Chapter Sixteen ◆ Air Quality

INTRODUCTION

16.1 This chapter presents the air quality assessment which has been completed for the Preliminary Environmental Information Report (PEIR) for the London Resort. The chapter presents the initial assessment results of the air quality effects from the Proposed Development made to date. Further assessment work will be undertaken prior to the submission of the DCO application and an updated assessment will be presented in the Environmental Statement (ES). The PEIR chapter on air quality presents the following information:

- The relevant law, policy and guidance that has informed the assessment.
- A review of existing baseline conditions.
- A preliminary assessment of the likely air quality effects associated with the development.

METHODOLOGY AND DATA SOURCES

EIA Scoping Opinion

16.2 Under Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, a Scoping Report for the Proposed Development was submitted on the 15th June 2020 to the Planning Inspectorate and ta Scoping Opinion from the Planning Inspectorate and will be received at the end of July 2020. The Scoping Report set out the proposed air quality assessment methodologies and outlines the proposed approach for the Environmental Statement. The Scoping Opinion and consultee comments relating to air quality will be given due consideration within the ES.

16.3 A Scoping Report under Regulation 8 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 had also previously been submitted when the Proposed Development was at an earlier stage in design development. Whilst the 2014 Scoping Report solely considers the Kent Project Site, the Scoping Opinion from the 2014 report has been used to inform the updated 2020 Scoping Report. The 2014 Scoping Opinion was largely in agreement with the scope set out in the 2014 Scoping Report, but there were some minor comments and additions which have been taken forward in the 2020 Scoping Report. The key comments and responses to these comments are set out in Table 16.1.

Table 16.1: Relevant advice in the 2014 scoping opinion and response.

Paragraph in 2014 Scoping Report	Scoping opinion comment	Response
3.52	A full study area, inclusive of the full road network impacted, was not presented or described in the report.	Traffic modelling is required to identify the full extent of the study area. The outputs from the traffic modelling, and how this influences the air quality model will be shared and agreed with the relevant local authorities and presented in the ES. All sensitive receptor locations will be agreed with the relevant local authorities.
3.53	Full parameters of the energy centre must be presented in the ES and the following types of emissions from the energy centre should be included; dust generated during construction, traffic related emissions during construction and operation and emissions from any proposed combustion processes (including any visible plumes).	Noted and reflected in the 2020 scoping report and will be addressed in the ES.
3.54	The assessment must have regard to the potential requirements of any other regulatory regimes relevant to the energy centre.	Noted and reflected in the 2020 scoping report and will be addressed in the ES.
3.55	Emissions at both on and off-site locations during construction and operational phases should be considered, including along access roads and local footpaths.	Noted and reflected in the scoping 2020 report and will be addressed in the ES.
3.56	The Secretary of State recommends that worst case scenarios are assessed.	Noted and reflected in the 2020 scoping report and will be addressed in the ES.
3.57	The potential impact on nearby sensitive habitats and designations due to an increase in air quality pollutants should be considered in the EIA.	Sensitive habitats and designations relevant to air quality changes are identified in the 2020 scoping report and a full assessment will be provided in the ES.
3.59	Consideration should be given to appropriate mitigation measures and to monitoring of dust and odour complaints.	Noted. Appropriate mitigation measures will be proposed where necessary.

Consultation

16.4 Further consultation will be carried out with the relevant local planning authorities during the consultation period, and ongoing consultation will take place following the Scoping Opinion to finalise the scope and methodology of the assessment.

Construction assessment methodology

16.5 Construction activities will give rise to dust and particulate matter ($PM_{10/2.5}$) emissions with the potential to affect local air quality. Impacts during the construction phase of the Proposed Development will be assessed using the Institute of Air Quality Management's (IAQM) guidance on the assessment of dust from demolition and construction[1]. This guidance provides a qualitative methodology for assessing the potential air quality impacts from various site construction activities (earthworks, demolition, construction and trackout) and provides site-specific mitigation measures to minimise these potential impacts. As per IAQM Guidance[1], Construction impacts can occur up to 350m from the site boundary, and therefore receptors within this distance will be considered in the assessment.

16.6 Traffic generated during construction will give rise to nitrogen oxides (NO_x) and PM_{10} emissions which will also have the potential to affect local air quality. Traffic emissions from the construction phase of development will be assessed quantitively using the dispersion modelling software ADMS-Roads.

Operational assessment methodology

16.7 At this stage, prior to receiving traffic data required for the assessment, this section outlines the methodology for a detailed air quality modelling study in order to predict and quantify the likely impact associated with the Proposed Development. The methodology will continue to be developed throughout the summer of 2020 and will be finalised and the results of the assessment report on in the ES. This section interacts closely with Chapter 9 – Transport and will be informed by the traffic modelling outputs data and modelling that will be provided. The ES will form part of the DCO application for the Proposed Development.

16.8 The air quality assessment for the PEIR has been completed in accordance with IAQM planning guidance[2]. This guidance includes criteria which identify when relevant operational impacts can be screened out as insignificant or require further assessment. Criteria relevant to this assessment are detailed in Table 16.2.

[1] Institute of Air Quality Management (IAQM) (2014), Guidance on the assessment of dust from demolition and construction

[2] Institute of Air Quality Management (IAQM) (2017), Land-use Planning and Development Control- Planning for Air Quality

Table 16.2: IAQM criteria for requiring an air quality assessment.

The development will:	**Indicative criteria to proceed to detailed assessment:**
Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans.	A change of LDV flows of: - more than 100 annual average daily traffic (AADT) within or adjacent to an AQMA - more than 500 AADT elsewhere.
Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors. NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.	Typically, any combustion plant where the single or combined NO_x emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

16.9 Whilst at this stage the exact data is not available, with respect to combustion plant and traffic figures, due to the size and scale of the scheme it is assumed all of the criteria will be met and as such further, detailed assessment is required.

Traffic emissions

16.10 Road traffic emissions will be considered in relation to the impact from a change in traffic as a result of the Proposed Development. The assessment will also take into account traffic flows associated with future committed developments.

16.11 Traffic data will be provided for roads impacted by the Proposed Development. The transport model is currently being finalised and this will be used to inform the air quality model and identify the full extent of modelled domain.

16.12 Pollutant concentrations are predicted at existing and proposed future receptor locations using the dispersion model ADMS-Roads (v5.1). This model is developed by Cambridge Environmental Research Consultants (CERC) and can be used to assess the impact of vehicle emissions and industrial sources on local air quality. Unlike simpler spreadsheet screening tools, it can include parameters such as variable meteorological conditions, complex road networks (including the combined contribution of multiple road links on single sensitive receptors) and the capability of including the effects of complex terrain, atmospheric chemistry and street-canyon effects. The model is widely used by local authorities in the UK as part of their review and assessment obligations.

16.13 This assessment will consider traffic-related pollutant concentrations (NO_2, PM_{10} and $PM_{2.5}$) at existing receptors in the vicinity of the Proposed Development. The assessment will consider existing traffic flows on the local road network as well as the predicted change in traffic as a result of the Proposed Development.

16.14 Pollutant concentrations will be predicted at receptors for the following assessment years:

- 2019 Existing Baseline;
- 2023 Peak Construction Year Do Nothing; Future baseline for construction peak year (including committed development flows) without the Proposed Development;
- 2023 Peak Construction Year Do Something; future baseline for peak construction year (including committed development with Proposed Development construction flows).
- 2025 Do Nothing; Future baseline (including committed developments) without the Proposed Development;
- 2025 Do Something; Operational scenario (including committed developments), the first full year after Gate 1 opening with all associated trips.
- 2029 Do Nothing; Future baseline (including committed developments) without the Proposed Development;
- 2029 Do Something; Operational scenario (including committed developments), Gate 2 opening year with all associated trips.

16.15 The impact of the Proposed Development will be assessed by comparing the Do Nothing and Do Something scenarios for future years.

16.16 Vehicle emissions will be calculated based on vehicle flow, composition and speed data using the EFT (Version 9.0) published by Defra.

16.17 Hourly sequential meteorological data for 2019 will be used in the model from a nearby meteorological station, which is most representative of onsite conditions, the meteorological station used will be agreed with the relevant local authorities.

Background Concentrations

16.18 Background concentration choice is a crucial component to the finalised results, current background values can be taken from Defra background mapped values using the national pollution maps published by Defra (2018a). These cover the whole of the UK on a 1x1 km grid and are published for each year from 2015 until 2030. Alternatively, concentrations monitored at local urban background monitoring sites can be used for current background values. Often a worst-case approach is used, taking the highest background pollutant concentrations from the two sources.

16.19 For future background concentrations Defra background maps provide background pollutants up to 2030. Background pollutant concentrations show year on year pollutant improvement as a result of national fleet improvement, air quality mitigation measures and expected improvement in point source emissions.

16.20 Both current and future background concentrations that are to be used will be agreed following consultation with the relevant local authorities.

Model Verification

16.21 The ADMS-Roads model will be used to assess operational emissions. In order to ensure that ADMS-Roads accurately predicts local concentrations, it is necessary to verify the model against local measurements.

16.22 The model verification process will follow Defra (2018) Technical Guidance (16) and will be agreed and discussed with the relevant officers from the Local Authorities. Due to the size of the model, multiple verification factors may be used to ensure model accuracy. Following adjustment, road NO_x concentrations will be added to background concentrations and processed using the NO_x to NO_2 calculator. Road $PM_{10/2.5}$ contribution will be adjusted using the verification factor calculated for road NO_x and then added to the background concentrations.

Combustion plant

16.23 The Proposed Development will be predominantly served by water sourced heat pumps, with combustion plant as back-up power and top-up. Following finalisation of the energy strategy, the impact of emissions from the proposed plant will be predicted using point sources within the ADMS Roads dispersion model. The model will be run to predict the contribution of plant emissions to annual mean and to the hourly mean, outlined in Table 16.5.

Model post-processing

Road Traffic

16.24 The model will predict road-NO_x concentrations at each receptor location. These concentrations will be adjusted following the verification process set out above, which, summed with background NO_2 concentrations, will be processed through the NO_x to NO_2 calculator available on the Defra LAQM Support website. This calculator predicts the component of NO_2 based on the adjusted road-NO_x and the background NO_2.

Point Sources

16.25 The point source modelling will be run to predict the contribution of the proposed boiler emissions to annual mean concentrations of nitrogen oxides, and to the 99.79th percentile of 1-hour mean nitrogen oxides concentrations. For the initial screening of the process contributions, the approach recommended by the Environment Agency (2005)[3] will be used to predict nitrogen dioxide concentrations. This assumes that:

- annual mean NO_2 concentration = annual mean NO_x concentration multiplied by 0.7; and
- 99.79th percentile of 1-hour mean NO_2 concentrations = 99.79th percentile of 1-hour mean NO_x concentrations multiplied by 0.35.

Receptors – onsite and offsite human and ecological

Operational receptors

16.26 Pollutant concentrations will be predicted at existing receptor locations expected to be impacted by emissions generated by the Proposed Development, and at proposed onsite receptor locations in order to assess exposure of future site occupants to poor air quality. Receptor locations include existing residential properties and amenity spaces.

16.27 Operational impacts will be considered at receptor locations where there is relevant exposure to national air quality objectives. Examples of receptors, dependent on the averaging period for pollutant concentration, are shown in Table 16.3. Air quality objectives are based on standards which are set at a level below the lowest concentration at which more sensitive members of the public have been observed to be affected by pollutant exposure. As any member of the public could be present at receptors which have relevant exposure, it is considered that all receptors are of equal sensitivity. Therefore, all receptors considered, where there is relevant exposure, will be of high sensitivity.

[3] Abbott J. A., Stedman J. and Bower J., *2005 Review of background air-quality data and methods to combine these with process contributions: technical modelling aspects*. Bristol: Environment Agency.

Table 16.3: Operational Receptor Sensitivity.

Averaging period	Sensitive receptors occur at	Sensitive receptors generally do not occur at
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access; Hotels, unless people live there as their permanent residence; Gardens of residential properties; and Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24 hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
Hourly mean	All locations where the annual mean and 24 -hour mean objective apply. Kerbside sites (for example, pavements of busy shopping streets). Parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

16.28 NOx, $PM_{2.5}$ and PM_{10} concentrations will be predicted at receptor locations. Neither the existing receptor locations being used, nor the proposed new receptor locations, have

been finalised at this stage. Receptor locations will be informed by the traffic model and the final Proposed Development site layout.

Ecological Receptors

16.28 Environment Agency AER guidance[4] provides the following detail which is also referenced in the IAQM (2020) Guide to assessment of air quality impacts on designated nature conservation sites[5], regarding consideration of ecological receptors,

- Check if there are any of the following within 10km of your site;
    - Special Protection Areas (SPAs)
    - Special Areas of Conservation (SACs)
    - Ramsar Sites
- Check is there are any of the following with 2km of your site;
    - Sites of Special Scientific Interest (SSSIs)
    - Local Nature Sites (ancient woodland, sites of nature conservation importance (SNCIs))

16.29 Following the above guidance, Table 16.4 provides details of ecological receptors which will be considered within this assessment.

Table 16.4: Details of Modelled Ecological Receptors.

Site Classification	Receptor Name	Estimated Distance from closest point to Order Limits Boundary (KM)
SPA/RAMSAR	Thames Estuary & Marshes	2.7
SSSI	Bakers Hole	*Within order limits boundary*
SSSI	Lion Pit	1.3
SSSI	West Thurrock & Marshes	0.8
SSSI	Darenth Wood	*Adjacent to order limits boundary*
SSSI	Grays Thurrock Chalk Pit	1.7
SSSI	Swanscombe Skull Site	0.4
SAC	North Downs Woodlands	8.1

16.30 Pollutant concentrations and deposition (nitrogen and acid) will therefore be predicted at the closest points of each of the identified conservation areas, assuming a receptor height

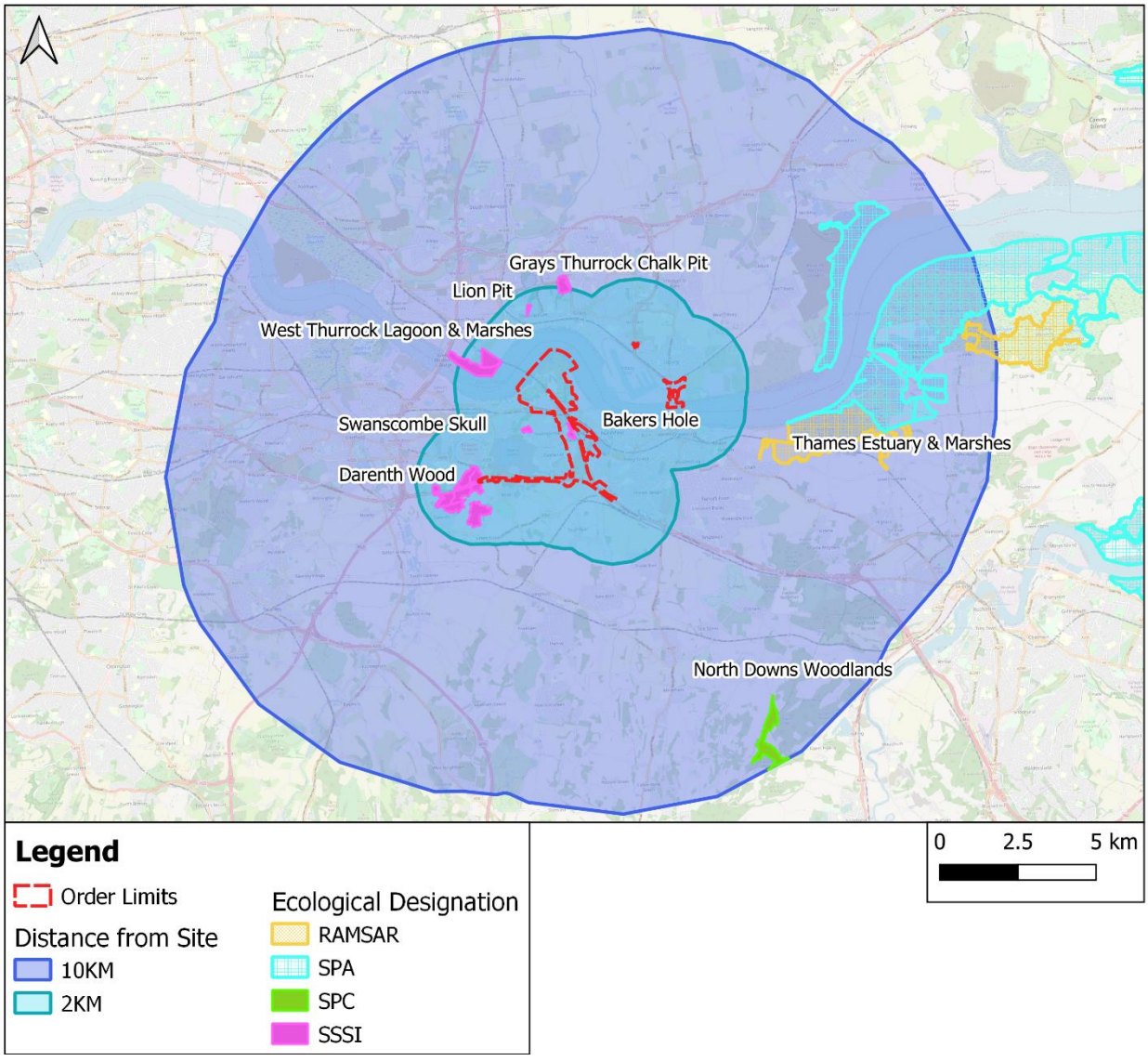
[4] Environment Agency (2016) Air emissions risk assessment for your environmental permit. https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

[5] IAQM (2020) A guide to the assessment of air quality impacts on designated nature conservation sites. https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf

of 0m which is the worst-case scenario in terms of nitrogen deposition.

16.31 The location of the ecological receptors presented in Table 16.4 are presented in Figure 16.1.

Figure 16.1: Ecological receptors in relevant proximity to the Project Site.



Determining significance

16.32 The impact of the Proposed Development will be considered in relation to relevant National Air Quality Objectives (AQOs). The effect significance will be determined in accordance with the IAQM's significance criteria. Air quality objectives relevant to this assessment are detailed in Table 16-5, whilst IAQM significance criteria is detailed in Table 16-6.

Table 16.5: Air Quality Objectives for Nitrogen Dioxide, PM_{10} and $PM_{2.5}$.

Pollutant	Time period	Objective
Nitrogen dioxide (NO_2)	Annual mean	40 µg/m^3
	Hourly mean	200 µg/m^3 not to be exceeded more than 18 times a year
Particulate matter (PM_{10})	Annual mean	40 µg/m^3
	Daily mean	50 µg/m^3 not to be exceeded more than 35 times a year
Particulate matter ($PM_{2.5}$)	Annual mean	25 µg/m^3

Table 16.6: IAQM air quality impact significance descriptors.

Long-term Average Concentration at Receptor In Assessment Year	Change in concentration relative to AQO				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQO	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQO	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Negligible	Moderate	Substantial	Substantial	Substantial

16.33 The overall significance of the air quality impact, whether beneficial or adverse, is considered holistically taking into account of a number of factors. Table 16.6 sets out impact descriptors for individual receptors. Whilst a number of individual receptors may be 'slight' or 'moderate' the overall effect may not necessarily be considered significant.

16.34 Judgement on the overall significance of an effect must consider;

- Existing and future air quality in the absence of the Proposed Development
- The extent of current and future population exposure to the impact; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

16.35 It is important to note that for proposed receptors where air quality objectives are predicted to be exceeded, the effect on residents or occupants will be significant. In the event these objectives are exceeded, provision for mitigation measures should proposed in order to avoid significant effects.

RELEVANT LAW, POLICY AND GUIDANCE

16.36 This section identifies the legislation, policy and guidance that has informed the preliminary assessment of effects with respect to air quality. Legislation relevant to the assessment is detailed along with national, regional and local policy.

Relevant legislation

Part IV of the Environment Act 1995

16.37 Part IV of the Environment Act 1995 places a duty on the Secretary of State for the Environment to develop, implement and maintain an Air Quality Strategy (AQS) with the aim of reducing atmospheric emissions and improving air quality. The latest AQS for England, Scotland, Wales and Northern Ireland was published in 2007, and provides air quality standards and objectives for key pollutants, which are designed to protect human health and the environment. It also sets out how different sectors (industry, transport and local government) can contribute to achieving the air quality objectives. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of Local Air Quality Management (LAQM). This requires local authorities to regularly and systematically review and assess air quality within their boundaries against these objectives and appraise development and transport plans against these assessments.

16.38 In areas where air quality objectives are not likely to be met by the relevant target date, local authorities are required to declare an Air Quality Management Area (AQMA) and develop an air quality action plan in pursuit of the air quality objectives.

National policy context

National Policy Statements (NPS)

16.39 National Policy Statements set out the need for and government's policies to deliver Nationally Significant Infrastructure Projects (NSIPs) in England. Whilst there is no NPS for business and commercial NSIP projects, to the extent that the Project includes transport and highways infrastructure, regard will be had to relevant policy in the NPS for National Networks (NPS NN).

National Planning Policy Framework (NPPF) 2019

16.40 The National Planning Policy Framework (NPPF) underlines the importance of local authorities contributing towards improving and protecting the environment. The legislation points towards the need to focus on the enhancement of biodiversity, minimising waste and pollution, and mitigation/adaptation to climate change.

16.41 With particular regard to air quality management, Section 9 of the NPPF notes that the environmental impact of transport and traffic should be identified and assessed, whilst

mitigating adverse effects to bring about net environmental gains. The guidance states that the planning system should actively manage patterns of growth, offering a choice of transport modes to reduce air pollution:

'Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health.' [6]

16.42 Further to this, Section 15 of the NPPF notes that planning policies should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of AQMAs and Clean Air Zones (CAZ), and the cumulative impacts from individual sites in local areas.[7] Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Additionally, the NPPF states that planning decisions should ensure that any new development in AQMAs and CAZs is consistent with the local air quality action plan.

Planning Practice Guidance

16.43 Planning Practice Guidance provides guiding principles on how the planning process can take account of the impact of new development on air quality. Guidance outlines when air quality considerations could be relevant to the development management process. The NPPG states:

'Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity.

Where air quality is a relevant consideration the local planning authority may need to establish:

• The 'baseline' local air quality, including what would happen to air quality in the absence of the development;

• whether the proposed development could significantly change air quality during the

[6] MHCLG (2019) National Planning Policy Framework, (*Section 9- Promoting Sustainable Transport. Paragraph 103)*
[7] MHCLG (2019) National Planning Policy Framework, (*Section 15- Conserving and enhancing the natural environment. Paragraph 181)*

construction and operational phases (and the consequences of this for public health and biodiversity); and

• whether occupiers or users of the development could experience poor living conditions or health due to poor air quality.' [8]

16.44 The guidance also outlines the specific issues that may need to be considered when assessing air quality impacts. Relevant considerations include when a development would:

• 'Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;

• introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;

• expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;

• give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;

• have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value.'[9]

16.45 Guidance also provides detail on how air quality impacts can be mitigated, stating that mitigation should be spatially specific, dependent on the proposed development, and proportionate to the likely impact. The following examples of mitigation are given:

• 'Maintaining adequate separation distances between sources of air pollution and receptors;

• using green infrastructure, in particular trees, where this can create a barrier or maintain

[8] MHCLG (2019) *National Planning Policy Guidance- Air Quality. Paragraph: 005 Reference ID: 32-005-20191101*
[9] MHCLG (2019) *National Planning Policy Guidance- Air Quality. Paragraph: 006 Reference ID: 32-006-20191101*

separation between sources of pollution and receptors;

• appropriate means of filtration and ventilation;

• including infrastructure to promote modes of transport with a low impact on air quality (such as electric vehicle charging points);

• controlling dust and emissions from construction, operation and demolition; and

• contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development.'[10]

Air Quality Standards (Standards) Regulations 2010

16.46 UK English legislation which implements Community legislation on ambient air quality assessment, management and sets legally binding limit values for air quality with respect to human health and vegetation. The regulation transposes Directive 2008/50/EC[11], which entered into force in Europe on June 2008, it consolidates and replaces previous ambient air quality legislation.

National Air Quality Action Plan (2017)

16.47 The National Air Quality Action Plan looks to tackle poor air quality in all its forms, with a focus on NO_2 from transport emissions due to year on year exceedances to the statutory limit. The overarching objective is to reduce concentrations where levels are above legal limits in the shortest possible time, transforming the most polluted areas of the UK into clean and safe spaces.

Clean Air Strategy (2019)

16.48 The strategy presents the approach the UK Government are taking to deal with air pollution holistically. The core aims include; making the UK air cleaner and healthier, protecting nature and boosting the economy. The clean air strategy covers several strands of government and society, with targeted approaches set out for the following sectors; transport, homes, farming and industry.

Regional and local planning policy

16.49 The relevant planning policies of the following local planning authorities have been considered given their proximity to the Project Site, and the potential for changes in traffic flows on roads within their administrative area:

[10] MHCLG (2019) National Planning Policy Guidance- Air Quality. Paragraph: 008 Reference ID: 32-008-20191101

[11]

- Dartford Core Strategy (2011), Dartford Development Policies Plan and Dartford Local Plan Policies Map (2017).

- Gravesham Local Plan Core Strategy (September 2014) Local Plan First Review (1994) Saved Policies and Local Plan Core Strategy Policies Map (2014).

- Thurrock Core Strategy and Policies for Management of Development (2015) and the Local Plan (1997) Saved Policies.

BASELINE CONDITIONS

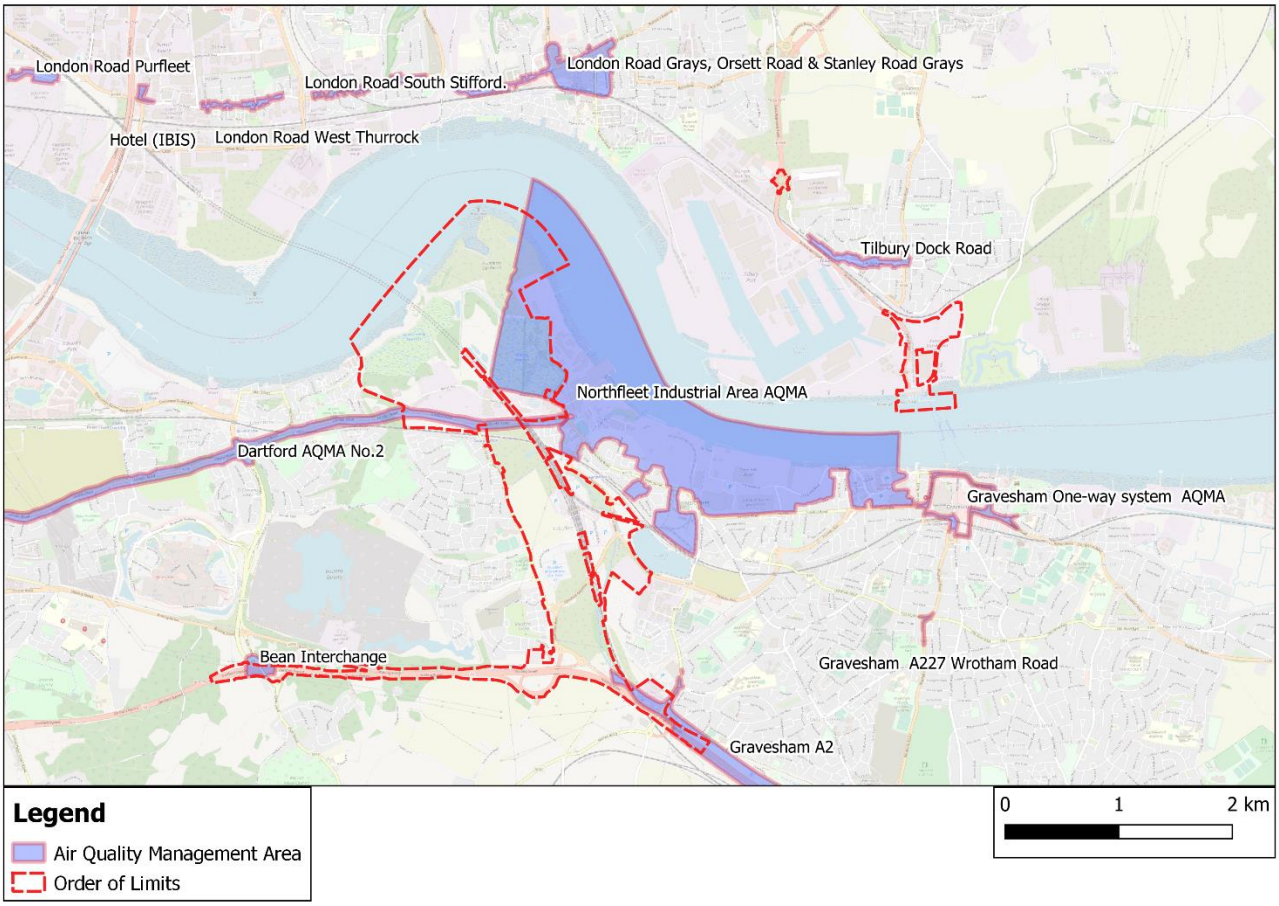
16.50 The existing baseline comprises the existing air quality conditions in the area that is likely to be affected by the Proposed Development. In order to establish the existing baseline with regards to air quality, a review was undertaken to establish an understanding of the baseline air quality conditions and to identify areas that are likely to be sensitive to changes in emissions as a result of the Proposed Development.

Air quality management areas (AQMAs)

16.51 Under Part IV of the Environment Act 1995, local authorities are responsible for reviewing and assessing local air quality in their areas of jurisdiction. Where national air quality objectives are not likely to be met, local authorities should declare these areas as AQMAs.

16.52 These areas are typically located where there are significant sources of air pollution along with relevant human exposure. The vast majority of AQMAs in the UK are declared due to traffic emissions. Part of the Project Site is located within the Northfleet Industrial Area AQMA (Gravesham Borough Council) and also in close proximity to the Dartford AQMA, which have been declared for nitrogen dioxide (NO_2) and particulate matter (PM_{10}) air quality objective exceedances. Locations of nearby AQMAs are presented in Figure 16.2.

Figure 16.2: Air quality management areas in the vicinity of the Project Site.



Air quality monitoring

16.53 Air quality is monitored in the vicinity of the Project Site by the surrounding local authorities (Dartford, Gravesham and Thurrock), using both automatic monitoring and passive diffusion tube monitoring. The locations of monitoring sites in the vicinity of the Proposed Development is shown in Figure 16.3. Monitoring data from 2016-2018 is presented in Table 16.7, 2018 is the most recent year of available monitoring data available online. The ES will incorporate 2019 monitoring data.

16.54 Results indicate that there have been exceedances of the annual mean NO_2 objective at roadside sites along London Road (A226) (Site ID: DA92, DA93 and GR98) and a number of roadside sites adjacent to Tilbury Docks, near the Essex Project Site on the north side of the river Thames. London Road (A226) is a main arterial road within the area which cuts through the order of limits boundary below Swanscombe Marshes and continues west towards central London.

Figure 16.3: Nearby air quality monitoring locations.

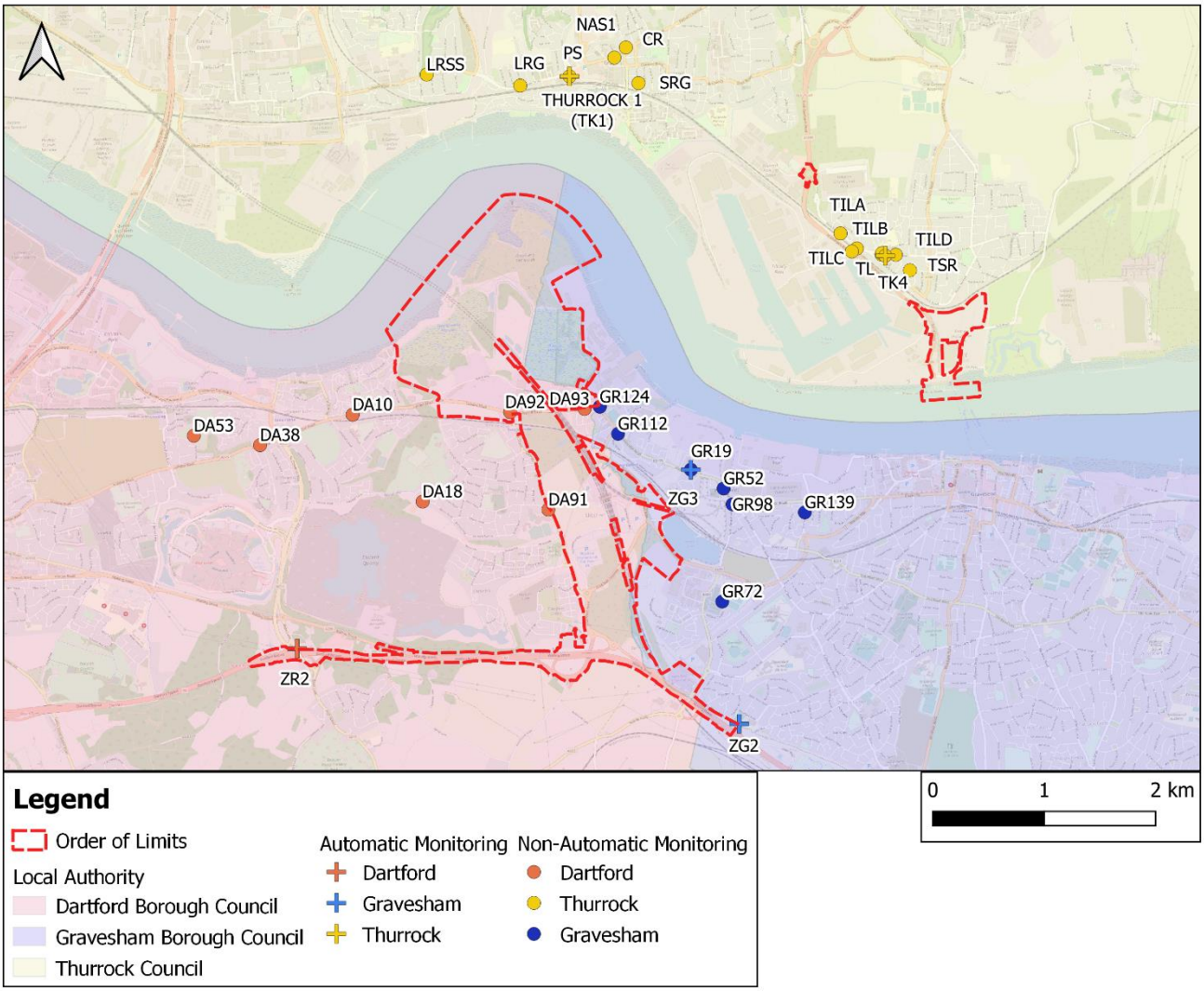


Table 16.7: Nearby diffusion tube monitoring results (2016-2018).

Diffusion tube ID	Site type	Annual mean NO_2 concentration (µg/m^3)		
		2016	**2017**	**2018**
DA10	Roadside	38.7	35.1	35.6
DA18	Urban Background	26.1	25.3	25.8
DA38	Roadside	39.9	37.2	35.4
DA53	Urban Background	20.7	19.8	19.9
DA91	Roadside	33.6	33.3	33.4
DA92	Roadside	**44.3**	**41.6**	**42.5**
DA93	Roadside	**42.9**	**40.3**	**41.0**
GR19	Background	23.6	22.8	27.3*
GR52	Roadside	33.4	33.2	43.8*
GR72	Background	24.4	25.2	28.8*

GR98	Roadside	33.1	32.0	**40.4***
GR112	Roadside	33.6	34.3	41.9*
GR124	Roadside	31.5	32.7	36.6*
GR139	Roadside	-	37.6	36.7*
LRSS	Roadside	39.6	**41.9**	39.2
LRG	Roadside	38.9	38.3	36.2
PS	Urban Background	25.7	26.1	25.4
NAS1	Roadside	33.5	32.9	32.9
CR	Intermediate	32.6	31.8	30.9
SRG	Roadside	30.9	28.7	29.6
TILA	Roadside	**40.8**	**40.9**	38.0
TILB	Roadside	39.7	37.6	**42.4**
TILC	Roadside	39.0	**40.2**	37.8
TILD	Roadside	36.9	36.3	35.0
TL	Roadside	35.7	35.0	32.9
TSR	Urban Background	28.0	28.4	26.8

*monitoring results not yet bias adjusted. Figures in **bold** indicate the annual mean objective has been exceeded.

16.55 As presented in Figure 16.3 and Table 16.7, air quality monitoring in proximity to the Project Site is extensive and covers arterial roads and background sites.

POTENTIAL SIGNIFICANT ENVIRONMENTAL EFFECTS OF THE PROPOSAL

Construction

16.56 Potential effects on air quality arising from the construction phase of the Proposed Development, on the Kent and Essex Project Site (together the 'Project Site'), include the following:

- dust deposition, resulting in the soiling of surfaces;
- visible dust plumes, which are evidence of dust emissions;
- elevated PM_{10} concentrations, as a result of dust generating activities on site; and
- an increase in concentrations of particulate matter and NO_x, due to emissions from diesel powered vehicles and equipment.

16.57 The risk of these sources having significant adverse effects on surrounding sensitive receptors is dependent upon the following:

- the activities being undertaken;
- the duration of these activities;

- the size of the site;
- meteorological conditions;
- the proximity of receptors to the activities; and
- the sensitivity of the receptors.

16.58 In accordance with IAQM guidance, construction impacts are considered where there is:

- a human receptor within 350m of the site boundary or 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance;
- an ecological receptor within 50m of the site boundary or 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance.

16.59 The IAQM guidance criteria used to assess the potential impacts from construction activities is detailed in Appendix 16.1. The following steps explain the site-specific assessment in the context of the IAQM criteria.

Step 1: Screen the need for a detailed assessment

16.60 In accordance with screening criteria in the IAQM guidance, an assessment is required as receptors are located within 350m of the Project Site boundary, and within 50m of the routes used by construction vehicles on the public highway within 500m from the Project Site entrance.

Step 2A: Define the potential for dust emission magnitude

16.61 Construction works completion is anticipated in 2025. The works include the demolition of existing structures, earthworks, and construction of the proposed buildings, facilities and attractions. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete.

16.62 Due to the size of the Project Site and scale of the Proposed Development, the magnitude of dust emissions during construction as a result of construction and earthworks activities has the potential to be large. The DCO Order Limits measures approximately 6.1km^2 and there are a number of existing buildings to be demolished as part of the Proposed Development. Due to the size and scale of the development, the emissions as result of trackout magnitude is also likely to be large (over 50 outward heavy-duty vehicle (HDV) movements in any one day).

Table 16.8: Predicted Dust Emission Magnitude for Construction Activities.

Activity	Dust emission magnitude
Demolition	Large
Earthworks	Large
Construction	Large
Trackout*	Large

* Trackout- The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network

Step 2B: Define the sensitivity of the area

16.63 The surrounding area is considered to be of high sensitivity to the impacts of construction dust. There are residential receptors in close proximity of the DCO Order Limits within Swanscombe, Castle Hill and Tilbury.

16.64 The surrounding area is considered to be of high sensitivity with respect to ecological receptors due to the presence of Bakers Hole, Darenth Wood, Swanscombe Skull SSSI and the river Thames.

16.65 The trackout routes have a number of residential receptors within 20m of the route, predominantly along the A2(T). Receptors along this road are set back from the roadside and separated by a barrier of vegetation and/or elevation differences.

16.66 With regards to the sensitivity to human health, taking into account baseline PM_{10} concentrations, the surrounding area is considered to be of medium sensitivity.

Table 16.9: Sensitivity of the Surrounding Area to Construction Dust Impacts.

Potential impact	Sensitivity of surrounding area			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust soiling	High	High	High	High
Human health	Medium	Medium	Medium	Medium
Ecological	High	High	High	High

Step C: Define the risks of impacts

16.67 The risk of dust impacts for relevant construction activities are summarised in Table 16.10.

These results take into account both the potential dust emission magnitude and the sensitivity of the area. Results show that the risk is considered high for demolition, earthworks, construction and trackout. It should be noted that construction activities on the Site will be temporary in nature, and mitigation appropriate to the level of risk and in line with good industry practices will be implemented across the Site to ensure any adverse effects are minimised.

Table 16.10: Risk of Dust Impacts.

Source	Dust soiling	Human health	Ecological
Demolition	High Risk	Medium Risk	High Risk
Earthworks	High Risk	Medium Risk	High Risk
Construction	High Risk	Medium Risk	High Risk
Trackout	High Risk	Medium Risk	High Risk

Operation

16.68 Potential significant effects arising from the operation of the Proposed Development that are expected are as follows;

- Effects of emissions from road traffic generated as a result of the operation of the Proposed Development.
- Effects associated with emissions from any on-site combustion plant/energy centre.
- Effects associated with existing and future sources of emissions on future receptors that would be introduced to the area through the Proposed Development.
- The potential for cumulative effects to take place as a result of the Proposed Development and other developments, during construction and operation.

16.69 The scale and significance of these effects will be assessed in greater detail following completion of the traffic modelling, and once details of the boiler and energy centre and site layout is finalised. The full assessment will be presented in the ES which will be submitted as part of the application for the Proposed Development.

16.70 Nearby monitoring results and the presence of a number of AQMAs indicate the Project Site is located in an area of relatively poor air quality. This is principally a result of the close proximity to major roads (M25 and the A2(T)) and the industrial use of surrounding land.

16.71 Areas of poor air quality are the most sensitive to changes in pollutant concentrations, so even minor changes as result of a proposed development may lead to significant impacts. Receptors within the nearby air quality management areas will be most likely to be

affected by operational emissions.

16.72 Existing receptors located along the main access roads to the Project Site, and along roads that will see significant increases in traffic flows, will have the potential to be significantly impacted by transport emissions.

16.73 On-site receptors, and existing receptors in relevant proximity to the Project Site, will have the potential to be impacted as a result of any energy centre, or building emissions, associated with the Proposed Development.

PROPOSED MITIGATION

Construction

16.74 Following the preliminary assessment of the likely impact from construction activities, appropriate mitigation is outlined below in line with best practice to ensure that the construction impact is minimised.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences at the Project Site.

- Display the name and contact details of person(s) accountable for air quality and dust issues on the Project Site boundary. This may be the environment manager/engineer or the site manager.

- Display the head or regional office contact information in the interest of transparency and as a point of contact in the event complaints or queries arise.

Site management

- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the relevant local authorities and stakeholders. The level of detail will depend on the risk and should include, at minimum, the measures in this document. The desirable measures should be included as appropriate for the Project Site. The DMP may include monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections.

- Develop and implement a stakeholder communications plan that includes community engagement before work commences at the Project Site.

- Develop a (DMP).

- Display the name and contact details of those individuals accountable for air quality and dust issues on the Project Site boundary in the interest of transparency and as a point of contact in the event complaints or queries arise.

- Record and respond to all dust and air quality pollutant emissions complaints.

- Make a complaint log available to the relevant local authority when asked.

- Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection findings and make an inspection log available to the relevant local authority if asked.

- Increase frequency of inspections when activities with high dust emission potential are being carried out or when meteorological conditions may worsen dust release (e.g. dry and windy conditions).

- Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the Project Site, and ensure that the action taken to resolve the situation is recorded in the logbook.

- Hold regular liaison meetings with other high-risk construction sites within 500m of the Project Site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport deliveries which might be using the same strategic road network routes.

Site monitoring

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the relevant local authority if asked.

- Increase the frequency of site inspections by the person accountable for air quality and dust issues on the Project Site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the local authority. Where possible commence baseline monitoring at least three months before work commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Site maintenance

- Plan the Project Site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.

- Erect solid screens or barriers around areas where activities likely to generate dust will take place and material stockpiles. Ensure these barriers are at least as high as any stockpiles on site.

- Enclose areas or specific operations where there is a high potential for dust production and the Project Site is active for an extensive period.

- Avoid site runoff of water or mud.

- Keep site fencing, barriers and scaffolding clean using wet methods.

- Remove materials that have a potential to produce dust from the Project Site as soon as possible, unless being re-used on the Project Site. If they are being re-used on-site cover as described below.

- Cover, seed or fence stockpiles to prevent wind whipping.

Vehicle operation and sustainable travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.

- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.

- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

- Implement a Travel Plan that supports and encourages sustainable travel.

- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authorities where appropriate).

- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

- Ensure all diesel powered engines are Euro-6 compliant.

Site operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local

exhaust ventilation systems.

- Ensure an adequate water supply on the Project Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.

- Use enclosed chutes and conveyors and covered skips.

- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

- Ensure equipment is readily available on the Project Site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste management

- Avoid bonfires and burning of waste materials.

- Reuse and recycle waste to reduce dust from water materials.

Demolition

- Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.

- Avoid explosive blasting, using appropriate manual or mechanical alternatives.

- Bag and remove any biological debris or damp down such material before demolition.

Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.

- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.

- Only remove the cover in small areas during work and not all at once.

Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

- Avoid scabbling (roughening of concrete surfaces) if possible.

- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.

- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Project Site. This may require the sweeper being continuously in use.

- Avoid dry sweeping of large areas.

- Ensure vehicles entering and leaving the Project Site are covered to prevent escape of materials during transport.

- Record all inspections of haul routes and any subsequent action in a site logbook.

- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

16.75 In addition, any construction plan that will be drafted will make provision to ensure that construction materials and excavated materials can be transported from the Project Site using the River Thames as frequently as possible, thereby reducing the number of construction vehicles required on the Project Site and on the surrounding road networks. The impact of emissions from construction vehicles will be assessed in the ES to ascertain whether they will affect air quality in the construction phase ahead of the opening year.

Operation

16.76 If necessary, operational mitigation measures will be proposed following the operational assessment and modelling of traffic and point source emissions. In the event operational emissions are deemed significant, mitigation will be required to offset and reduce impacts or decrease the level of exposure.

16.77 Potential mitigation measures may include:

- Effective travel planning and the promotion of sustainable transport options for visitors and staff of the Project Site;
    - Provision for electric vehicle charging spaces;
    - Measures to promote the use of active transport (cycling and walking);
    - Encouraging the use of public transport;
- Use of Tilbury port to alleviate congestion and operational traffic in proximity to the Project Site;
- Effective landscaping to ensure site layout will help minimise visitor exposure to poor air quality;
- Use of zero emission technology to avoid combustion plant; and
- Use of mechanical ventilation at proposed new receptor locations where exposure to poor air quality is assessed to be significant.

RESIDUAL ENVIRONMENTAL EFFECTS

Construction

16.78 With implementation of recommended mitigation, it is anticipated that residual effects will be insignificant. A full assessment will be provided in the ES.

Operation

16.79 A full assessment of the residual environmental effects following implementation of mitigation will be provided in the ES which will be submitted as part of the application for the Proposed Development.

CUMULATIVE AND IN-COMBINATION EFFECTS

16.80 Cumulative impacts are considered inherently in the assessment, traffic data used in the traffic model being produced is inclusive of trips associated with cumulative schemes. The cumulative impact will be assessed in the future modelling scenarios during both the peak construction and opening year and will be reported on in the ES.

CLIMATE CHANGE

16.81 Long term climate change projections include predicted increases in mean summer and winter temperatures, as well as a decrease in mean summer precipitation. This may lead to warmer and dryer conditions in future years which could increase the likelihood of dust generation. It is considered however that the assessment carried out will remain fit for purpose and mitigation measures proposed would ensure no significant impacts occur as a result of climate change.

SUMMARY AND CONCLUSIONS

16.82 This chapter details the preliminary assessment that has been carried out with regards to the potential air quality effects associated with the Proposed Development during both the operation and construction phases.

16.83 A review of baseline conditions has also been carried out which identifies that the Proposed Development is surrounded by a number of air quality management areas, with local authority monitoring data indicating that air quality objectives have been exceeded at a number of nearby roadside locations, including along London Road and in the vicinity of Tilbury Docks.

16.84 A preliminary construction assessment has been carried out which qualitatively considers the potential risk of construction and demolition activities, including dust nuisance and elevated particulate concentrations as a result of construction activities.

16.85 Owing to the size of the Proposed Development and sensitivity of the surrounding area, it has been identified as a high-risk site with the potential for temporary major adverse impacts. In order to reflect this high risk, best practice mitigation measures have been outlined for controlling dust and emissions during construction. With the implementation of these measures throughout the construction phase, it is anticipated that any residual effects on air quality will not be significant.

16.86 With regards to operational impacts, the chapter details the methodology for a detailed air quality modelling study which will be carried out in order to predict and quantify the likely impact associated with the Proposed Development. The methodology is being further developed and will be reported on in the ES.

16.87 Road traffic emissions will be considered in relation to the impact from a change in traffic as a result of the Proposed Development. The assessment will also take into account traffic flows associated with future committed developments.

16.88 The Proposed Development will be predominantly served by water sourced heat pumps, with combustion plant as back-up power and top-up. Following finalisation of the energy strategy, the impact of emissions from the proposed plant will be predicted using point

sources within the ADMS Roads dispersion model. The model will be been run to predict the contribution of plant emissions to annual mean and the 99.79th percentile of 1-hour mean nitrogen oxides concentrations.

16.89 Pollutant concentrations will be predicted at existing receptor locations expected to be impacted by emissions generated by the Proposed Development, and at proposed onsite receptor locations in order to assess exposure of future site occupants to poor air quality. The impact of the development will be considered in relation to relevant National Air Quality Objectives (AQOs). The effect significance will be determined in accordance with the IAQM's significance criteria.

16.90 The overall significance of the air quality impact, whether beneficial or adverse, will be considered holistically taking into account of a number of factors. Judgement on the overall significance of an effect will consider;

- Existing and future air quality in the absence of the development.
- The extent of current and future population exposure to the impact; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.