c
^a grain size <0.06 mm.	
^b grain size 0.06 – 2.0 mm.	
^c a loam is composed mostly of sand and silt	

8.95 The site covers some 190,000m² and most of this will be subject to earthworks, including the removal of foundations of the demolished buildings and breaking up of paved areas. The earthworks will be phased over four years and dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). It is estimated that approximately 25,000 tonnes of material will be moved throughout the works, and there may be up to 20 earth-moving vehicles active at any one time.

8.96 Based on the example definitions set out in Table A4.1 in **ES Volume 3, Appendix Air Quality – Annex 5**, the dust emission class for earthworks is considered to be large.

Construction

8.97 Construction works are anticipated to last approximately eight years to complete both phases of the Proposed Development. The total building volume of all components is estimated to be 200,000m³, consisting of a range of materials; reinforced concrete frames for the residential components and steel frames for the proposed stadium and commercial components. Piling will be used, and there is the potential for on-site concrete batching using materials from the existing business use within the Phase 2 site area.

8.98 Based on the example definitions set out in Table A4.1 in **ES Volume 3, Appendix Air Quality – Annex 5**, the dust emission class for construction is considered to be large.

²⁰ British Geological Survey (2021) UK Soil Observatory Map Viewer, [Online], Available: <http://mapapps2.bgs.ac.uk/ukso/home.html>

Trackout

- 8.99 The number of vehicles accessing the site, which may track out dust and dirt, will vary throughout the indicative eight year construction period. It is anticipated that the peak number of construction vehicles will occur during month 30 of the construction programme, with an estimated 107 Heavy Goods Vehicle movements per day. Vehicles may travel up to 800m on unpaved road surfaces. Wheel washing facilities will be provided at the site exits.
- 8.100 Based on the example definitions set out in Table 4.1 in **ES Volume 3, Appendix Air Quality – Annex 5**, the dust emission class for trackout is considered to be large.
- 8.101 **Table 8.14** summarises the anticipated dust emission magnitude for the Proposed Development.

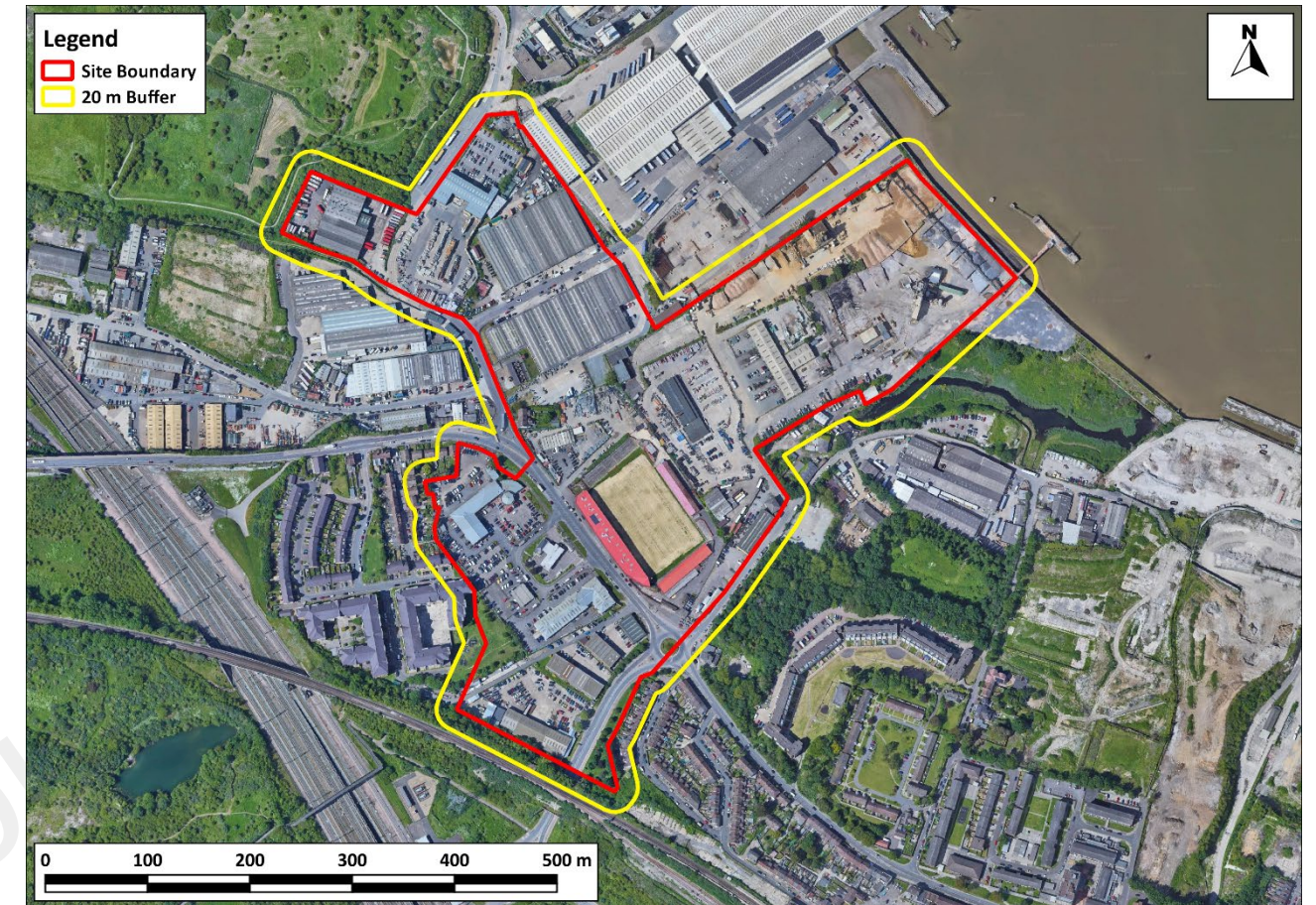
Table 8.14 Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Large
Earthworks	Large
Construction	Large
Trackout	Large

Sensitivity of the Area

- 8.102 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM₁₀ concentrations.
- 8.103 The IAQM guidance explains that residential properties are ‘high’ sensitivity receptors to dust soiling, while places of work are ‘medium’ sensitivity receptors (Table A5.2 in **ES Volume 3, Appendix Air Quality – Annex 5**). There are more than 10, but less than 100, residential properties within 20m of the site (see **Figure 8.4**). While the Proposed Development is phased, with properties becoming occupied from 2026 and therefore introducing additional receptors within 20m of ongoing construction activities, it is judged that at any point in time there will not be more than 100 residential properties within 20m of the construction works.

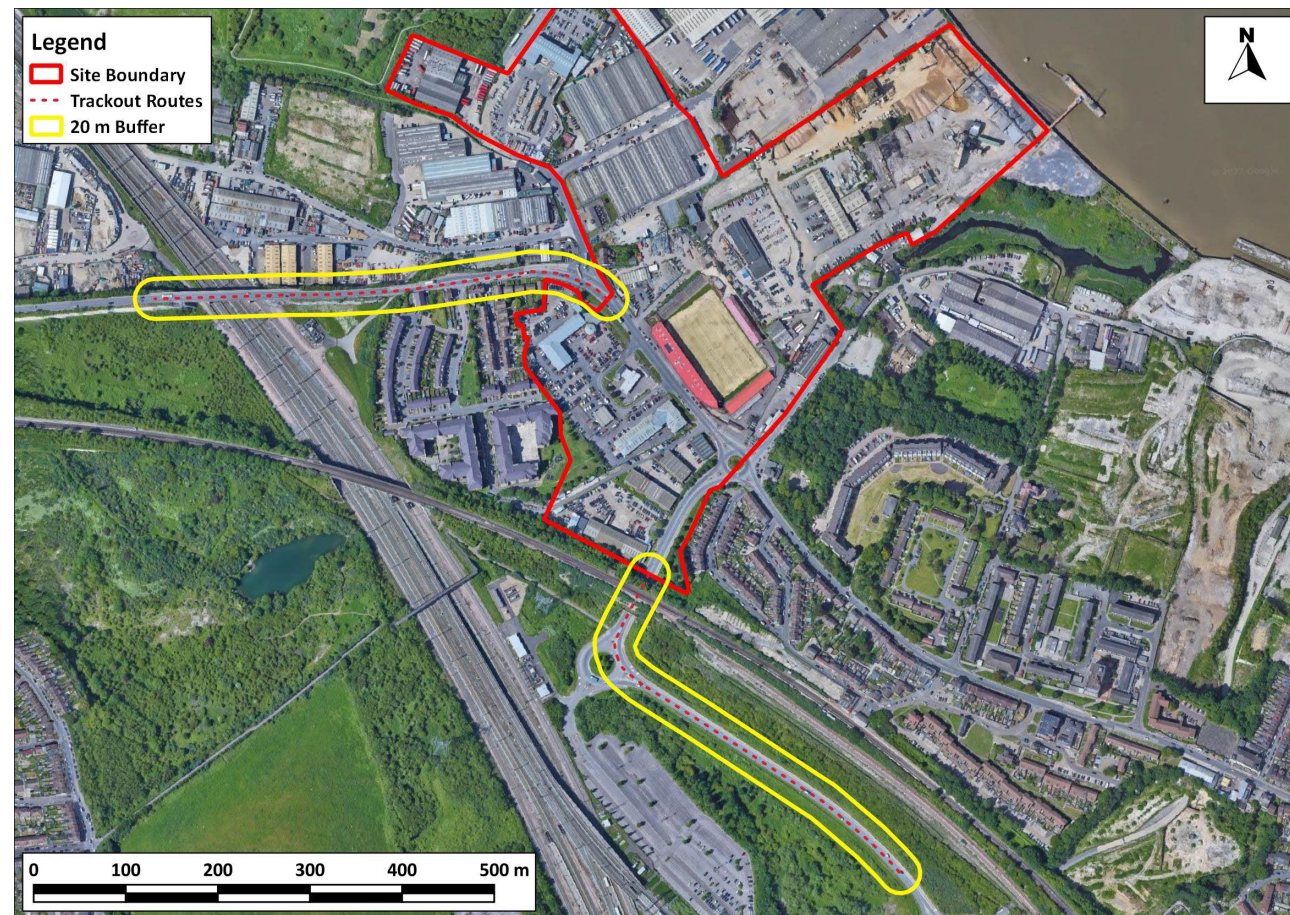
Figure 8.4 20m Distance Band around Site Boundary



Imagery ©2022 Bluesky, Getmapping plc, Infoterra Ltd, Maxar Technologies, The GeoInformation Group.

- 8.104 **Table 8.14** shows that the dust emission magnitude for trackout is large and Table A5.3 in **ES Volume 3, Appendix Air Quality – Annex 5** thus explains that there is a risk of material being tracked 500m from the site. There are approximately 15 residential properties and a nursery within 20m of the roads along which material could be tracked (see **Figure 8.5**).

Figure 8.5 20m Distance Band around Roads Used by Construction Traffic Within 500m of the Site Exits



Imagery ©2022 Bluesky, Getmapping plc, Infoterra Ltd, Maxar Technologies, The GeoInformation Group.

Sensitivity of the Area to Effects from Dust Soiling

8.105 Using the information set out in paragraph 8.103 and **Figure 8.4** alongside the matrix set out in Table A5.3 in **ES Volume 3, Appendix Air Quality – Annex 5**, the area surrounding the on-site works is of 'high' sensitivity to dust soiling. Using the information set out in paragraph 8.104 and **Figure 8.5** alongside the same matrix, the area is also of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

8.106 Residential properties are also classified as being of 'high' sensitivity to human health effects, while places of work are classified as being of 'medium' sensitivity. The matrix in Table A5.4 in **ES Volume 3, Appendix Air Quality – Annex 5** requires information on the baseline annual mean PM₁₀ concentration in the area. Receptors R1, R2, R3 and R5 in **Figure 8.1** are all within 20m of the site boundary. The maximum predicted baseline PM₁₀ concentration at these receptors is 16.8µg/m³ (**Table 8.9**). However, to be conservative, the nearby measured concentration at ZG3 (22.3µg/m³) has been used in this assessment. Using the information set out in paragraph 8.103 and **Figure 8.4** alongside the matrix in Table A5.4 in **ES Volume 3, Appendix Air Quality – Annex 5**, the area surrounding the on-site works is of 'low' sensitivity to human health effects. Using the information set out in paragraph 8.104 and **Figure 8.5** alongside the same matrix the area surrounding roads along which material may be tracked from the site is also of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

8.107 The guidance only considers designated ecological sites within 50m to have the potential to be impacted by the construction works. Swanscombe Peninsula SSSI is located within 20m of the site boundary, and within 20m of a road where dust may be tracked. The guidance considers SSSIs with dust-sensitive features to be of 'medium' sensitivity. The Ebbsfleet Marshes Local Wildlife Site (LWS) is within 50m of the site boundary and within 20m of a road along which material could be tracked. The guidance considers LWSs to be of 'low' sensitivity to ecological effects. Table A5.3 in **ES Volume 3, Appendix Air Quality – Annex 5** therefore shows that the area is of 'medium' sensitivity to ecological effects from both the on-site works and trackout.

Summary of Area Sensitivity

8.108 Table 8.15 summarises the sensitivity of the area around the proposed construction works site.

Table 8.15 Summary of the Area Sensitivity

Effects associated with:	Sensitivity of the Surrounding Area	
	On-site works	Trackout
Dust Soiling	High	High
Human health	Low	Low
Ecological	Medium	Medium

Risk and significance

8.109 The dust emission magnitudes in **Table 8.14** have been combined with the sensitivities of the area in **Table 8.15** using the matrix in Table A5.6 in **ES Volume 3, Appendix Air Quality – Annex 5**, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in **Table 8.16**. These risk categories have been used to determine the appropriate level of mitigation as set out in **ES Volume 3, Appendix Air Quality – Annex 7** (step 3 of the assessment procedure).

Table 8.16 Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health	Ecological
Demolition	High Risk	Medium Risk	High Risk
Earthworks	High Risk	Low Risk	Medium Risk
Construction	High Risk	Low Risk	Medium Risk
Trackout	High Risk	Low Risk	Medium Risk

8.110 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effects will normally be 'not significant'; these are considered later in this ES chapter.

Completed Development

8.111 As discussed in paragraph 8.27, the approach taken in the assessment of air quality impacts associated with the Completed Development (arising from road traffic) involved assessing one scenario, in which the impacts of the fully completed and operational development (anticipated to take place in 2031) were assessed in the first year of operation of any part of the Proposed Development in 2026. This represents a conservative approach.

8.112 Predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} in 2026 for existing receptors, taking account of emissions from the adjacent road network, are set out in **Table 8.17** to **Table 8.19** for both the "Without Development" and "With Development" scenarios. These tables also describe the impacts at each receptor using the impact descriptors given in **Table 8.2**.

NO₂

Table 8.17 Predicted Impacts on Annual Mean NO₂ Concentrations in 2026 (µg/m³)

Receptor	Without Development (µg/m ³)	With Development (µg/m ³)	% Change ^a	Impact Descriptor
R1	24.1	25.4	3	Negligible
R2	23.1	23.6	1	Negligible
R3	20.6	23.3	7	Minor Adverse
R4	19.2	19.9	2	Negligible
R5	24.2	29.3	13	Moderate Adverse
R6	24.0	26.2	5	Negligible

Receptor	Without Development (µg/m³)	With Development (µg/m³)	% Change ^a	Impact Descriptor
R7	24.5	26.6	5	Negligible
R8	19.1	19.8	2	Negligible
R9	22.3	23.9	4	Negligible
R10	21.7	22.5	2	Negligible
R11	20.2	20.8	2	Negligible
R12	20.4	21.0	2	Negligible
R13	24.4	25.5	3	Negligible
R14	24.3	25.1	2	Negligible
R15	26.7	27.1	1	Negligible
R16	25.0	25.3	1	Negligible
R17	24.1	24.4	1	Negligible
R18	21.0	21.1	0	Negligible
R19	26.7	27.8	3	Negligible
R20	26.7	27.2	1	Negligible
R21	21.7	22.5	2	Negligible
Objective	40		-	-

^a % changes are relative to the objective and have been rounded to the nearest whole number.

8.113 As shown in **Table 8.17**, the annual mean NO₂ concentrations are predicted to be well below the objective at all of the modelled receptors in 2026. The percentage changes, when rounded, are predicted to be between zero and 13%, resulting in one *moderate adverse* impact at an existing receptor (R5), one *minor adverse* impact at an existing receptor (R3), and *negligible* impacts at all other receptors.

PM₁₀ and PM_{2.5}

Table 8.18 Predicted Impacts on Annual Mean PM₁₀ Concentrations in 2026 (µg/m³)

Receptor	Without Development (µg/m³)	With Development (µg/m³)	% Change ^a	Impact Descriptor
R1	15.6	15.8	1	Negligible
R2	15.5	15.7	1	Negligible
R3	15.3	15.7	1	Negligible
R4	16.2	16.2	0	Negligible
R5	15.6	16.4	2	Negligible
R6	15.6	15.9	1	Negligible
R7	15.7	16.0	1	Negligible
R8	16.1	16.1	0	Negligible
R9	16.4	16.6	1	Negligible
R10	15.9	16.0	0	Negligible
R11	15.9	16.0	0	Negligible
R12	16.0	16.1	0	Negligible
R13	16.2	16.3	0	Negligible
R14	17.0	17.1	0	Negligible
R15	17.1	17.1	0	Negligible
R16	16.9	16.9	0	Negligible

Receptor	Without Development (µg/m³)	With Development (µg/m³)	% Change ^a	Impact Descriptor
R17	16.8	16.8	0	Negligible
R18	16.5	16.5	0	Negligible
R19	17.0	17.2	0	Negligible
R20	17.1	17.1	0	Negligible
R21	16.2	16.3	0	Negligible
Criterion	32 ^b		-	-

^a % changes are relative to the objective and have been rounded to the nearest whole number.
^b While the annual mean PM₁₀ objective is 40µg/m³, 32µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG22. A value of 32µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance.

Table 8.19 Predicted Impacts on Annual Mean PM_{2.5} Concentrations in 2026 (µg/m³)

Receptor	Without Development (µg/m³)	With Development (µg/m³)	% Change ^a	Impact Descriptor
R1	10.4	10.5	0	Negligible
R2	10.3	10.4	0	Negligible
R3	10.2	10.5	1	Negligible
R4	10.9	11.0	0	Negligible
R5	10.4	10.8	2	Negligible
R6	10.4	10.5	1	Negligible
R7	10.4	10.6	1	Negligible
R8	10.9	10.9	0	Negligible
R9	11.1	11.2	0	Negligible
R10	10.7	10.7	0	Negligible
R11	10.6	10.7	0	Negligible
R12	10.7	10.7	0	Negligible
R13	10.8	10.9	0	Negligible
R14	11.2	11.3	0	Negligible
R15	11.3	11.3	0	Negligible
R16	11.3	11.3	0	Negligible
R17	11.3	11.3	0	Negligible
R18	10.9	11.0	0	Negligible
R19	11.2	11.3	0	Negligible
R20	11.3	11.3	0	Negligible
R21	10.8	10.9	0	Negligible
Objective	25 ^b		-	-

^a % changes are relative to the objective and have been rounded to the nearest whole number.
^b The 25µg/m³ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

8.114 As presented in **Table 8.18** and **Table 8.19**, annual mean PM₁₀ and PM_{2.5} concentrations will be well below the objectives at all receptor locations and the impacts associated with the Proposed Development traffic are *negligible* at all receptors.

8.115 The assessment has assumed that the Proposed Development and all relevant cumulative schemes are complete and fully operational in 2026. This will have overestimated the traffic emissions and hence the predicted 2026 concentrations and impacts. In reality, the Proposed Development will not be fully completed until 2031 at the earliest. Taking these conservative assumptions into account, and that predicted concentrations remain well below the objective, it is judged that the effect of operational road traffic generated emissions (NO₂, PM₁₀ and PM_{2.5}) will be 'not significant'.

MITIGATION, MONITORING AND RESIDUAL EFFECTS

Demolition and Construction Mitigation

8.116 Measures to mitigate dust emissions will be required during the demolition and construction works of the Proposed Development in order to minimise effects upon nearby sensitive receptors.

8.117 The site has been identified as High Risk during all demolition and construction activities, as set out in **Table 8.16**. The IAQM guidance describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on what monitoring should be undertaken during the construction phase. This reflects best practice experience and has been used, together with the professional experience of the consultant (see **ES Volume 3, Appendix: Air Quality – Annex 4**) who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in **ES Volume 3, Appendix: Air Quality – Annex 7**.

8.118 The mitigation measures have been included within the Outline CEMP (refer to **ES Volume 3, Appendix: Demolition and Construction – Annex 1**) and shall be written into a dust management plan (DMP). The DMP may be integrated into a Code of Construction Practice or the detailed CEMP, and may require monitoring. These will be secured by way of planning condition.

8.119 The assessment has demonstrated that the overall air quality effect of peak construction traffic associated with the Proposed Development will be 'not significant'. Therefore, it is not considered necessary to propose additional mitigation, however, a Construction Logistics Plan (CLP) will be agreed with the GBC prior to any works; this will ensure the impacts of construction traffic emissions on local air quality are minimised. Again, this will be secured by way of planning condition.

8.120 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There will not be any excessive use of water.

Completed Development Mitigation

8.121 The assessment has demonstrated that the Proposed Development will not cause any new exceedances of the air quality objectives and that the overall air quality effect of the Proposed Development will be 'not significant'. Therefore, there is no requirement for mitigation.

8.122 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law).

Residual Effects

8.123 A summary of the residual effects resulting from the Proposed Development is presented in **Table 8.20**.

Table 8.20 Residual Effects

Receptor	Description of the Residual Effect	Scale and Nature	Significant / Not Significant	Geo	D I	P T	St Mt Lt
Demolition and Construction							
Existing and Introduced Receptors	Demolition and Construction Dust	Negligible*	Not Significant	L	D	T	Mt
Existing Receptors	Road traffic emissions	Negligible	Not Significant	L	D	T	Mt

Receptor	Description of the Residual Effect	Scale and Nature	Significant / Not Significant	Geo	D I	P T	St Mt Lt
Completed Development							
Existing Receptors	Road traffic emissions	Negligible (PM ₁₀ and PM _{2.5}) to Moderate Adverse (for NO ₂)	Not Significant**	L	D	P	Lt
Introduced Receptors	Road traffic emissions	N/A***	Not Significant	L	D	P	Lt
Key/Notes: Residual Effect Scale = Negligible / Minor / Moderate / Major Nature = Beneficial or Adverse Geo (Geographic Extent) = Local (L), Borough (B), Regional (R), National (N) D = Direct / I = Indirect P = Permanent / T = Temporary St = Short Term / Mt = Medium Term / Lt = Long Term N/A = not applicable / not assessed *The scale of impacts at individual receptor locations was not determined for demolition and construction. A qualitative assessment was undertaken, and it is considered that with the application of recommended mitigation measures, residual effects will be 'not significant'. **Based on professional judgement, taking account of the conservative nature of the assessment. ***There are no impacts at Introduced receptors, and the assessment has focused on the suitability of the site for the proposed uses. Future air quality conditions at the site will be acceptable, and effects are thus classified as 'not significant'.							

SITE SUITABILITY

8.124 Predicted air quality conditions for future occupants of the Proposed Development in 2026, taking account of emissions from the adjacent road network, are set out in **Table 8.21**.

Table 8.21 Predicted Concentrations of NO₂, PM₁₀ and PM_{2.5} in 2026 for Introduced Receptors in the Proposed Development (µg/m³)

Receptor	Annual Mean NO ₂	Annual Mean PM ₁₀	Annual Mean PM _{2.5}
P1	19.5	15.1	10.1
P2	20.8	15.3	10.2
P3	24.7	15.7	10.4
P4	23.5	15.7	10.5
P5	22.6	14.4	9.6
P6	22.0	14.4	9.6
P7	19.8	15.2	10.1
P8	19.7	15.1	10.1
P9	29.3	16.2	10.7
Objective	40	32 ^a	25 ^b
^a While the annual mean PM ₁₀ objective is 40µg/m ³ , 32µg/m ³ is the annual mean concentration above which an exceedance of the 24-hour mean PM ₁₀ objective is possible, as outlined in LAQM.TG22. A value of 32µg/m ³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM ₁₀ objective, as recommended in EPUK & IAQM guidance. ^b The PM _{2.5} objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.			

8.125 The predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} are well below the respective objectives at all introduced receptors. The annual mean NO₂ concentrations are well below 60µg/m³, and it is therefore unlikely that the 1-hour mean NO₂ objective will be exceeded (see paragraph 8.8). Additionally, as the annual mean PM₁₀ concentrations are well below 32µg/m³, it is also unlikely that the 24-hour mean PM₁₀ objective will be exceeded.

8.126 Future users and residents of the Proposed Development will therefore experience acceptable air quality.

ASSESSMENT OF THE FUTURE ENVIRONMENT

Evolution of the Baseline

8.127 If the Proposed Development was not to come forward, it is expected that the site would remain in its current state. Air quality is generally expected to improve with time, particularly through the introduction of more stringent vehicle emissions standards. Air quality conditions at the site would therefore be expected to improve and this is reflected in the predicted future baseline concentrations presented in **Table 8.8** and **Table 8.9**.

Cumulative Effects Assessment

8.128 As set out in **ES Volume 1, Chapter 2: EIA Methodology**, the cumulative effects assessment considers the potential for cumulative effects to arise as a result of the Proposed Development in-combination with the defined 'Tier 1' (schemes which meet the defined criteria with regards to scale and distance from the site and have full planning consent, a resolution to grant consent, or have been submitted but not yet consented where considered appropriate) and 'Tier 2' (major planning applications and decisions which have not yet been submitted for approval, and are at varying stages in the pre-application stage) cumulative schemes.

8.129 The Tier 2 'London Resorts' scheme is currently withdrawn from planning. The transport consultant have extracted traffic generation data from the previously submitted application (as presented in **ES Volume 1, Chapter 7: Traffic and Transport**), and this has been reviewed in the context of the assessment undertaken and presented within this ES chapter. The data indicate that all traffic associated with the London Resort scheme would be routed from the A2 to Ebbsfleet International Station. All of these links are more than 200m away from any existing or proposed receptors. Taking account of the conservative assessment presented in this ES chapter, and the anticipated routing of the London Resort scheme generated traffic, there are unlikely to be any significant cumulative road traffic effects.

8.130 As outlined in **ES Volume 1, Chapter 7: Traffic and Transport**, the Scoping Opinion also requested consideration of the following Tier 2 cumulative schemes: Ebbsfleet Central East, Land adjacent to Northfleet Harbour and Blue Lake. However, sufficient data were not available to complete a quantitative assessment, and thus a qualitative assessment of the impact of these schemes on traffic and transport was completed in **ES Volume 1, Chapter 7: Traffic and Transport**. This concluded that there are unlikely to be any significant cumulative effects resulting from these schemes.

Demolition and Construction

8.131 The IAQM guidance is clear that, with appropriate mitigation measures in place, any residual refurbishment, demolition and construction dust effects from an individual site will be '**not significant**'. The guidance also suggests that cumulative construction dust impacts are only likely where sites are within 500m of each other. Work would also have to be taking place in areas of both sites that are close to a receptor in order for cumulative effects to occur.

8.132 In accordance with the mitigation measures set out in **ES Volume 3, Appendix: Air Quality - Annex 7**, if there is concurrent construction work on sites within 500m of each other, the construction contractors should "*hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised*".

8.133 Of the cumulative schemes identified, two Tier 1 schemes are located within 500m of the site, namely consented schemes 1 and 5a, as well as three Tier 2 schemes, namely A, B and C (as set out in **ES Volume 1, Chapter 2: EIA Methodology**). It is anticipated that all construction sites will adopt appropriate mitigation measures to limit emissions of dust, will hold the liaison meetings recommended above and will ensure that plans are co-ordinated to minimise impacts upon the most sensitive receptors. With these measures in place, the cumulative effect of demolition and construction activities, should be '**not significant**'.

Completed Development

8.134 The traffic data used in the assessment incorporate traffic flows associated with all relevant cumulative schemes, which would affect flows on the roads included in this assessment (including all cumulative Tier 1 schemes outlined in **ES Volume 1, Chapter 2: EIA Methodology**). As such, predictions of future pollutant concentrations presented in this ES chapter take account of cumulative effects.

8.135 The cumulative operational effects of road traffic emissions have therefore been shown to be '**not significant**'.

LIKELY SIGNIFICANT EFFECTS

8.136 The demolition and construction works have the potential to create dust. During these works, it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. Appropriate measures have been recommended and, with these measures in place, it is expected that any residual effects will be 'not significant'.

8.137 The assessment has also shown that the effects of emissions from peak construction traffic emissions on local air quality will be 'not significant'.

8.138 The operation of the Proposed Development is not predicted to result in any significant effects on the existing receptors considered within this assessment in relation to concentrations of NO₂, PM₁₀ and PM_{2.5}. In addition, the assessment demonstrated that air quality for future occupants of the Proposed Development would be acceptable.

8.139 The cumulative effects assessment has identified that the conclusions will not change or be worse than that of the main assessment.